Phase 1 Heritage Impact Assessment for proposed new water storage dams on farm Geluk 798, Reitz, Free State Province.

Report prepared by
Paleo Field Services
PO Box 38806
Langenhoven Park 9330
May 2023

Summary

A Phase 1 Heritage Impact Assessment was carried out over three separate areas proposed for construction of new water storage dams at the Geluk Dam water treatment works outside Reitz in the northeastern Free State Province. The extent of the proposed development. Footprint 1 is capped by well-developed alluvium while Footprints 2 and 3 are mantled by a residual soil veneer on bedrock. All three proposed dam footprints area underlain by Normandien Formation sandstone, but no fossils were observed where outcrop was visible. There is no evidence of intact or capped Stone Age artefacts, Iron Age structures, indications of prehistoric structures or rock art within any of the three footprint areas. There is also no aboveground evidence of informal graves, graveyards or historical structures older than 60 years within the confines of the three footprint areas. It is the author's opinion that proposed development in any of the three footprints will not impact on archaeologically sensitive heritage. All three footprints are each **designated a site rating of General Protection C, all designated low Archaeological and Cultural Heritage Sensitivity**. Dam construction at Footprint 1 will require large scale excavations *exceeding >1 m into into alluvium and situ sedimentary bedrock*, which will directly affect potentially significant, Quaternary overbank sediments, as well as palaeontologically significant Normandien Formation strata, while construction at Footprints 2 and 3 will require large scale excavations *exceeding >1 m into in situ sedimentary bedrock*, which will also directly affect palaeontologically significant Normandien Formation strata **considered to be of moderate to high Palaeontological Sensitivity**. It is the opinion of the author that the proposed developments can continue, provided that any excavations *exceeding >1 m into in situ alluvium and sedimentary bedrock at Footprint 1* and any excavations *exceeding >1 m into in situ sedimentary bedrock at Footprints 2 and 3* should be monitored by a professional palaeontologist during the construction phase of the project.

Contents

Introduction

A Phase 1 Heritage Impact Assessment was carried out over three separate areas proposed for construction of new water storage dams at the Geluk Dam water treatment works outside Reitz in the northeastern Free State Province (**Fig. 1**). The extent of the proposed development (development > 300 m linear and/or >5000 m^2 in extent) falls within the requirements for a Heritage Impact Assessment (HIA) as required by Section 38 of the South African National Heritage Resources Act (Act No. 25 of 1999).

The palaeontological and archaeological significance of the affected area were carried out on using existing field data, database information, published literature and maps. This was followed up by a field assessment by means of a pedestrian survey. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used for recording purposes. The task involved identification of possible archaeological and paleontological sites or occurrences in the affected area, an assessment of their significance, possible impact by the proposed development and recommendations for mitigation where relevant.

Site Information

Maps: 1:50 000 topographical map 2728 CB Blydskap

1:250 000 geological maps 2728 Frankfort

General Site Coordinates (**Fig. 2**):

Dam footprint 1: 27°41'28.81"S 28°22'32.39"E

Dam footprint 2: 27°41'54.39"S 28°22'26.84"E

Dam footprint 3: 27°41'58.76"S 28°22'32.93"E

The affected areas are located around the Geluk Dam water treatment works on the farm Geluk 798, which is situated about 12 km northwest of Reitz (**Fig. 2 & 3**). Footprint 1 lies on overbank deposits (alluvium) on the bank of the Liebenbergsvlei River, and immediately north of the water treatment works. Footprint 2 and 3 rests on sedimentary rocks next to the existing Geluk Dam and covers a surface area of ~10 ha and 5.5 ha, respectively.

Background

Archaeology

The proposed footprint is situated on the Liebenbergsvlei River, which along with the adjacent Wilge and Klip Rivers, is characterized by the presence of Type V, stone-walled Iron Age settlement units **(Fig. 4 & 5**). Bored stones and rock art localities (paintings) have been recorded on several farms in the area between Lindley and Reitz.

Palaeontology

The Reitz area is underlain by late Permian, Adelaide Subgroup sandstone and mudstone sequences subdivided into the Normandien and Estcourt Formations (*Pne*), and conformably overlying Triassic, Tarkastad Subgroup sedimentary members of the Verkykerskop and Driekoppen Formations (*Trt*) (**Fig. 6**). Dykes and sills of resistant Jurassic dolerites (*Jd***)** determine the relief in the area around the Geluk Dam water treatment works (**Fig. 7**). The Normandien Formation is distinguished by three sandstone members (Frankfort *Pf*, Rooinek *Pr*, Schoondraai *Ps*) and one mudstone member (Harrismith *Trh*) and is interpreted to have been deposited by meandering streams flanked by wide, semi-arid floodplains. Normandien Formation rocks are assigned to the Dicynodon Assemblage Zone (AZ), which is characterized by the presence of a number of therapsids, including both *Dicynodon* and *Theriognathus*. According to Groenwald (1990), three fossil species, namely *Dicynodon lacerticeps*, *Theriognathus platyceps* and *Prorubidgea maccabei*, are present in the Schoondraai Member of the Normandien Formation, while *Lystrosaurus murrayi* sans *Dicynodon lacerticeps* is present in the overlying Harrismith Member.

Small, fossil rich alluvial exposures (Cornelia Formation) have been recorded near the Vaal River, about 130 km northeast of Reitz. These Quaternary deposits are characterized by several distinct fossil mammal species, including *Stylochoerus*

compactus, *Connochaetes laticornutus* and *Megalotragus eucornutus*. Multiple Florisian localities are known from alluvial contexts in the region, but there is currently no record of fossil-rich Quaternary sediments in the vicinity of the proposed footprint.

Field Assessment

Footprint 1 is capped by well-developed alluvium while Footprints 2 and 3 are mantled by a residual soil veneer on bedrock. All three proposed dam footprints area underlain by Normandien Formation sandstone, but no fossils were observed where outcrop was visible (**Fig. 8**). There is no evidence of intact or capped Stone Age artefacts, Iron Age structures, indications of prehistoric structures or rock art within any of the three footprint areas. There is also no aboveground evidence of informal graves, graveyards or historical structures older than 60 years within the confines of the three footprint areas.

Impact Statement and Recommendation

Archaeology

The three dam footprints are not considered archaeologically vulnerable in accordance with the types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (No 25 of 1999). It is the author's opinion that proposed development in any of the three footprints will not impact on archaeologically sensitive heritage. The three footprints are each designated a site rating of General Protection C (**Table 1**).

Palaeontology

Dam construction at Footprint 1 will require large scale excavations *exceeding >1 m into into alluvium and situ sedimentary bedrock*, which will directly affect potentially significant, Quaternary overbank sediments, as well as palaeontologically significant Normandien Formation strata (**Fig. 9**). Dam construction at Footprints 2 and 3 will require large scale excavations *exceeding >1 m into in situ sedimentary bedrock*, which will directly affect palaeontologically significant Normandien Formation strata. It is the opinion of the author that the proposed developments can continue, provided that any excavations *exceeding >1 m into in situ alluvium and sedimentary bedrock at Footprint 1* and any excavations *exceeding >1 m into in situ sedimentary bedrock at Footprints 2 and 3* should be monitored by a professional palaeontologist during the construction phase of the project.

References

Brink, J.S. and Rossouw, L. 2000. New trial excavations at the Uitzoek-Cornelia type locality. *Navorsinge van die Nasionale Museum* 16(6): 141 – 156.

Groenewald, G.H. 1990. Gebruik van palaeontologie in litostratigrafiese korrelasie in die Beaufort Groep, Karoo opeenvolging van Suid Afrika. *Palaeontologia africana* 27: 21 – 30.

Groenewald G.H. and Kitching J.W. 1995. Biostratigraphy of the Lystrosaurus AZ. In: B.S. Rubidge (ed.) *Biostratigraphy of the Beaufort Group*. Biostrat. Ser. S.Afr. Comm. Strat. 1, 35 – 39.

Kitching, J.W. 1995. Biostratigraphy of the *Dicynodon* Assemblage Zone IN B.S. Rubidge (ed.) *Biostratigraphy of the Beaufort Group*. Biostrat. Ser. S.Afr. Comm. Strat. 1, 29 – 34.

Maggs T. M. O'C 1976. *Iron Age Communities of the Southern Highveld*. Occasional Publications of the Natal Museum No. 2. Natal Museum, Pietermaritzburg.

Maggs T. M. O'C 1976. Iron Age patterns and Sotho history on the southern Highveld: South Africa. World Archaeology 7(3): 319 – 332.

Van Riet Lowe, C. 1941. *Prehistoric Art in South Africa*. Archaeological Series No. V. Bureau of Archaeology, Dept. of the Interior. Pretoria.

DECLARATION OF INDEPENDENCE

Palaeo Field Services act as an independent specialist consultant and do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference.

31 / 05 / 2023

Tables & Figures

Table 1. Field rating categories for heritage sites as prescribed by SAHRA.

Field Rating	**Grade**	**Significance**	**Mitigation**
National Significance (NS)	Grade 1	-	Conservation; national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; provincial site nomination
Local Significance (LS)	Grade 3A	High significance	Conservation; mitigation not advised
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A (GP.A)	-	High/medium significance	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium significance	Recording before destruction
Generally Protected C (GP.C)	-	Low significance	Destruction

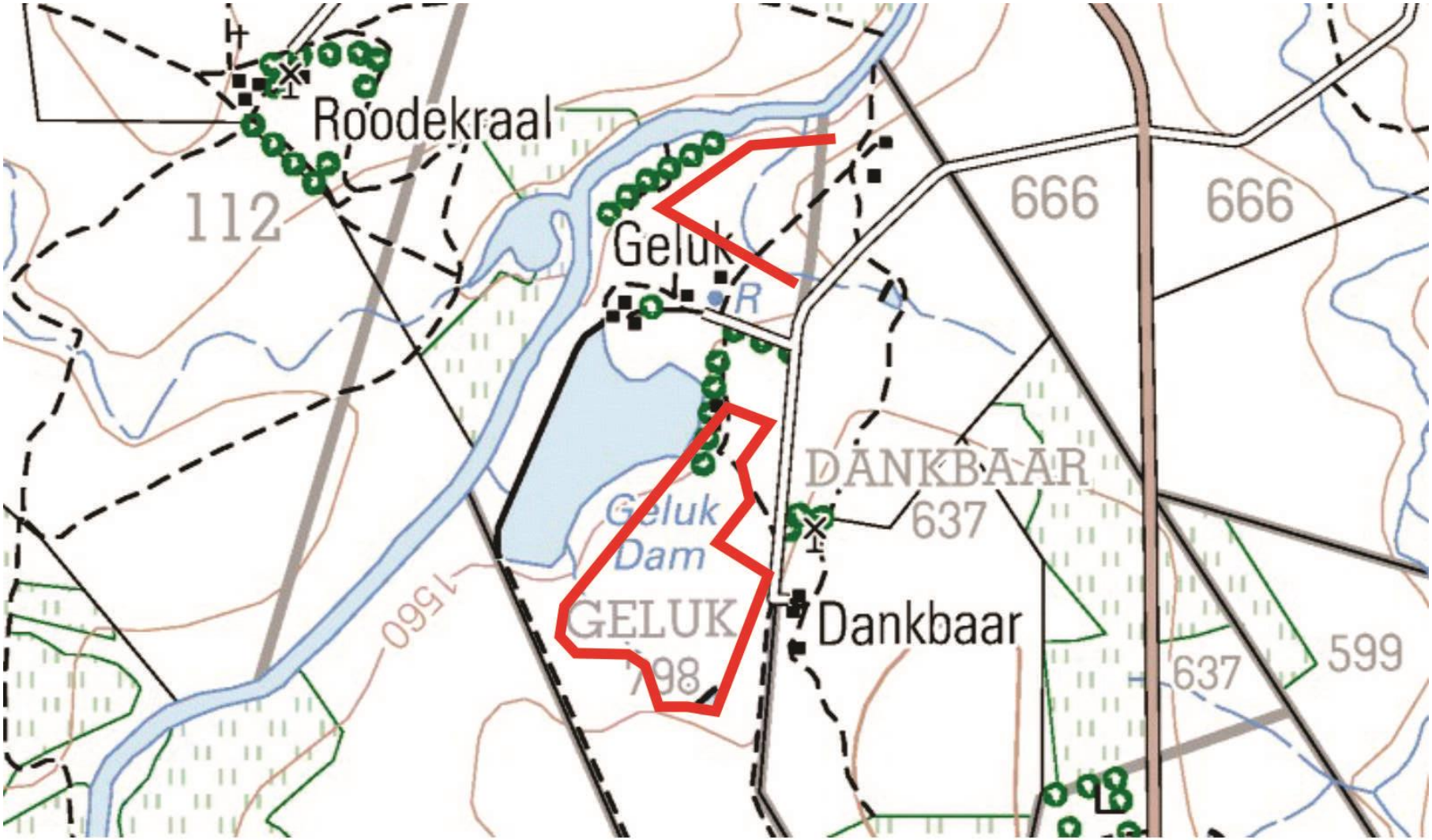

Figure 1. Proposed storage dams development marked on portion of 1:50 000 scale topographic map 2728 CB Blydskap.

Figure 2. General view of the site.

Figure 3. General view of Footprint 1, looking west (above) and Footprints 2 & 3, looking south (below)

Figure 4 General view of the Liebenbergsvlei River, looking north.

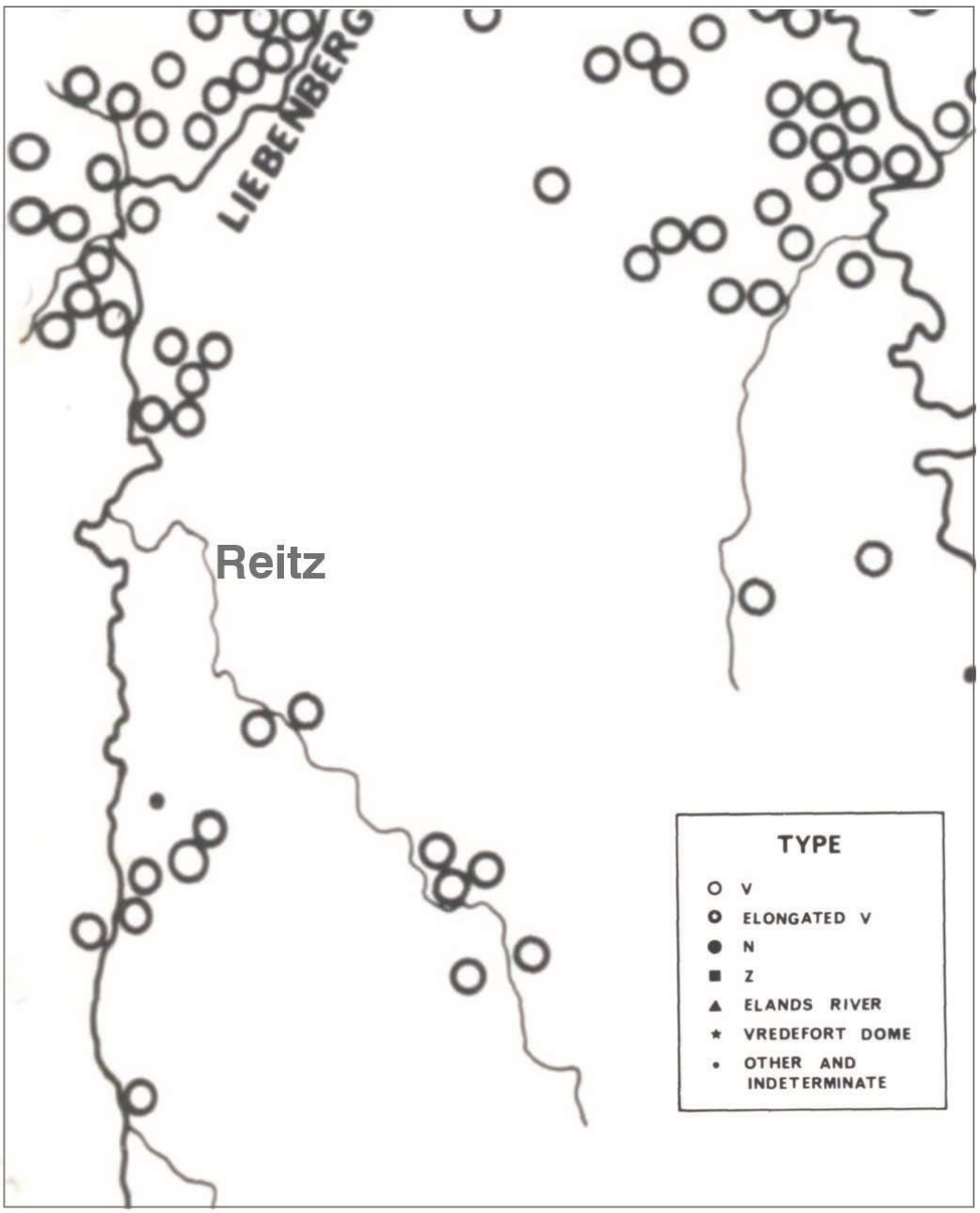

Figure 5. Distribution of late Iron Age settlements along the Liebenbergsvlei River and tributaries south of Reitz (after Maggs 1976).

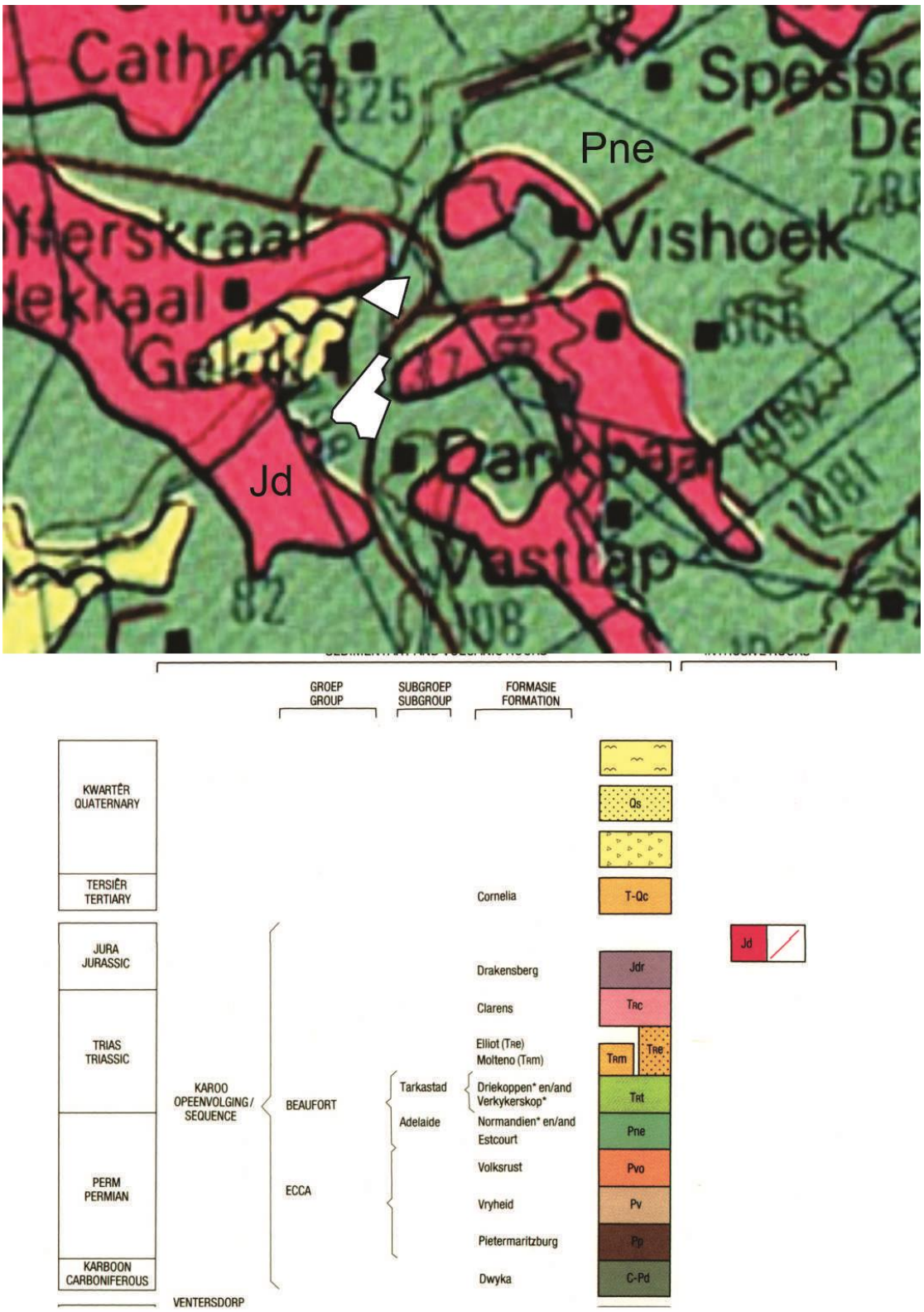

Figure 6. According to portion of 1:250 000 scale geological map 2728 Frankfort the study area is underlain by Adelaide Subgroup sandstone and mudstone sequences of the late Permian Normandien and Estcourt Formations (*Pne*), igneous dolerite intrusions (*Jd*) and geologically recent alluvium.

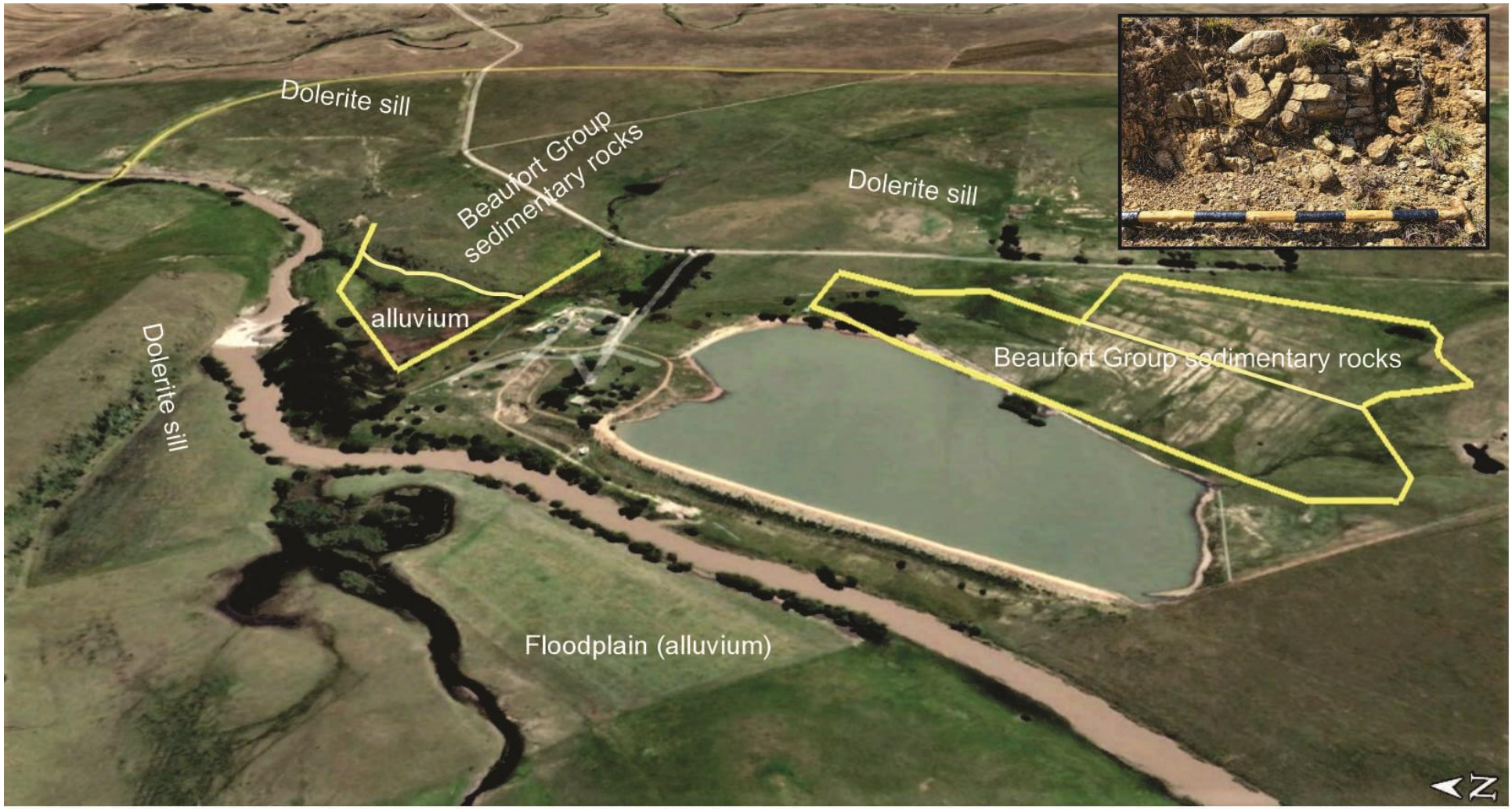

Figure 7. Aerial view of the terrain showing topography and general distribution of outcrop (weathering-resistant dolerite exposure shown in insert).

Figure 8. All three proposed dam footprints area underlain by Normandien Formation sandstone, but no fossils were observed where outcrop was visible.

Figure 9. Proposed storage dam footprints marked on SAHRIS palaeosensitivity map (2023).