# Phase 1 Heritage Impact Assessment of the farm Rietfontein 313 near Leandra, Mpumalanga Province.

Report prepared by
Paleo Field Services
PO Box 38806
Langenhovenpark
9330

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## Summary

At the request of Greenbox Environmental Consultants a Phase 1 Heritage Impact Assessment was carried out for a proposed new residential development on the farm Rietfontein 313 outside Leandra in Mpumalanga Province. The survey area covers about 5 $km^2$ of undulating terrain made up of existing farmland that include grazing as well as assorted arable land. The terrain is primarily underlain by Jurassic-age dolerites (*Jd*), but coarse-grained Vryheid Formation sandstones are primarily exposed along the western margins of the study area where no fossils or fossil localities were observed. The area is covered by a well-developed residual soil overburden, but it has been severely degraded by previous agricultural activities. A pedestrian survey revealed no evidence of Quaternary fossils or fossil exposures within Ecca Group, Vryheid Formation outcrop. Given the predominance of palaeontologically insignificant dolerite bedrock and degraded Quaternary overburden, most of the study area is generally regarded as of low palaeontological significance, three smaller areas are underlain by potentially sensitive argillaceous rocks that are more or less buffered by superficial overburden. Given the nature and potential scale of the development excavations larger than 1 $m^2$ that exceeds depths of >1 m into potentially **unweathered** Vryheid Formation sediments will need further monitoring by a professional palaeontologist during the construction phase of the project. Except for indication of modern farming activities, the pedestrian survey revealed no evidence of *in situ* Stone Age archaeological sites or scatters, prehistoric structures related to the occupation by early agricultural societies, graves or graveyards or historically significant structures older than 60 years. The effect of modern farming practices on the landscape is clear with the result that the study area is also not considered to be archaeologically sensitive. It is assigned site rating of Generally Protected C (GP.C).

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# Introduction

At the request of Greenbox Environmental Consultants a Phase 1 Heritage Impact Assessment was carried out for a proposed new residential development on the farm Rietfontein 313 outside Leandra in Mpumalanga Province (**Fig. 1**). South Africa's unique and non-renewable heritage is 'Generally' protected in terms of the National Heritage Resources Act (Act No 25 of 1999) and may not be disturbed at all without a permit from the relevant heritage resources authority. The NHRA requires that all heritage resources, that is, all places or objects of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance are protected. Thus any assessment should make provision for the protection of all these heritage components, including archaeology older than 100 years, shipwrecks, battlefields, graves, and structures over 60 years of age, living heritage and the collection of oral histories, historical settlements, landscapes, geological sites, palaeontological sites and objects. The Act 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 of development listed in Section 38 (1) of the NHR Act are:

- The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- The construction of a bridge or similar structure exceeding 50m in length;
- Any development or other activity which will change the character of the site;
- Exceeding 5000 m² in extent;
- Involving three or more existing erven or subdivisions thereof;
- Involving three or more subdivisions thereof which have been consolidated within the past five years;
- Costs of which will exceed a sum set in terms of regulations by the South African Heritage Resources Agency (SAHRA).
- The rezoning of a site exceeding 10 000 m².

- Any other category of development provided for in regulations by the South African Heritage Resources Agency (SAHRA).

**Methodology**

The affected areas were evaluated on the basis of existing field data, database information, maps and published literature. This was followed up by a field assessment (pedestrian survey of each locality). A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used for recording purposes. Relevant heritage information, aerial photographs (Google Earth) and site records were consulted and integrated with data acquired during the site visit.

**Terms of reference:**

- Identify and map potential 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.

**Field Rating**

Site significance classification standards, as prescribed by SAHRA, were used for the purpose of this report (**Table 2**).

## Locality data

1 : 50 000 scale topographic map 2628BD Leandra

1:250 000 scale geological map: 2629 East Rand

The survey area covers about 5 $km^2$ of undulating terrain made up of existing farmland that include grazing as well as assorted arable land on the farm Rietfontein 313, located north of the R29 and about 2 km west of Leandra (**Fig. 2 & 3**).

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

A) 26°20'30.58"S 28°51'51.88"E

B) 26°20'14.65"S 28°52'41.08"E

C) 26°22'29.92"S 28°54'4.38"E

D) 26°22'53.77"S 28°53'41.76"E

E) 26°22'25.37"S 28°53'7.17"E

F) 26°21'55.54"S 28°52'40.94"E

G) 26°20'28.51"S 28°52'40.02"E

H) 26°20'41.00"S 28°51'55.81"E

**Geology**

The area around Leandra is underlain by fluvial and deltaic deposits of coarse sandstones, mudrocks and siltstones of the Early Permian Vryheid Formation (*Pv*, Ecca Group, Karoo Supergroup c. 290 to 270 Ma), which is known for its abundant coal deposits. (Keyser *et al*., 1986; Johnson *et al.*, 1996, 2006) (**Fig. 4**).The study area is also widely intruded by dykes, inclined sheets and sills of Jurassic-age dolerites (*Jd*). Superficial sediments are mainly represented by Quaternary alluvium and residual soils.

## Background

**Palaeontology**

Well-preserved plant fossils are commonly found in the fine-grained mudrocks associated with the coal deposits associated with the Vryheid Formation in the region. A wealth of plant fossils is recorded from the formation, including the well-known *Glossopteris* Flora (as well as lycopods, rare ferns and horsetails, conifers and ginkgoaleans) (Anderson and Anderson 1985). A low diversity of trace fossils, rare insects, possible conchostracans, non-marine bivalves and fish scales have also been reported from this formation (MacRae, 1999).

Quaternary palaeontological sites are occasionally found in Pleistocene alluvial terraces and dongas along rivers and streams. Quaternary alluvial deposits, especially near water courses and drainage lines, have the potential to yield microfossil and large mammal fossil remains. Localized, fossil rich alluvial exposures of Pleistocene age (Cornelia Formation) have been recorded north and east of Cornelia, which is located about 80 km due south of Leandra (**Fig. 5**). One of these sites is known as the Cornelia-Uitzoek vertebrate locality, and is the type site of the Cornelian Land Mammal Age (Butzer *et al.* 1974; Bender & Brink 1992; Brink & Rossouw 2000). The site consists of a pocket of Quaternary alluvial and colluvial gravels and clays in small basins of Karoo Ecca shale. These Quaternary deposits are characterized by several distinct fossil mammal species, including *Stylochoerus compactus*,

*Connochaetes laticornutus* and *Megalotragus eucornutus* (**Fig**. **6**). During recent excavations a human first upper molar, was discovered during the systematic excavation of a densely-packed bone bed in the basal part of the sedimentary sequence (Brink et al. 2012. This sequence was dated by palaeomagnetism which correlated the bone bed to the Jaramillo subchron, between 1.07 and 0.99 Ma. This makes the specimen the oldest southern African hominine remains outside the karst landscapes of northern South Africa.

**Archaeology**

Stone Age archaeological research in the region is largely overlooked. Early Stone Age artifacts were recorded on the farm Droxford situated between Ermelo and Mbabane and Later Stone Age and rock art localities have previously been recorded in the Carolina, Ermelo and Lothair Districts, all east and southeast of Leandra (Van Riet Lowe 1941; Mason 1962). Early Stone tool assemblages have been recorded in Vaal River gravels near Vereeniging while a large Early Stone Age stone tool assemblage has been excavated at the Cornelia-Uitzoek vertebrate locality which includes Acheulean bifaces, biface flakes, and a number of flakes (Butzer *et al.* 1974; Brink *et al.* 2012) (**Fig. 6**). A number of Middle Stone Age lithic scatters and associated faunal material have also been recorded by the author of this report during previous surveys conducted along a number of erosional gullies in the Cornelia area.

The early settlement and subsequent diffusion of Iron Age agro-pastoralists 1500 years ago in Mpumalanga is well documented, but the majority of the known sites are located north of Ermelo and Bethal (Evers 1975; Delius 2007). The record of diffusion of Iron Age agro-pastoralists are also established in the north-eastern Free State with the type site of Iron Age settlements in the region named after Ntsuanatsatsi hill, the legendary place of origin of the Fokeng people, which is situated between Frankfort and Vrede (Type site OU1, farm Helena, Maggs 1976). Type N settlements are the oldest Iron Age settlements from the north-eastern corner of the Free State with radiocarbon dates going back to between the 15$^{th}$ and 17$^{th}$ century A.D. **(Fig. 7**). Type N settlements subsequently led to Type V settlement units (Type site OO1 Makgwareng, Lindley District), after the former were replaced or converted into a new settlement pattern (Maggs 1976). Type V settlements spread out further to the south and east, but did not extend further than the Vet River and the Drakensberg escarpment. Two well-known Late Iron Age sites in the region southern

Mpumalanga region include Tafelkop near Bethal, which consist of numerous corbelled huts that are associated with early Sotho migration in the north-eastern Free State (Hoernle 1930; Maggs 1976; Mason 1962; Walton 1951, 1965). Another site worth mentioning is Wildebeestfontein recorded close to Kendall in the Bethal District (Taylor 1979). Although Leandra lies well within a region characterized by the presence of numerous stone-walled settlements of the late Iron Age (Maggs 1976, Bergh 1998), there is currently no record of stone-walled settlements located within the vicinity of Rietfontein 313 (**Fig. 5**).

## Field Assessment

The terrain is primarily underlain by Jurassic-age dolerites (*Jd*), but coarse-grained Vryheid Formation sandstones are primarily exposed along the western margins of the study area where no fossils or fossil localities were observed (**Fig. 8).** The area is covered by a well-developed residual soil overburden, but it has been severely degraded by previous agricultural activities. Except for indication of modern farming activities, the pedestrian survey revealed no evidence of Quaternary fossils, fossil exposures within the Ecca Group, *in situ* Stone Age archaeological sites or scatters, prehistoric structures related to the occupation by early agricultural societies, graves or graveyards or historically significant structures older than 60 years.

## Impact Statement and Recommendation

Potential impacts are summarized in **Table 1**.

**Palaeontology**

The proposed development is expected to largely affect Quaternary overburden, made up of residual soils and alluvium, and Karoo dolerites with associated Vryheid Formation metasediments - represented by coarse-grained deltaic sandstones - the latter underlying the extreme western and northwestern boundaries of the footprint. The superficial overburden covering the study area is extensively degraded and is not considered to be palaeontologically significant with regard to Quaternary fossil remains. Given the predominance of palaeontologically insignificant dolerite bedrock and degraded Quaternary overburden, the study area marked **A** in **Fig. 9** is generally regarded as of low palaeontological significance. The sections marked **B, C and D** in **Fig. 9** are underlain by potentially sensitive argillaceous rocks that are more or less buffered by superficial overburden and the chances of finding fossils are considered

low. However, given the nature and potential scale of the development excavations larger than 1 $m^2$ that exceeds depths of >1 m into potentially **unweathered** Vryheid Formation sediments in Areas B, C and D, will need further monitoring by a professional palaeontologist during the construction phase of the project. The palaeontologist must apply for a valid collection / removal permit from SAHRA if fossil material is found within unweathered/fresh sedimentary bedrock.

**Archaeology**

The effect of modern farming practices on the landscape is clear with the result that the study area is also not considered to be archaeologically sensitive. It is assigned site rating of Generally Protected C (GP.C) **(Table 2**).

## References


Anderson, J.M., Anderson, H.M., 1985. Palaeoflora of Southern Africa: Prodromus of South African megafloras, Devonian to Lower Cretaceous. A.A. Balkema, Rotterdam. 423 pp.

Bergh, J.S. 1999. *Geskiedenisatlas van Suid Afrika: Die vier noordelike provinsies*. Van Schaik. Pretoria.

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.

Brink, J.S., Herries, A.I.R. and Moggi-Cheggi, J. et al. 2012. First hominine remains from a 1.0 million year old bone bed at Cornelia-Uitzoek, Free State Province, South Africa. *Journal of Human Evolution* 63: 527 – 535.

Butzer, K.W., Clark, J.D. and Cook, H.B.S. 1974. Geology, archaeology and fossil mammals of the Cornelia Beds. *Memoirs van die Nasionale Museum* 9.

Delius, P. (ed) 2007. *Mpumalanga reclaiming the past, defining the future*. Department of Culture and Tourism, Mpumalanga.

Evers, T.M. 1975. Recent Iron Age research in the Eastern Transvaal, South Africa.

*The South African Archaeological Bulletin* 30 (119/120): 71 – 83.

Hoernle, R. F. A. 1930. The Stone Hut Settlement on Tafelkop, near Bethal. *Bantu Studies* 4: 217-33

Johnson, M.R., Van Vuuren, C.J.,Hegenberger, W.F., Key, R. and Shoko, U. 1996. Stratigraphy of the Karoo Supergroup in southern Africa: an overview. Journal of African Earth Sciences 23(1): 3-15.

Johnson, M.R., van Vuuren, C.J., Visser, J.N.J., Cole, D.I., Wickens, H.deV., Christie, A.D.M., Roberts, D.L., Brandl, G., 2006. Sedimentary rocks of the Karoo Supergroup. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The Geology of South Africa. Geological Society of South Africa, Pretoria. Pp 461 – 499.

Keyser, N., Botha, G.A. & Groenewald, G.H. 1986. 1:250 000 scale geological map 2628 East Rand. Council for Geosciences. Pretoria.

Maggs, T.C. 1976. *Iron Age communities of the southern Highveld*. Occasional Papers of the Natal Museum No. 2.

Mason, R.J. 1962. *Prehistory of the Transvaal*. Johannesburg: Witwatersrand University Press.

MacRae, C. 1999. *Life Etched in Stone*. Fossils of South Africa. The Geological Society of South Africa, Johannesburg.

SAHRA, 2005. Minimum Standards for the Archaeological and the Palaeontological Components of Impact Assessment Reports.

Taylor, M.O.V. 1979. Wildebeestfontein: A Late Iron Age Site in the Southeast Transvaal. Goodwin Series, No. 3, Iron Age Studies in Southern Africa (1979): 120-129.

Van Riet Lowe, C. 1941. *Prehistoric Art in South Africa*. Archaeological Series 5. Bureau of Archaeology, Dept. of the Interior. Pretoria.

Walton, J. 1951. Corbelled Stone Huts in Southern Africa. Man 51: 45-48

Walton, J. 1965. Early Ghoya settlement in the Orange Free State. *Researches of the National Museum*. Memoir 2, pp. 1 – 40.

AUTHOR DETAILS

Dr. Lloyd Rossouw specializes in the southern African Quaternary and has over twenty years of extensive fieldwork experience. He graduated with Archaeology and Cultural Anthropology for his BA degree and went on to receive training in southern African archaeology at Honors level at the University of Stellenbosch's Archaeology Department. He received specialized training in faunal osteology and Quaternary palaeontology for his MSc-degree at the Bernard Price Institute of Palaeontology (Wits) and obtained his PhD-degree at the University of the Free State, specializing in plant microfossil research. He is currently Head of the Archaeology Department at the National Museum in Bloemfontein and a member of the Association for Southern African Professional Archaeologists (ASAPA) and the Palaeontological Society of Southern Africa (PSSA).

DECLARATION OF INDEPENDENCE

I, Lloyd Rossouw, declare that I act as an independent specialist consultant. I 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. I have no interest in secondary or downstream developments as a result of the authorization of this project.

14 / 12 / 2018

# 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 |

**Table 2.** Summary of potential impacts at Rietfontein 313.

| Geological Unit | Rock types and Age | Potential Palaeontological / Archaeological heritage in region | Palaeontological significance | Archaeological significance | Potential Development Impact | Heritage Impact at site after survey |
|---|---|---|---|---|---|---|
| Regolith | Alluvium, residual soils. Quaternary to Recent | Rare (localized) large vertebrate skeletal remains, coprolites, microfossils, in alluvial or lacustrine (pan) contexts; Intact or uncapped stone tool assemblages, Rock art, Prehistoric structures (LIA); Historical structures; Graves/graveyards | Moderate-High | High | High | Low |
| Karoo Dolerite | Intrusive igneous bedrock. Jurassic | Palaeontologically sterile<br><br>Rare Stone Age knapping sites near contact metamorphic zones | Low | Moderate | High | Low |
| Ecca Group, Vryheid Formation (Karoo Supergroup) | Fluvial and deltaic deposits of coarse sandstone, fine-grained mudrocks and siltstones. Early Permian | Plant fossils (Glossopteris, lycopods, rare ferns and horsetails, conifers and ginkgoaleans); trace fossils, rare insects, non-marine bivalves and fish scales. | High | Low | Low - Moderate | Low-Moderate |

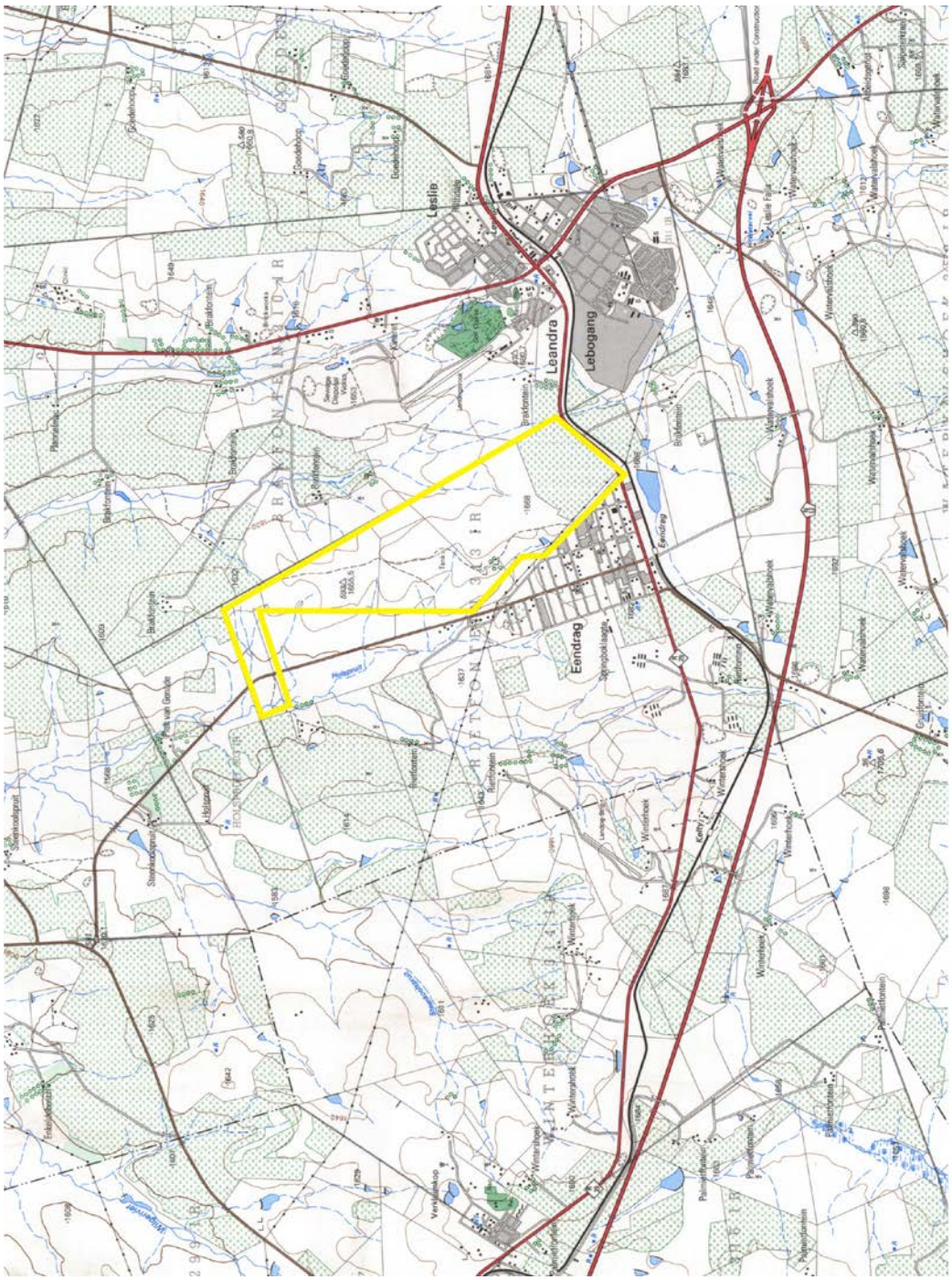


Figure 1. Map of the proposed development footprint on farm Rietfontein 313 (portion of 1:50 000 scale topographic 2628BD Leandra).


Figure 2. Aerial view of the study area.

Figure 3. General view of the terrain: open grazing land (above left), farmland (above right), modern farm features (below left) and geologically recent alluvial deposits (below right).

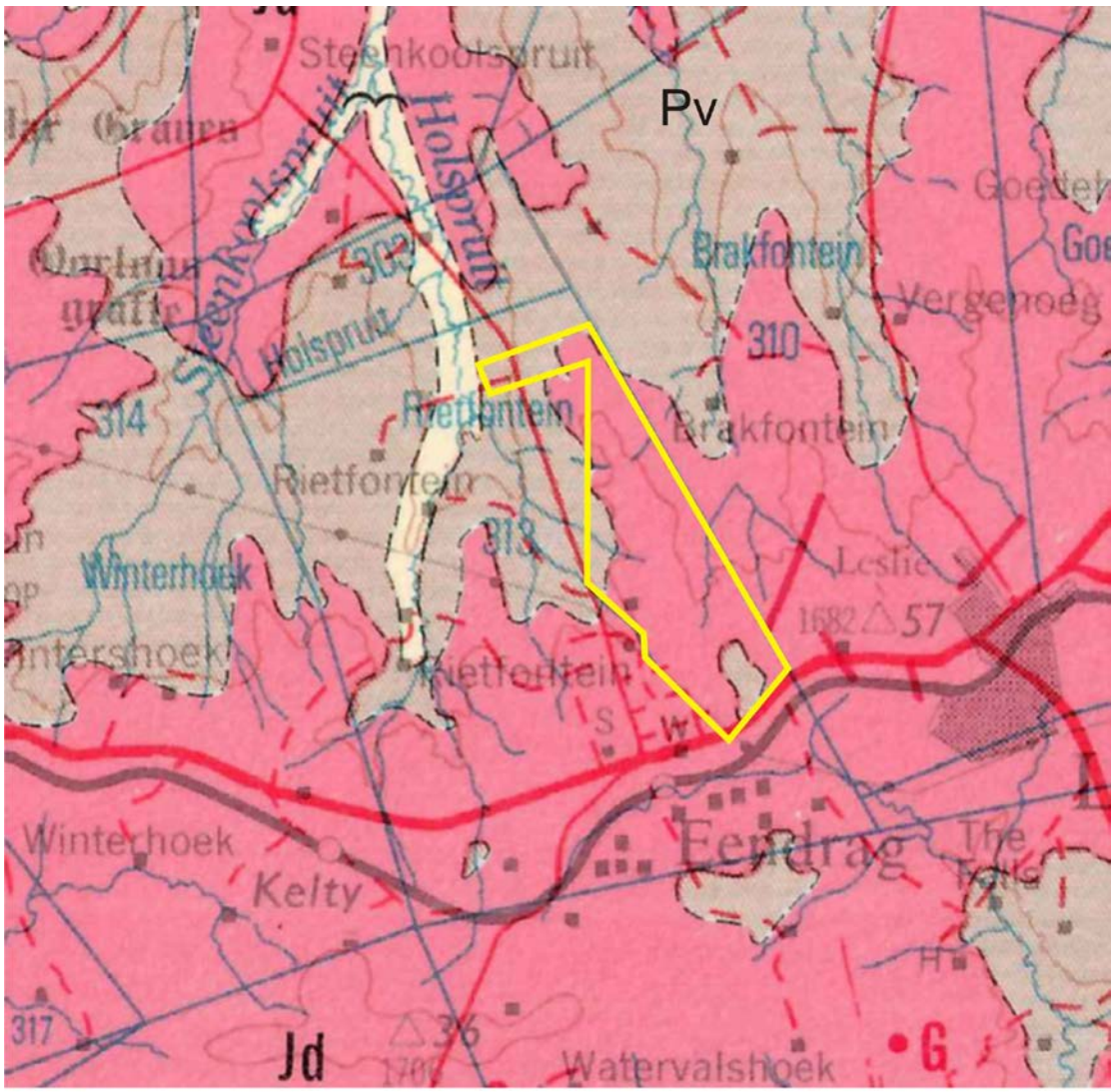


Figure 4. Portion of 1:250 000 scale geological map 2926 East Rand showing study area underlain by intrusive dolerites (*Jd*) and Early Permian Vryheid Formation sediments and metasediments (*Pv*).

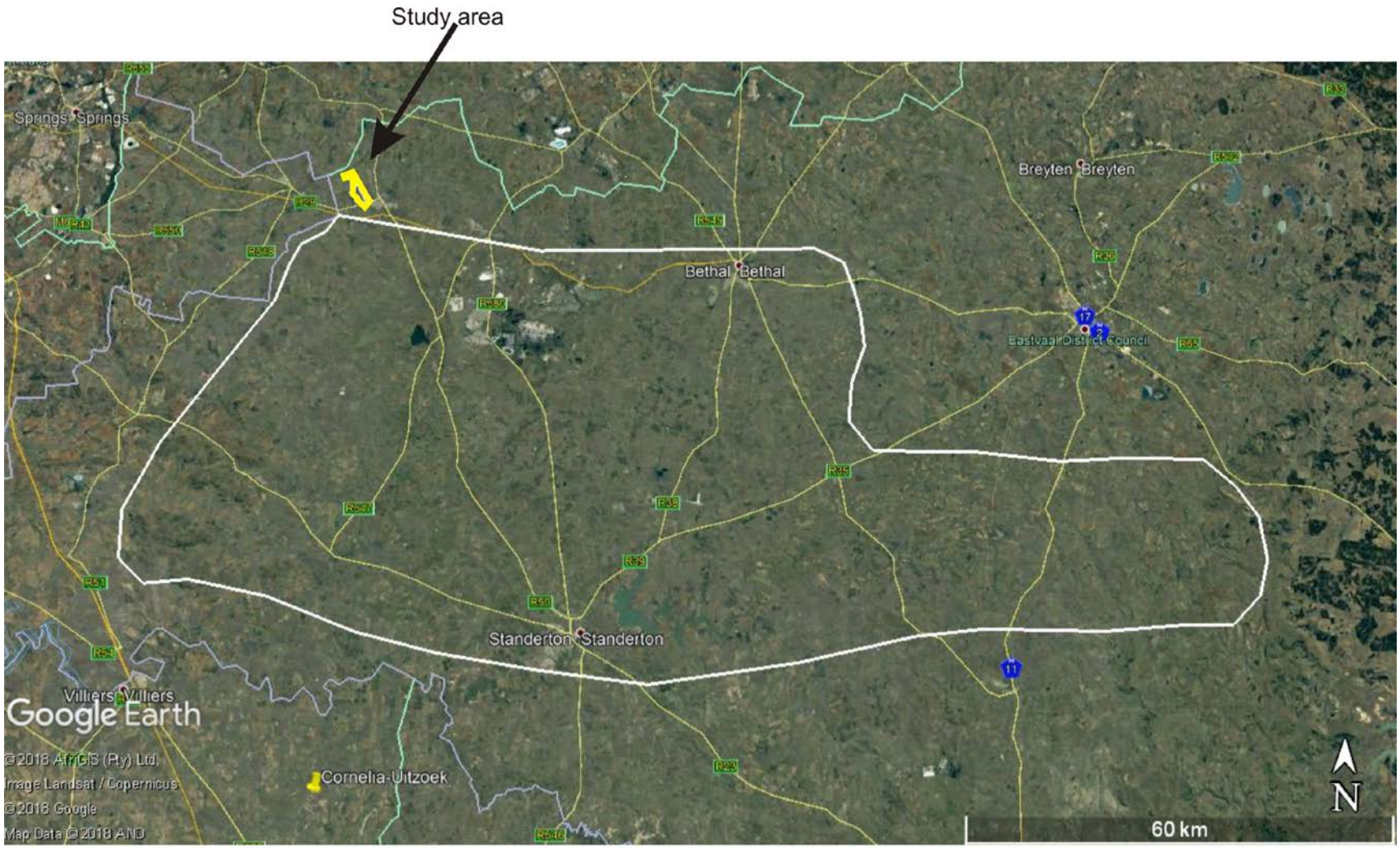


Figure 5. Aerial view of study area (yellow polygon) with distribution of 585 Late Iron Age sites between Heidelberg, Ermelo and Standerton according to Bergh (1998, white polygon) and locality of the Cornela-Uitzoek fossil and Stone Age archaeological site.

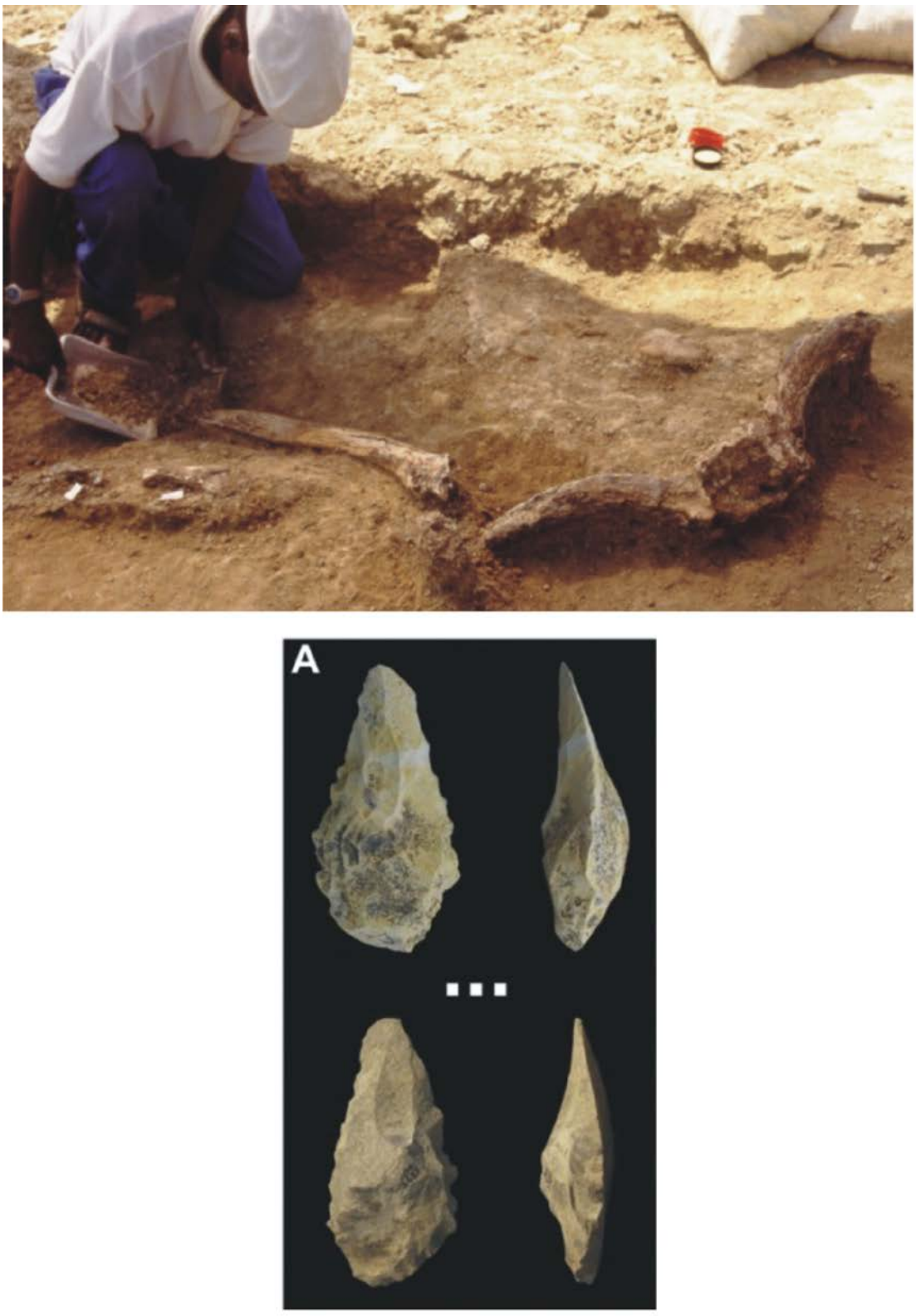


Figure 6. Skull and horn cores of *Megalotragus eucornutus* (above) and Acheulian bifaces (below) from the Cornelia-Uitzoek fossil and Stone ge archaeological site.

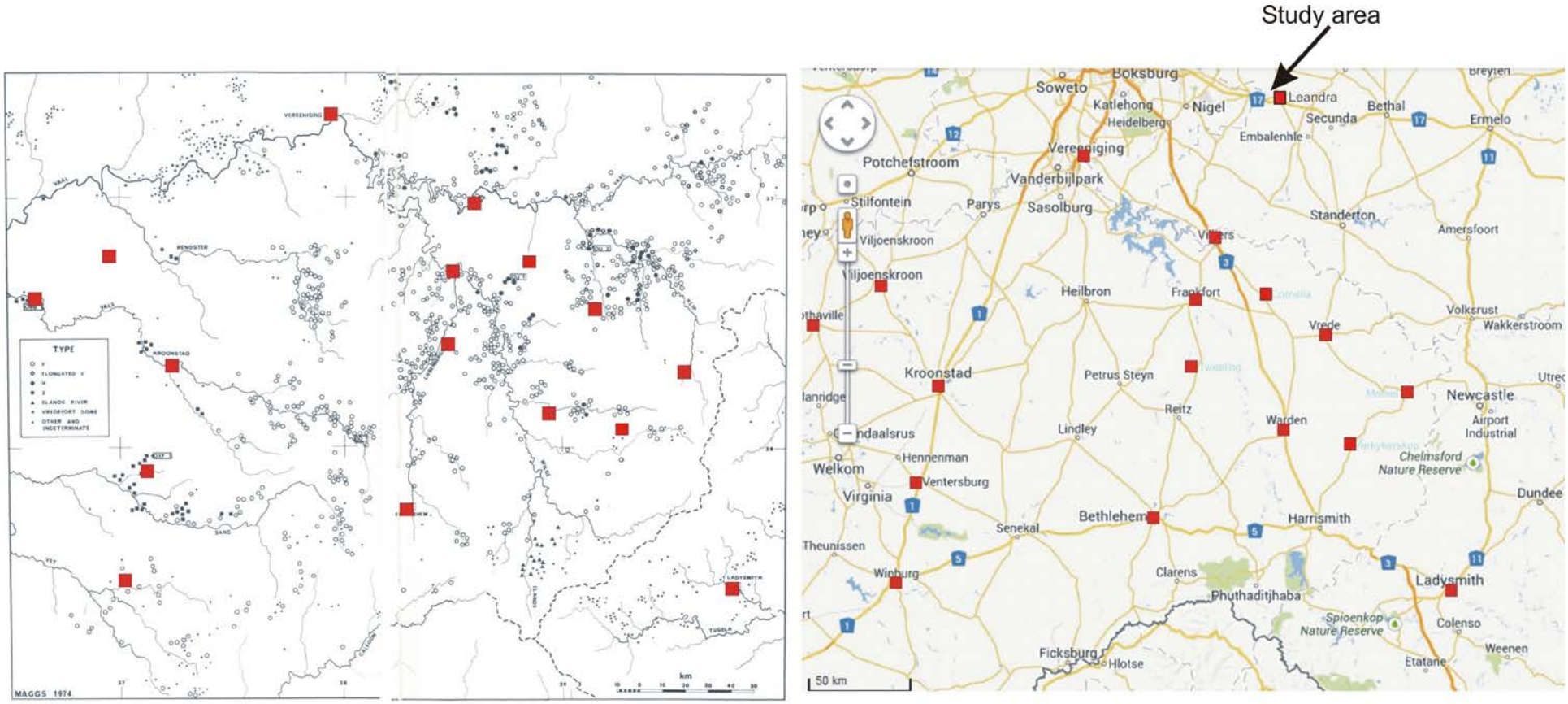


Figure 7. Distribution of Iron Age settlements in the Southern Highveld region (left) according to Maggs (1976).

Figure 8. The terrain is primarily underlain by Jurassic-age dolerites (top) and coarse-grained Vryheid Formation sandstones, primarily exposed along the western margins of the study area (center and bottom). Scale 1 = 10 cm.

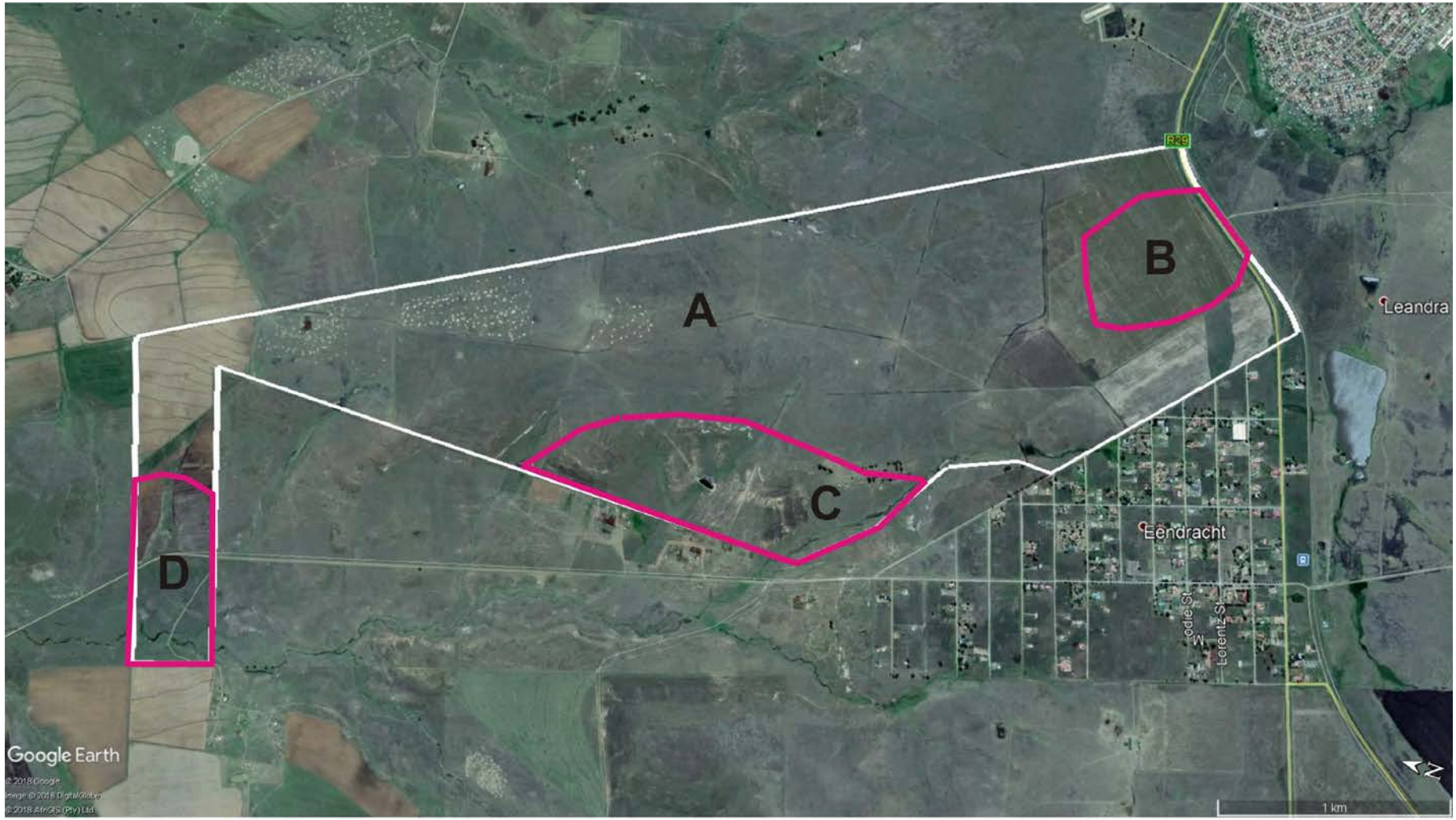


Figure 9. Area A iis generally regarded as of low palaeontological significance while the sections marked B, C and D are underlain by potentially sensitive argillaceous rocks of the Vryheid Formation.