

**A PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT FOR THE PROPOSED
CONSTRUCTION OF A 10 MEGAWATT SOLAR FACILITY ON THE FARM
HANGKLIP (ANNEX ALOE RIDGE NO. 451) NEAR GRAAFF REINET, BLUE
CRANE MUNICIPALITY, EASTERN CAPE PROVINCE**

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Note: This report follows the minimum standard guidelines required by the South African Heritage Resources Agency for compiling Archaeological Heritage Phase 1 Impact Assessment (AHIA) reports.

EXECUTIVE SUMMARY

Purpose of the Study

The original proposal was to conduct a phase 1 archaeological impact assessment of the proposed construction site for a 10 megawatt solar facility on the farm Hangklip (Annex Aloe Ridge No. 451) near Graaff Reinet, Blue Crane Municipality, Eastern Cape Province. The survey was conducted to establish the range and importance of possible exposed and *in situ* archaeological sites/materials, the potential impact of the development and, to make recommendations to minimize possible damage to these sites.

The location of the development

The proposed 10 megawatt solar facility development is situated on the farm Hangklip (Annex Aloe Ridge No. 451) approximately 25 kilometres south-east of Graaff Reinet and 30 kilometres from Pearston, Blue Crane Municipality, Eastern Cape Province.

Type of development

The proposed development entails the establishment and operation of a solar facility on an area of 19 ha with a generating capacity of 10 MW.

The investigation

The proposed Hangklip solar facility site is covered with orange brown alluvial soil, low bushes, shrubs and grass and used for stock farming. Large areas are covered by dense grass especially along the dry water course which made archaeological visibility difficult. In some areas the alluvial sands have been eroded/washed out and exposed the underlying land surfaces. Occasional Middle and later Stone Age stone tools were observed on these eroded surfaces. It is unlikely that any significant archeological material will be exposed during the development.

Cultural sensitivity

The study area investigated appears to be of low archaeological sensitivity and the impact of construction will be of low negativity. Development may proceed as planned.

Recommendations

1. If any concentrations of archaeological material are uncovered during development, it should be reported immediately to the Albany Museum and/or the South African Heritage Resources Agency.
2. Construction managers/foremen should be informed, before construction starts, on the possible types of heritage sites which may be encountered during construction.

PROJECT INFORMATION

Status

The proposed solar power production is to be developed by Scatec Solar (Pty) Ltd to introduce power to the national grid under the control of Eskom. This report is part of a Basic Assessment Process (BA).

The type of development

The proposed Hangklip solar facility site and associated infrastructure will be developed on approximately 19 ha with a generating capacity of 10 MW. The panels of the solar cells are situated on raised aluminium, stainless steel or wooden frames. The frames are approximately 3.0 m in width, with a height of 2.2 m. The panels are established at an angle of approximately 25° from the horizontal. The frames are founded into the ground by means of small steel footings. Electrical wiring and power lines are positioned below ground with switch boxes established on the frames.

The Developer:

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Terms of reference

Conduct a phase 1 archaeological impact assessment of the proposed construction site for a 10 megawatt solar facility on the farm Hangklip (Annex Aloe Ridge No. 451) near Graaff Reinet, Blue Crane Municipality, Eastern Cape Province. The survey was conducted to establish the range and importance of possible exposed and *in situ* archaeological sites/materials, the potential impact of the development and, to make recommendations to minimize possible damage to these sites.

BRIEF ARCHAEOLOGICAL BACKGROUND

Literature review

Little is known about the archaeology of the Graaff Reinet/Pearston area because no systematic research or regional surveys/recordings have been conducted. There are a few reports of faded rock paintings and stone tools in the Brintjies Hoogte Mountains to the east of Pearston. The closest and one of the most complete archaeological surveys in South Africa was conducted in the Agter Sneeuberg region in the central and upper Seacow River Area some 200 km north-west (Sampson 1985). The only systematic survey and recording in the immediate vicinity was conducted in the Mountain Zebra National Park (Brooker 1974) and Deacon (1976) excavated Highlands Rock Shelter some 50-60 km to the north-east. Sampson's, Brooker's, and Deacon's research and surveys, together with records/collections of the Albany Museum, provide the background information for compiling an archaeological time sequence for the region.

The oldest evidence for occupation of the region are stone artefacts (small hand axes, sidescrapers and flakes) from the Earlier Stone Age, known as the 'final' Acheulian Industry which date older than 200 000 years. Excavations at the Cradock springs in the town yielded a number of these stone tools (Opperman pers. comm.). Sampson (1985) located a large number of sites and there is also a collection in the Albany Museum from the Cradock and Graaff Reinet area. Middle Stone Age (MSA) artefacts (long blades and points) are found throughout the region, but because these are found in the open it is difficult to know where they fit into the cultural time sequence. At Highlands Rock Shelter MSA stone tools, possibly a Howieson's Poort Industry, was dated older than 30 000 years (Deacon 1976). Sampson on the other hand reported many open-air MSA sites which he assigned to the Orangian Industry (dating between 128 000 - 75 000 years old), Florisbad and Zeekoegat Industries dating between 64 000 and 32 000 years old.

Without the aid of radiocarbon dating in the past, all Later Stone Age (LSA) assemblages were classified into three phases using mainly scrapers shape and size, namely, Smithfield A, large circular scrapers, Smithfield B, long, narrow end scrapers (both manufactured of black hornfels) and Smithfield C, small thumbnail scrapers (manufactured of chalcedonies and agates) (Goodwin and Van Riet Lowe 1929). When radiocarbon dating became available many years later it indicated that there were no sites which date between 9 500 and 4 600 years old for the drier inland plateaux (Deacon 1974). The LSA deposits at Highlands Rock Shelter date to 4 500 years old (Deacon 1976). Today the term Smithfield is only used for stone tool assemblages with backed bladelets and long end scrapers dating within the last 1000 years and replaces the term Smithfield B (Sampson 1988). The term Smithfield A has been replaced by Oakhurst and Smithfield C by Interior or Post-Wilton. Oakhurst is similar to the Albany Industry in the adjacent Cape Mountains, dating between 10 500 and 8 000 years old and also replaces the previously termed Lockshoek Industry (Sampson 1985).

The survey of the Mountain Zebra National Park (Brooker 1974) confirmed that the area is rich in archaeological remains and that some of the LSA time sequence for the region was present, as well as rock art. Unfortunately no rock engravings were found to compare with that of Samekoms, but there is another engraved and painted site listed in the Albany Museum records, only a few kilometres away. Unfortunately, apart from the stone tools, little else is preserved and it is not possible to reconstruct subsistence patterns. Better preservation of organic material at Highlands Rock Shelter provides some insight into hunter-gatherer subsistence in the area. Collecting of underground plant remains such as *Cyperus usitatus* and *Freesia corymbosa* would appear to have been an important food source together with the hunting of mountain zebra/quagga, mountain reedbuck, warthog and various small antelope

such as duiker, klipspringer and steenbok. Also listed in the museum records are freshwater shell middens along the banks of the Great Fish River and small quantities of crab and freshwater mussel were also found in the excavations. Many stock enclosures with stone walls and fragments of sand-tempered ceramic vessels are found throughout the Seacow River area and are most probably associated with Khoi pastoralists who settled in the area during the past 1 000 years.

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Relevant impact assessments

None from the immediate vicinity

DESCRIPTION OF THE PROPERTY

Area Surveyed

Location data

The proposed area for the construction of a 10 megawatt solar farm is situated approximately 25 kilometres south-east of Graaff Reinet and 30 kilometres from Pearston, Blue Crane Municipality, Eastern Cape Province. It is located on the farm Hangklip (Annex Aloe Ridge No. 451) north of the R63 road to Pearston and next to (north-west) the gravel road to Petersburg (Maps 1-2).

Map

1:50 000 3224 BC Graaff Reinet (south)

ARCHAEOLOGICAL INVESTIGATION

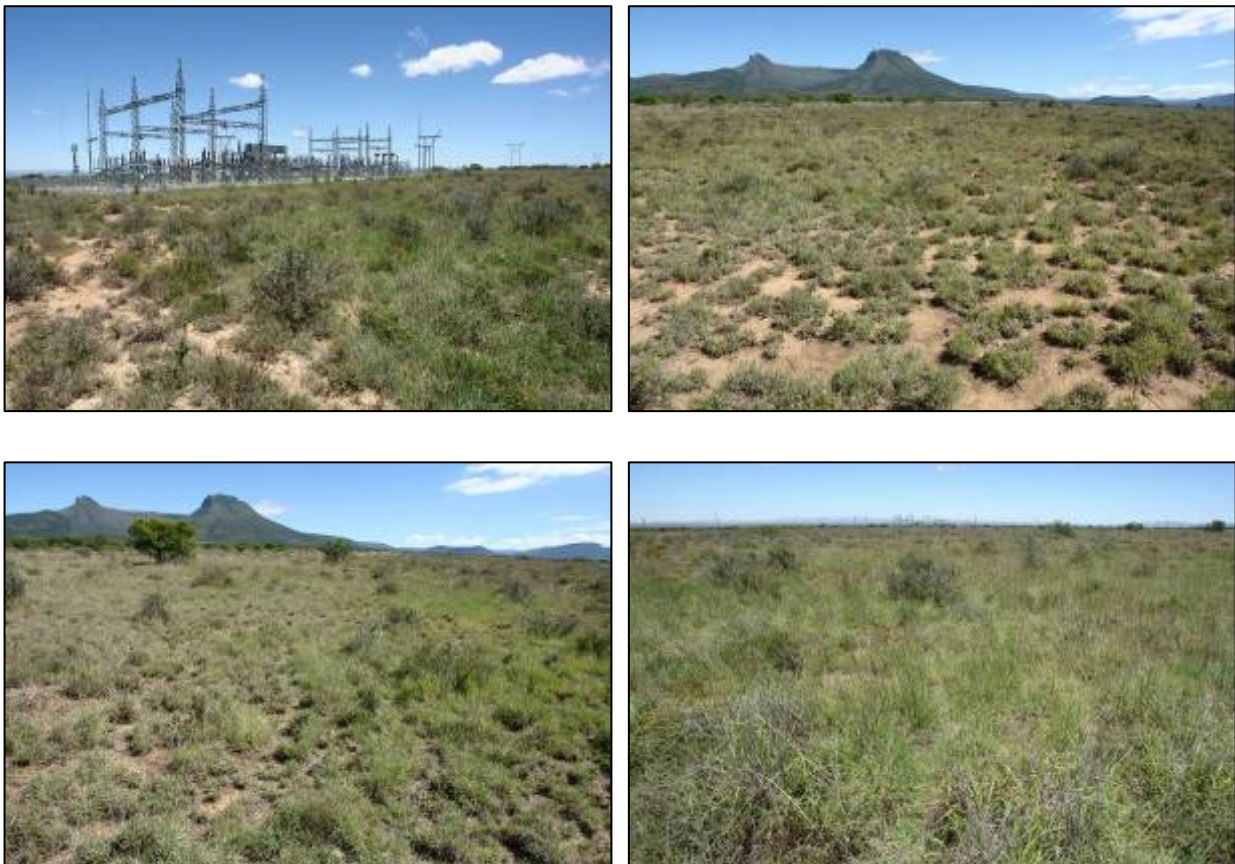
Methodology and results

The survey was conducted on foot. GPS readings were taken with a Garmin and all important features were digitally recorded. The proposed area for development is situated adjacent to a sub-station and a gravel road, which suggests that the immediate areas were disturbed in the past. The relatively flat terrain comprised orange brown alluvial soil covered with natural Karroo veld, used mainly for stock farming. Most of the area is covered by dense grass, bushes and shrub vegetation. Along the dry water course are dense patches of *Acacia Karroo* trees and grass. The dense vegetation and surface alluvial soil cover, made it difficult to observe

archaeological sites/materials. However, where surface erosion (wash outs) exposed the underlying original land surfaces, occasional Middle (older than 30 000 years) and Later Stone Age (younger than 30 000 years) stone tools were observed (Figs 1-6).

In general the surface visibility was good, but surprisingly no significant archaeological sites/materials were observed. The criteria follow for a 'recordable/representative archaeological site', was a minimum of 4 stone tools (and/or other material, such as bone, beads, shell) per square metre. This size for a representative site was increased from one to four square metres when it turned out that the general area was not well presented by archaeological sites/materials. Nevertheless, it is possible that concentrations of such materials may be covered by soil and vegetation. Two small areas were observed with more than 4 stone tools per four square metres. Both were observed in washed out areas, and therefore the material is in secondary context, is of low significance and not worth collecting. The first 'site' included two Middle Stone Age bladelet cores and a four Later Stone Age hornfels flakes. (GPS reading: 32.26.657S; 24.43.705E). The second 'site' comprised a Middle Stone Age core and five Later Stone Age hornfels flakes (GPS reading: 32.26.620S; 24.43.739E).

There are no graves or buildings older than 60 years. In general it would appear that it is unlikely that any sensitive archaeological remains will be exposed during the development. The area is of low cultural sensitivity and the proposed development may proceed.



Figs 1-4. General views of the proposed site for the construction of a 10 megawatt solar facility. The sub-station and surrounding landscape (top left), orange brown alluvial soil covered by low bushes, shrubs and grass (top right and second row).



Figs 5-10. An example of a washed out/eroded area and exposed land surface (top row), two Middle Stone Age bladelet cores from site 1 (middle left), a Middle Stone Age hornfels core (middle right) and two Later Stone Age flakes from site 2 (bottom left) and an example of a weathered Middle Stone Age stone tool.

ASSESSMENT OF THE IMPACTS

Pre-colonial archaeology

Nature of the impacts

From the investigation, it would appear that the proposed solar facility site is of low archaeological sensitivity. Apart from a few exposed stone tools no sites/remains of significance were recorded, but material may be covered by soil and grass. The main impact to archaeological sites/remains (if any) will be the physical disturbance of the material and its context. The construction of the solar panels, cabling between the panels and access roads may expose, disturb and displace archaeological sites/material.

Extent of the impacts

Construction of the solar panels, cabling between the panels and access roads may impact on remains which are buried, but these impacts will be limited and restricted to the local area. The construction of the solar panels may disturb small areas and the negative impact on possible archaeological sites/materials may be relatively small. Other projects such as the construction of roads, buildings and underground lines will disturb large areas and may expose sites/materials on a larger scale. In both cases further disturbances of sites/materials can be limited by mitigation.

Table 1. Impacts to the pre-colonial archaeology.

Nature: The potential impact of the construction of the solar panels, cabling between the panels, and access roads on above and below ground archaeology.		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (4)	Permanent (4)
Magnitude	Minor (2)	Minor (2)
Probability	Unlikely (2)	Unlikely (2)
Significance	Low < 20	Low < 20
Status (positive or negative)	Negative	Neutral
Reversibility	No	No
Irreplaceable loss of resources?	No, but in some cases, yes	No
Can impacts be mitigated?	Yes	
Mitigation		
No mitigation is proposed before construction starts because the archaeological remains (if any) are of low significance (excluding human remains). However, if concentrations of archaeological materials are exposed then all work must stop for an archaeologist to investigate (see below).		
If any human remains (or any other concentrations of archaeological heritage material) are exposed during construction, all work must cease and it must be reported immediately to the nearest museum/archaeologist or to the South African Heritage Resources Agency, so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to investigate and to remove/collect such material. Recommendations will follow from the investigation.		
Cumulative impacts: n/a		
Residual impacts: n/a		

Pre-colonial archaeological cultural landscape

Nature of the impact

The archaeological significance of the area is low and therefore the visual impact of the solar facility on the cultural landscape will be low as well. The development is relatively far removed from any major towns, highways and there are no historical buildings, graves or other features of importance on or near the site. Due to size of the solar panels (2.2 m high and 3,05 wide) they will have little visual impact on the landscape and ‘sense of place’.

Extent of impact

The visual impact of the solar panels will be restricted to the immediate area of the development and will have little negative effect on the cultural landscape and 'significance/sense of place'. Notwithstanding, the 'presence' of the solar panels will be long term to permanent, but negative impacts can be mitigated.

Table 2. Impacts to the pre-colonial cultural landscape.

Nature: The potential impact of the construction of the solar panels, cabling between the panels, and access roads on the cultural landscape and 'sense of place'.		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Long term/permanent (4)	Long term/permanent(4)
Magnitude	Minor (2)	Minor (2)
Probability	Unlikely (2)	Unlikely (2)
Significance	Low < 20	Low < 20
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	yes
Mitigation No mitigation is proposed because the archaeological remains are of low significance.		
Cumulative impacts The cumulative impacts will only increase if further solar facilities are planned for adjoining areas, which may bring changes to the pre-colonial cultural landscape in terms of visual impacts and changes to 'sense of place'.		
Residual impacts: n/a		

DISCUSSION AND MITIGATION

The proposed solar facility site on the farm Hangklip (Annex Aloe Ridge No. 451) is of low archaeological significance. Apart from a few Middle and later Stone Age stone tools in secondary context, no other archaeological remains were observed. Due to the size of the solar panels the visual impact on the surrounding cultural landscape will be low. Although it is unlikely that any sensitive archaeological remains will be exposed during the development, there is always a possibility that human remains and/or other archaeological and historical material may be uncovered during the development. It is recommended that;

1. If any concentrations of material are uncovered during development, it should be reported to the Albany Museum and/or the South African Heritage Resources Agency immediately so that systematic and professional investigation/excavations can be undertaken. Sufficient time should be allowed to remove/collect such material (See appendix B for a list of possible archaeological sites that maybe found in the area).
2. Construction managers/foremen should be informed, before construction starts, on the possible types of heritage sites which may be encountered during construction.

GENERAL REMARKS AND CONDITIONS

Note: This report is a phase 1 archaeological impact assessment/investigation only and does not include or exempt other required heritage impact assessments (see below).

The National Heritage Resources Act (Act No. 25 of 1999, section 35) (see Appendix A) requires a full Heritage Impact Assessment (HIA) in order that all heritage resources, that is, all places or objects of aesthetics, architectural, historic, 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, shipwrecks, battlefields, graves, and structures older than 60 years, living heritage, historical settlements, landscapes, geological sites, palaeontological sites and objects.

It must be emphasised that the conclusions and recommendations expressed in this archaeological heritage sensitivity investigation are based on the visibility of archaeological sites/features and may not therefore, reflect the true state of affairs. Many sites/features may be covered by soil and vegetation and will only be located once this has been removed. In the event of such finds being uncovered, (such as during any phase of construction work), archaeologists must be informed immediately so that they can investigate the importance of the sites and excavate or collect material before it is destroyed. The onus is on the developer to ensure that this agreement is honoured in accordance with the National Heritage Act No. 25 of 1999.

It must also be clear that Archaeological Specialist Reports (AIA's) will be assessed by the relevant heritage resources authority. The final decision rests with the heritage resources authority, which should grant a permit or a formal letter of permission for the destruction of any cultural sites.

APPENDIX A: brief legislative requirements

Parts of sections 35(4), 36(3) and 38(1) (8) of the National Heritage Resources Act 25 of 1999 apply:

Archaeology, palaeontology and meteorites

35 (4) *No person may, without a permit issued by the responsible heritage resources authority—*

- (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;*
- (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;*
- (d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.*

Burial grounds and graves

36. (3) *(a) No person may, without a permit issued by SAHRA or a provincial heritage resources authority—*

- (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;*
- (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*
- (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.*

Heritage resources management

38. (1) *Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorized as –*

- (a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- (b) the construction of a bridge or similar structure exceeding 50m in length;*
- (c) any development or other activity which will change the character of the site –*
 - (i) exceeding 5000m² in extent, or*
 - (ii) involving three or more erven or subdivisions thereof; or*
 - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
 - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA, or a provincial resources authority;*
- (d) the re-zoning of a site exceeding 10 000m² in extent; or*
- (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must as the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.*

APPENDIX A: IDENTIFICATION OF ARCHAEOLOGICAL FEATURES AND MATERIAL FROM INLAND AREAS: guidelines and procedures for developers

Human Skeletal material

Human remains, whether the complete remains of an individual buried during the past, or scattered human remains resulting from disturbance of the grave, should be reported. In general human remains are buried in a flexed position on their side, but are also found buried in a sitting position with a flat stone capping. Developers are requested to be on alert for the possibility of uncovering such remains.

Freshwater mussel middens

Freshwater mussels are found in the muddy banks of rivers and streams and were collected by people in the past as a food resource. Freshwater mussel shell middens are accumulations of mussel shell and are usually found close to rivers and streams. These shell middens frequently contain stone tools, pottery, bone, and occasionally human remains. Shell middens may be of various sizes and depths, but an accumulation which exceeds 1 m² in extent, should be reported to an archaeologist.

Large stone cairns

They come in different forms and sizes, but are easy to identify. The most common are roughly circular stone walls (mostly collapsed) and may represent stock enclosures, remains of wind breaks or cooking shelters. Others consist of large piles of stones of different sizes and heights and are known as *isisivane*. They are usually near river and mountain crossings. Their purpose and meaning is not fully understood, however, some are thought to represent burial cairns while others may have symbolic value.

Stone artefacts

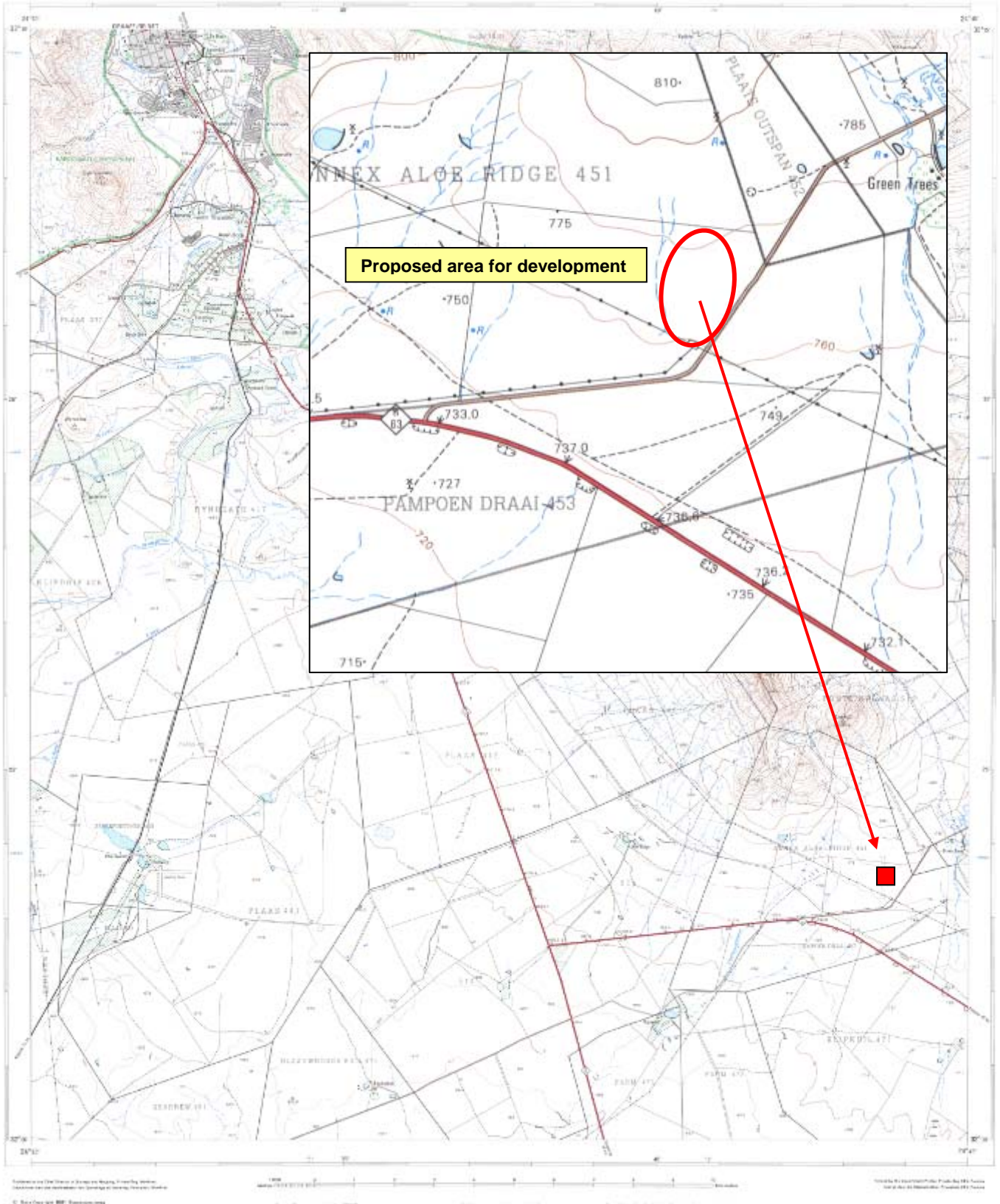
These are difficult for the layman to identify. However, large accumulations of flaked stones which do not appear to have been distributed naturally should be reported. If the stone tools are associated with bone remains, development should be halted immediately and archaeologists notified.

Fossil bone

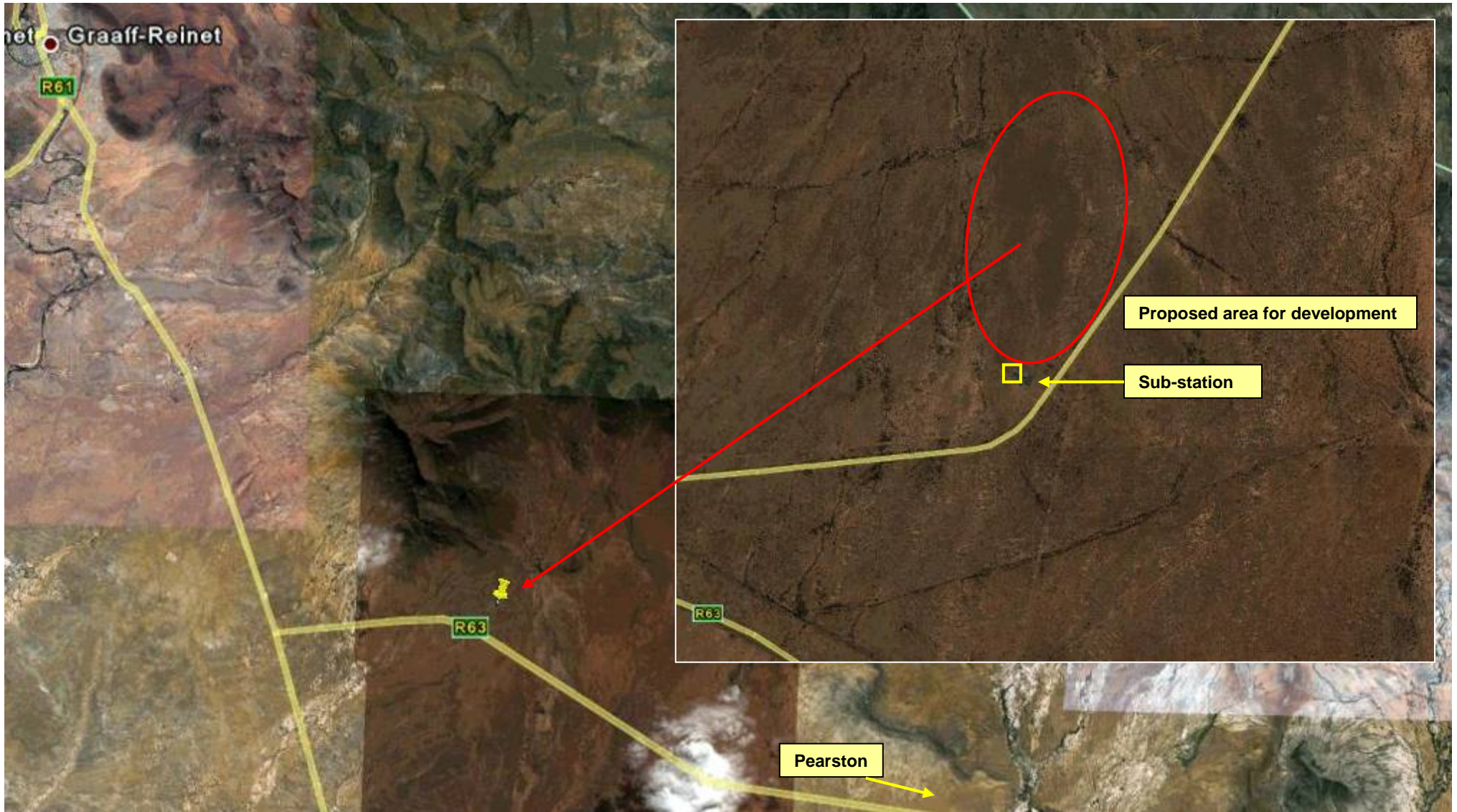
Fossil bones may be found embedded in geological deposits. Any concentrations of bones, whether fossilized or not, should be reported.

Historical artefacts or features

These are easy to identify and include foundations of buildings or other construction features and items from domestic and military activities.



Map 1. 1:50 000 maps indicating the location of the proposed development. The red oval marks the approximate size of the site.



Map 2. Aerial photographs indicating the location of the proposed development. The red oval marks the approximate size of the site.