

Phase 1 Heritage Impact Assessment for proposed new
WWTW facility with 1.3 km-long outfall sewerage
pipeline at Lindley, Free State Province.

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

Summary

A Phase 1 Heritage Impact Assessment was carried out for a proposed new Waste Water Treatment Works facility with a ~17 ha surface footprint and associated 1.3 km – long outfall sewerage pipeline between the Vals River and Ntha Township at Lindley in the northeastern Free State Province. The affected area is made up of low relief terrain presently used for cattle farming and grazing. It is the author's opinion the the proposed new Waste Water Treatment Works and associated outfall pipeline footprints are not archaeologically vulnerable and that they will not impact on archaeologically sensitive heritage. **It is recommended that the proposed WWTW and Outfall Sewerage pipeline footprints are each assigned a Low Archaeological Sensitivity site rating.** The field assessment indicates that the proposed development will primarily affect Quaternary-age surface deposits and older sediments with potential palaeontological impact limited to Adelaide Subgroup (Normandien Formation) strata underlying the proposed WWTW area and about 800 m of the linear section. The palaeontological significance of the Normandien Formation strata in the region is considered high and excavations that may *exceed 1 m into sedimentary bedrock*, may impact *in situ* fossil remains. **It is the opinion of the author that the WWTW footprint and first ~800 m section of pipeline south of the WWTW site, are each assigned a Very High Palaeontological Sensitivity site rating,** with the recommendation that planned development may continue, on condition that any excavations exceeding >1 m into intact, Normandien Formation rocks should be monitored by a professional palaeontologist on a regular basis during the construction phase of the project.

Contents

Summary	2
Contents	3
Introduction.....	3
Site Information	3
Background	4
Field Assessment and Impact Statement.....	5
Recommendation	6
References.....	6
Tables & Figures.....	8

Introduction

A Phase 1 Heritage Impact Assessment was carried out for a proposed new Waste Water Treatment Works facility with a ~17 ha surface footprint and associated 1.3 km – long outfall sewerage pipeline between the Vals River and Ntha Township at Lindley in the northeastern Free State Province (**Fig. 1**). The extent of the proposed development (development > 300 m linear and/or >5000 m² 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 2727DD Lindley

1:250 000 geological maps 2726 Kroonstad

General Site Coordinates of pipeline and WWTW footprint (**Fig. 2**):

WWTW footprint

- A) 27°52'11.23"S 27°53'10.82"E
- B) 27°52'11.32"S 27°53'33.63"E
- C) 27°52'22.80"S 27°53'33.95"E
- D) 27°52'22.18"S 27°53'10.75"E

Outfall Sewerage Pipeline

Starting point at Ntha township: 27°52'58.65"S 27°53'59.12"E

End Point at proposed new WWTW site: 27°52'22.80"S 27°53'33.95"E

The affected area lies ~ 1.5 km west of the R707 provincial road at Lindley, between Ntha Township and the southern bank of the Vals River, on open grassland that is currently used for cattle grazing (**Fig. 3 & 4**).

Background

Archaeology

The proposed footprint is situated south of the Vals River at Lindley, which along with the adjacent Wilge and Klip Rivers, is characterized by the presence of Type V, stone-walled Iron Age settlement units (**Fig. 5 & 6**). Bored stones and rock art localities (paintings) have been recorded on several farms in the area between Lindley and Reitz.

Palaeontology

The area west of Lindley is underlain by late Permian, Adelaide Subgroup sandstone and mudstone sequences are subdivided into the Normandien and Estcourt Formations (*Pne*), overlain by lower Triassic, Tarkastad Subgroup sedimentary members of the Verkykerskop and Driekoppen Formations (*Trt*) to the south (**Fig. 7**). Dykes and sills of resistant Jurassic dolerites (*Jd*) determine the relief in the region. 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 northwest of Lindley. 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 near Senekal located about 80 km south of Lindley. Fluvially derived overbank sediments of the Sand, Doring and Vet Rivers to the west and the Vals River east of Kroonstad previously yielded abundant Quaternary-aged mammal fossil remains. There is currently no record of fossil-rich Quaternary sediments in the vicinity of the proposed footprint.

Field Assessment and Impact Statement

Pipeline footprint

The pipeline footprint is capped by superficial deposits of made up of shallow to well-developed, windblown sand, alluvium and agricultural soils covered by grassland. Proposed development will primarily affect geologically recent surface deposits with potential palaeontological impact limited to Normandien Formation strata underlying parts of the pipeline section. There is no evidence of intact or capped Stone Age artefacts, Iron Age structures or rock engravings (on dolerite) within the confines of the footprint. There is also no aboveground evidence of informal graves, graveyards or historical structures older than 60 years within the confines of the linear footprint. A small graveyard, located near the southern terminus of the proposed pipeline (GPS 27°53'0.73"S 27°54'0.23"E) will not be affected by the development (**Fig. 2 & 8**).

WWTW site

Excavations within the WWTW area will primarily affect potentially significant Normandien Formation strata and geologically more recent alluvium of late Quaternary age, the latter a superficial overburden restricted to within ~50 m of the southern bank of the Vals River (**Fig. 9 & 10**). There is no evidence of intact or capped Stone Age artefacts, Iron Age structures rock engravings (on dolerite), aboveground evidence of informal graves, graveyards or historical structures older than 60 years within the confines within the confines of the WWTW footprint.

Recommendation

Archaeology

It is the author's opinion that proposed development in both of the footprints will not impact on archaeologically sensitive heritage. The footprints are assigned an archaeological site rating of General Protection C (**Table 1**).

Palaeontology

The field assessment indicates that the proposed development will primarily affect geologically recent surface deposits with potential palaeontological impact limited to Normandien Formation strata at the WWTW footprint and Normandien Formation strata underlying about 800 m of the pipeline section. Here, excavations that may exceed 1 m into Normandien Fm. sedimentary bedrock, will impact *in situ* rocks which could be palaeontologically sensitive. The remaining ~500 m long section of the pipeline is underlain by palaeontologically significant igneous dolerite surrounded by thermally derived metasediments, which is considered to be of low paleontological significance (**Fig. 9 & 10**).

It is the opinion of the author that the WWTW footprint and first ~800 m section of pipeline south of the WWTW site, are each assigned a Very High Palaeontological Sensitivity site rating, with the recommendation that planned development may continue, on condition that any excavations exceeding >1 m into intact, Normandien Formation rocks should be monitored by a professional palaeontologist on a regular basis during the construction phase of the project.

References

- Brink, J.S. and Rossouw, L. 2000. New trial excavations at the Uitzoek-Cornelia type locality. *Navorsing 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

Paleo 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.

A handwritten signature in black ink, appearing to read 'A. Rossouw'. The signature is fluid and cursive, with a large initial 'A' and a long, sweeping underline.

30 / 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

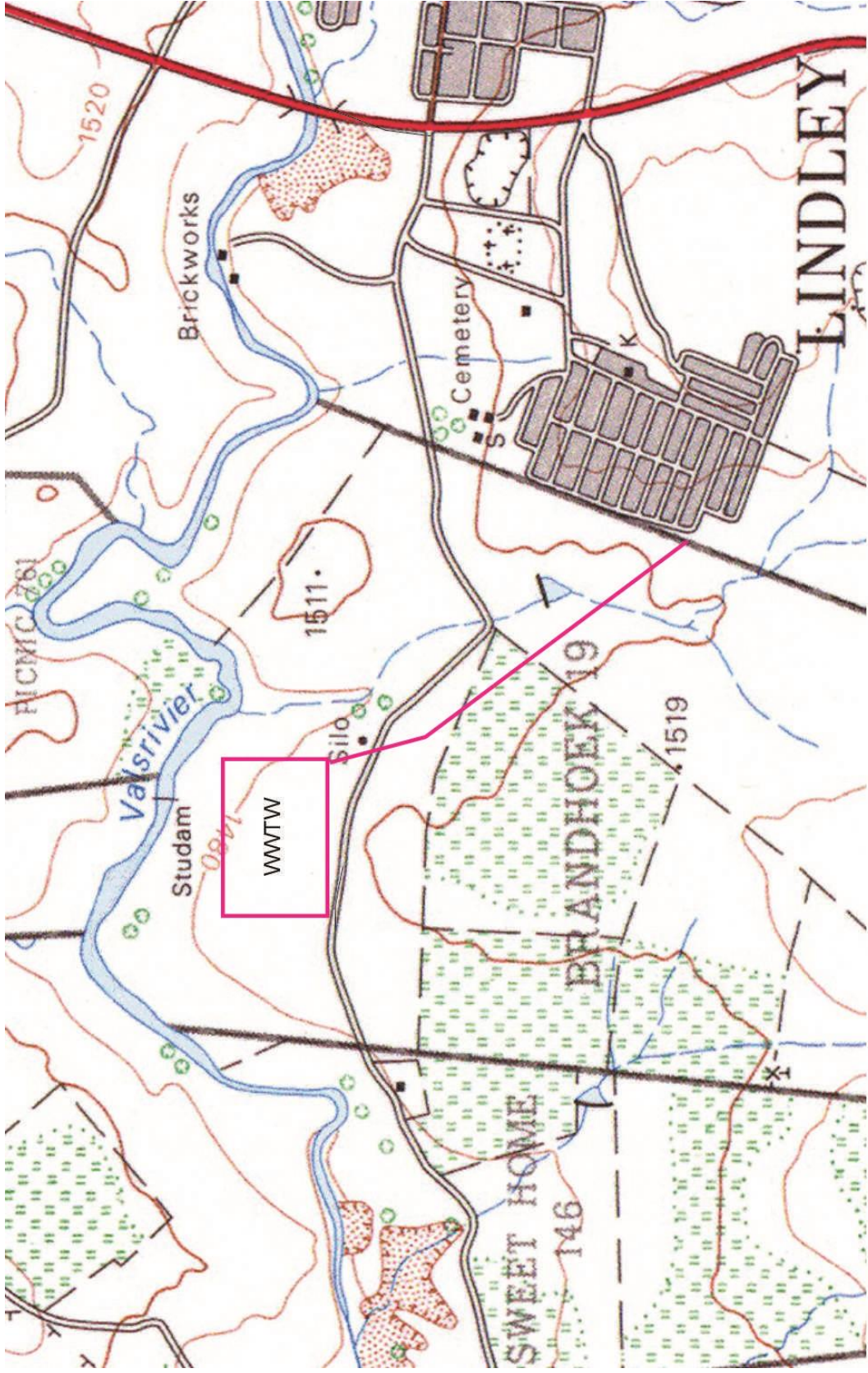


Figure 1 Proposed new water pipeline and WWTW footprint marked on portion of 1:50 000 topographical map 2727DD Lindley.



Figure 2. Aerial view of study area (white stippled polygon) and layout (red line & polygon) of the proposed new water pipeline and WWTW footprint.



Figure 3. General view of the footprint area, looking northwest.



Figure 4. The footprint is capped by superficial deposits of made up of shallow to well-developed, windblown sand, alluvium and agricultural soils covered by grassland.

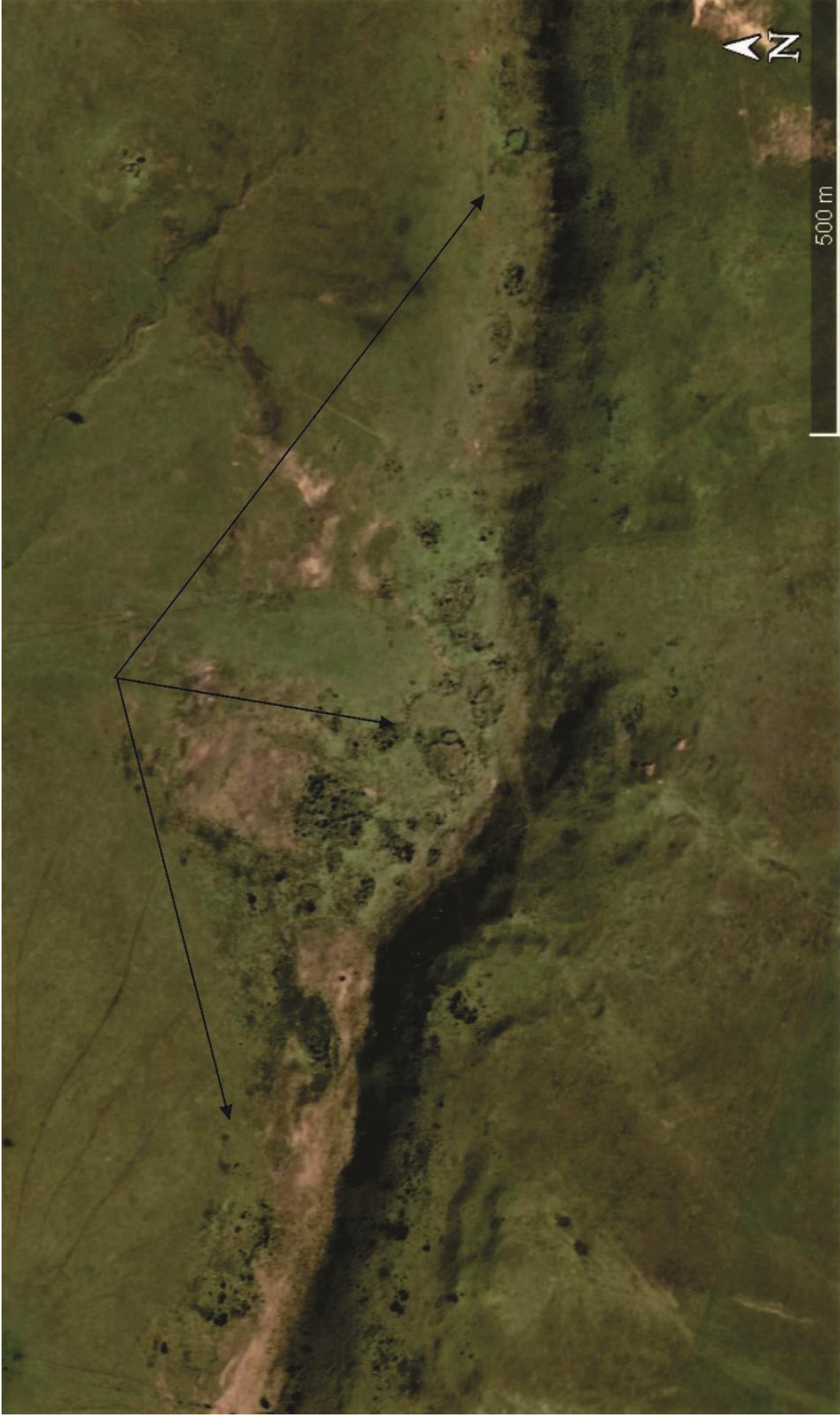


Figure 5. Aerial view of late Iron Age stone-walled complexes at Makgwareng, located on the Vals River east of Lindley.

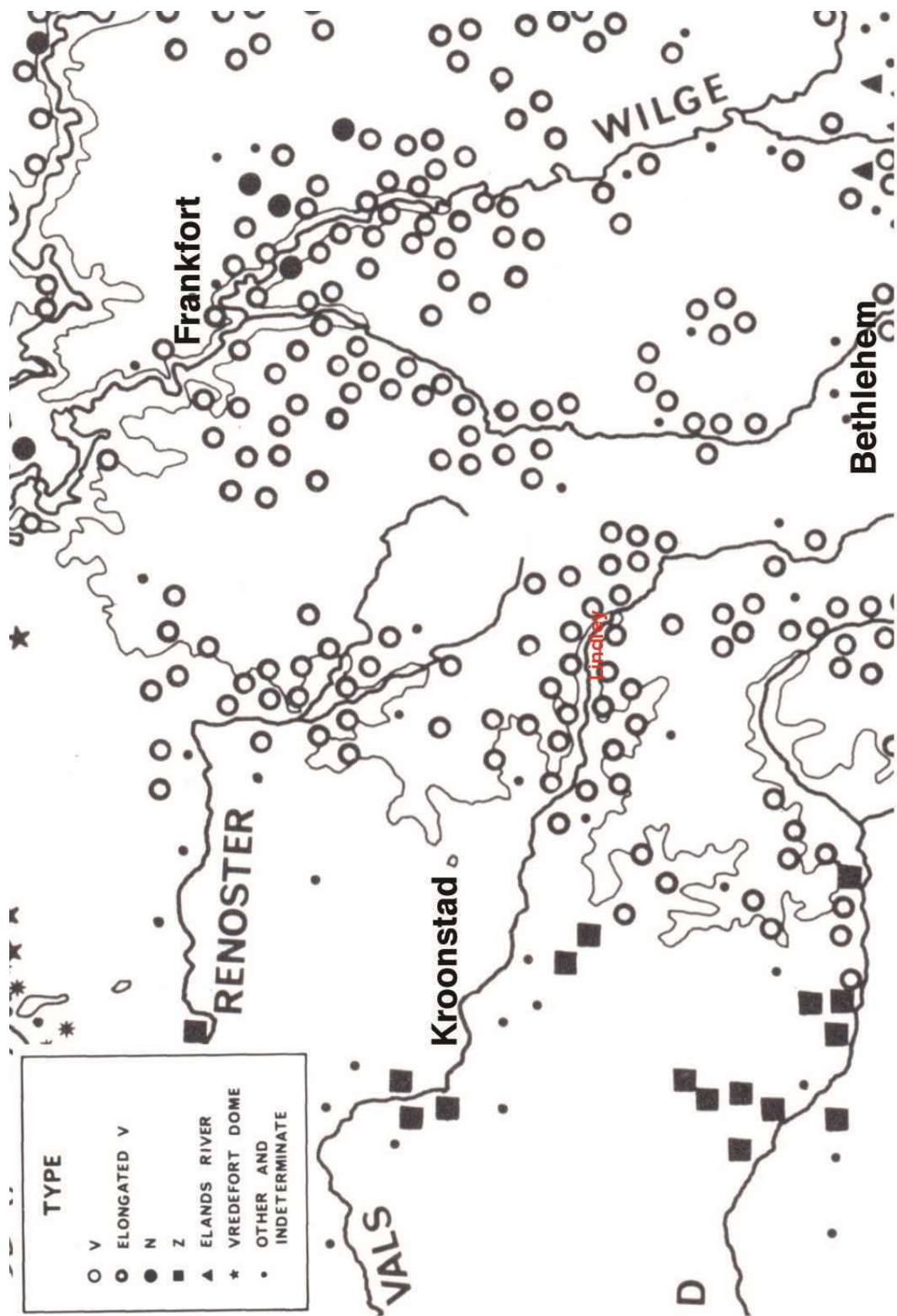


Figure 6. Distribution of late Iron Age stone – walled sites in the Kroonstad-Frankfort-Bethlehem area (after Maggs 1976).

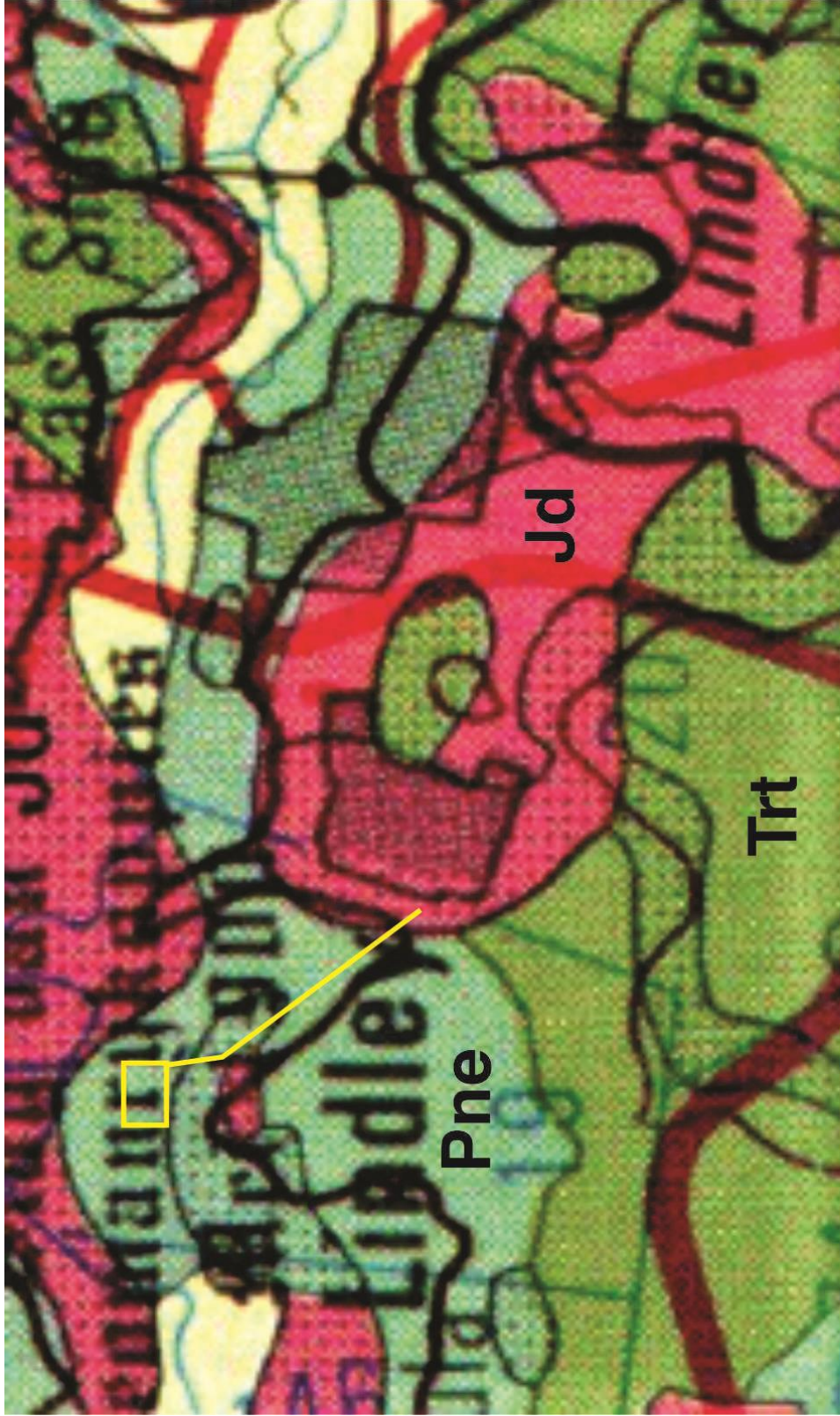


Figure 7. Portion of 1:250 000 geological map 2726 Kroonstad showing Lindley underlain by late Permian, Adelaide Subgroup sandstone and mudstone sequences are subdivided into the Normandien and Estcourt Formations (*Pne*), overlain by lower Triassic, Tarkastad Subgroup sedimentary members of the Verkykerskop and Driekoppen Formations (*Trt*) to the south. Dykes and sills of resistant Jurassic dolerites (*Jd*) determine the relief in the region.



Figure 8. Small graveyard located near the southern terminus of the proposed pipeline, looking south.

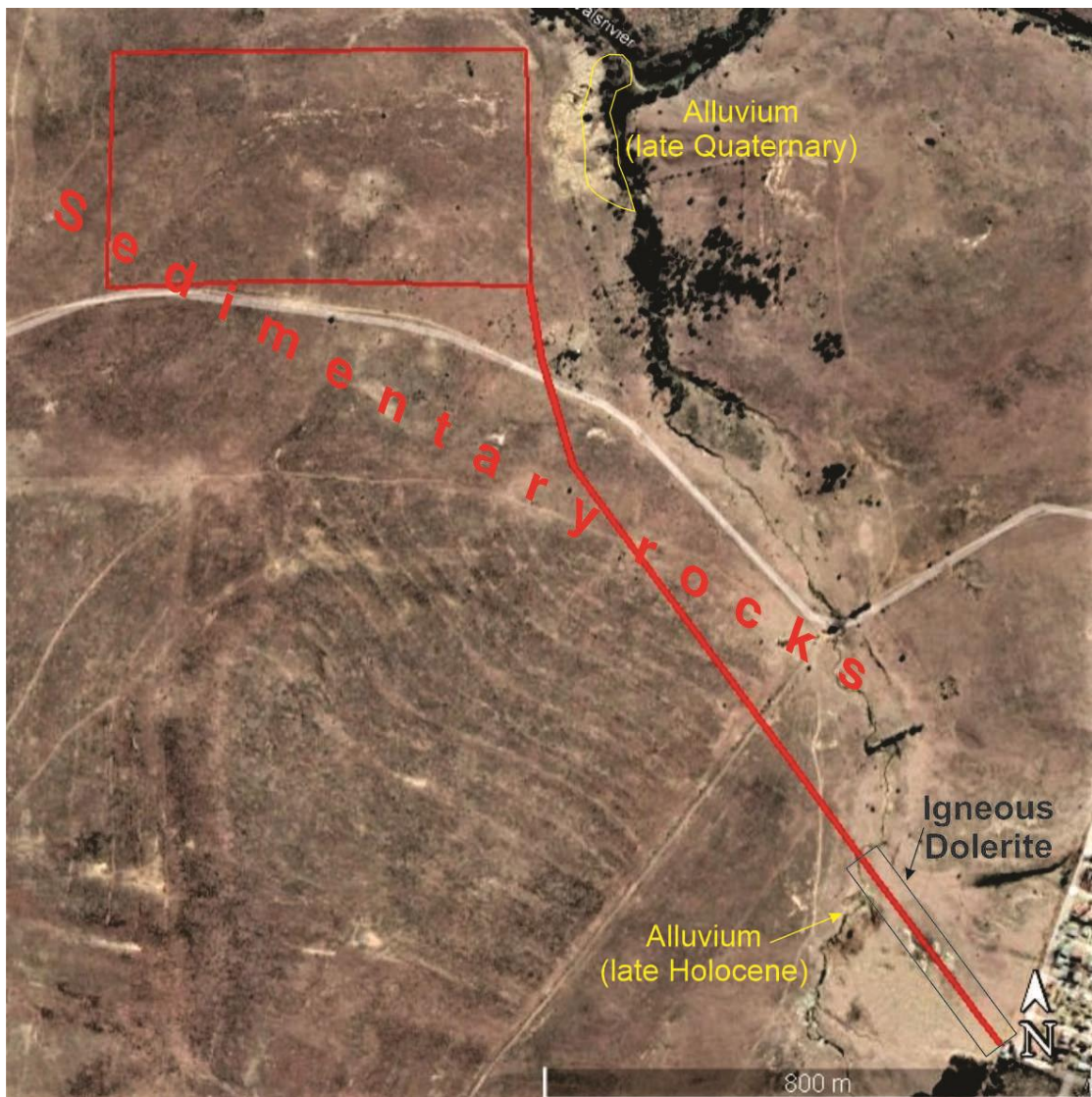


Figure 9. Distribution of geological outcrop in the study area.

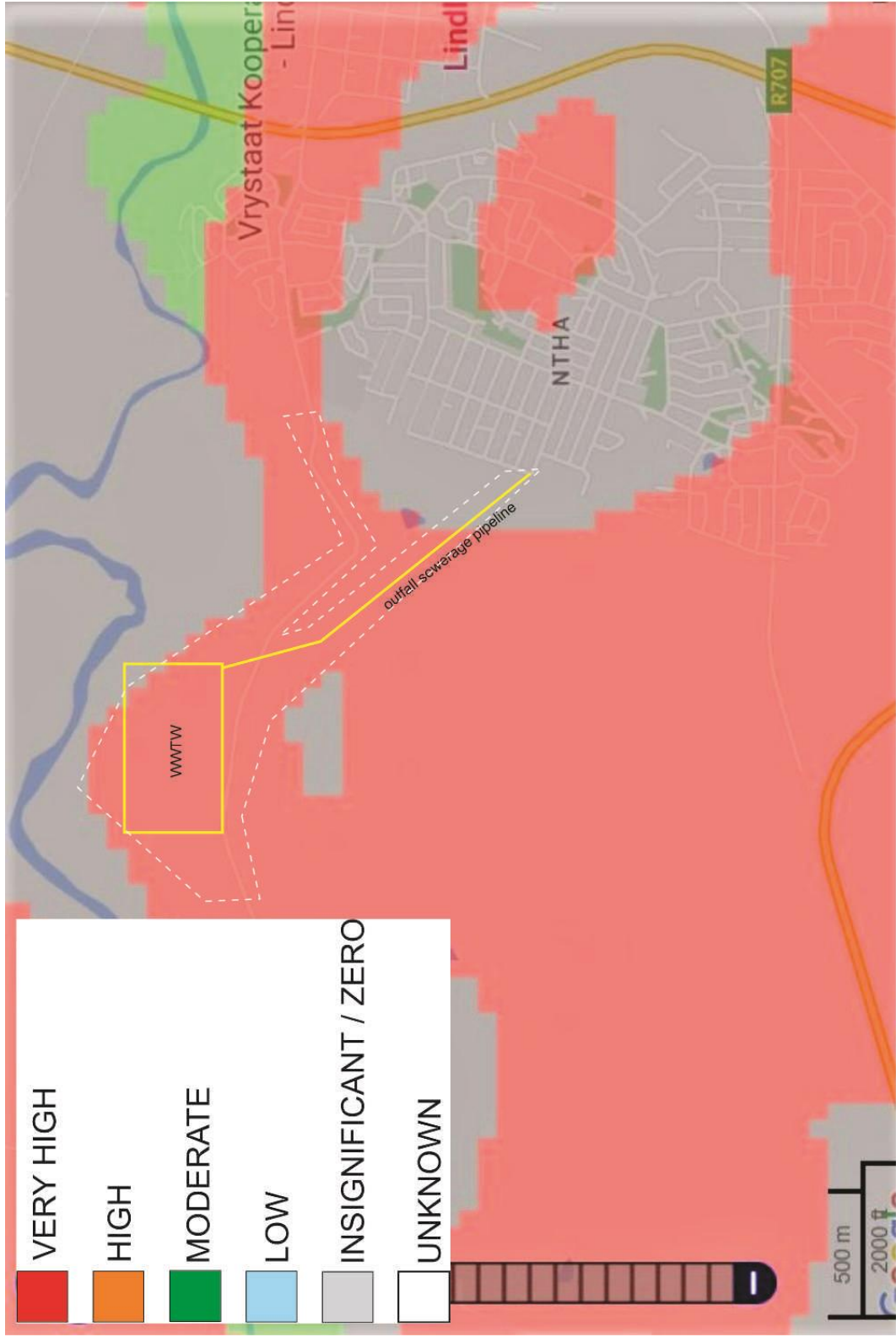


Figure 10. Proposed development (yellow line & polygon) footprint marked on SAHRIS palaeosensitivity map (2023).