

**Phase 1 Heritage Impact Assessment for proposed
extension of an existing sand mine on Remainder of
Portion 1 of farm Wonderwater 180, Sasolburg, Fezile
Dabi District, FS Province.**



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Summary

A Phase 1 Heritage Impact Assessment was carried out for the the extension of an existing sand mine on Remainder of Portion 1 of the farm Wonderwater 180 near Sasolburg in Fezile Dabi District, FS Province. The site is situated on the northern outskirts of Sasolburg and about 2.5 km due south of the Vaal River. The footprint covers 80 ha on the farm Wonderwater 180 and includes an existing sand mine operation as well as agricultural land. The proposed development will directly affect a well-developed, late Quaternary aeolian overburden, not considered to be palaeontologically sensitive. The site is regarded as of low archaeological significance and is assigned a rating of Generally Protected C. As far as the archaeological and palaeontological heritage is concerned, the proposed development may proceed with no additional heritage assessments necessary, provided that all excavation activities are restricted to the removal of the above mentioned, late Quaternary sandy overburden. In the unlikely event that anomalous objects or structures are uncovered within the sandy overburden during the operational phase of the project, a professional archaeologist must be called in to confirm their validity and record the finds. Such finds should not be washed or cleaned in any way and *in situ* material must be kept in place and protected from further damage by covering it with light but rigid object until further confirmation by the archaeologist.

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Introduction

A Phase 1 Heritage Impact Assessment was carried out for the the extension of an existing sand mine on Remainder of Portion 1 of the farm Wonderwater 180 near Sasolburg in Fezile Dabi District, FS Province (**Fig. 1**). The assessment is required as a prerequisite for new development in terms of the the National Heritage Resources Act (NHRA) No. 25 of 1999. The region's unique and non-renewable heritage sites are 'Generally' protected in terms of the NHRA and may not be damaged or disturbed without a permit from the relevant heritage resources authority (**Table 1**). The task (terms of reference) involved identification of possible archaeological and palaeontological sites or occurrences within the proposed development area(s), an assessment of their significance, possible impact by the proposed development and recommendations for mitigation where relevant.

Methodology

Preliminary evaluation of the affected area(s) was based on field records, database information, published literature and geological maps. This was followed up with a field assessment and foot survey. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used for recording purposes. Site significance classification standards, as prescribed by SAHRA, were used for the purpose of this evaluation (**Table 2**).

Locality Data

The site is situated on the northern outskirts of Sasolburg and about 2.5 km due south of the Vaal River. The footprint covers 80 ha on the Remainder of Portion 1 of farm Wonderwater 180 and includes an existing sand mine operation as well as agricultural land (**Fig. 2 & 3**).

Maps: 1:50 000 topographical map 2627 DD Sasolburg

1:250 000 geological map 2626 Wes Rand

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

- A) 26°46'28.65"S 27°48'3.46"E
- B) 26°46'21.51"S 27°48'21.96"E
- C) 26°47'11.71"S 27°48'26.87"E
- D) 26°47'13.47"S 27°48'14.72"E
- E) 26°47'5.16"S 27°48'5.62"E

Background

Wonderwater 180 is situated about 45 km west-northwest of the Vredefort Dome, a World Heritage Site that represents the central portion of a deeply eroded complex impact structure that formed 2023 ± 4 Ma ago in the Archaean and Palaeoproterozoic rocks of the Kaapvaal craton. With an estimated original diameter of 250 – 300 km, the structure is the oldest and largest impact feature identified on Earth thus far. Wonderwater 180 is underlain by much younger Karoo Supergroup sandstones and siltstones belonging to the Early Permian, Vryheid Formation of the Ecca Group (*Pv*) (**Fig. 4**). The Vryheid Formation is well-known for the occurrence of coal beds and its rich variety of plant fossils and invertebrate trace fossils (**Fig. 5 & 7**). Vertebrate fossils are generally very scarce, but it is noted that aquatic reptiles and fish (*Mesosaurus* and *Palaeoniscus*), have been recorded in similar-aged strata of the Whitehill Formation in the southern part of the Karoo basin (**Fig. 5**). Vaal River terraces and tributaries in the northeastern Free State and Northern Cape have previously yielded Plio-Pleistocene mammal fossils (e.g. Cornelia Beds & River Gravels between Bloemhof and Kimberley), but there is currently no record of fossil-bearing alluvium in the vicinity of the study area.

Early to Middle Stone Age artifacts, derived from the Vaal gravels between Vereeniging and Meyerton, represent early phases of Stone Age human occupation in the region and include an abundance of Acheulian (Early Stone Age) hand axes, cleavers and core-axes, primarily made from quartzite (**Fig. 6 & 7**). Late Iron Age stone-walled settlements, built by Sotho-Tswana speakers between 1400 and 1800 AD (eg. Askoppies and Buffelskloof), form part of the rich cultural heritage of the Vredefort Dome (**Fig. 7**). Rock art sites may include engravings on dolerite (e.g Parys area, vide van Riet Lowe 1941). European settlement in the region occurred from 1836 (Voortrekkers) while establishment of the Boer republics and the discovery of diamonds and gold further contributed to the distinctive historical character of the region.

Field Assessment

The study area is situated on low relief terrain where palaeontologically significant Ecca outcrop is entirely capped by a well-developed, late Quaternary overburden (trampled sandy soil) (**Fig. 8 & 9**). Exposed sections indicate homogenous and culturally sterile soil profiles where no Quaternary fossils were observed (**Fig. 10**).

There is also no above ground evidence of *in situ* Stone Age archaeological material distributed as surface scatters on the landscape, prehistoric structures, graves or historically significant buildings older than 60 years within the boundaries of the study area.

Impact Statement & Recommendation

The SAHRIS palaeosensitivity map indicates very high significance for the study area, as it lies within the outcrop area of the Vryheid Formation (**Fig. 11**). In this case however, the proposed development will only affect a well-developed, late Quaternary aeolian overburden, not considered to be palaeontologically sensitive and not indicated on the map. The site is regarded as of low archaeological significance and is assigned a rating of Generally Protected C (**Table 2**). As far as the archaeological and palaeontological heritage is concerned, the proposed development may proceed with no additional heritage assessments necessary, provided that all excavation activities are restricted to the removal of the above mentioned, late Quaternary sandy overburden. In the unlikely event that anomalous objects or structures are uncovered within the sandy overburden during the operational phase of the project, a professional archaeologist must be called in to confirm their validity and record the finds. Such finds should not be washed or cleaned in any way and *in situ* material must be kept in place and protected from further damage by covering it with light but rigid object until further confirmation by the archaeologist.

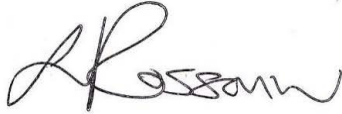
References

- Anderson, J.M. and Anderson, H.M. 1985. Palaeoflora of Southern Africa. Prodrum of SA Megafloras Devonian to Lower Cretaceous. A.A. Balkema, Rotterdam.
- Johnson, M.R. et al. 2006. *Sedimentary Rocks of the Karoo Supergroup*. In: M.R. Johnson, et al. (eds). The Geology of South Africa. Geological Society of South Africa, pp. 461 - 500.
- Maggs, T M. 1976. *Iron Age Communities of the Southern Highveld*. Pietermaritzburg Natal Museum.

DECLARATION OF INDEPENDENCE

Paleo Field Services act as an independent specialist consultant and do not 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. Paleo Field Services has no interest in secondary or downstream developments as a result of the authorization of this project.

Yours truly,

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

12 / 12 / 2022

Tables & Figures

Table 1. The NHRA (Act no. 25 of 1999) identifies what is defined as a heritage resource, the criteria for establishing its significance and lists specific activities for which a heritage specialist study may be required. In this regard, categories potentially relevant to the proposed development are listed in Section 34 (1), Section 35 (4), Section 36 (3) and Section 38 (1) of the NHRA and are as follows:

Section 34. (1) No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.
Section 35 (4) No person may, without a permit issued by the responsible heritage resources authority —
<ul style="list-style-type: none"> • destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
<ul style="list-style-type: none"> • <i>b)</i> destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
36 (3) No person may, without a permit issued by SAHRA or a provincial heritage resources authority—
<ul style="list-style-type: none"> • (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
<ul style="list-style-type: none"> • (b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
<ul style="list-style-type: none"> • (c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.
38 (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as —
<ul style="list-style-type: none"> • The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
<ul style="list-style-type: none"> • The construction of a bridge or similar structure exceeding 50 m in length;
<ul style="list-style-type: none"> • Any development or other activity which will change the character of the site
a) exceeding 5000 m ² in extent; or
b) involving three or more existing erven or subdivisions thereof; or
c) involving three or more subdivisions thereof which have been consolidated within the past five years;
<ul style="list-style-type: none"> • The rezoning of a site exceeding 10 000 m²; or
<ul style="list-style-type: none"> • Any other category of development provided for in regulations by the South African Heritage Resources Agency (SAHRA).

Table 2. Field rating categories 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

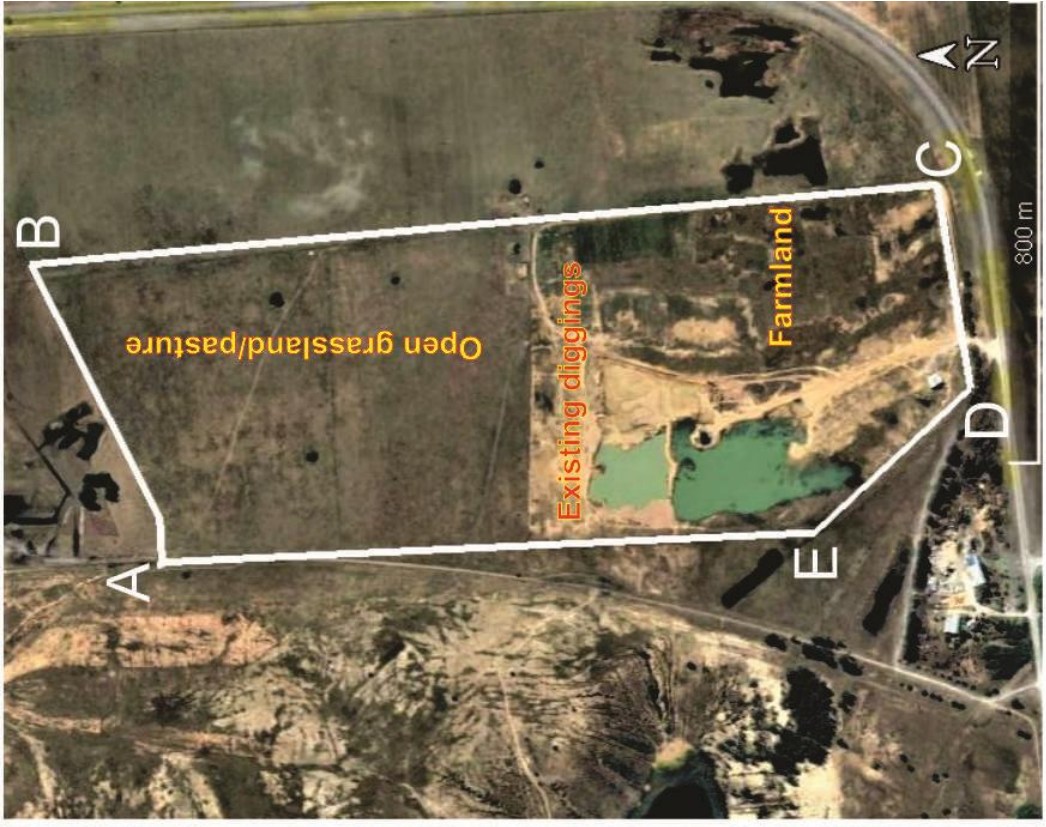
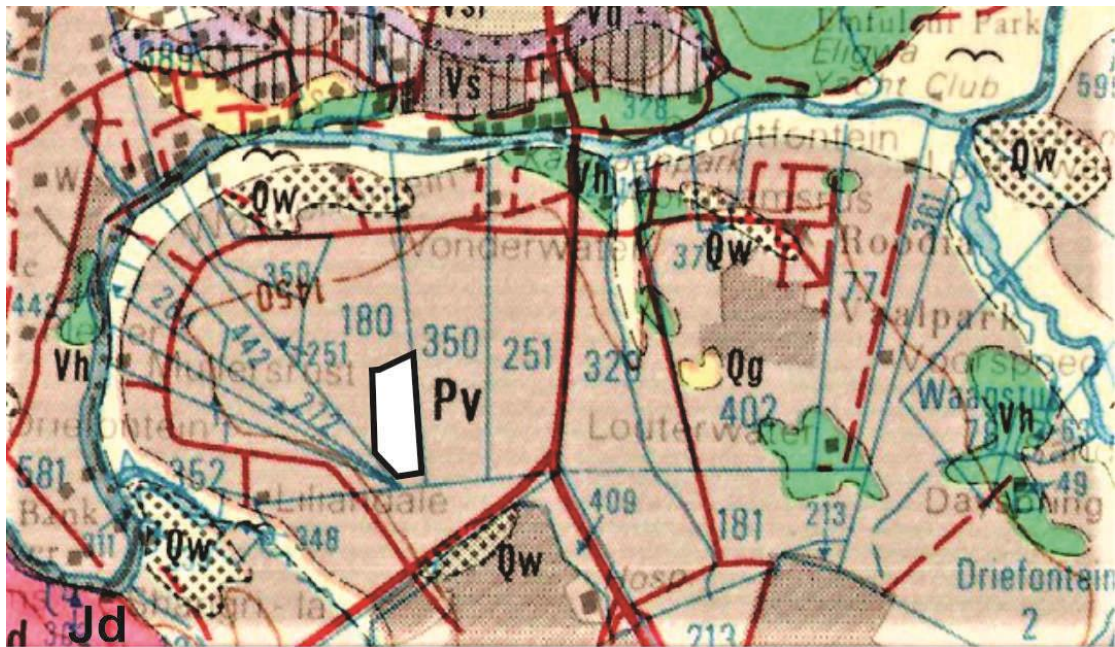


Figure 2. Aerial view and layout of study area.



Figure 3. General view of the site, looking north (top), south (center) and west (bottom).



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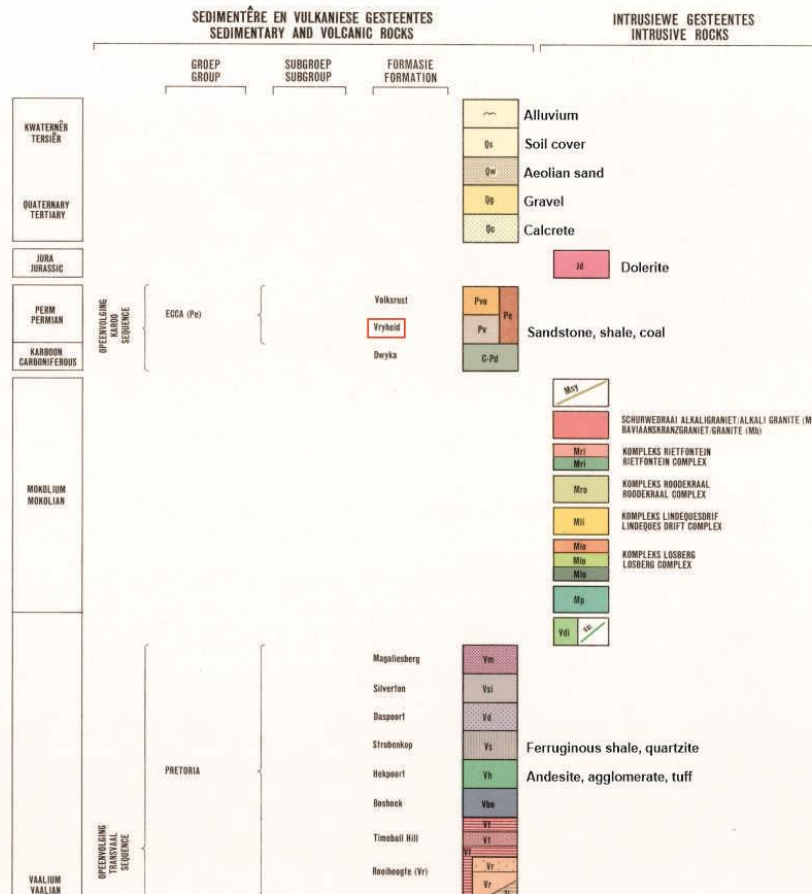


Figure 4. Portion of 1:250 000 scale geological map 2626 Wes Rand, showing Wonderwater 180 underlain by Karoo Supergroup sandstones, shales and siltstones of the Early Permian, Vryheid Formation (Pv, Ecca Group).

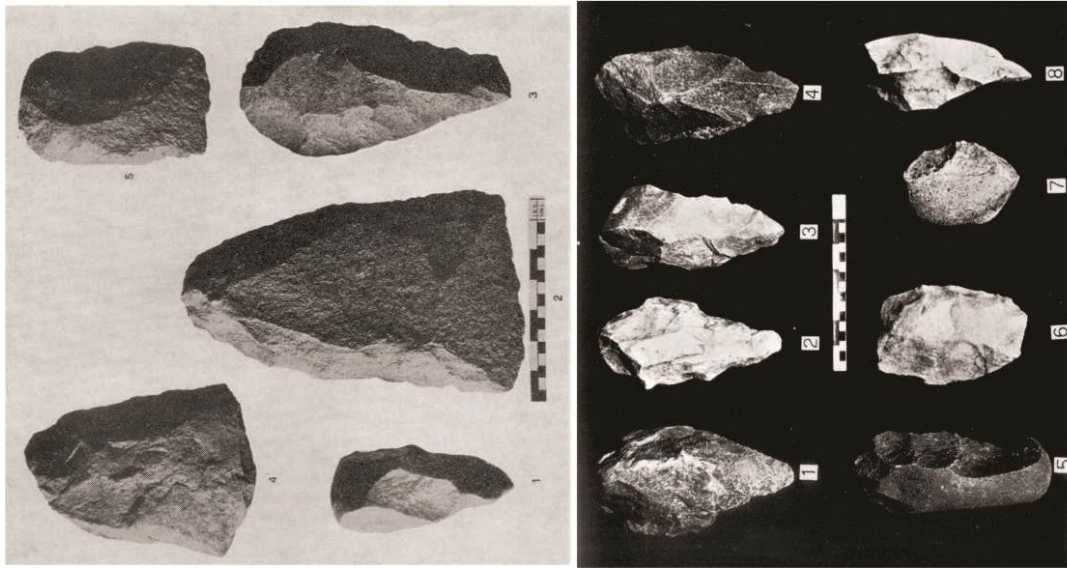
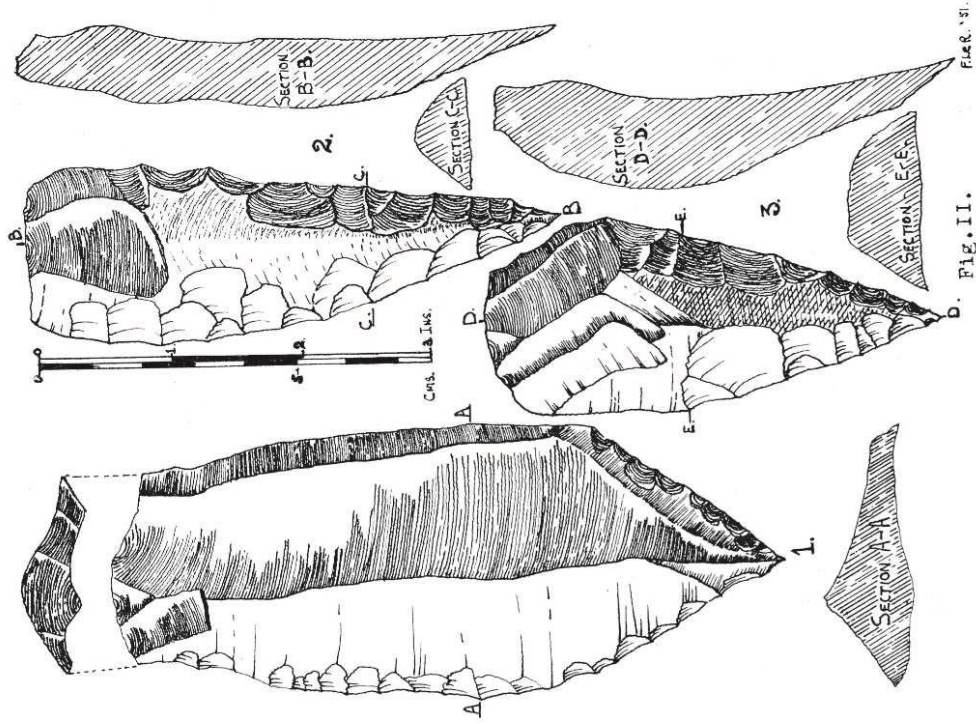


Figure 5. Examples of Acheulian and MSA stone tools previously recorded in the region (see Fig. 7).



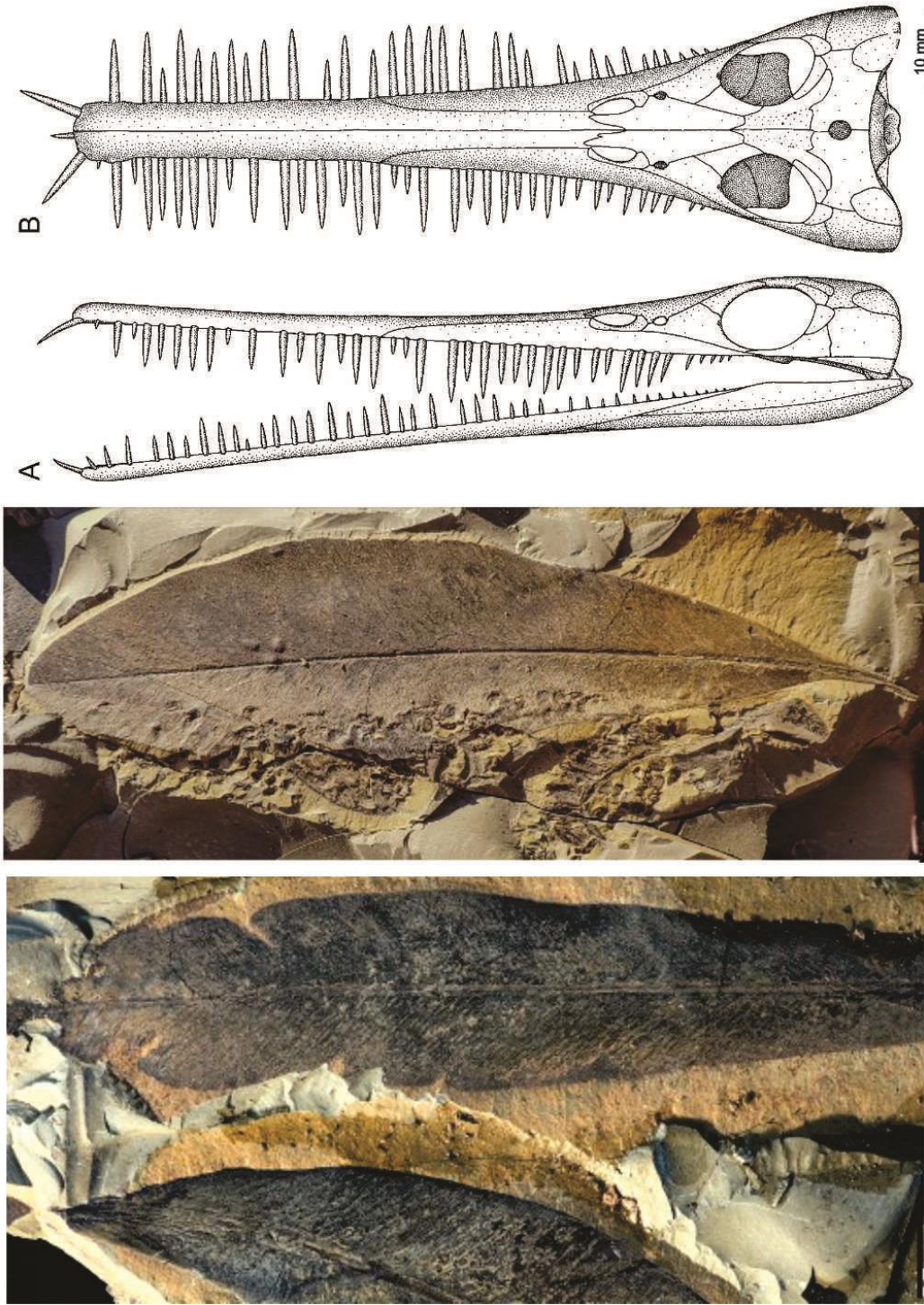


Figure 6. Examples of plant fossils (*Glossopteris*) and vertebrates (*Mesosaurus*) previously recorded in Ecca Group rocks (after Prevec et al. 2022 and Modesto 2006).

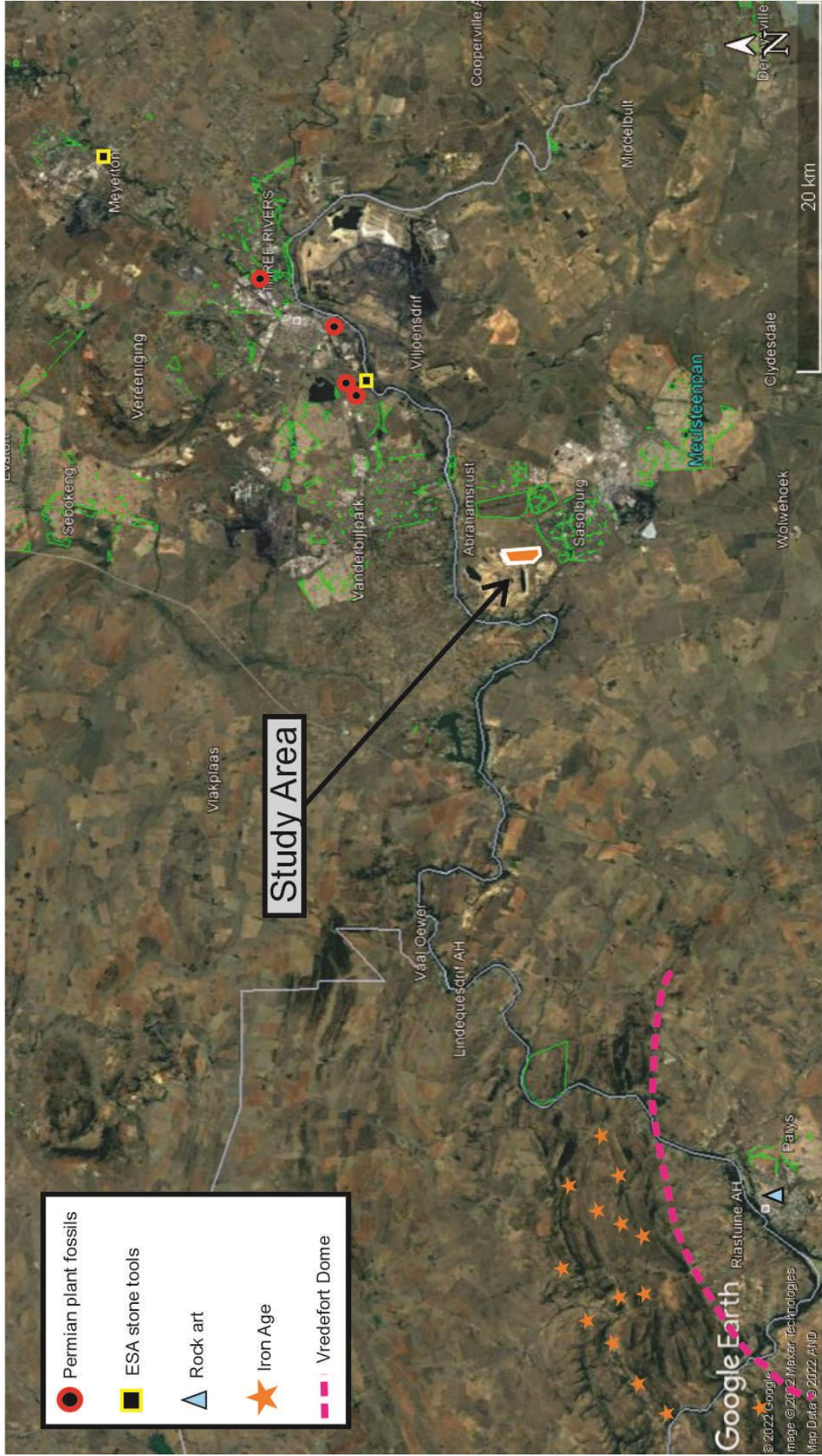


Figure 7. Distribution of previously recorded palaeontological and archaeological sites near the Vaal River and study area.



Figure 8. The study area covers low relief terrain primarily used for grazing.

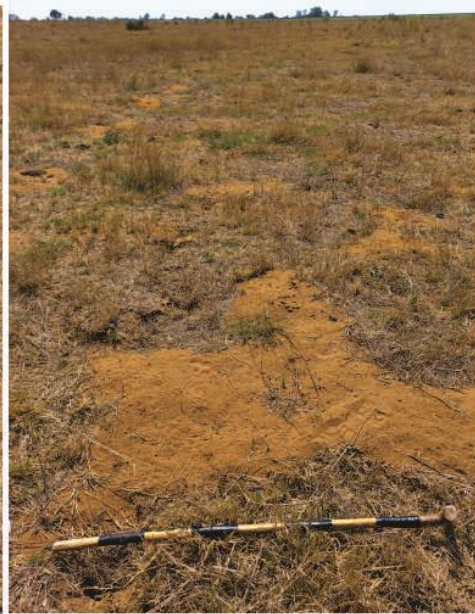


Figure 9. Thick, sandy deposits exposed by animal burrowing (above left, right & center) and homogenous sandy profiles from mining area (bottom). Scale 1 = 10 cm.

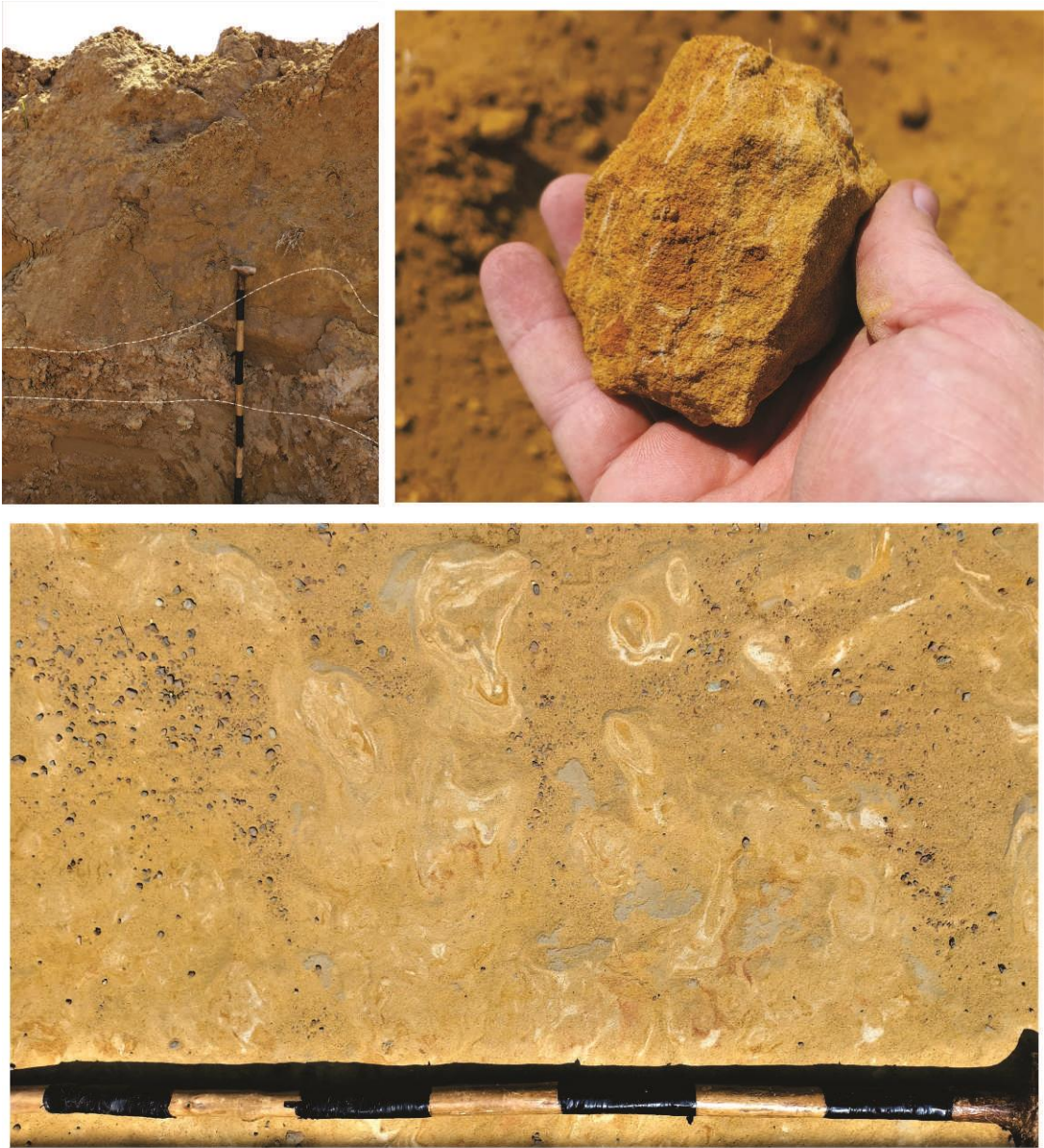


Figure 10. Unconsolidated to calcified, mottled sand.
Scale 1 = 10 cm.

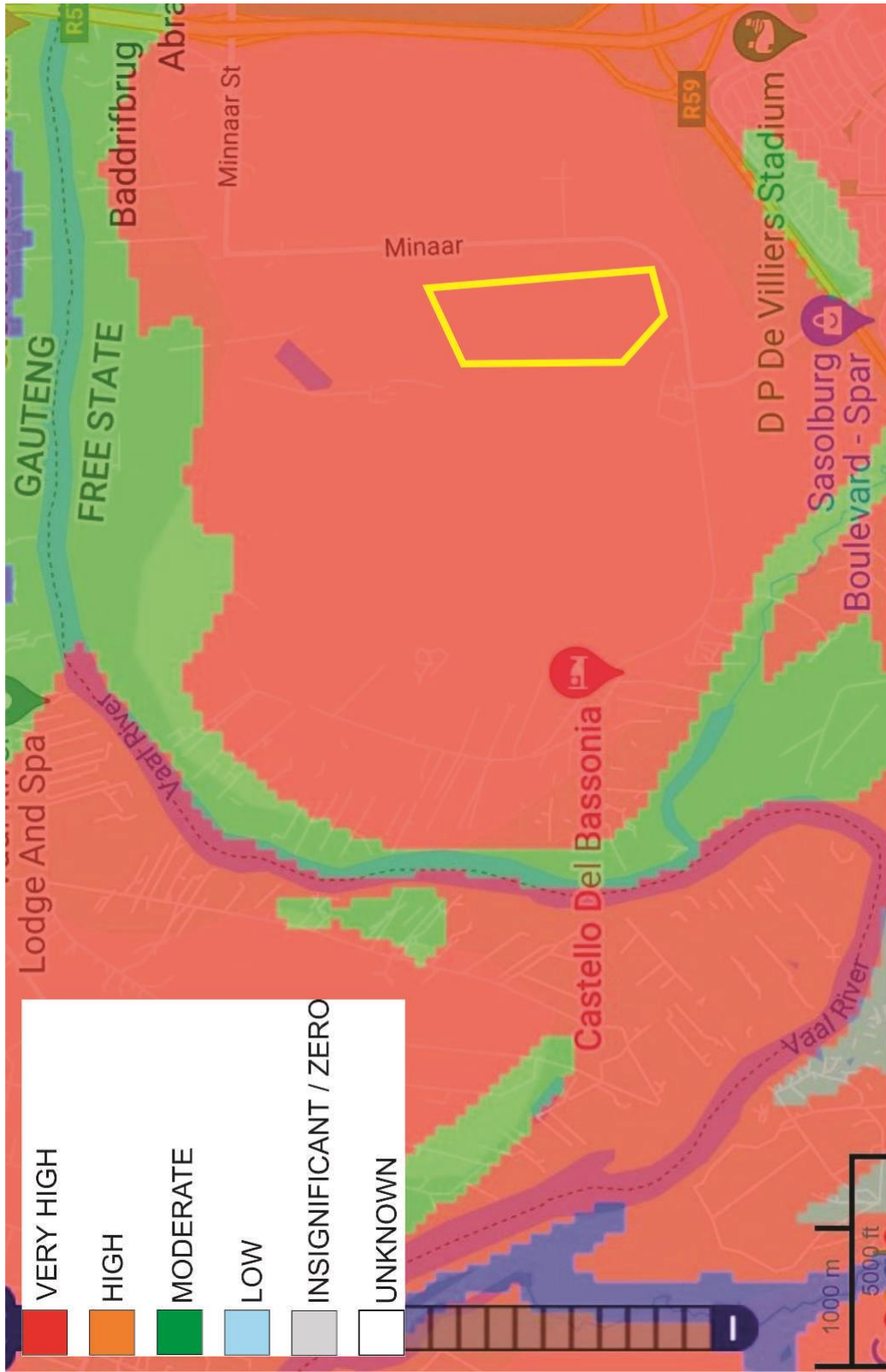


Figure 11. Although the SAHRIS palaeosensitivity map indicates very high significance for the study area, the proposed development will primarily affect an aeolian sand overburden, not considered to be palaeontologically sensitive and not indicated on the map.

Appendix 1: Survey Track Log

Index	Coordinates	Index	Coordinates
1	S26 47 15.1 E27 48 18.8	17	S26 46 35.2 E27 48 20.3
2	S26 47 11.3 E27 48 20.0	18	S26 46 31.4 E27 48 19.0
3	S26 47 05.8 E27 48 17.4	19	S26 46 33.3 E27 48 05.5
4	S26 47 02.0 E27 48 17.2	20	S26 46 27.2 E27 48 05.5
5	S26 46 56.2 E27 48 18.5	21	S26 46 27.1 E27 48 13.4
6	S26 46 52.2 E27 48 18.5	22	S26 46 29.5 E27 48 14.3
7	S26 46 50.8 E27 48 24.2	23	S26 46 27.9 E27 48 18.8
8	S26 46 37.4 E27 48 22.7	24	S26 46 22.2 E27 48 19.8
9	S26 46 37.8 E27 48 16.2	25	S26 46 39.4 E27 48 04.6
10	S26 46 41.2 E27 48 17.0	26	S26 46 49.0 E27 48 05.0
11	S26 46 42.9 E27 48 20.9	27	S26 46 46.7 E27 48 06.8
12	S26 46 46.0 E27 48 17.6	28	S26 46 45.9 E27 48 17.3
13	S26 46 46.7 E27 48 06.7	29	S26 46 49.5 E27 48 14.5
14	S26 46 42.6 E27 48 06.4	30	S26 46 55.9 E27 48 11.3
15	S26 46 41.9 E27 48 12.6	31	S26 46 58.2 E27 48 12.8
16	S26 46 36.1 E27 48 10.8	32	S26 47 01.8 E27 48 17.0

