Phase 1 Heritage Impact Assessment for proposed new chicken broiler development on Farm Fransina 2060 near Thaba Nchu, Free State Province.

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Summary

A Phase 1 Heritage Impact Assessment was carried out for the proposed establishment of new chicken broiler facilities on the farm Fransina 2060 located near the Rustfontein Dam and about 25 km due west of Thaba Nchu in the Free State Province. Two development footprints, each covering ~7 ha of open grassland, are located within an outcrop area of potential fossil-bearing Adelaide Subgroup sediments, partially intruded by dolerite and capped by unconsolidated residual soils. Both sites are regarded as of very low archaeological significance, and are assigned the rating of Generally Protected C. Potential for palaeontological impact at Site 1 and 2 is considered low and moderate respectively. The dolerite intrusion at Site 1 is deemed paleontologically insignificant and resulting fossil preservation near its igneous-sedimentary contact zones can vary from severely diminished to irregularly preserved. It will be difficult to determine the potentially adverse effect of excavations into potentially fossil-bearing bedrock sediments underlying Site 2 other than to emphasize that such impacts on fossil heritage are generally irreversible. As far as palaeontological heritage is concerned it is advised that proposed development can proceed at both sites, with the recommendation that for Site 2, linear excavations longer than 50 m in length and >1 m in width, exceeding depths of >1 m into sedimentary bedrock, or any excavations larger than 50 m^2 that exceeds depths of >1 m into sedimentary bedrock, should preferably involve monitoring by a professional palaeontologist.

Introduction

A Phase 1 Heritage Impact Assessment was carried out for the proposed establishment of a new chicken broiler facility on the farm Fransina 2060 near the Rusfontein Dam south of Sannaspos in the Free State Province (**Fig. 1 & 2**). The extent of the proposed development (over 5000 m2) falls within the requirements necessary for a Heritage Impact Assessment (HIA) as required by Section 38 (Heritage Resources Management) of the South African National Heritage Resources Act (Act No. 25 of 1999). The task involved identification of possible archaeological and palaeontological sites or occurrences in the proposed zone, an assessment of their significance, possible impact by the proposed development and recommendations for mitigation where relevant.

Methodology

The palaeontological and archaeological significance of the affected area was evaluated via a desktop study using existing field data, database information, published literature and geological maps. This was followed up with a field assessment by means of a pedestrian survey and investigation of exposures and outcrop within the footprint. 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 1**).

Locality data

1 : 50 000 scale topographic map: 2926BC Meadows

1 : 250 000 scale geological map 2924 Bloemfontein

Two areas, each covering ~7 ha of open grassland, were investigated. The sites are located on farm Fransina 2060 and lies about 25 km due west of Thaba Nchu (**Fig. 2**).

Site 1 coordinates:

A) 29°16'45.07"S 26°34'28.40"E
B) 29°16'48.24"S 26°34'41.84"E
C) 29°16'54.12"S 26°34'40.04"E
D) 29°16'51.00"S 26°34'26.71"E

Site 2 coordinates:

E) 29°16'37.05"S 26°34'53.43"E
F) 29°16'34.78"S 26°35'4.20"E
G) 29°16'42.25"S 26°35'6.24"E
H) 29°16'44.52"S 26°34'55.22"E

Background

Palaeontology

At Fransina 2060, potentially fossil – bearing sandstones and mudstones of the late Permian Adelaide Subgroup (*Pa*, Beaufort Group, Karoo Supergroup), are intruded by Jurassic-age dolerite dykes (*Jd*, Karoo Dolerite Suite) (**Fig. 4**). The Adelaide sedimentary rocks are associated with stream deposits consisting of floodplain mudstones and subordinate, lenticular channel sandstones (Johnson et al. 2006), These rocks are occupied by the *Dicynodon* Assemblage Zone, which is characterized by the presence of a distinctive and fairly common dicynodont genus that, along with other therapsid, reptile, fish and amphibian fossils, are usually preserved in dispersed and isolated contexts in mudrock horizons associated with an abundance of calcareous nodules (Kitching 1977, 1995) (**Fig. 5 & 6**). Geologically recent, fossil – bearing sediments (alluvium), not shown on the geological map in Figure 4, also occur widely in the region. Numerous Quaternary-age fossils from the late Pleistocene Florisian LMA have been recorded from various localities along the Modder River north the Rustfontein Dam and include a range of extinct markers in the families Bovidae and Equidae (e.g. *M. priscus, P antiquus, A bondi, E. capensis & E. lylei*) (Rossouw 2000, 2006) (**Fig. 5**).

Archaeology & History

The Stone Age archaeological record of Modder River catchment between Bloemfontein and Thaba Nchu goes back to the early Middle Stone Age. In addition to cave sites and rock shelters, Stone Age archaeological remains previously recorded in the region are primarily represented by open site stone tool assemblages associated with overbank deposits of the nearby Modder River and its tributaries (Rossouw 1999) (**Fig. 6 & 7**). One such occurrence was recorded at Fransina 2060 north of the study area during a survey conducted by E.C.N. van Hoepen in 1949 (**Fig. 6**). Early traveler accounts indicate that Khoi and Basotho communities already inhabited the region by the time of the first arrival of Trekboere and Voortrekkers (Casalis 1834; Thompson 1969) (**Fig. 8**). More recently, the Barolong under the chieftainship of Moroka, who died in April 1880, occupied the Thaba Nchu area east of the study area until the territory was incorporated into the Free State Republic in 1884 (**Fig. 9**). Bounded by the Modder River in the southwest and the Leeuw River in the northeast the territory covered about 220 000 ha, but by the end of the 19th century, only fragmented areas were retained under qualified freehold tenure by a significant section of the Barolong aristocracy (Murray 1984) (**Fig. 10**). The region has also witnessed several skirmishes between British and Boer forces during the Anglo-Boer War. Immediately following the capture of Bloemfontein by British forces during the Anglo-Boer War, military movements and

skirmishes occurred well towards the east between Bloemfontein and Thaba Nchu (Amery 1906).

Field Assessment

Except for a few dolerite exposures observed at Site 1 outcrop visibility was hampered by a red-brown residual soil capping low relief terrain at both sites (**Fig. 11**). There are no indications of open site, Stone Age accumulations or prehistoric structures within the footprint areas. There is also no evidence of informal graves or historical structures older than 60 years within the confines of the footprints.

Impact Statement and Recommendation

The proposed development footprints are located within an outcrop area of potentially fossil-bearing Adelaide Subgroup sediments, partially intruded by dolerite and capped by unconsolidated residual soils. Both sites are regarded as of very low archaeological significance, and are assigned the rating of Generally Protected C (**Table 1**).

Potential for palaeontological impact at Site 1 and 2 is considered low and moderate respectively. The dolerite intrusion at Site 1 is deemed paleontologically insignificant and resulting fossil preservation near its igneous-sedimentary contact zones can vary from severely diminished to irregularly preserved. It will be difficult to determine the potentially adverse effect of excavations into potentially fossil-bearing bedrock sediments underlying Site 2 other than to emphasize that such impacts on fossil heritage are generally irreversible. Conversely, the recovery of new fossils as a result of industrial excavation activities can also be considered a positive impact, but only if the process is accompanied by appropriate scientific recording and retrieval methods. As far as palaeontological heritage is concerned it is advised that

- proposed development can proceed at Site 1
- proposed development can proceed at Site 2, with the recommendation that linear excavations longer than 50 m in length and >1 m in width, exceeding depths of >1 m into sedimentary bedrock, or any excavations larger than 50 m^2 that exceeds depths of >1 m into sedimentary bedrock, should preferably involve monitoring by a professional palaeontologist.

References

Amery, L.S. 1906.The Times history of the war in SA, Vol 4. Sampson Low, Marston and Company. London.

Casalis, E. 1889. *My life in Basuto Land*. Religious Tract Society. Piccadilly.

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.

Kitching, J.W. 1977. The distribution of Karoo Vertebate Fauna. *Bernard Price Institute for Palaeontological Research. Memoir 1*, 1 – 131.

Kitching, J.W. 1995. Biostratigraphy of the Dicynodon AZ. **In**: B.S. Rubidge, *Biostratigraphy of the Beaufort Group*. Biostrat. Ser. S.Afr. Comm. Strat. 29 – 34.

Murray, C. 1984. *The land of the Barolong: annexation and alienation 1884-1900. Co*llected Seminar Papers. *Institute of Commonwealth Studies*, 33. pp. 24-35.

Rossouw, L. 1999. Palaeontological and archaeological survey of the Riet River, Modder River and certain sections of the Gariep River Unpublished Report, PARG. University of the Witwatersrand.

Rossouw, L. 2000. Preliminary species list of Late Pleistocene / Holocene fossil vertebrate remains from erosional gullies along the Modder River NE of Sannaspos, Free State Province. Unpublished Report, PARG, University of the Witwatersrand.

Rossouw, L. 2006. Florisian mammal fossils from erosional gullies along the Modder River at Mitasrust farm, central Free State, South Africa. *Navorsinge van die Nasionale Museum* 22(6): 145-162.

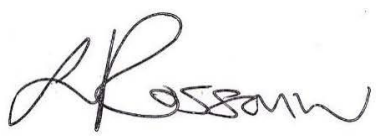
Rubidge, B. S. 1995. (ed) *Biostratigraphy of the Beaufort Group*. Biostrat. Ser. S.Afr. Comm. Strat. 1, 1 – 45.

Thompson, L (ed) 1969. African societies in Southern Africa : historical studies New York : Praeger. 336 p.

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,



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Tables and Figures

Table 1. 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

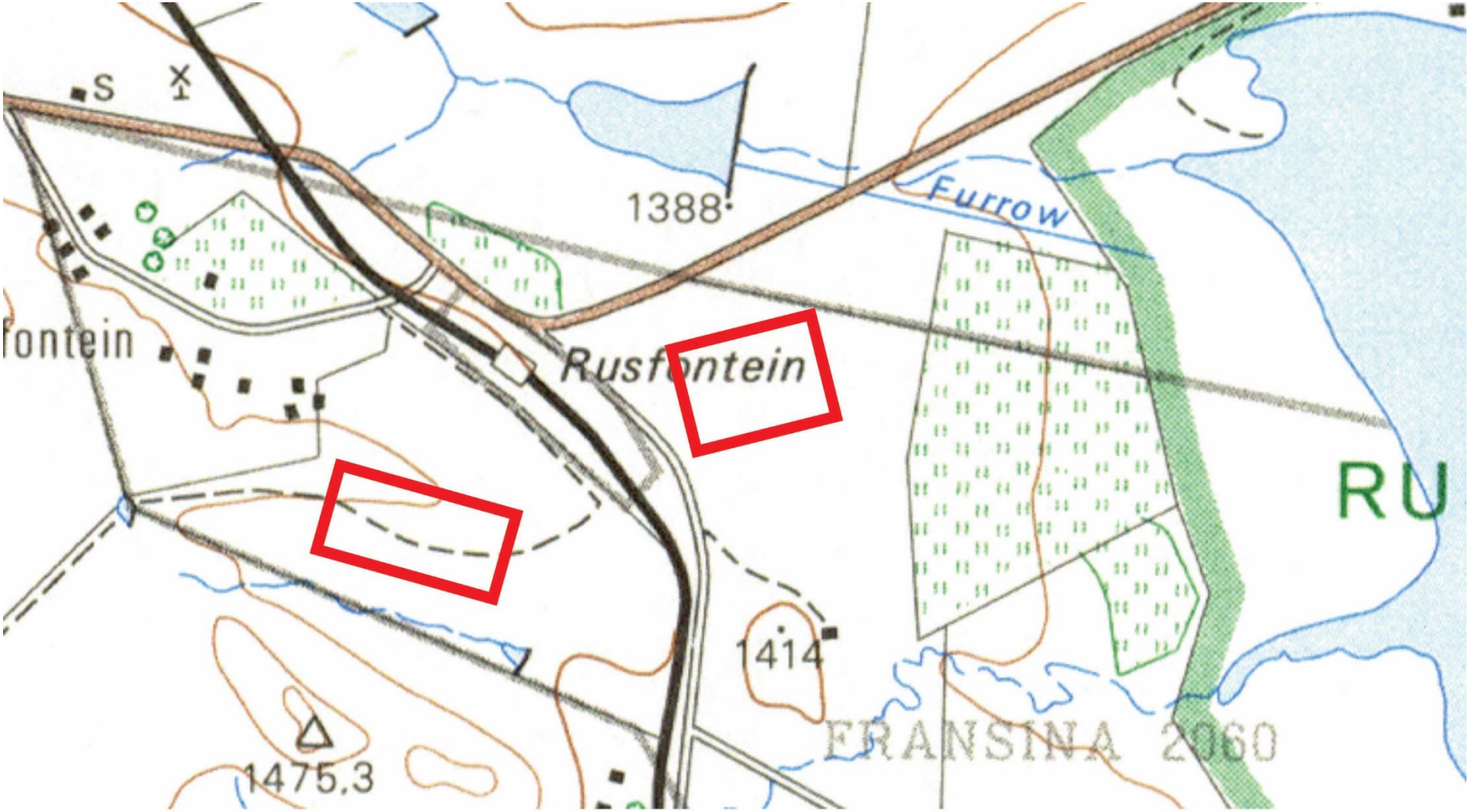

Figure 1. Map of the proposed development footprints (portion of 1:50 000 scale topographic 2926BC Meadows).

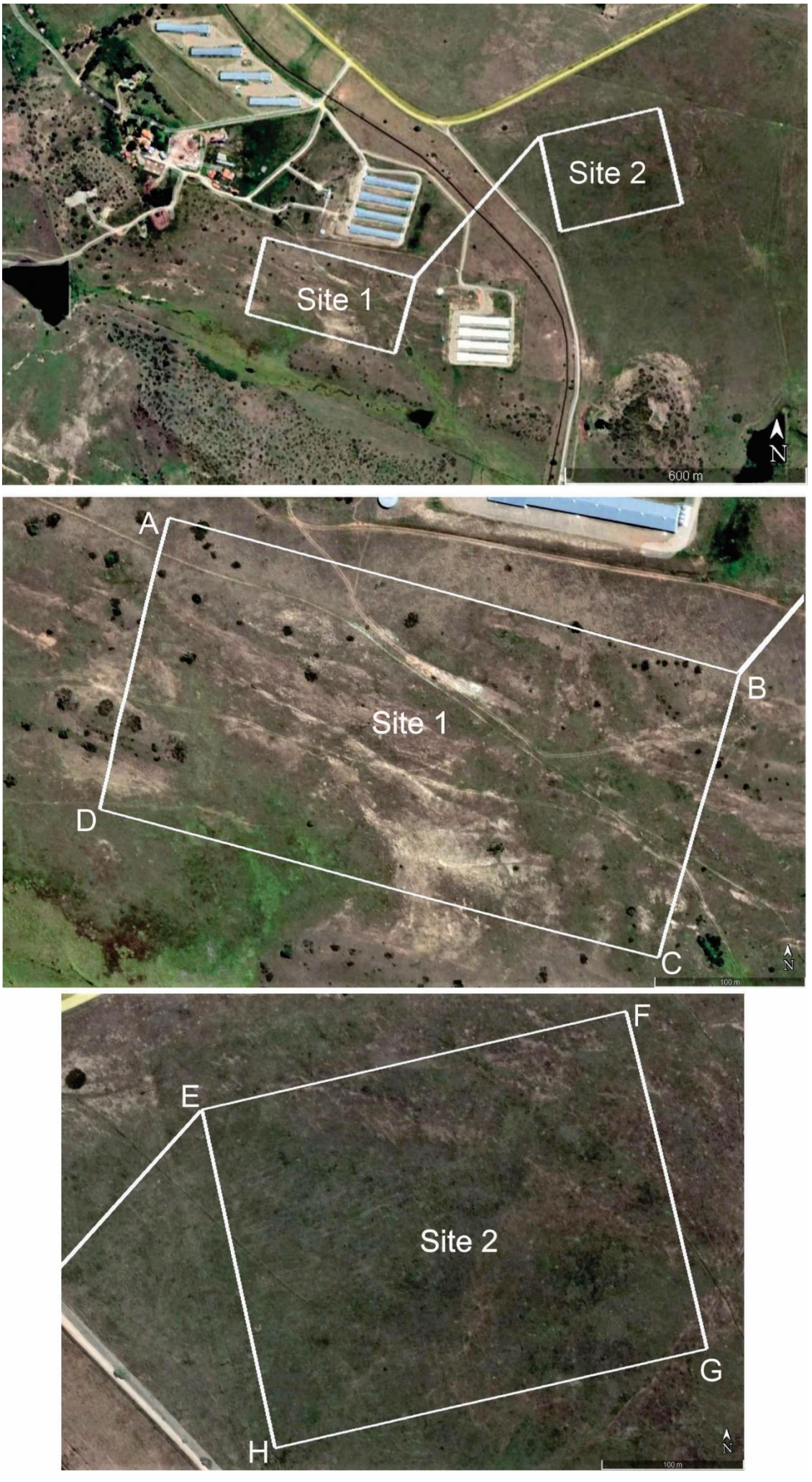

Figure 2. Aerial view and layout of the study areas.

Figure 3. General view of the study area looking north from Site 1 and east towards Site 2).

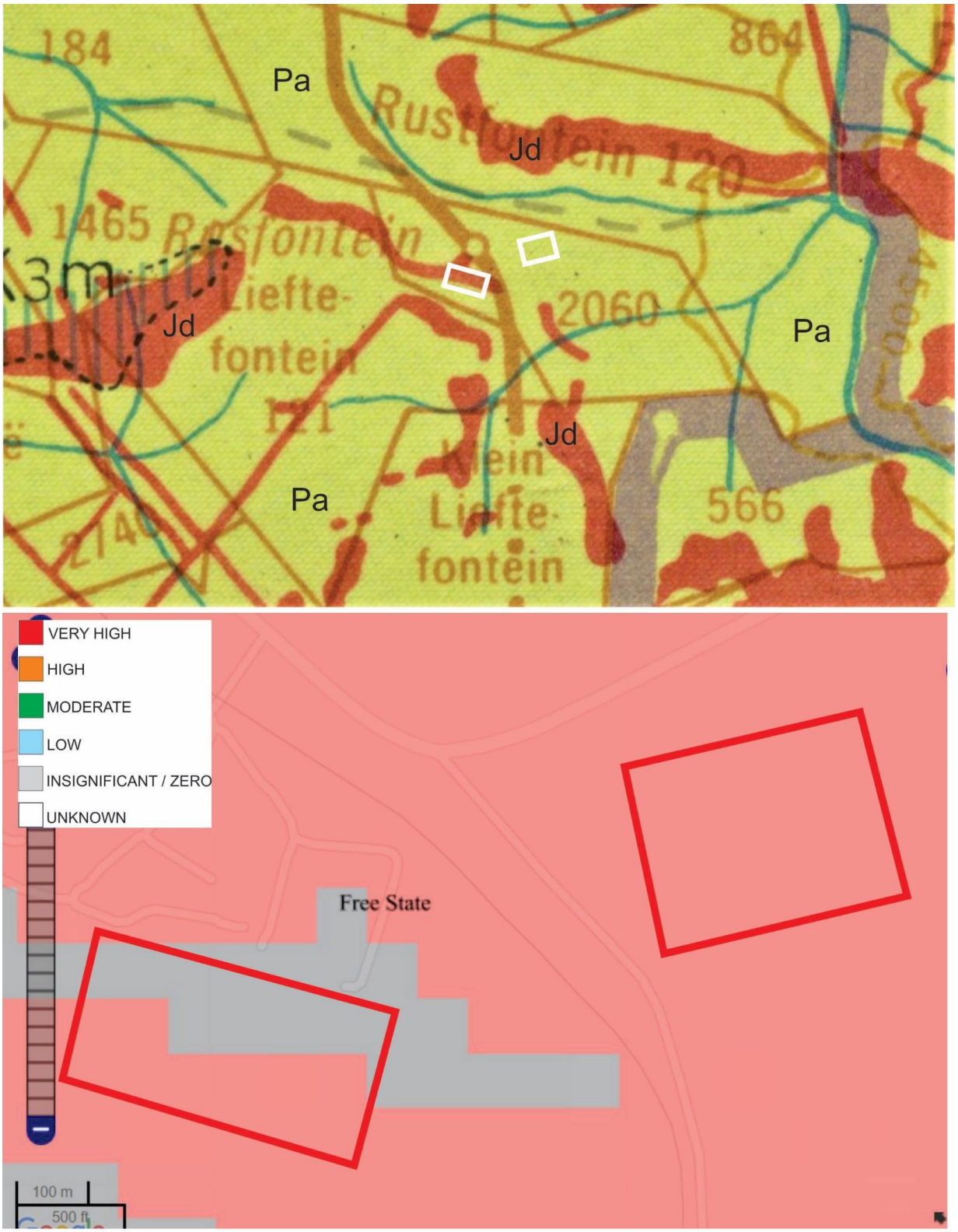

Figure 4. According to 1:250 000 scale geological map 2924 Bloemfontein (above), the study area lies within the fossil-bearing Adelaide Subgroup (***Pa***, Beaufort Group, Karoo Supergroup), as also indicated by the SAHRIS palaeosensitivity map (below).

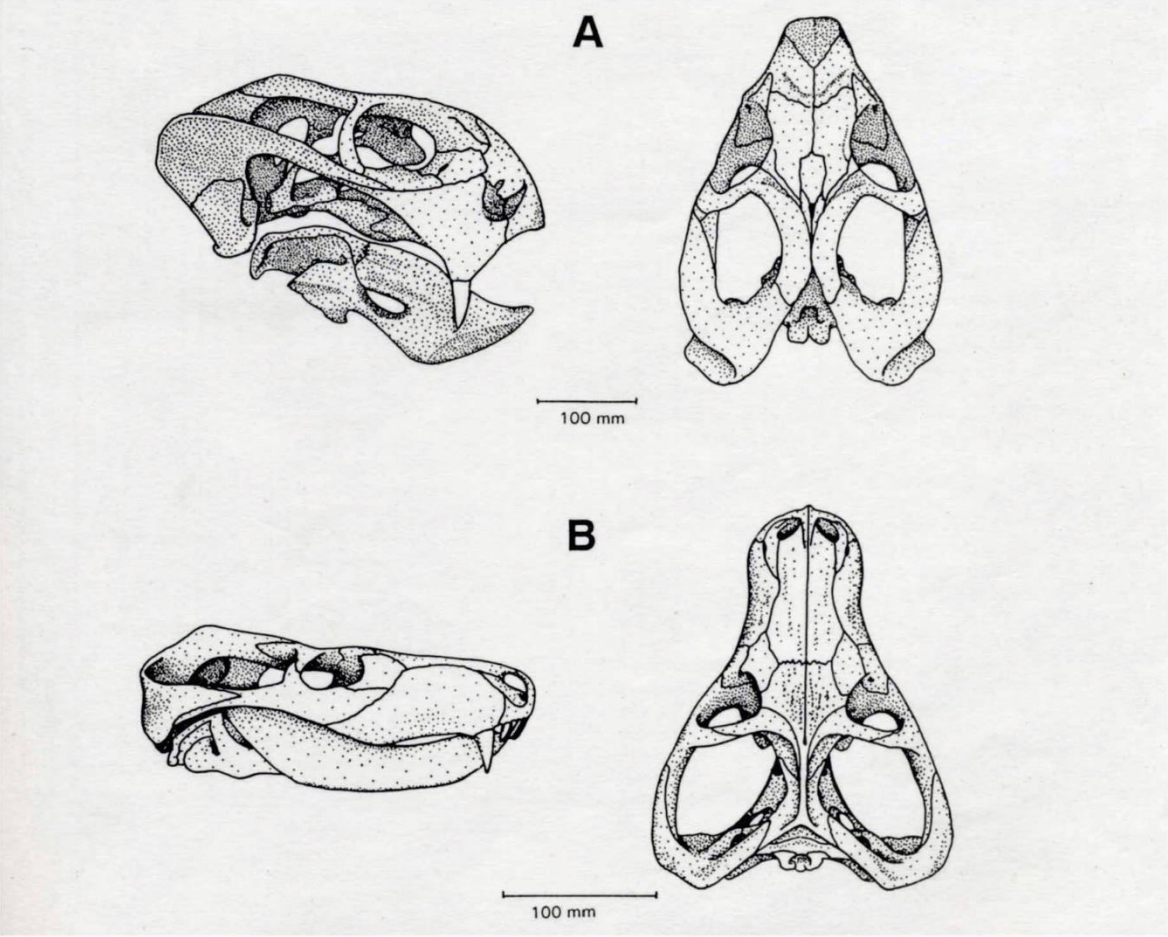

Figure 5. Biozone - defining fossils of the Dicynodon AZ include *Dicynodon* and *Theriognathus* (left A & B respectively, after illustration from Rubidge 1995). Late Quaternary Florisian markers include a range of extinct mammals in the Bovid and Equid families (field examples, above & below right).

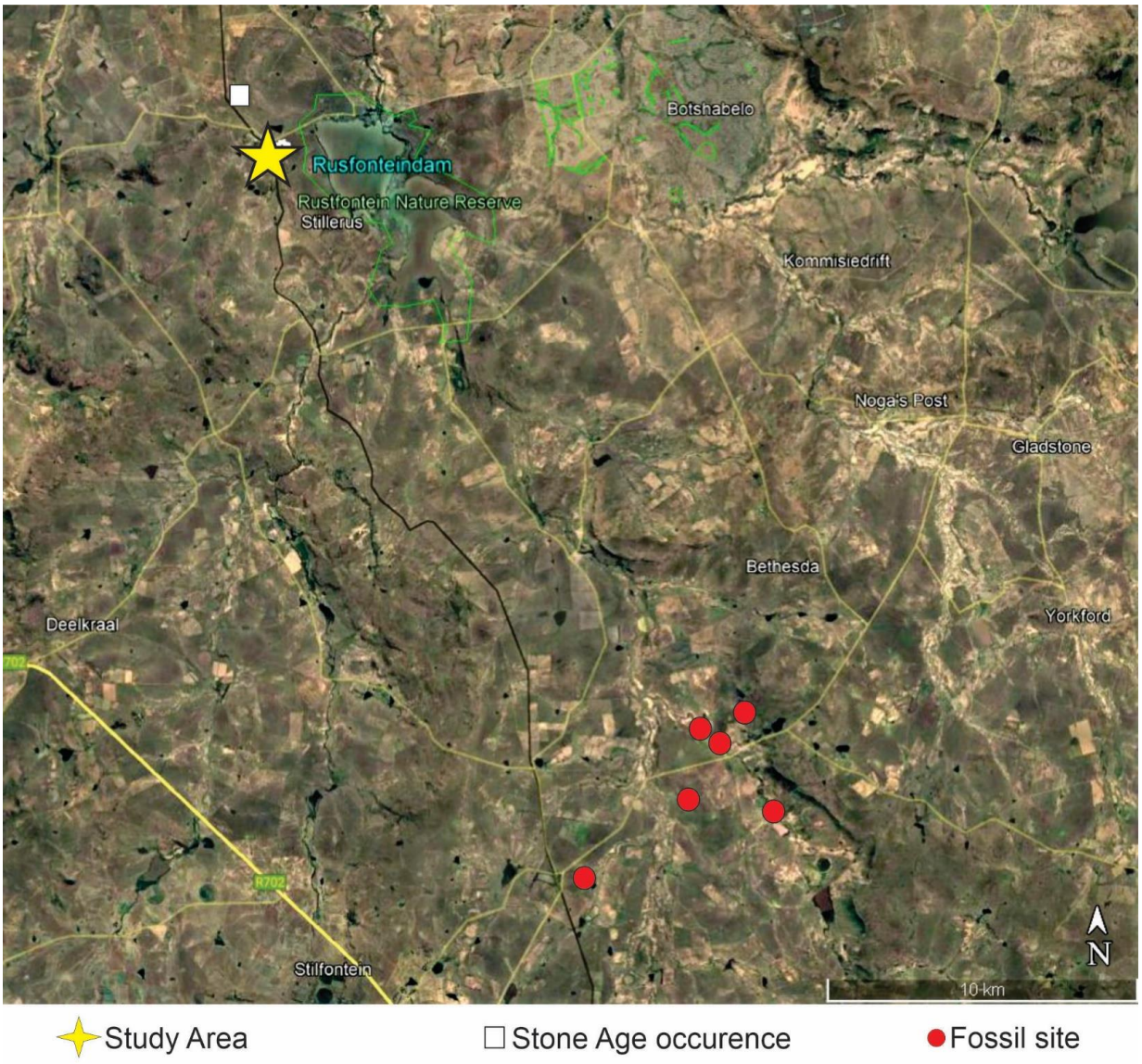

Figure 6. Distribution of known archaeological and palaeontological localities on quarter degree grid 2926 BC Meadows.

Figure 7. Stone tool types commonly found in the region are based on prepared core technologies and can include parallel-sided blades (left) or convergent flakes and points, characterised by having one or more midridges on the dorsal surface, a striking platform, as well as a bulb of percussion and flaking scar on the ventral surface (top row right). Stone tools are primarily made of hornfels, a dark, fine-grained isotropic rock associated with contact-metamorphic zones. A LSA microlithic component (centre & bottom row right) often utilized cryptocrystalline quartz as raw material (e.g chalcedony & agates) and sometimes even silicified wood (e.g. Agathoxylon).

Figure 8. Historical kraals with associated cultural remains (bottom row) recorded near Thaba Nchu.

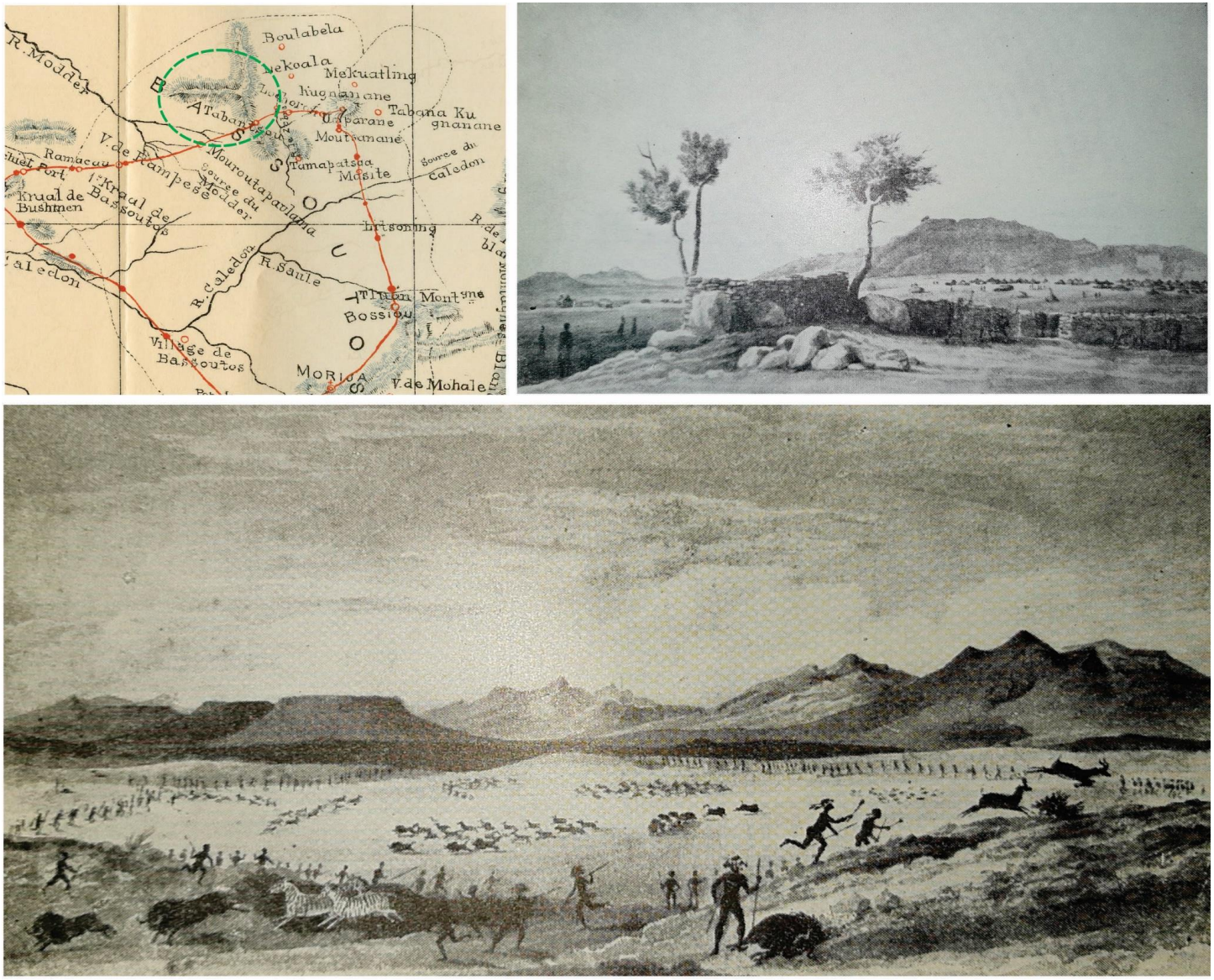

Figure 9. Copy of a map made by the Rev. Casalis in 1834, showing the boundaries of the country of the Basuto (above left). Depiction of the residence of chief Moroka and Wesleyan Mission (above right) hunting scene at Thaba Nchu, ca.1834 (below).

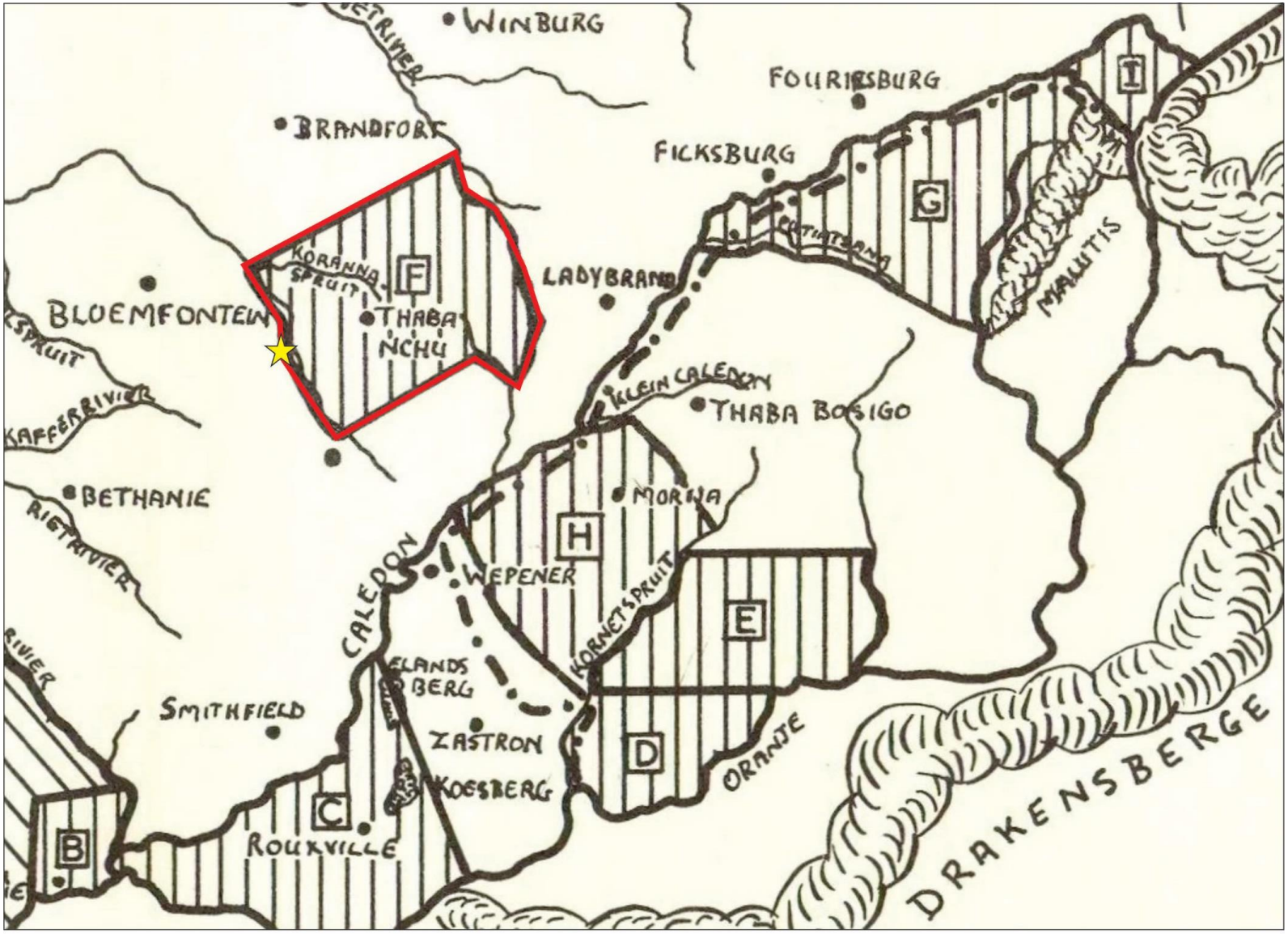

Figure 10. Late 19th century map of the Barolong Reserve originally set aside by the Free State Republic in 1885. Approximate position of Fransina 2060 indicated by yellow star.

Figure 11. Except for a few dolerite exposures observed at Site 1 (above left), outcrop visibility was hampered by a low relief terrain (right), capped a red-brown residual soil of varying thickness (below left).
Scale 1 = 10 cm.

Appendix 1: Survey Track Log

Index	Coordinates
1	S29 16 31.2 E26 34 35.7
2	S29 16 34.3 E26 34 33.2
3	S29 16 38.9 E26 34 38.4
4	S29 16 40.7 E26 34 42.0
5	S29 16 46.1 E26 34 48.4
6	S29 16 47.0 E26 34 42.3
7	S29 16 49.7 E26 34 44.8
8	S29 16 50.8 E26 34 42.0
9	S29 16 48.7 E26 34 39.7
10	S29 16 45.7 E26 34 40.9
11	S29 16 50.0 E26 34 47.5
12	S29 16 52.1 E26 34 44.0
13	S29 16 34.9 E26 34 41.1
14	S29 16 37.4 E26 34 45.2
15	S29 16 42.0 E26 34 50.0
16	S29 16 37.1 E26 34 54.9
17	S29 16 38.5 E26 35 00.4
18	S29 16 36.1 E26 35 01.5
19	S29 16 39.1 E26 35 05.3
20	S29 16 42.1 E26 35 04.7
21	S29 16 40.9 E26 35 02.3
22	S29 16 40.3 E26 34 56.9
23	S29 16 43.6 E26 34 54.4