Phase 1 Heritage Impact Assessment of Remainder of the farm Cecilia 2352 and farm Bloemfontein 654, Bloemfontein, FS Province.

Report prepared for
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Executive Summary

A Phase 1 Heritage Impact Assessment was carried out as part of a proposed new residential development on the remainder of farms Cecilia 2352 and Bloemfontein 654, near Bloemfontein in the Free State Province. The study area is capped by relatively thick deposits of geologically recent aeolian sands and residual soils that thins out towards the southeast, exposing dolerite bedrock. A foot survey of the terrain revealed no evidence for the accumulation and preservation of intact fossil material within these superficial Quaternary sediments. The survey revealed no indication of *in situ* Stone Age archaeological material, capped or distributed as surface scatters on the landscape. There are also no indications of rock art, prehistoric structures or buildings older than 60 years with historical significance within the boundaries of the study area.

There are no major palaeontological or archaeological grounds to suspend proposed development at the site. The palaeontological significance of the sedimentary bedrock in the region is considered high. However, the study area is in large part underlain by intrusive igneous dolerites which are considered to be of low paleontological significance. Potentially fossil-bearing bedrock within the study area is capped by a relatively thick mantle of geologically recent and palaeontologically sterile, superficial deposits. The sedimentary bedrock component at Cecilia 2352 and Bloemfontein 654 is rated Generally Protected A (GP.A). It is unlikely that the proposed development will affect palaeontological heritage resources within the overlying Quaternary soils due to the disturbed condition of the substrate and the absence of suitable Quaternary-aged alluvial contexts at the site. The palaeontological significance of the unconsolidated Quaternary soils is therefore considered as low. The superficial sediment component at at Cecilia 2352 and Bloemfontein 654 is rated Generally Protected C (GP.C). Impact on potential *in situ* archaeological remains, rock art localities or historically significant structures within the study area is considered unlikely. There are no major archaeological grounds to suspend potential development at Cecilia 2352 and Bloemfontein 654. The archaeological component of the site is rated Generally Protected C (GP.C).

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Introduction

A Phase 1 Heritage Impact Assessment was carried out as part of a proposed new residential development on the remainder of farms Cecilia 2352 and Bloemfontein 654, near Bloemfontein in the Free State Province (**Fig. 1**). The residential development (Cecilia Park) will cover approximately 166 ha. The assessment is required as a prerequisite for new development in terms of the National Environmental Management Act and is also called for in terms of the National Heritage Resources Act 25 of 1999. A site visit and subsequent assessment took place during November 2014. The task involved identification of possible paleontological sites or occurrences in the proposed zone, an assessment of their significance, possible

impact by the proposed development and recommendations for mitigation where relevant.

Terms of Reference

- Identify and map possible heritage sites and occurrences using available resources.
- Determine and assess the potential impacts of the proposed development on potential heritage resources;
- Recommend mitigation measures to minimize potential impacts associated with the proposed development.

Methodology

The archaeological significance of the affected area was evaluated through a desktop study and carried out on the basis of existing field data, database information and published literature. This was followed 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. Relevant archaeological information, aerial photographs (incl. Google Earth) and site records were consulted and integrated with data acquired during the on-site inspection.

Field Rating

Site significance classification standards prescribed by SAHRA (2005) were used for the purpose of this report (**Table 1**).

Description of the Affected Area

Locality data

1 : 50 000 scale topographic map: 2926 AB Maselspoort

General site coordinates (**Fig. 2**):

A) 29° 6'58.57"S 26° 8'55.81"E

B) 29° 7'10.07"S 26° 9'44.57"E

C) 29° 7'33.29"S 26° 9'44.53"E

D) 29° 7'25.95"S 26° 8'55.38"E

The site is located at the corner of Haldon Road (N8) and the N1 national road (**Fig. 2**). It is made up of open veld and mainly disturbed terrain, informally used by off-road and quad-bike enthusiasts for recreational purposes (**Fig. 3 & 4).** Old topographic maps of the area indicate that the affected area has already been subjected to commercial farming practices (plantations) by 1953 (**Fig. 5**).

Geology

The geology of the region has been described by Theron (1963) and Johnson (2006). It is situated within the Beaufort Group, Adelaide Subgroup (Karoo Supergroup), and is primarily represented by late Permian, Balfour Formation sedimentary rocks, which are made up of alternating sandstone and mudstone layers (*Pa*) (**Fig. 6**). Dykes and sills of resistant Jurassic dolerites (*Jd***)** determine the relief in the region. The igneous Jurassic dolerites are not fossiliferous and can be excluded from further consideration in the present palaeontological assessment. The site is capped by younger, superficial deposits of Quaternary age. Superficial deposits in the region consist mainly of and shallow to well-developed, windblown sand and agricultural soils of varying depth.

Background

The site is located within an area considered to be of high palaeontological sensitivity (SAHRIS Palaeo-sensitivity map 2014, **Fig. 7**). The local palaeontological footprint is primarily represented by Late Permian Karoo vertebrate fauna and Late Cenozoic (Quaternary) macrofossils (Broom 1909 a, b; Kitching 1977; Churchill *et al* 2000; Rossouw 1999, 2000, 2006). The succession of Beaufort Group sedimentary rocks is subdivided into eight biostratigraphic units, called assemblage zones (Rubidge 1995) and the sedimentary strata underlying the affected area are assigned to the *Dicynodon* Assemblage Zone (AZ) (Kitching 1995) (**Fig. 8**). This biozone is characterized by the presence of a distinctive and fairly common dicynodont genus. Therapsids and other vertebrate fossils from this biozone are usually found as dispersed and isolated specimens in mudrock horizons, associated with an abundance of calcareous nodules. Plant fossils (*Dadoxylon, Glossopteris*) and trace fossils (arthropod trails, worm burrows) are also present. The sediments assigned to the *Dicynodon* AZ are associated with stream deposits consisting of floodplain mudstones and subordinate, lenticular channel sandstones. In more recent times the central interior and what is now the Free State Province, was once a vast and highly productive grassland

ecosystem. Numerous mammal fossils stretching as far back as the Middle Pleistocene are regularly discovered in the Free State Province, especially in fluvial sediments along river courses like the nearby Modder River and the Renosterspruit. Quaternary palaeontological sites, often associated with Stone Age artefacts, are found eroding out of Pleistocene alluvial terraces and dongas along the Modder River and its tributaries near Maselspoort and Mockesdam and further east along the Honingspruit near Sannaspos. Fossils discovered at various fossil sites along the Modder River and its tributaries revealed the existence of a number of open grassland adapted herbivores (*Equus capensis, Megalotragus priscus, Pelorovis antiquus, Antidorcas bondi* and *Equus lylei*).

The Stone Age archaeological record of Modder River catchment east of Bloemfontein spans back to the early Middle Stone Age. Prehistoric archaeological remains previously recorded in the region include stone tools and mammal fossil remains from sealed and or exposed contexts. Along much of the course of Modder River and its tributaries north of Bloemfontein, alluvial deposits contain numerous occurrences of *in situ* Middle and Later Stone Age material eroding out of the overbank sediments where they are often found in association large mammal fossil remains (Churchill *et al*. 2000; Rossouw 1999, 2000, 2006). The incidence of surface scatters usually decreases away from localized areas such as alluvial contexts and dolerite-shale contact zones when stone tools largely occur as contextually derived individual finds in the open veld.

Historically, several farms in the area including Bains Vlei and Kwaggafontein was owned by Andrew Hudson Bain who settled in the Free State in 1847. In 1860 and 1862 two hunts, organized for the second son of Queen Elizabeth and for the Barolong tribe respectively, took place at Bains Vlei which led to the mass killing of thousands of antelope and a subsequent dwindling of large antelope herds in the Bloemfontein area.

Field Assessment

The study area is capped by relatively thick deposits of geologically recent aeolian sands and residual soils that thins out towards the southeast, exposing dolerite bedrock (**Fig. 10 - 12**). A foot survey of the terrain revealed no evidence for the accumulation and preservation of intact fossil material within these superficial

Quaternary sediments (**Fig. 13**). The survey revealed no indication of *in situ* Stone Age archaeological material, capped or distributed as surface scatters on the landscape (**Fig. 14**). There are also no indications of rock art, prehistoric structures or buildings older than 60 years with historical significance within the boundaries of the study area.

Impact Statement and Recommendation

Significance of impacts is summarized in **Table 2**. The natural terrain has been altered by previous farming activities (plantations) and subsequent human impact resulting from various recreational activities. There are no major palaeontological or archaeological grounds to suspend proposed development at the site.

Palaeontology

Sedimentary bedrock

The palaeontological significance of the sedimentary bedrock in the region is considered high. However, the study area is in large part underlain by intrusive igneous dolerites which are considered to be of low paleontological significance. Potentially fossil-bearing bedrock within the study area is capped by a relatively thick mantle of geologically recent and palaeontologically sterile, superficial deposits. The sedimentary bedrock component at Cecilia 2352 and Bloemfontein 654 is rated Generally Protected A (GP.A).

Superficial deposits

It is unlikely that the proposed development will affect palaeontological heritage resources within the overlying Quaternary soils due to the disturbed condition of the substrate and the absence of suitable Quaternary-aged alluvial contexts at the site. The palaeontological significance of the unconsolidated Quaternary soils is therefore considered as low. The superficial sediment component at at Cecilia 2352 and Bloemfontein 654 is rated Generally Protected C (GP.C).

Archaeology

Impact on potential *in situ* archaeological remains, rock art localities or historically significant structures within the study area is considered unlikely. There are no major archaeological grounds to suspend potential development at Cecilia 2352 and

Bloemfontein 654. The archaeological component of the site is rated Generally Protected C (GP.C).

References

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Tables and 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

Table 2. Summary of impacts at at Cecilia 2352 and Bloemfontein 654.

Zone	Rock types and Age	Archaeology & Potential Fossils / Biostratigraphy	Palaeontological Significance	Archaeological Significance	Heritage Impact & Significance at site
Cecilia 2352	Superficial deposits, soils Quaternary to Recent	Stone Age, pre-colonial, colonial. Vertebrate skeletal remains; freshwater molluscs, coprolites, microfossils	High	High	Low
	Dolerite (*Jd*) Intrusive igneous bedrock. Jurassic	Stone tool raw material (dolerite-shale contact zone). Rock engravings No fossils	Low	Low-Moderate	Low
	Adelaide Subgroup (*Pa*) Balfour Formation. Fluvial and lacustrine mudstones and sandstones. Late Permian				
Bloemfontein 654	Superficial deposits, soils Quaternary to Recent	Vertebrate skeletal remains; freshwater molluscs, coprolites, microfossils	High	High	Low
	Dolerite (*Jd*) Intrusive igneous bedrock. Jurassic	Stone tool raw material (dolerite-shale contact zone). Rock engravings No fossils	Low	Low-Moderate	Low

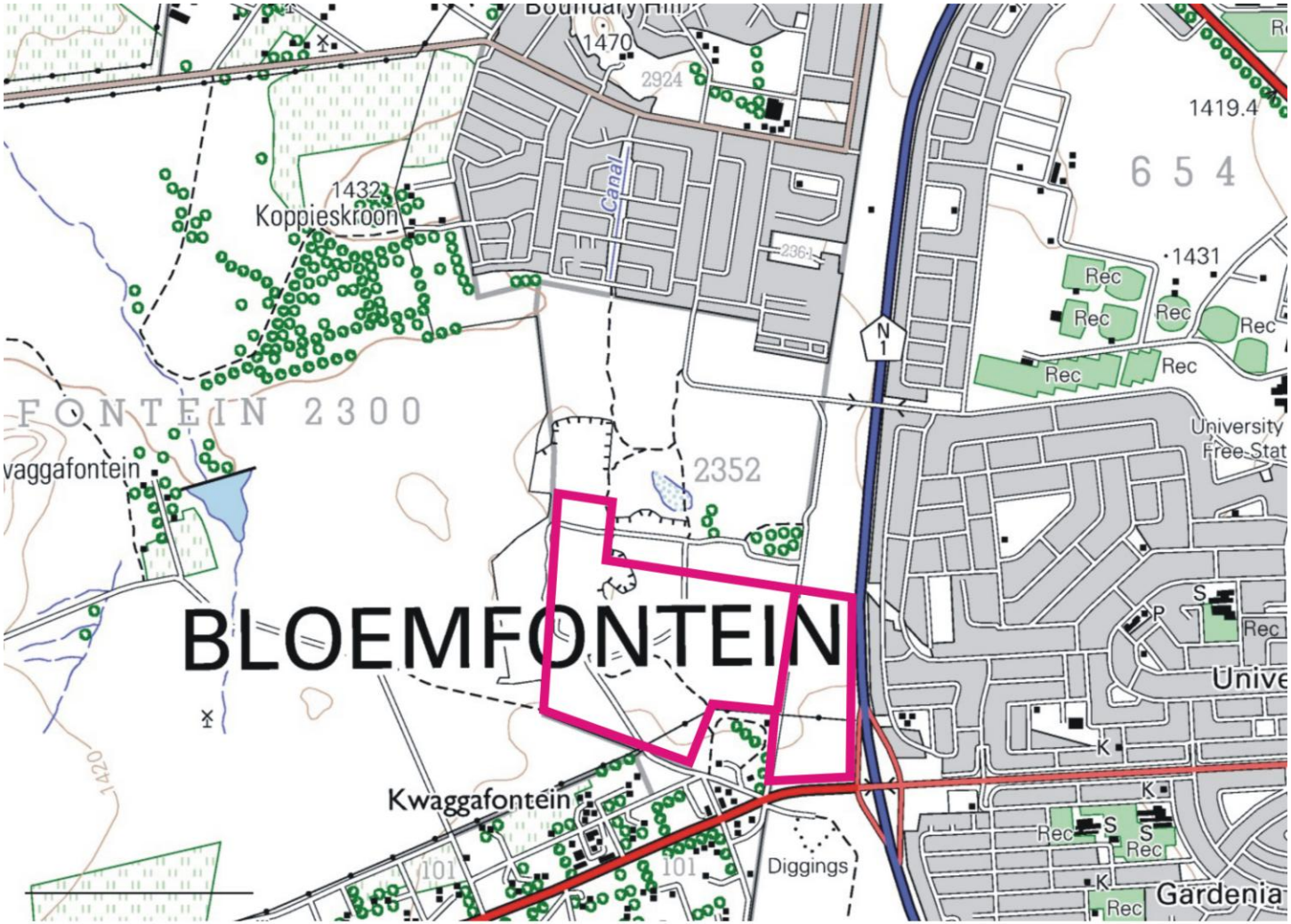

Figure 1. Map of the study area (portion of 1:50 000 scale topographic map 2926 AB Maselspoort).

Figure 2. Aerial view of the study area.

Figure 3. The study area at Bloemfontein 654, looking southeast (above) and south (below).

Figure 4. The study area at Cecilia 2352, looking west.

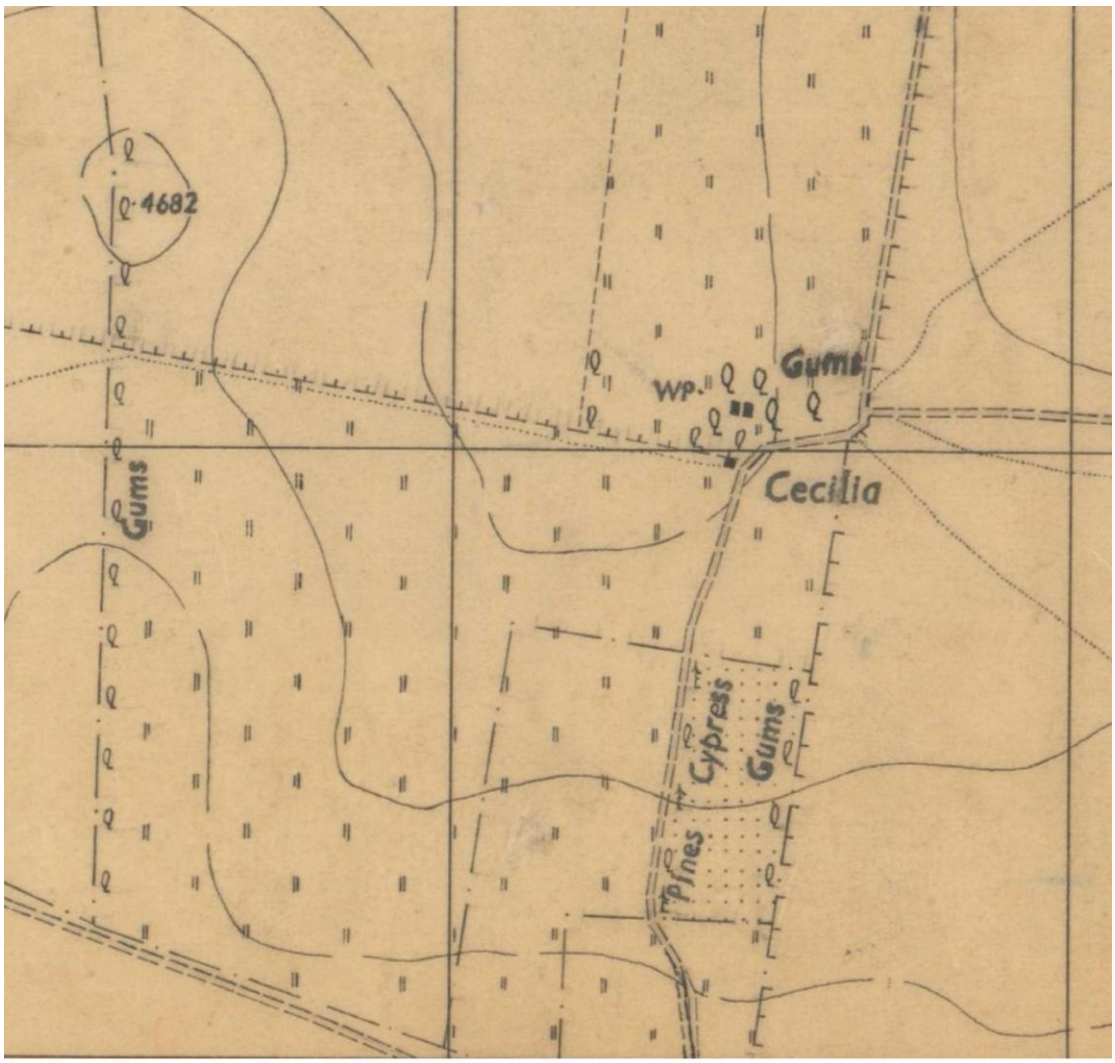

Figure 5. 1:18000 topographic map of Cecilia ca. 1953 indicate that the affected area has been used as a tree plantation during the 1940's and 1950's.

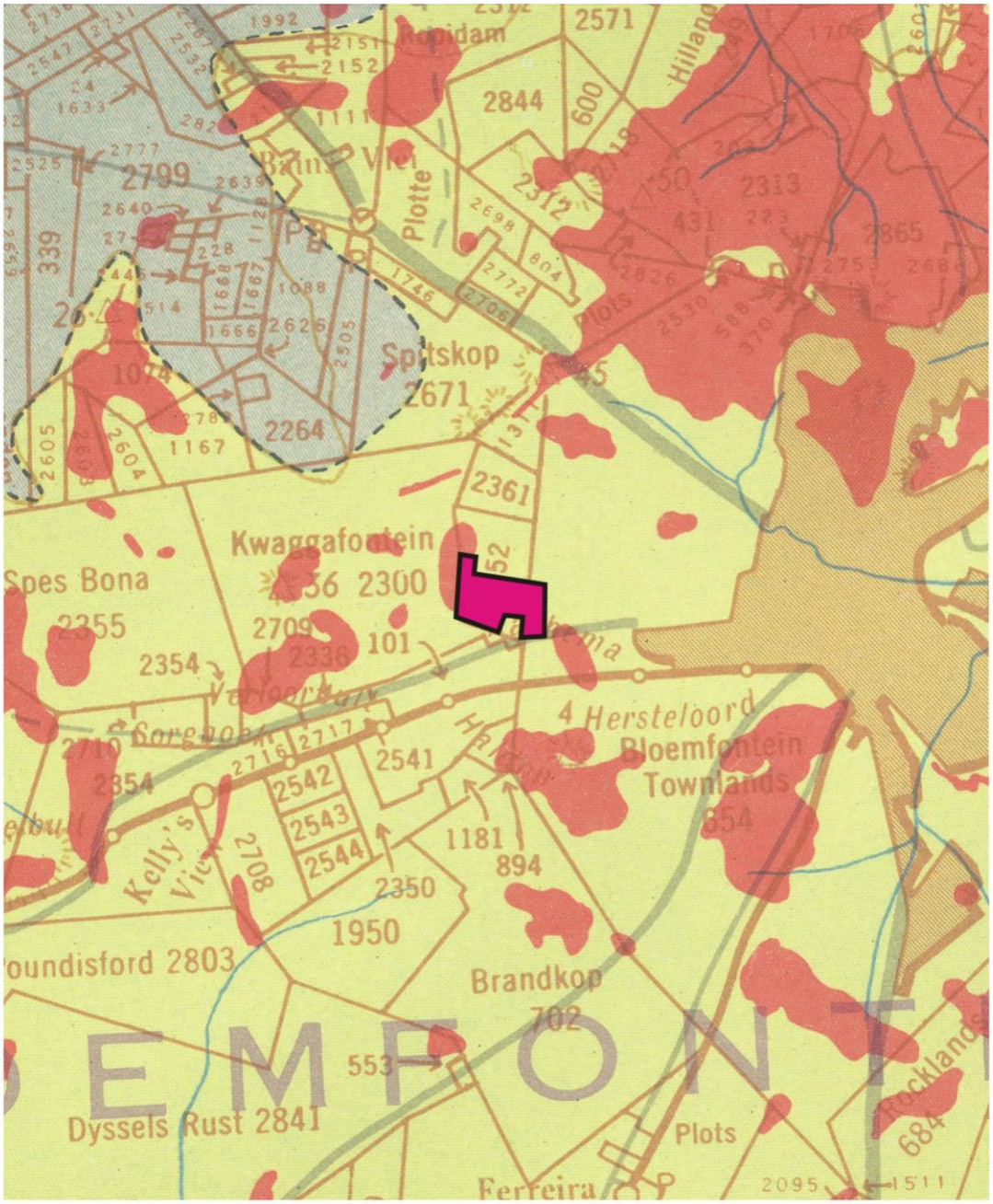

Figure 6. Portion of the 1:250 000 scale geological map Bloemfontein 2926. The site (rectangle) is situated within the Beaufort Group, Adelaide Subgroup, which is represented by Late Permian, Balfour Formation sedimentary rocks, made up of alternating sandstone and mudstone layers (green area). The sedimentary rocks are intruded by resistant Jurassic dolerites (Karoo Dolerite Suite, red area). Surface (superficial) sediments are primarily made up of alluvium, aeolian sands and residual soils.

Figure 7. According to the SAHRIS Palaeo-sensitivity map (2014), the site is located within an area considered to be of high palaeontological sensitivity. Red = high sensitivity; field assessment and protocol for finds is required. Grey = low sensitivity; no palaeontological studies are required.

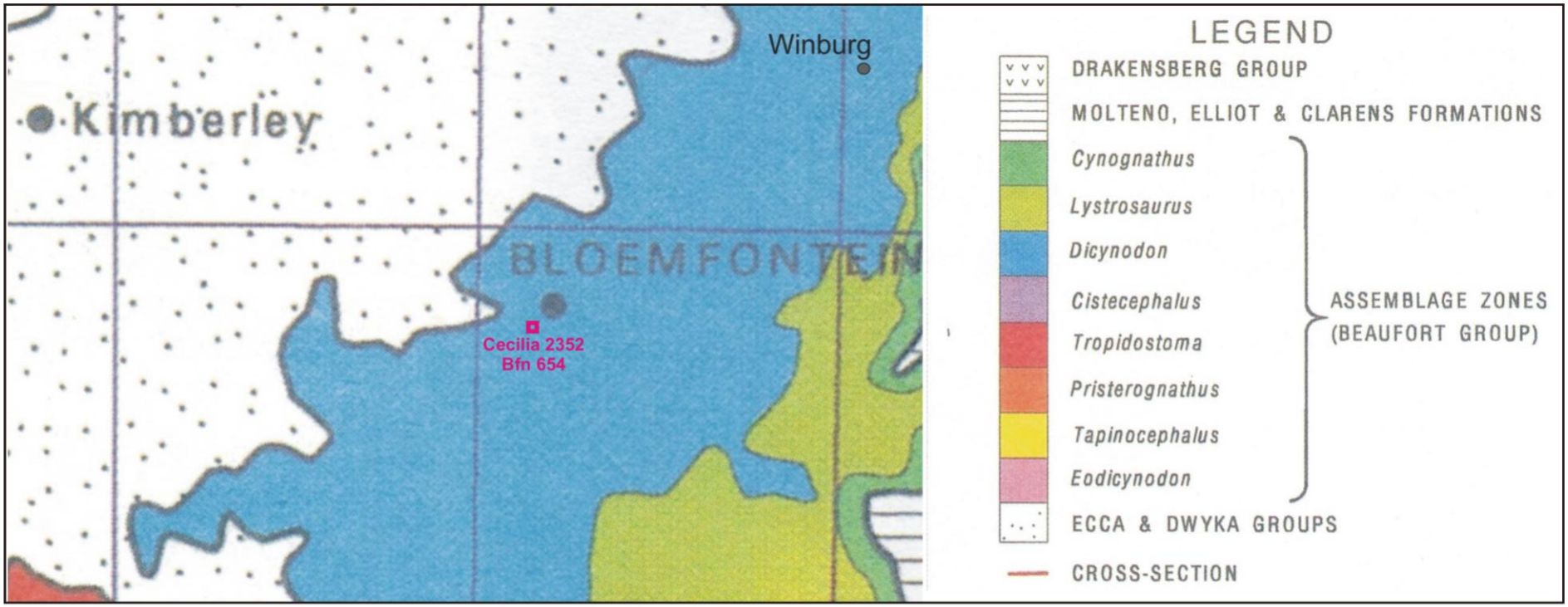

Figure 8. Geographical distribution of vertebrate biozones of the Beaufort Group around Bloemfontein (Rubidge 1995).

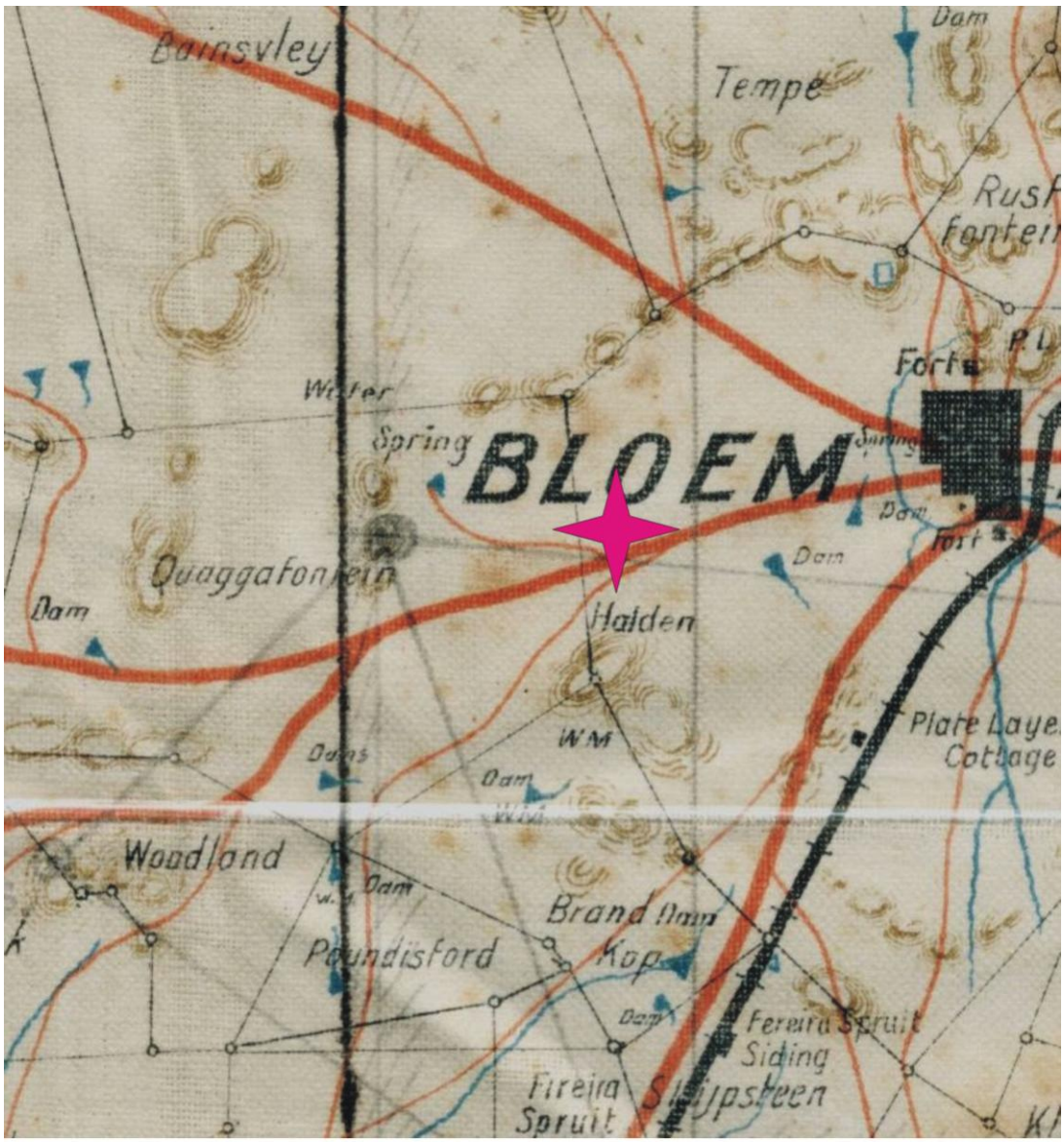

Figure 9. British military map ca. 1900 of the area between Bains Vlei in the and Brandkop in the south. The study area is indicated by a star.

Figure 10 The site is capped by relatively thick deposits of geologically recent aeolian sands and residual soils that thins out towards the southeast, exposing dolerite bedrock. Scale: 1 = 10 cm.

Figure 11. The superficial sediments near the southeastern boundary of the study area is extensively disturbed by previous construction activities. Scale: 1 = 10 cm.

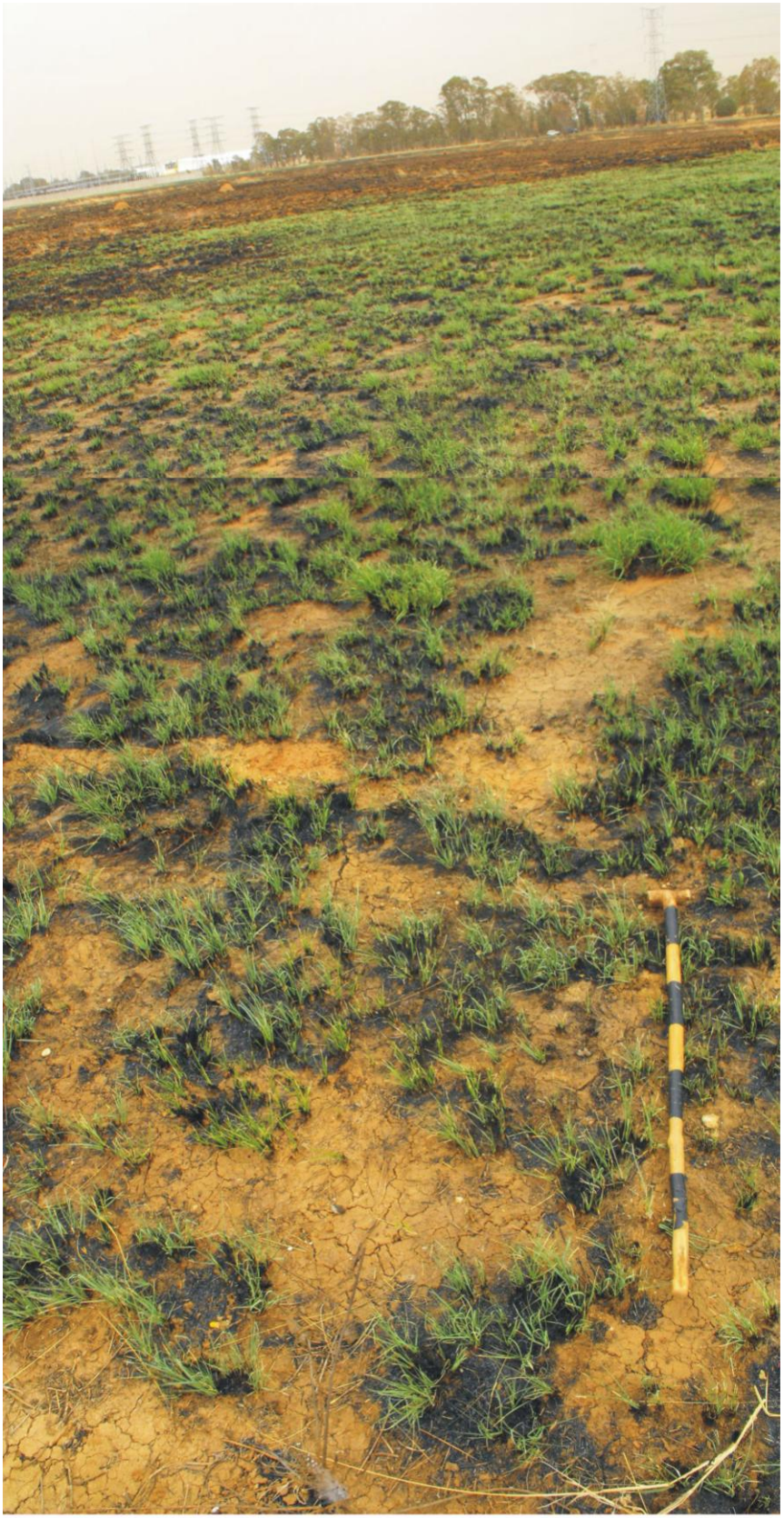

Figure 12. Open veld underlain by geologically recent superficial sediments, looking southwest. Scale: 1 = 10 cm.

Open veld underlain by geologically recent superficial sediments, looking east (above, left) and west (right). The terrain is frequently exposed to illegal dumping (below, left) Scale: 1 = 10 cm.

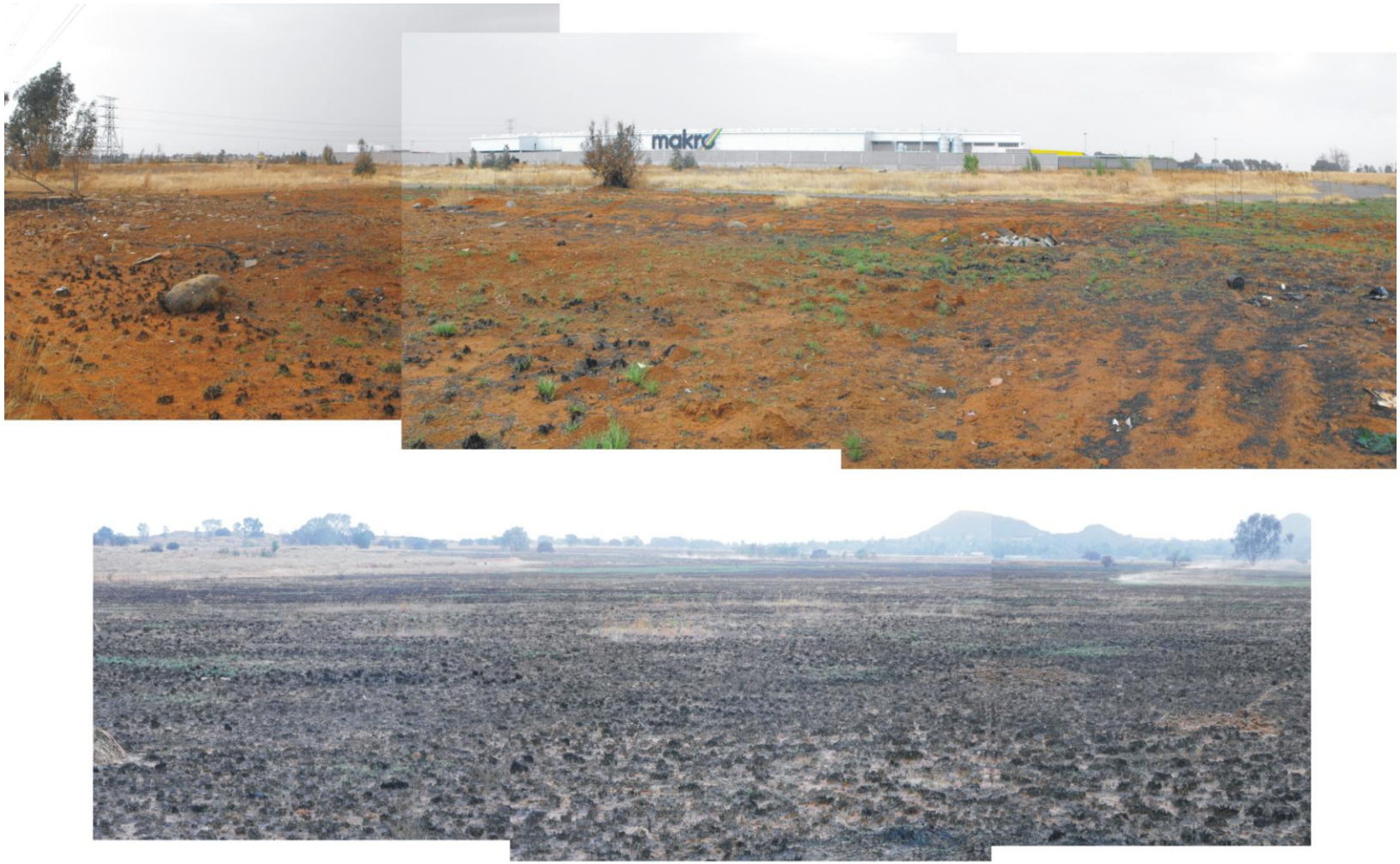

Figure 14. The survey revealed no indication of *in situ* Stone Age archaeological material, capped or distributed as surface scatters on the landscape, looking southwest (above) and west-northwest (below).