**A PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT FOR THE PROPOSED 75MW DOBBIN PHOTOVOLTAIC SOLAR FARM ON THE FARM HET FONTEIN 1/66, NEAR CRADOCK, INXUBA YETHEMBA DISTRICT MUNICIPALITY, EASTERN CAPE PROVINCE.**


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**NOTE:** This report follows the minimum standard guidelines required by the South African Heritage Resources Agency (SAHRA) for compiling a Phase 1 Archaeological Impact Assessment (AIA).

## 1. EXECUTIVE SUMMARY

### 1.1. Purpose of the Study

The purpose of the study was to conduct and compile a phase 1 archaeological impact assessment (AIA) for the proposed establishment of the Dobbin 75 MW Photovoltaic Solar Farm on the Farm Het Fontein 1/66, near Cradock, Inxuba Yethema District Municipality, Eastern Cape Province. The survey was conducted to establish the range and importance of the exposed and *in situ* archaeological heritage material remains, sites and features; to establish the potential impact of the development; and to make recommendations to minimize possible damage to the archaeological heritage.

### 1.2. Brief Summary of Findings

Isolated surface scatters of weathered and patinated Middle Stone Age (MSA) stone artefacts were observed within the area proposed for development. The stone artefacts were manufactured on a fine-grained raw material (hornfels) and comprised of flakes and blades with some edge-damage and secondary retouch. A Later Stone Age (LSA) open site in the north-western corner of the proposed area was identified by the number of formal tools, flakes, and chips occurring within a relatively exposed area on a slight gradient slope. Rock engravings, mainly scratches, cross hatchings, and a few animal and indeterminate images, were documented on granite boulders occurring on the boulder koppie (hillock) extending north-south across the proposed area. Several fragments of broken glass, ceramics, and metal and tin were documented within the area along the railway line and adjacent to the internal farm dirt road. A few dry packed stone features were documented within the proposed area and a dry packed stone wall boundary fence occurs outside the proposed area for development.

### 1.3. Recommendations

The area is of a medium-high cultural sensitivity, the following recommendations must be considered (for full recommendations see page 34):

1. The Later Stone Age open site (HF1) must be protected and/or avoided during all phases of development.
2. The koppie that extends north-south containing the granite boulders with rock engravings must be protected and/or avoided during all phases of development.
3. The dry packed stone features must be protected and/or avoided during all phases of development.
4. An archaeological ground truthing survey should be conducted once the final layout of the solar farm and associated infrastructure has been determined and confirmed.

## 1.4. SIGNIFICANCE RATINGS

### TABLE 1.4.1. SIGNIFICANT RATINGS OF IMPACTS.

| Impact | Consequence | Probability | Significance | Status | Confidence |
|---|---|---|---|---|---|
| Impact 1: The Destruction of the Later Stone Age Site (HF1) | Very High | Definite | High | -ve | High |
| With Mitigation | Very Low | Possible | Insignificant | -ve | High |
| Impact 2: The Destruction of Stone Artefact Surface Scatters. | Very High | Definite | High | -ve | Medium |
| With Mitigation | Very Low | Possible | Insignificant | -ve | Medium |
| Impact 3: The Destruction of the Boulders containing Rock Engravings. | Very High | Definite | High | -ve | High |
| With Mitigation | Very Low | Possible | Insignificant | -ve | High |
| Impact 4: The Destruction of the scatters' of broken glass, ceramics, metal, and tin. | Very High | Definite | High | -ve | |
| With Mitigation | Very Low | Possible | Insignificant | -ve | High |
| Impact 5: The Destruction of stone packed features. | Very High | Definite | High | -ve | High |
| With Mitigation | Very Low | Possible | Insignificant | -ve | High |

## 2. BACKGROUND INFORMATION

Af-Rom Energy proposes to establish a 75 MW photovoltaic solar farm in the Cradock region in order to supply electricity to Eskom via the REBID program.

SRK Consulting applied for a downscaling of the process from an S & EIR process to a Basic Environmental Assessment process based on:

- The comparatively low impacts associated with a PV Solar Farm compared with impacts typically associated with the listed activities in EIA regulations; and
- The basic assessment obtaining specialist input to address potential authority and stakeholder issues.

The phase 1 archaeological impact assessment (AIA) report has been prepared as part of the Basic Environmental Assessment phase.

The proposed activity includes the development of a 75 MW photovoltaic solar farm that would comprise the following infrastructure:

- Up to 75 MW (depending on the environmental and technical constraints associated with the site) of photovoltaic (PV) panels;
- PV panels are anticipated to be constructed in rows (along and east/west axis). The bottom edge of the PV panel will be no closer than 300m from natural ground level, and the top edge is likely to be no higher than 2000m from natural ground level;
- PV panels in a single row are anticipated to be no more than a few centimetres apart, creating an approximation of a solid row of PV panels, and reducing the extent of the area required;
- Rows of PV panels will be separated to ensure that one row of panels does not create shadows on the row behind, the precise spacing must still be determined;
- PV panels will either be fixed (no adjustment of angle, or orientation possible), or will be able to be tilted on a north/south axis to improve energy production. The ability to tilt the panels will reduce the spacing of rows of panels;
- Anchoring of the PV panels to the ground will be by means of an innovative anchoring system that involves drilling a 64mm diameter hole, to a depth of approximately 1200mm, and inserting a 1500mm long galvanised steel post;
- Construction of inverter substations – Clusters of PV modules will be connected with underground cables to inverter substations;
- Construction of a Step-up Substation – The substation will have transformers to step up the medium voltage (either 22 kV or 33kV) to High Voltage (HV) 132kV. Switchgear ad metering will also be found in the substation;

- Internal cabling – medium voltage (MV) underground power lines will be installed from the inverter substations to a central collector/step-up substation;
- Construction of a 132 kV overhead power line – an overhead line of approximately 1 km (length) to be confirmed) will run from the step-up substation to the Eskom Substation (attached to the Beaufort West to De Aar) electric rail line;
- Internal roads will be required and are likely to be either natural tracks, or potentially gravel. A short access road to the site will be required. The precise location is still to be determined;
- For safety and security reasons, a security fence and a fire break would be required around the perimeter of the site, the area to be fenced is expected to be between 150 and 250 ha;
- Construction of Control room – a control room may be required for the operation and maintenance personnel. Some equipment may also be stored in the control room. The control room is anticipated to include limited ablution facilities linked to a septic tank;
- A water reservoir for cleaning panels. The capacity of the reservoir has not been determined, but is likely to be approximately 50 000 litres;
- Water for cleaning panels, and for limited domestic use, is anticipated to be from existing boreholes.

The plant is expected to have a lifespan of approximately 25 years after which the plant will be decommissioned.

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**Terms of Reference (ToR)**

- Provide an outline and description of the approach/methodology used during the phase 1 archaeological impact assessment (AIA) including assumptions, limitations, sources of information and the knowledge of local people (where possible);
- Provide a description and assess the sensitivity of the affected environment (archaeological heritage) that were identified during the phase 1 archaeological impact assessment (AIA);
- Identify the potential sources of risk to the affected environment (archaeological heritage) as a result of the construction of the proposed solar farm for the construction and operation phases; and
- Provide a clear statement identifying potential environmental impacts of the proposed project of the archaeological heritage and indicate any very significant adverse environmental impacts that cannot be mitigated and will jeopardise the project.

## 3. 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 5000m$^2$ 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 000m$^2$ 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.*

## 4. BRIEF ARCHAEOLOGICAL BACKGROUND

### Literature review

The Early Stone Age (ESA) spans a period of between 1.5 million and 250 000 years ago and refers to the earliest that Homo sapiens sapiens predecessors began making stone artefacts. The Acheulian Industry which replaced the Olduwan Industry approximately 1.5 million years ago is attested to in diverse environments and over wide geographical areas. The hallmark of the Acheulian Industry is its large cutting tools (LCTs or bifaces), primarily handaxes and cleavers. The end products were astonishingly similar across the geographical and chronological distribution of the Acheulian techno-complex: large flakes

that were suitable in size and morphology for the production of handaxes and cleavers perfectly suited to the available raw materials (Sharon 2009). Early Stone Age stone artefacts endure for long periods and generally occur as open air surface scatters either as isolated occurrences or in large quantities and very rarely in association with other archaeological heritage, plant and material remains. The Albany Museum database includes records of occurrences of Acheulian handaxes between Middelburg and the Camdeboo National Park near Graaff Reinet, Sampson (1985) located a large number of sites and there is also a collection in the Albany Museum from the Cradock area.

The large Early Stone Age handaxes and cleavers were replaced by smaller stone tools called the Middle Stone Age flake and blade industries. The Middle Stone Age spans a period from 250 000-30 000 years ago and focuses on the emergence of modern humans through the change in technology, behaviour, physical appearance, art, and symbolism. Various stone artefact industries occur during this time period, although less is known about the time prior to 120 000 years ago, extensive systemic archaeological research is being conducted on sites across southern Africa dating within the last 120 000 years (Thompson & Marean 2008). Surface scatters of these flake and blade industries occur widespread across southern Africa although rarely with any associated botanical and faunal remains. It is also common for these stone artefacts to be found between the surface and approximately 50-80cm below ground. Fossil bone may be associated with Middle Stone Age occurrences. These stone artefacts, like the Earlier Stone Age handaxes are usually observed in secondary context with no other associated archaeological material. The Albany Museum database holds records of the occurrence of Middle Stone Age stone artefacts around the Cradock area and the Department of Archaeology has curated Middle Stone Age stone artefacts in its collection from the Cradock area including Highlands Rock Shelter excavated by H.J. Deacon during the 1970's. Relevant archaeological impact assessments conducted by the Archaeology Contracts Office of the National Bloemfontein Museum in 2006 (Van Ryneveld & Koortzen 2006) and the Albany Museum in 2008 have recorded surface scatters of Middle Stone Age stone artefacts in the Cradock vicinity (Binneman & Booth 2008). Middle Stone Age stone artefacts (long blades and points) are found throughout the region, but because these are found in the open areas it is difficult to know where they fit into the cultural time sequence. At Highlands Rock Shelter MSA stone artefacts, 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.

The Later Stone Age spans a period from 30 000 years ago to the historical period (the last 500 years) until 100 years ago and is associated with the archaeology of San hunter-gatherers. The majority of archaeological sites date from the past 10 000 years where San hunter-gatherers inhabited the landscape living in rock shelters and caves as well as on the open landscape, inland and along the coast. The open sites are difficult to locate

because they are in the open veld and often covered by vegetation and sand and those along the coast are sometimes opened and closed by the movement of the dunes. Sometimes these sites are only represented by a few stone artefacts and fragments of bone. The preservation of these sites is poor and it is not always possible to date them (Deacon & Deacon 1999). Caves and rock shelters, however, in most cases, provide a more substantial preservation record of pre-colonial human occupation. The Albany Museum holds records of Later Stone Age fresh water shell midden sites along the Fish River and the surrounding area as well as rock shelters containing rock paintings.

Some 2 000 years ago Khoekhoen pastoralists entered into the region and lived mainly in small settlements. They were the first food producers in South Africa and introduced domesticated animals (sheep, goats and cattle) and ceramic vessels to southern Africa. Often, these archaeological sites are found close to the banks of large streams and rivers and along the coast. Large piles of freshwater mussel shell (called freshwater middens) usually mark the large stream and river sites and large piles of marine shellfish middens mark the coastal sites. Precolonial groups collected the freshwater mussel from the muddy banks of the rivers as a source of food. Mixed with the shell and other riverine and terrestrial food waste are also cultural materials. Human remains are often found buried in the middens along the coast (Deacon and Deacon 1999).

In general little systematic archaeological research and regional surveys/recordings have been conducted in the Cradock area. The only systematic survey and recording in the immediate vicinity was conducted in the Mountain Zebra National Park (Brooker 1974) and H.J. Deacon (1976) excavated Highlands Rock Shelter a few kilometres to the north. 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 Later Stone Age deposits at Highlands Rock Shelter date to 4 500 years old (Deacon 1976). 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 *Freezia corymbrosa* would appear to have been an important food source together with the hunting of mountain zebra/quagga, mountain reedbuck, and various small antelope such as duiker, klipspringer and steenbok. The survey of the Mountain Zebra National Park (Brooker 1974) confirmed that the area is rich in archaeological remains and that some of the Later Stone Age time sequence for the region was present, as well as rock art. Unfortunately, apart from the stone tools, little else is preserved and it is not possible to reconstruct subsistence patterns. 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.

Rock art is generally associated with the Later Stone Age period mostly dating from the last 5000 years to the historical period. It is difficult to accurately date the rock art without destructive practices. The southern African landscape is exceptionally rich in the distribution of rock art which is determined between paintings and engravings. Rock paintings occur on the walls of caves and rock shelters across southern Africa. Rock engravings, however, are generally distributed on the semi-arid central plateau, with most of the engravings found in the Orange-Vaal basin, the Karoo stretching from the Eastern Cape (Cradock area) into the Northern Cape as well as the Western Cape, and Namibia. At some sites both paintings and engravings occur in close proximity to one another especially in the Karoo and Northern Cape. The greatest concentrations of engravings occur on the andesite basement rocks and the intrusive Karoo dolerites, but sites are also found on about nine other rock types including dolomite, granite, gneiss, and in a few cases on sandstone (Morris 1988).

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Thompson, E. & Marean, C.W. 2008. The Mossel Bay lithic variant: 120 years of Middle Stone Age Research from Cape St. Blaize Cave to Pinnacle Point. *South Africa Archaeological Society Goodwin Series*, 10: 90-104.

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## 5. DESCRIPTION OF THE PROPERTY

### 5.1. Area Surveyed

The area for the proposed Dobbin 75 MW Photovoltaic Solar Farm is situated on the Farm Het Fontein 1/66 approximately 30 km north-west of Cradock on the N10. The proposed area is approximately 516ha in extent.

The proposed area comprises typical Karoo vegetation predominantly made up of Eastern Upper Karoo and Tarkastad Montane Shrubland. Bushclumps occur along the riverine and dry riverbed areas. A portion of the proposed area comprises agricultural lands. Small drainage lines and non-perennial streams occur within the proposed area; however, these areas will be avoided by establishing buffers around the water features, with construction occurring outside of these features. The Great Fish River flows through the Farm Het Fontein 1/66 north-east of the proposed area for development.

### 5.2. Map

1:50 000 map: 3125CD VISRIVIER

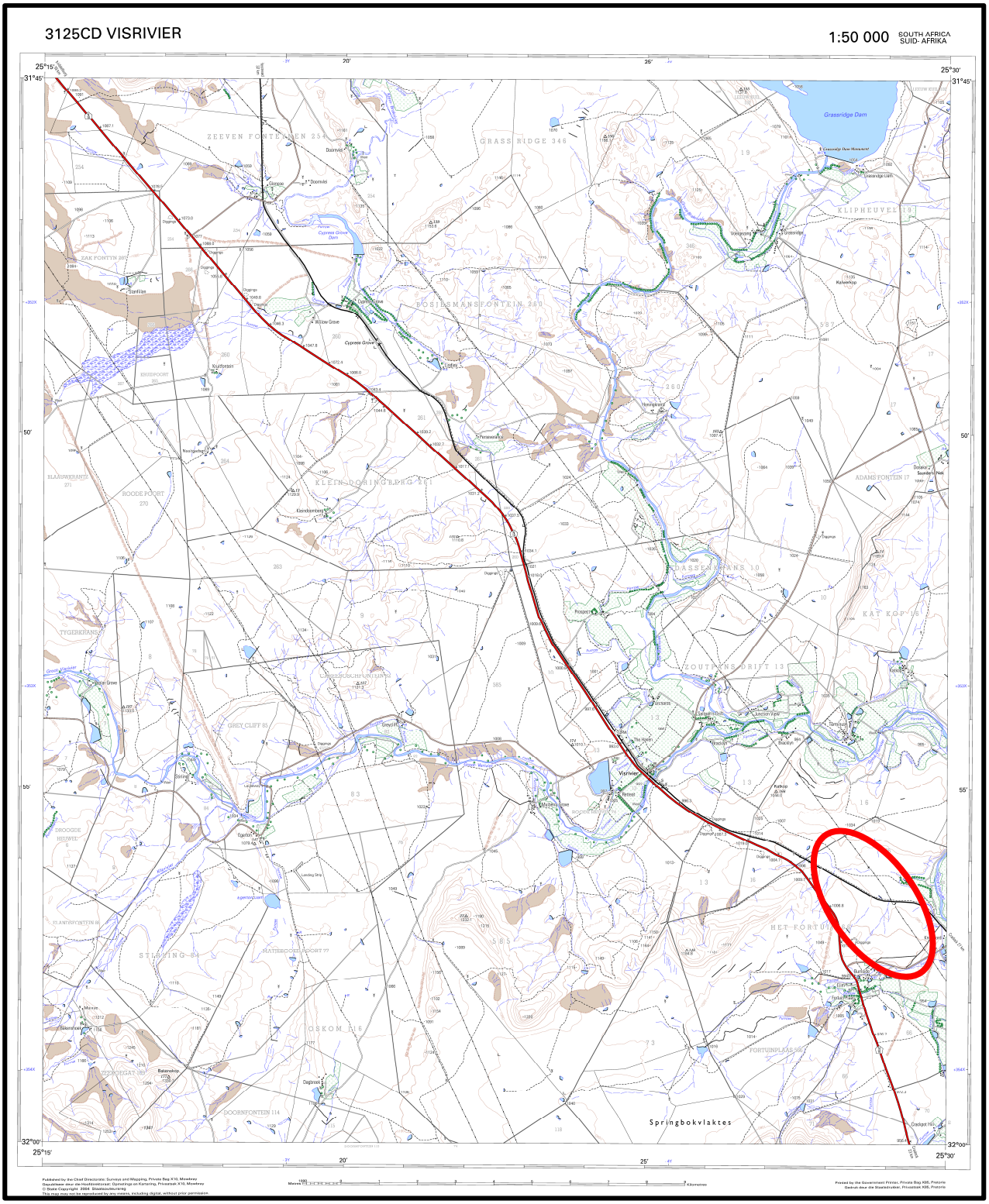


**Figure 1. Map 1. 1:50 000 topographic map showing the location of the area proposed for the Dobbin 75 MW Photovoltaic Solar Farm.**


**Figure 2. Map 2. Aerial view of the location of the area proposed for development of the Dobbin 75 MW Photovoltaic Solar Farm.**

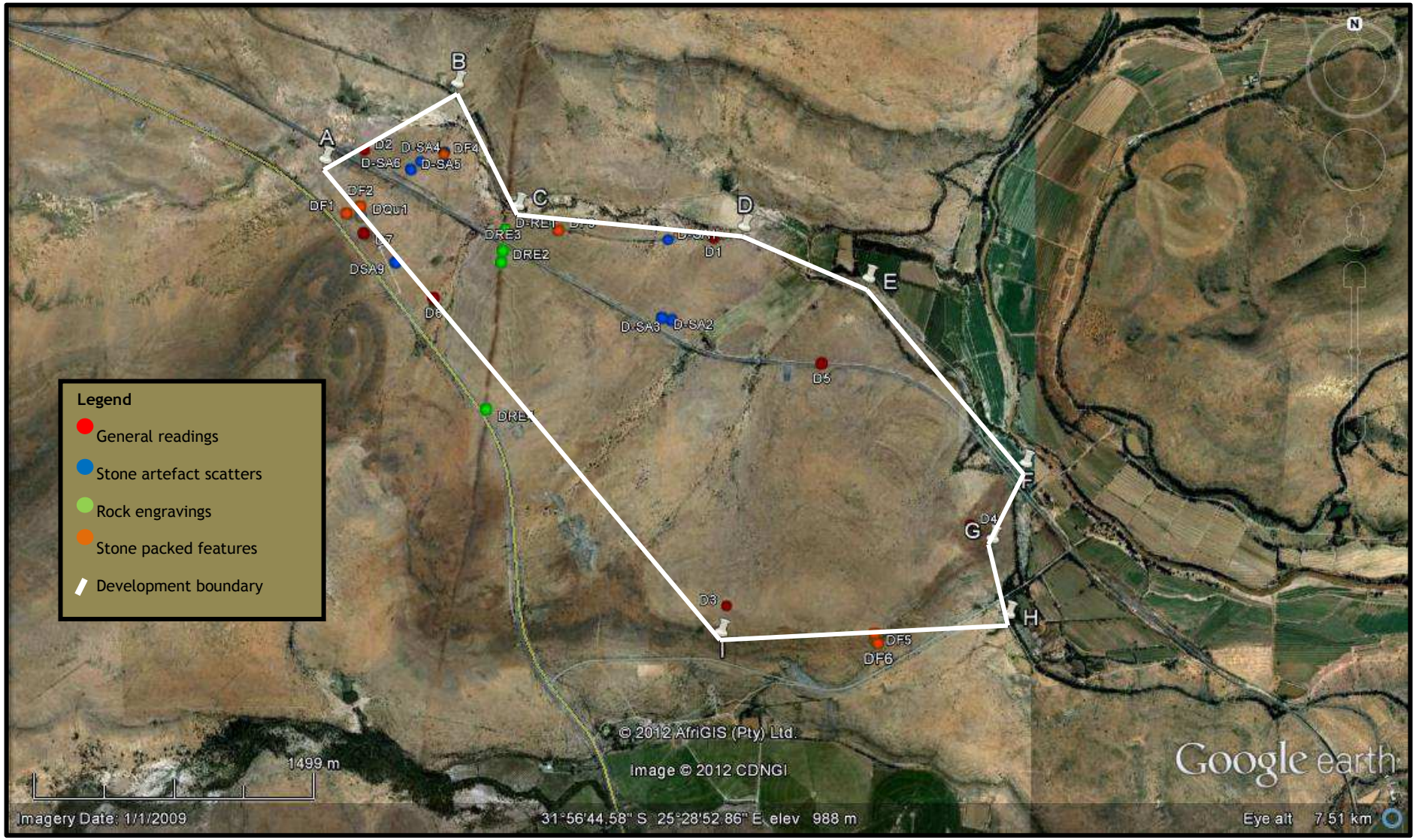


**Figure 3. Map 3. Close-up aerial view of the proposed area for the development of the Dobbin 75 MW Photovoltaic Solar Farm showing the location of the GPS co-ordinates and sites.**

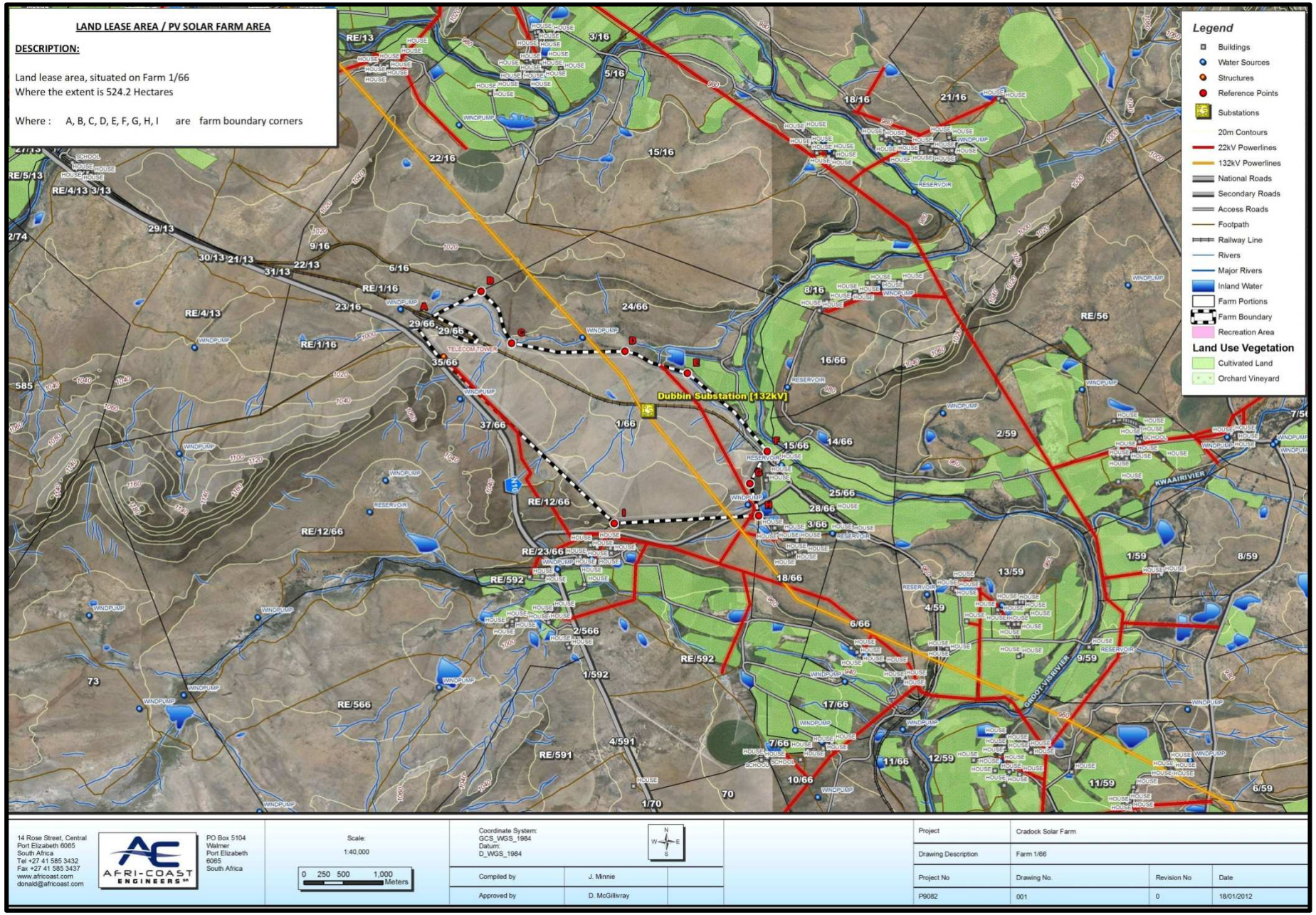


**Figure 4. Map 4. Layout of the proposed area for the development of the Dobbin 75 MW Photovoltaic Solar Farm (courtesy of SRK Consulting).**

## 6. ARCHAEOLOGICAL INVESTIGATION

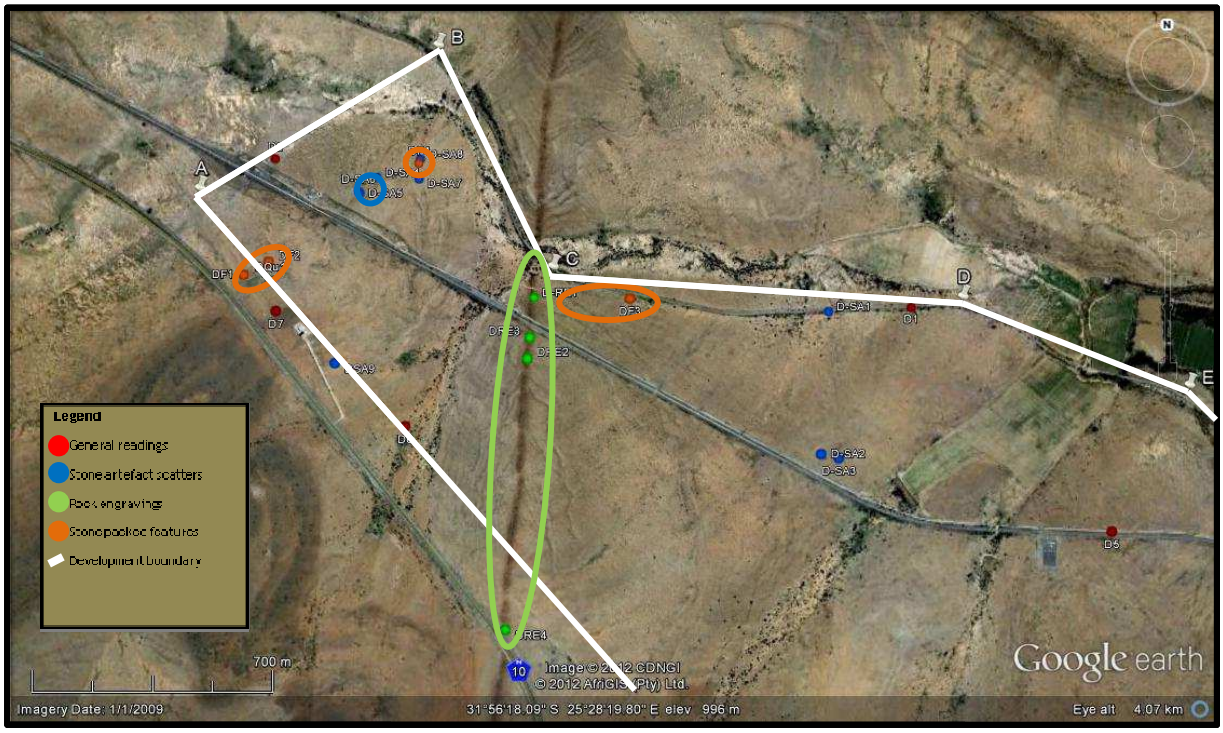


**Figure 5. Map 5. Close-up aerial view of the track walked as well as the archaeological remains, features, and sites occurring within the proposed area for the Dobbin 75 MW Photovoltaic Solar Farm.**

The archaeological investigation was conducted on foot focusing on the 516 ha area proposed for the establishment of the Dobbin 75 MW Photovoltaic Solar Farm. The GPS co-ordinate readings and photographs were taken using a Garmin Oregon 550 unit. The general GPS readings, artefact surface occurrences, and sites have been plotted on Maps 3 and 5. Archaeological visibility was generally good throughout the proposed area except where dense grass and bush vegetation occurred. The exposed and disturbed areas were investigated for the possibility of archaeological remains, features, and sites.

The proposed area has been heavily disturbed by the construction of the Dobbin Substation and associated powerlines that run east-west across the property and the Telkom tower and associated telephone lines that also run east west across the proposed area, as well as the Cradock to De Aar railway line that cuts through the proposed area. Cultivated agricultural lands, internal dirt farm roads and fences, erosion dongas and a quarry (DQu1) also add to the areas that have been disturbed and may therefore expose or move the archaeological heritage remains out of *in situ* context (Figures 6-11).

**Figure 6. View of the landscape and overhead powerlines.**

**Figure 7. View of the railway line facing west.**

**Figure 8. View of the railway facing east and the Dobbin Substation in the distance.**

**Figure 9. Underground water channel systems underneath the internal farm dirt roads.**

**Figure 10. View of eroded donga areas and the bushclump vegetation along the dry river bed.**

**Figure 11. View of the quarry (DQu1).**

Isolated surface scatters of patinated and weathered Middle Stone Age stone artefacts were documented within the proposed area. The stone artefacts were mainly manufactured on a fine grained black (hornfels) raw material and included flakes, blades, and cores. Some of the stone artefacts showed evidence of secondary retouch and edge-damage, although some of the edge-damage is recent and may have been caused from trampling by humans and animals (Figures 12-14). The surface scatters of stone artefacts are probably not in situ and therefore occur in a secondary context. No other archaeological organic or material remains were observed in associated with the stone artefacts. However, according to previous observations the stone artefacts may occur between the surface and 50-80 cm below ground.

**Figures 12-13. Examples of Middle Stone Age stone artefacts.**

**Figure 14. Examples of Middle Stone Age stone artefacts.**

A Later Stone Age (LSA) site (HF1) was documented in the north-western portion of the proposed development. The relatively exposed area is situated on a slight gradient slope and is approximately 75 m x 75 m in extent. The site comprised several formal tools such as scrapers and an adze with several flakes and chips manufactured from a fine-grained black (hornfels) raw material (Figures 15-17). It is unlikely that the site would have any significant depth of archaeological deposit. No other organic or material archaeological remains were observed in association with the stone artefacts.

**Figure 15. Distribution of Later Stone Age stone artefacts at HF1.**

**Figures 16-17. Examples of the Later Stone Age formal stone tools.**

Several rock engravings were documented on the outcrop that extends from the N10 north across the proposed area (DRE1-DRE4). Granite boulders occur along the top of the outcrop extending north-south through the proposed development for approximately 1050 m. The images comprised mainly scratches, cross hatchings, and a few animal and indeterminate images (Figures 18-24). More than twenty granite boulders with rock engravings were recorded along the extent of the outcrop, however, several more granite boulders with engravings were observed during the walkthrough. A pile of stacked rocks topped with a granite rock with engraving was documented at the area marked DRE2 (Figures 23-24). No other material or organic archaeological remains were found in association in and amongst the boulders. Rock engravings are generally associated with the Later Stone Age (LSA) made by hunter-gatherers and several rock engravings on similar boulders have been documented within the greater Cradock and Karoo area. However, rock engravings may also be attributed to the historical period which would have been made by shepherds overseeing domesticated animals.

**Figure 18. Rock engraving – indeterminate animal image.**

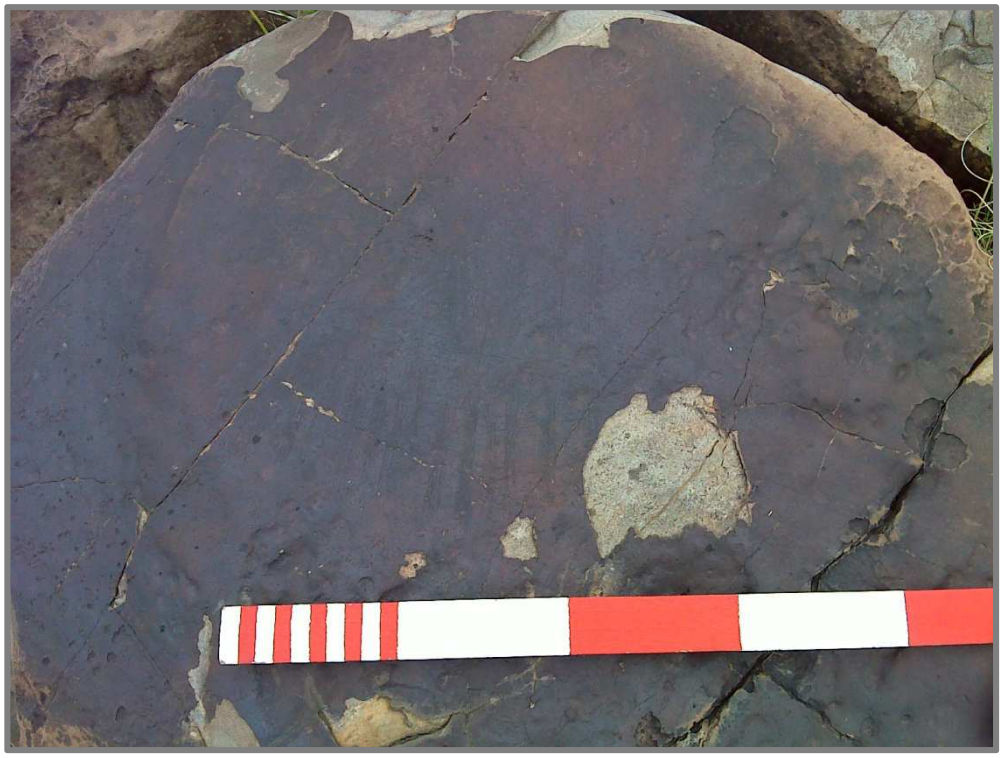

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**Figure 19. Rock engraving – scratches.**

**Figure 20. Rock engraving – scratches over crosshatching.**

**Figure 21. Rock engraving – possibly a horse.**

**Figure 22. Rock engraving – indeterminate animal (possibly a horse), scratches, and lines.**

**Figure 23. Pile of stacked rocks (DRE2) topped with engravings.**

**Figure 24. Close-up of rock engraving images at DRE2 – resembling a praying mantis on the left, scratches, lines, and an indeterminate image on the right.**

Broken glass, ceramics, and fragments of metal and tin occur along the entire extent of the railway line that passes through the proposed area. The remains possibly comprise both recent and later pieces and have presumably been discarded from the trains that pass through the area. Broken glass, ceramic, and fragments of metal and tin also occurs adjacent to the internal farm road between the areas marked DRE1 and DF3 (Figure 25). The area resembles a dump and similarly seems to contain both recent and later pieces.

**Figure 25. Remains of a glass bottle and a few ceramic sherds.**

Several packed stone features occur within the proposed area. The area marked DF1 and DF2 comprises four packed rock features immediately east of the quarry (Figure 26). It is possible that these packed rocks may be associated with the quarry activities. DF3 is a neatly arranged dry packed stone feature situated immediately south of the internal farm dirt road (Figure 27). The packed rock feature at the area marked DF4 occurs north of the HF1 (Figure 28). The remains of a weir was documented along the riverine area, however, it has been established that these areas will not be affected by the proposed development (Figure 29). A dry packed stone wall runs along the existing fence line on the eastern boundary outside (Figure 30). The stone wall occurs outside of the proposed development area and is not expected to be affected by the proposed development.

**Figure 26. Packed rocks at DF1 and DF2.**

**Figure 27. Dry packed stone feature at DF3.**

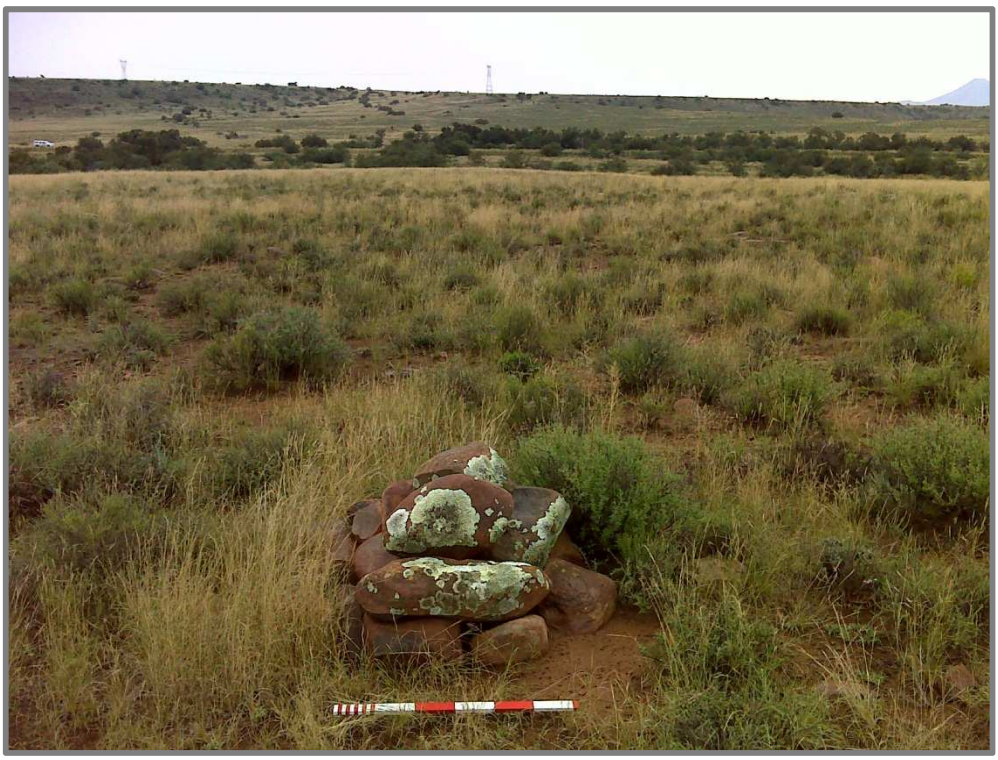

**Figure 28. Packed rocks at DF4.**

**. Figure 29. Remains of the weir.**

**Figure 30. View of the dry packed stone walling running next to the fence line.**

## 7. DESCRIPTION OF SITES

### 7.1. Site Het Fontein 1 (HF1):

Site Het Fontein 1 (HF1) is situated on a slight gradient slope in the western portion of the proposed area. The relatively exposed area comprises formal tools such as scrapers and an adze as well as flakes and chips made on a fine-grained black (hornfels) raw material. No other organic or material cultural remains were documented in association with the stone artefacts.

Site HF1 is considered as having a medium-high cultural significance.

### 7.2. Stone Artefact Occurrences and Scatters:

Mainly isolated occurrences of Middle Stone Age (MSA) stone artefacts are distributed over the proposed area. The stone artefacts comprise mainly flakes, blades, and cores manufactured on a fine-grained black (hornfels) raw material. It is unlikely that the surface exposed stone artefacts occur *in situ* and are considered to be in a secondary and disturbed context. No other organic or material cultural remains were documented in association with the stone artefacts.

The stone artefact occurrences and scatters are considered as having a medium-low cultural significance.

(See Table 8.1 and 8.2 for descriptions and co-ordinates)

### 7.3. Rock Engravings:

Several rock engravings occur on a rocky outcrop that extend from the fence line bordering the N10 north across the proposed area. The images include scratches, cross hatchings, and a few animal and indeterminate images.

The rock engravings have are considered as having a medium-high cultural significance.

### 7.4. Broken Glass, Ceramic Sherds, and Fragments of Metal and Tin:

Broken glass, ceramic sherds, and fragments of metal and tin occur mainly along the northern extent of the railway line. These remains also occur immediately south of the internal farm dirt road between DRE1 and DF3, resembling a dump area. The remains possibly comprise both recent and later pieces.

The original railway line and associated railway siding buildings are considered as having a medium-low cultural significance.

### 7.5. Dry Packed Stone Walling Features:

DF1 and DF2 occur adjacent to the existing quarry and may be associated with the quarry activities. DF3 is situated immediately south of the internal dirt farm road. No other dry stone packed features occur within the vicinity of DF3. DF4 is situated between HF1 and the internal farm dirt road. The remains of the weir and the dry packed stone walling will not be affected by the proposed development.

The stone packed features are considered as having a medium cultural significance.

## 8. CULTURAL LANDSCAPE

The cultural landscape spans the last 250 000 years showing evidence of Middle Stone Age (MSA), Later Stone Age (LSA), and historical communities' and people interaction with the landscape. The archaeological evidence shows that Middle Stone Age people passed through the area between 250 000 and 30 000 years ago and would have possibly occupied the nearby the rock shelters as recorded at Highlands Rock Shelter situated nearby. Surface scatters of Middle Stone Age stone artefacts are found throughout the wider region to Cradock and Middelburg. It is possible that these people may also have occupied

the flat open areas, however, no associated archaeological material or organic remains suggests that more permanent occupation occurred within the proposed area for development.

The Later Stone Age (LSA) open surface scatter site (HF1) indicates that the area may have been an ideally located to observe herds of antelope for hunting. The now exposed area showing evidence of formal tools, flakes, and chips shows that the area was briefly occupied as a minor manufacture site. No other archaeological material or organic remains were observed within the area or any possible depth of archaeological deposit; however, people may have chosen to live in the open sites. The rock engravings also show that the area landscape was used as a canvas to express artistic value of their observances and spiritual and cultural beliefs. There is evidence of Later Stone Age communities occupying rock shelters and the banks of the Great Fish River. Therefore it can be established that people moved across and used the landscape within the last 20 000 years.

Historically the landscape was seen as a viable area to be settled by the incoming *trekboere* and European farmers. The Great Fish River provided sufficient water for the irrigation of agricultural lands. Evidence of the historical influence on the landscape is indicated by the stone wall features occurring within the area as well as some of the rock engravings that may have been made by young shepherds overseeing the domestic livestock.

Currently the landscape is still occupied by European farmers, however, the area has changed hands from the original settlers taking away the generational heritage of the "family farm", however, creating a new culture of farmers continuing the historical use of landscape. The landscape is currently being used for agricultural and domestic grazing purposes accentuated by the easy access to water and irrigation. The railway adds to the use of landscape, historically, as the mainline between Cradock and De Aar.

## 9. GPS CO-ORDINATES AND SITES

### TABLE 1: GPS CO-ORDINATES AND SITES FOR THE PROPOSED DOBBIN SOLAR FARM.

| REFERENCE | DESCRIPTION | CO-ORDINATES |
|---|---|---|
| DSA1 | Middle Stone Age stone artefact surface scatter | 31°56'13.10"S; 25°28'54.30"E |
| DSA2 | Middle Stone Age stone artefact surface scatter | 31°56'26.70"S; 25°28'43.20"E |
| DSA3 | Middle Stone Age stone artefact surface scatter | 31°56'27.10"S; 25°28'45.20"E |
| DSA4 (Site 1) | Later Stone Age open site | 31°56'27.10"S; 25°28'45.20"E |
| DSA5 (Site 1) | Later Stone Age open site | 31°56'01.30"S; 25°27'51.80"E |
| DSA6 (Site 1) | Later Stone Age open site | 31°56'01.10"S; 25°27'51.60"E |
| DSA7 | Middle Stone Age stone artefact surface scatter | 31°56'00.00"S; 25°27'58.60"E |
| DSA8 | Middle Stone Age stone artefact surface scatter | 31°55'58.10"S; 25°27'58.60"E |
| DSA9 | Middle Stone Age stone artefact surface scatter | 31°56'17.40"S; 25°27'48.80"E |
| DRE1 | Rock engravings (northern extent) | 31°56'11.40"S; 25°28'11.10"E |
| DRE2 | Rock engravings | 31°56'17.20"S; 25°28'10.30"E |
| DRE3 | Rock engravings and packed rocks | 31°56'15.20"S; 25°28'10.60"E |
| DRE4 | Rock engravings (southern extent, next to N10 road) | 31°56'42.80"S; 25°28'07.50"E |
| DF1 | Pile of packed rocks next to quarry | 31°56'08.90"S; 25°27'38.70"E |
| DF2 | Pile of packed rocks next to quarry | 31°56'07.70"S; 25°27'41.50"E |
| DF3 | Dry packed stone feature | 31°56'11.60"S; 25°28'21.90"E |
| DF4 | Pile of packed rocks | 31°55'58.50"S; 25°27'58.40"E |
| DF5 | Stone walling | 31°57'21.30"S; 25°29'27.00"E |
| DF6 | Stone walling | 31°57'23.00"S; 25°29'27.70"E |
| D1 | General reading | 31°56'12.80"S; 25°28'53.70"E |
| D2 | General reading | 31°55'57.90"S; 25°27'42.30"E |
| D3 | General reading | 31°57'16.60"S; 25°28'56.70"E |
| D4 | General reading | 31°57'02.40"S; 25°29'46.60"E |
| D5 | General reading | 31°56'33.50"S; 25°29'16.00"E |
| D6 | Weir | 31°56'23.50"S; 25°27'56.50"E |
| D7 | Erosion wall | 31°56'12.40"S; 25°27'42.30"E |
| DQu1 | Quarry | 31°56'09.50"S; 25°27'41.70"E |

## 10. RECOMMENDATIONS

The area is of a medium-high cultural sensitivity, the following recommendations must be considered:

1. The Later Stone Age open site (HF1) must be protected and/or avoided during all phases of development.
- A 50 m diameter protection perimeter must be established before and during all construction and development activities to avoid possible negative impact.

2. The *koppie* that extends north-south containing the granite boulders with rock engravings must be protected and/or avoided during all phases of development.
- A 50 m protection perimeter must be established running parallel and on both sides of the extent of the boulder outcrop.

3. The dry packed stone features and the dense scatters of the glass, ceramics, metal, and tin remains must be protected and/or avoided during all phases of development.
- Development should take place approximately 50 m from the recorded stone features.
- Development should be avoided in the area between DRE1 and DF3.
- A 50 m protection perimeter should be established south of and running parallel to railway line.

4. An archaeological ground truthing survey should be conducted once the final layout of the solar farm and associated infrastructure has been determined and confirmed.

5. If concentrations of archaeological heritage material and human remains are uncovered during construction, all work must cease immediately and be reported to the Albany Museum (046 622 2312) and/or the South African Heritage Resources Agency (SAHRA) (021 642 4502) so that systematic and professional investigation/ excavation can be undertaken.

6. Construction managers/foremen should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites.

## 11. GENERAL REMARKS AND CONDITIONS

**NOTE:** This report is a phase 1 archaeological impact assessment (AIA) only and does not include or exempt other required specialist assessments as part of the heritage impact assessments (HIAs).

The National Heritage Resources Act (Act No. 25 of 1999, Section 35 [Brief Legislative Requirements]) requires a full Heritage Impact Assessment (HIA) in order that all heritage resources including 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 emphasized that the conclusions and recommendations expressed in this phase 1 archaeological impact assessment (AIA) are based on the visibility of archaeological remains, features and, sites and may not reflect the true state of affairs. Many archaeological remains, features and, sites may be covered by soil and vegetation and will only be located once this has been removed. In the event of such archaeological heritage being uncovered (such as during any phase of construction activities), archaeologists or the relevant heritage authority 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 Resources Act No. 25 of 1999 (NHRA 25 of 1999).

Archaeological Specialist Reports (desktops and AIA's) will be assessed by the relative heritage resources authority. The final decision rests with the heritage resources authority that may confirm the recommendations in the archaeological specialist report and grant a permit or a formal letter of permission for the destruction of any cultural sites.

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

1. Human Remains:

All human remains exposed during all the phases of the construction activities must be reported to the archaeologist, nearest museum or relevant heritage resources authority. Construction must be halted until the archaeologist has investigated and removed the human remains. Human remains may be exposed when a grave or informal burial has been disturbed. In general, the remains are buried in a flexed position on the side and may also be buried in a sitting position with a flat stone capping the location of the burial. Developers are requested to be aware of the exposing human remains.

2. Stone Artefacts:

Stone artefacts are difficult for the layman to identify. Large accumulations of flaked stones that do not appear to have been distributed naturally must be reported. If the stone artefacts are associated with bone / faunal remain or any other associated organic and material cultural artefacts development must be halted immediately and reported to the archaeologist, nearest museum or relevant heritage resources authority.

3. Large Stone Features:

Large stone features occur in different forms and sizes, however, are relatively easy to identify. The most common features are roughly circular stone walls (mostly collapsed), usually dry packed stone, and may represent stock enclosures, the remains of wind breaks or, cooking shelters. Other features consist of large piles of stones of different sizes and heights are known as *isisivane*. These features generally occur near river and mountain crossings. The purpose and meaning of the *isisivane* are not fully understood, however, interpretations include the representation of burial cairns and symbolic value.

4. Freshwater Shell Middens:

Accumulations of freshwater shell middens comprising mainly freshwater mussel occur along the muddy banks of rivers and streams and were collected by pre-colonial communities as a food resource. The freshwater shell middens generally contain stone artefacts, pottery, bone and, sometimes even human remains. Freshwater shell middens may be of various sizes and depths, an accumulation that exceeds $1m^2$ in extent must be reported to the archaeologist, nearest museum or, relevant heritage resources authority.

5. Historical Artefacts and Features:

These are relatively easy to identify and include the foundations and remains of buildings, packed dry stone walling representing domestic stock kraals. Other items include historical domestic artefacts such as ceramics, glass, metal and military artefacts and dwellings.

6. Fossil Bone:

Fossil bones may be embedded in geological deposits. Any concentrations of bone whether fossilized or not must be reported.