



**mineral resources**

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EC30/5/1/3/3/2/1/0437EM  
4 May 2010

South African Heritage Resources Agency  
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6140

ATTENTION: MR. T. LUNGILE

Sir

**CONSULTATION IN TERMS OF SECTION 40 OF THE MPRDA OF 2002: BORROW PIT  
(M - P), DIVISION OF CRADOCK, EASTERN CAPE**

1. The above refers.
2. Attached, a copy of the EMP received from Chris Hani District Municipality.
3. Any written comments or requirements your department may have in this regard can be forwarded to this office no later than **7 July 2010**. Failure to do so, will lead to the assumption that your department has no objection(s) or comments with regard to the said documents. Comments may be submitted at your earliest convenience e.g. 30 days from the date hereof in order to reduce the turn around time for the application process.
4. Consultation in this regard has also been initiated with other relevant State Departments.
5. Please use the reference numbers as indicated in all future correspondence.
6. Your co-operation is appreciated.

Yours faithfully

REGIONAL MANAGER

EASTERN CAPE

COPY



**CHRIS HANI DISTRICT MUNICIPALITY**  
**Environmental Management Plan 2**  
**Borrow Pit Rehabilitation (M – P)**

Project Number: 23034KWE

DME Ref: EC/30/5/1/2/2/0189 MP

March 2010

The Municipal Manager  
Chris Hani District Municipality  
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**Queenstown**  
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**KV3**  
**ENGINEERS**

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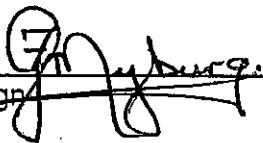
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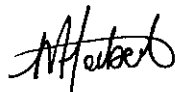
  
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30/3/2010  
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Date

### SUBMISSION TO:

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Attention: Ms. N. Mkhacane

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## **1 INTRODUCTION AND BACKGROUND**

KV3 Engineers have been appointed by the Chris Hani District Municipality to prepare an Environmental Management Plan (EMP) for 17 borrow pits for the upgrading of three gravel roads in the Middelburg district of the Karoo.

The roads that will be upgraded using existing borrow pits are all in the immediate vicinity of Middelburg in the Eastern Cape and fall within the ambit of the responsibility of the Chris Hani District Municipality. The roads give access to the many farms in the area and have not been maintained for a number of years. As part of the Extended Public Works Program of the Government funds have been allocated to do maintenance on these access roads.

This Environmental Management Plan (EMP) is a generic document prepared for the various sites where gravel will be mined to use as road construction material. In terms of the Minerals and Petroleum Resources Development Act, 2002 (Act No: 28 of 2002) exemption can be obtained from a mining permit for the aforementioned activity. The Act does however require that an EMP be prepared to ensure that the impact of the planned activity has the minimum effect on the environment.

All the sites have been used as borrow pits in the past and are typically between 0.3 and 0.6ha in size. This document will therefore not treat any of the sites as Greenfield projects.

It has been requested by the Department of Minerals Resources (DMR) to divide the original EMP, dated October 2008, into an EMP for borrow pits A to L in Rosmead and an EMP for borrow pits M to P along the road to Conway and Spitskopvlei.

Paleontological and archaeological impact assessments have been done for all the sites. The recommendations of these studies are incorporated in this EMP.

The EMP has the following goals:

- Identification of activities that could impact on the environment;
- Detailing the mitigation measures and specifications with which the contractor shall comply in order to minimise the extent of environmental impacts during excavation activities by providing procedures for implementation;
- Defining corrective actions that shall be taken in the event of non-compliance; and

- Prevent long-term environmental degradation.

## 2 LOCALITY MAP

The layout of the 17 borrow pits is outlined in Figure 1 and Figure 1(b) (1:50 000) in **Annexure A**. Site Plans A to L has been included (Figures 2M – 2P).

**Table 1** The coordinate list of the 4 farms (M to P) along the road between Conway and Spitskop.

Farm	X - S	Y - E	Location
M	31 65 44.7	025 03 55.1	Langekloof 323
N	31 52 58.8	025 05 30.6	Willenburgersrivier 317
O	31 52 37.1	025 07 25.2	Wolfontein 277
P	31 50 58.9	025 08 09.6	Wolfontein 277

Please note that the site plans with the required borrow pit coordinates have been included on Figures 2M – 2P.

## 3 ARCHAEOLOGICAL IMPACT ASSESSMENT

An archaeological impact assessment (AIA) has been conducted by ArchaeMaps. Please refer to the attached AIA Report in **Annexure B**. Please take note that the recommendations made were for the Farm Knoffelsvlei and Nooitgedacht, which does not fall within this area.

## 4 PALEONTOLOGICAL IMPACT ASSESSMENT

A paleontological impact assessment (PIA) has been conducted by Mr. Lloyd Rossouw. The PIA Report is attached in **Annexure C**. The following recommendations has been made;-

- Excavation procedures related to the reparation of the gravel roads within the inspected area, must be accompanied by a follow-up paleontological investigation at the cost of the developer; and
- A Karoo vertebrate specialist should check the mudstone-bearing burrow pits before and when earth-moving commences in order to determine whether, as is probable, paleontological remains or features are exposed *in situ*.

## **5 PUBLIC PARTICIPATION PROCESS (PPP)**

### **5.1 Objectives of the Public Participation Process**

The objectives of the Public Participation Process are as follows;-

- To identify and notify the relevant Interested and Affected Parties of the proposed project;
- To address any environmental or social concerns and issues which may arise as a result of the proposed project;
- To provide stakeholders the opportunity to voice any concern related to the project;
- To provide stakeholders the opportunity to review and provide feedback on the Basic Assessment Report and other documentation to ensure that the issues raised are addressed adequately and suitably.

### **5.2 Identification of Stakeholders**

An advertisement was placed in the Burger, Eastern Cape on the 29th of August 2008 notifying the public of the proposed application for exemption form applying for a mining permit for the reparation of the existing gravel roads.

No site notices were placed on the various farms as it was not feasible. The various farms are more than 3km apart from each other. The gravel roads are only used by the various farmers of which all were notified and owner consent were received.

Written notifications were sent to all landowners and municipal and statutory bodies regarding the proposed project.

All stakeholders registered in response to notifications and advertisements are also included on the list.

**Table 2** The database of all registered Interested and Affected Parties.

	<b>Name &amp; Surname</b>	<b>Organisation</b>
1	Mr John Bennie	Landowner: Farm Garingdam
2	Mr H Vorster	Landowner: Farm Wonderheuvel
3	Mr J van der Merwe	Landowner: Farm Watervoor & Vleipoort
4	Mr Bongani Ndhlovu	Grootfontein Landbou Kollege
5	Mr A Vorster	Landowner: Farm Dassiesfontein
6	Mr E Vorster	Landowner: Farm Nooitgedagt
7	Mr J Marais	Farm Knoffelsvlei
8	Mr C van der Walt	Landowner: Farm Elim
9	Mr Louis Fereira	Landowner: Farm Willemburgersrivier
10	Mr S Botha	Landowner: Farm Wolwevlei
11	Mr Johan van Rensburg	Landowner: Farm Nooitgedagt
12	Mr Trevor Els	Chris Hani District Municipality
13	Mr Freek Myburg	Chris Hani District Municipality
14	Anotnieta Jerardino	South African Heritage Resources Agency
15	Cllr N.R. Swartz	Inxuba Yethemba Ward Councillor
16	Cllr. C.A. Sammy	Inxuba Yethemba Ward Councillor
17	Cllr M.V. Mtila	Inxuba Yethemba Ward Councillor

### 5.3 Comment period on the EMP and Specialist Investigations

The EMP and a summary of the Archaeological and Paleontological Impact Assessment were made available to all registered Interested and Affected Parties (IAPs). No comments have been received up to date. Mr Johan van Rensburg, owner of the Farm Langekloof, requested to minimise the disturbance to his property and to communicate all information to him. The summary was faxed to all landowners. On request the complete AIA and PIA report will be send to the registered I&APs.

<b>STAKEHOLDER</b>	<b>ORGANISATION</b>	<b>COMMENT</b>
Mr Johan van Rensburg	Property Owner: Farm Langekloof	Mr van Rensburg has recommended that dust emissions must be minimised and that rehabilitation of the area must take place as per minimum requirements.

## 6 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

The following procedures and guidelines must be followed by any officials from the municipality or personnel of any contractors during the execution of the planned works.

### 6.1 Access

The landowners will be notified prior to the entering of any private property and the access and access gates will be confirmed between the Contractor and Landowner.

All the borrow pits are located adjacent to the roads where the material is required and only limited access roads are used to transport the material to the location of



requirement. Care should however be taken to ensure that existing roads are used for acquiring the road construction material and that no new access routes are developed unless no alternative exists.

Where gates exist for access to the quarries, these gates should be used to gain access and personnel must ensure that if the access gates are damaged that these are repaired. Where no access gate or entry point exists, the contractor may not remove a portion of the fence to gain access, but can create a temporary access gate, after permission from the landowner has been obtained. It is however important to note that the borrow pits are located on farms and that livestock may leave the farm if care is not taken to manage access effectively. It is also important for contractors to ensure that access is sufficiently controlled to prevent unlawful access overnight and weekends if temporary access is used.

It is also the responsibility of the Contractor to repair the fence to its original state once work is completed and the site is vacated.

No unauthorised firearms or weapons of any kind will be permitted on the sites.

The Contractor shall take all necessary precaution against trespassing on private properties.

## **6.2 Maintenance of access roads**

In the case of multiple usage of access roads by other users, arrangements for multiple maintenance responsibility must be made with the other users. If not, the maintenance of access roads will be the responsibility of the holder of the mining permit.

## **6.3 Site Establishment**

Site camps will not be established at the borrow pits.

## **6.4 Demarcation**

The borrow pit areas shall be clearly demarcated and fenced off by means of beacons at its corners, where required by the landowner, or for safety purposes. Excavation and resultant operations shall only take place within this demarcated area.

## **6.5 Infrastructure and Services**

No infrastructure, communication or power service are found in the vicinity of the borrow pits.

## **6.6 Pollution and Waste Management**

Adequate chemical toilets must be provided for staff, located within reasonable walking distance from the borrow pit area, as required by the Occupational Health and Safety (OHS) Act, 2004 (Act No. 56 of 2004) as amended. Alternatively, existing ablution facilities on site will be utilised if available. Chemical toilets shall be emptied / serviced on a regular basis to prevent overflowing. All chemical toilets provided by the Contractor shall be efficient, sanitary and non-offensive. A minimum of one toilet will be provided per 15 persons at each working area.

Petroleum-chemicals and hydrocarbon materials should not be spoiled on site and all necessary precautions according to regulations, should be adhered to. If any oil spillage occurs the contaminated soil must be excavated immediately to a depth of 150 mm and disposed of in containers at a registered hazardous waste site.

No servicing of vehicles will be allowed on site.

No construction debris, rubble, domestic waste, etc. should be allowed on the borrow pit premises. It is the contractor's responsibility to remove and transport all construction waste material off the site to a registered waste site.

Under no circumstances will the burial or burning of waste be allowed on sites.

The Contractor will be responsible for providing sealable bins/containers at the site for domestic waste. The domestic waste must be separated at source. Wherever possible, materials will be recycled. The Contractor shall dispose of all domestic waste generated by his staff and sub-contractors on a regular basis at a registered waste disposal site.

Although storm water may accumulate in the low lying excavation, no erosion of the surrounding area will take place.

Dust or wind erosion minimisation will be required if and when dust becomes a hazard for traffic safety or a nuisance to the land owner, live stock and fauna or flora.

Specific attention should be given to public traffic safety and accommodation for the duration of the hauling of material from the borrow pit.

## **6.7 Occupational Health and Safety**

All conditions and safety requirements of the OHS Act regarding working near heavy duty equipment, safety signage, and personal protective clothing must be strictly

adhered to. A health and safety officer must be appointed to ensure that these conditions are implemented.

#### **6.8 General Safety**

Warning signs must be placed on and around the sites as per OSH Requirements. Where there is a potential of a particular fire hazard at any point in the construction works, the Contractor shall ensure that his employees are properly trained in the use of the appropriate fire fighting equipment and that such equipment is on hand at all times. No fires will be allowed in and around the borrow pits due to the dry seasons and to prevent the spread of fires.

Adequate first aid services will be provided by the Contractor at the various sites.

The Contractor shall ensure that suitable regulations and precautions are established and brought to the attention of his employees (permanent or temporary).

#### **6.9 Water Management**

No water will be extracted from surrounding rivers or any drainage along the construction areas for construction purposes. The Contractor will supply water from off-site sources approved by the Environmental Control Officer (ECO), or arrange council water for the construction period.

#### **6.10 Dust Control and Air Quality**

The Contractor is to take appropriate measures to minimise the generation of dust as a result of excavation works. Such measures include frequent spraying during low rainfall periods or by other means approved by the Site Manager. Dust control by means of water-spraying would be sufficient on the stockpiling areas. Speed limits must be enforced in all areas to reduce dust generation. Dust dispersion from demolition activities and gravel roads shall be limited and suppressed to the maximum extent practical. Gravel roads shall be sprayed with water from a water cart to limit dust generation.

#### **6.11 Topsoil**

The upper 100mm (minimum thickness) of *in situ* soil material shall be regarded as topsoil. Topsoil shall, in all instances, be carefully removed from the area to be disturbed and stockpiled so as to be replaced and / or used for natural vegetation purposes after construction. Topsoil shall be stockpiled in areas not exposed to construction traffic, be placed in low, uncompacted heaps and protected against erosion.

Every effort must be made to preserve and protect the upper / surface soil layers for rehabilitation purposes. Effort must also be made to restore and backfill old borrow areas with spoil / surplus material, rather than creating new spoil sites.

#### **6.12 Excavation, Hauling and Placement**

The Contractor shall provide the Municipality with a detailed plan of his intended construction processes prior to starting any excavation. The plans shall detail the number of personnel and plant to be used and the measures by which the impacts of pollution (noise, dust, litter, fuel, oil, and sewage), erosion, vegetation destruction and deformation of landscape will be prevented, contained and rehabilitated. Particular attention shall also be given to the impact that such activities will have on the adjacent environment. The Contractor shall demonstrate his "good housekeeping", particularly with respect to closure at the end of every day so that the site is left in a safe condition from rainfall overnight or over periods when there is no excavation activity.

- **STOCKPILES**

The Contractor shall plan his activities so that materials excavated from borrow pits, in so far as possible can be transported directly to, and placed at, the point where it is to be used. However, should temporary stockpiling become necessary, the areas for the stockpiling of excavated and imported material as well as the Contractor's proposed measures for prevention, containment and rehabilitation against environmental damage shall be approved by the Municipality.

No vehicles shall be allowed access onto the stockpiles.

The existing borrow pits have no naturally occurring indigenous trees and shrubs that may be damaged during operations and stockpiling may only take place within the designated working area. The existing borrow pits are more than 50 years old and no vegetation has established in or on the access roads to the borrow pits. Care shall be taken to preserve all vegetation in the immediate area of these temporary stockpiles. During the life of the stockpiles the Contractor shall at all times ensure that they are:

- Positioned and sloped to minimise the possibility of slope failures;
- Constructed and maintained so as to avoid erosion of the material and contamination of surrounding environment; and kept free from all alien / undesirable vegetation.

After the stockpiled material has been removed, the site shall be re-instated to its original condition. No foreign material generated / deposited during construction shall remain on site. Areas affected by stockpiling shall be shaped using manual labour or available plant to ensure that the area is stable and erosion is limited. *In situ* excess materials must also be spread and shaped.

## **7 RESPONSIBILITY**

The environment affected by the excavation operations shall be rehabilitated by the holder, as far as practicable, to its natural state or to a predetermined and agreed standard or land use which conforms to the concept of sustainable development. The affected environment shall be maintained in a stable condition that will not be detrimental to the safety and health of humans and animals and that will not pollute the environment or lead to the degradation thereof.

It is the responsibility of the holder of the exemption to ensure that the manager on the site and the employees are familiar with all the statutory requirements which must be met in order to excavate, and this which includes the implementation of the EMP:

If operations are to be conducted in an area that has already been disturbed, the holder must reach specific agreement with the Regional Manager concerning the responsibilities imposed upon himself/herself pertaining to the rehabilitation of the area and the pollution control measures to be implemented.

## **8 REHABILITATION OF EXCAVATION AREAS**

The following operation procedures shall be adhered to:

The excavated area must serve as a final depositing area for the placement of spoil during processing. Rocks and coarse material removed from the excavation must be dumped into the excavation simultaneously with the spoil. Waste will not be permitted to be deposited in the excavations.

Once excavations have been filled with overburden, rocks and coarse natural materials and profiled with acceptable contours and erosion control measures, the topsoil previously stored shall be returned to its original depth over the area.

## **9 FINAL REHABILITATION**

All infrastructures, equipment, plant and other items used during the excavation period will be removed from the site (Section 44 of the MPRDA). Waste material of any description, including receptacles, scrap, rubble and tyres, will be removed entirely from the affected area and disposed of at a recognised landfill site. It will not be buried or burned on the site.

Final rehabilitation shall be completed within a period specified by the Regional Manager of the Department of Minerals and Energy.

## **10 MONITORING AND REPORTING**

Regular monitoring of all the environmental management measures and components shall be carried out by the holder of the mining permit in order to ensure that the provisions of this EMP are adhered to. Ongoing and regular reporting of the progress of implementation of this EMP will be done. Inspections and monitoring shall be carried out on both the implementation of the EMP and the impact on plant and animal life.

Visual inspections on erosion and physical pollution shall be carried out on a regular basis.

***Annexure A: Locality Maps & Site  
Plans***

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***Annexure B: Archaeological Impact  
Assessment***

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PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT .

**UTILIZATION OF 17 QUARRIES FOR  
UPGRADING OF THE DR2629, ROAD NR 654 AND THE DR2631,  
MIDDELBURG AREA, EASTERN CAPE, SOUTH AFRICA**

DATE: 2008-10-06

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17 Quarries - Upgrading of the DR2629, Road nr 654 & the DR2631, Middelburg, EC

Kwezi V3 Engineers

PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT

UTILIZATION OF 17 QUARRIES FOR  
UPGRADING OF THE DR2629, ROAD NR 654 AND THE DR2631,  
MIDDELBURG AREA, EASTERN CAPE, SOUTH AFRICA

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## 1) TERMS OF REFERENCE

Kwezi V3 Engineers has been appointed by the developer, the Chris Hani District Municipality, to upgrade 3 existing gravel farm roads; the DR2629, Road nr 654 and the DR2631, making use of 17 existing quarries alongside the affected road portions.

Kwezi V3 Engineers' Environmental and Waste Management Division has been requested by the developer to apply to the Department of Minerals & Energy (DME) for exemption from mining rights for utilization of the 17 gravel quarries. With the requested exemption provisionally granted DME required an Archaeological & Palaeontological Impact Assessment to be conducted on all 17 proposed quarries. The Archaeological & Palaeontological Impact Assessment is to form part of the proposed developments' Environmental Impact Assessment (EIA) and was requested in terms of the Minerals and Petroleum Resources Development Act, Act nr 28 of 2002 (MPRDA 2002), the natural and cultural environmental particulars of which are described in the National Environmental Management Act, Act nr 107 of 1998 (NEMA 1998) and the National Heritage Resources Act, Act No 25 of 1999 (NHRA 1999) and associated Regulations.

ArchaeoMaps Archaeological Consultancy has been appointed by Kwezi V3 Engineers to conduct the Phase 1 Archaeological Impact Assessment (AIA) as specialist sub-section to the EIA. The Phase 1 AIA aimed to locate, identify and assess the significance of cultural heritage resources, inclusive of archaeological deposits / sites, built structures older than 60 years, sites of cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict and cultural landscapes or views as defined and protected by the NHRA 1999, that may be affected by the proposed development. Palaeontological deposits / sites as defined and protected by the NHRA 1999 are not the subject of the report.

### 1.1) DEVELOPMENT LOCATION AND IMPACT

The proposed development is located in the Middelburg area, Eastern Cape, centering on the area between Middelburg, Steynsburg, Cradock and Graaf-Reinet.

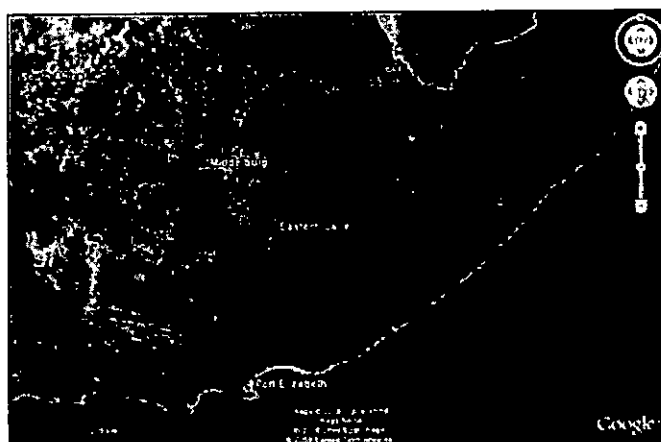


Figure 1: Middelburg, Eastern Cape, South Africa

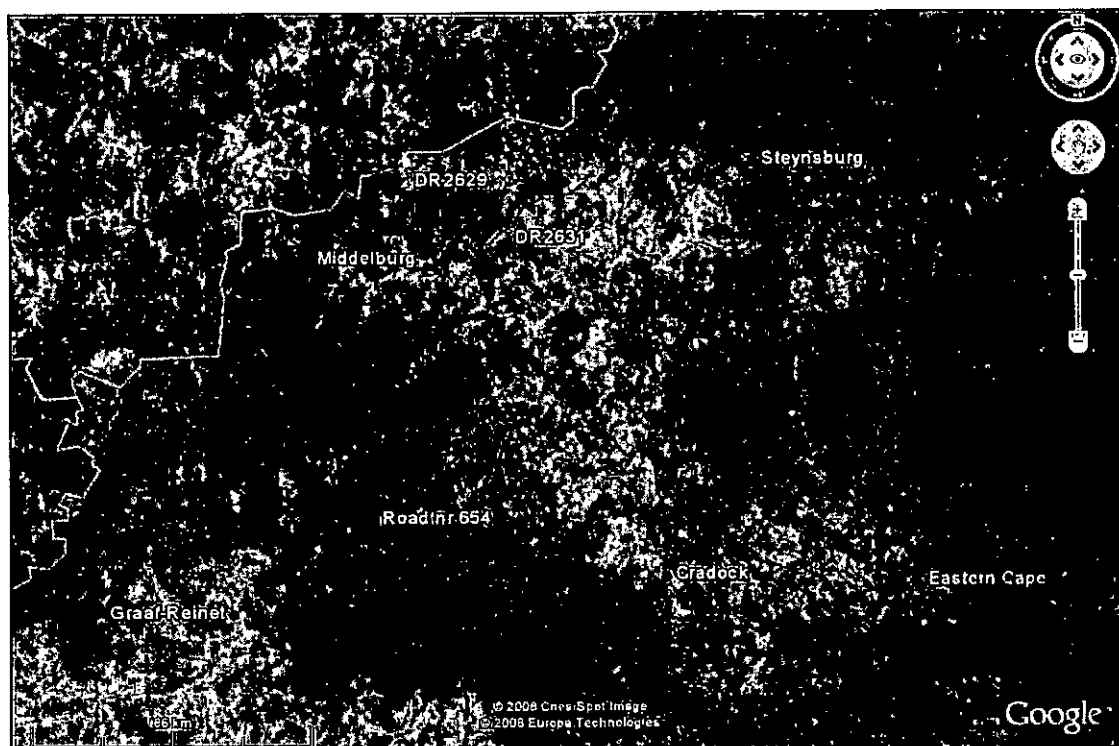


Figure 2: General locality of the DR2629, Road nr 654 and the DR2631 in relation to Middelburg, Steynsburg, Cradock and Graaf-Reinet, Eastern Cape

All 3 existing gravel farm roads; the DR2629, Road nr 654 and the DR2631, are characterized by built-up gravel road surfaces of which construction / the last main upgrade date to approximately 30 years ago, and by implication prior to current legislation. The greater part of the gravel quarries intended for utilization during the proposed development was also used at the time.

In totality the development will comprise of an estimated 220.1km road upgrade, utilizing 17 existing quarries with current development planning outlined as:

1.	DR2629: (Middelburg)	145.3km	9 quarries
2.	Road nr 654: (Hofmeyer/Conaway)	8.8km	5 quarries
3.	DR2631: (Suurberg)	26.0km	3 quarries

Development impact on all road surfaces will be total; resulting in the loss of all surface heritage sites / features that may be present in areas of impact. All road surfaces are however built-up, implying a secondary *ex-situ* context to all material that may be present.

Development impact at all the gravel quarries will be total; resulting in the loss of all surface and sub-surface heritage sites / features that may be present in areas of impact.

## 2) THE PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT

### 2.1) METHODOLOGY

The Phase 1 AIA was conducted over a 5 day period (2008/10/22-26) by one archaeologist. Assessment was done by foot and vehicle and limited to a Phase 1 surface survey; no excavation or sub-surface testing was done. GPS co-ordinates were taken with a Garmin GPSmap 60CSx GPS (Datum: WGS84). Photographic documentation was done with a Casio Exilim EX-S10 camera. A combination of Garmap and Google Earth software was used in the display of spatial information.

Archaeological and cultural heritage site significance assessment and associated mitigation recommendations were done according to the system prescribed by SAHRA (2007).

SAHRA ARCHAEOLOGICAL & CULTURAL HERITAGE SITE SIGNIFICANCE ASSESSMENT			
SITE SIGNIFICANCE	FIELD RATING	GRADE	RECOMMENDED MITIGATION
High Significance	National Significance	Grade 1	Site conservation / Site development
High Significance	Provincial Significance	Grade 2	Site conservation / Site development
High Significance	Local Significance	Grade 3A / 3B	Site conservation or extensive mitigation prior to development / destruction
High / Medium Significance	Generally Protected A	-	Site conservation or mitigation prior to development / destruction
Medium Significance	Generally Protected B	-	Site conservation or mitigation / test excavation / systematic sampling / monitoring prior to or during development / destruction
Low Significance	Generally Protected C	-	On-site sampling, monitoring or no archaeological mitigation required prior to or during development / destruction

Table 1: Cultural heritage site significance assessment and mitigation recommendations

## 2.2) 9 QUARRIES ALONG THE DR2629

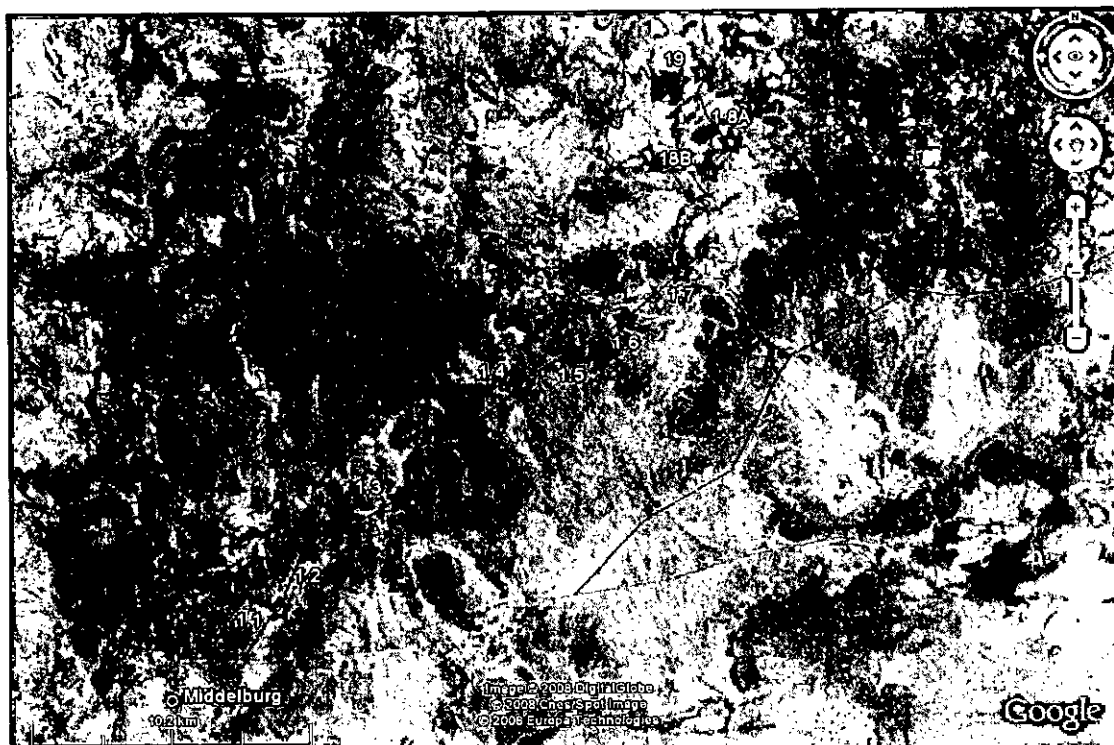


Figure 3: Proposed quarry development locations along the DR2629

DR2629 (MIDDELBURG)						
QUARRY NR	DISTANCE	CO-ORDINATES	PROPERTY NAME	HERITAGE RESOURCES Y / N	TYPE	RECOMMENDATIONS
1.1	2.4km	S31°28'34.6"; E25°03'31.3"	Grootfontein	Yes	Historical Stone Age	Destruction/Conservation Destruction
1.2	4.8km	S31°27'27.1"; E25°04'10.9"	Grootfontein	No	N/A	N/A
1.3	8.6km	S31°26'26.7"; E25°06'18.0"	Watervoor / Vleipoor	Yes	Stone Age	Destruction
1.4	14.5km	S31°24'10.8"; E25°09'08.1"	Dassiefontein	No	N/A	N/A
1.5	16.8km	S31°23'32.4"; E25°10'13.5"	Dassiefontein	Yes	Stone Age	Destruction
1.6	19.2km	S31°22'54.0"; E25°11'28.2"	Knoffelsvlei	No	N/A	N/A
1.7	21.9km	S31°21'57.6"; E25°12'45.5"	Knoffelsvlei	Yes	Stone Age	Conservation
1.8A	(26.5km)	S31°19'24.9"; E25°13'53.1"	Elim	No	N/A	N/A
1.8B	(26.5km)	S31°19'59.1"; E25°13'23.9"	Elim	No	N/A	N/A
1.9	30.6km	S31°18'03.3"; E25°13'14.9"	Nooitgedaght	Yes	Historical	Conservation

Table 2: DR2629 quarry development co-ordinates and Phase 1 AIA findings

- o **THE DR2629 ROAD SURFACE & RESERVE:** The assessment covered approximately 40/154.3km of the DR2629 to be upgraded by the development. No archaeological or cultural heritage resources as defined and protected by the NHRA 1999 were identified either on the existing built-up road surface or within the (largely already disturbed) road reserve.

The remainder of the surface of the road portion to be upgraded is similar to the assessed portion. Gravel from the same quarries was used for construction / upgrading purposes, minimizing the likelihood that cultural heritage sites will be encountered on the remainder of the road surface or within the reserve.



Figure 4: General view of the DR2629

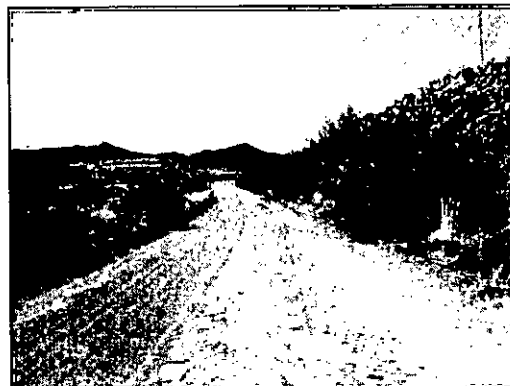


Figure 5: View of the DR2629 road surface and reserve

o **SUMMARY & RECOMMENDATIONS - QUARRIES 1.1 TO 1.9:** Five of the proposed quarry sites (Quarries 1.2; 1.4; 1.6; 1.8A & 1.8B) proved to be anthropically sterile. Four of the 5 sites will be utilized during the course of development namely Quarries 1.2, 1.4, 1.6 and either 1.8A or 1.8B. Utilization of the quarries will not impact on any identified archaeological or cultural heritage sites / resources. It is recommended that development at these sites proceed without the developer having to comply with further archaeological or cultural heritage legislative requirements.

Cultural heritage material in inferred secondary or low significance contexts were discovered at 3 proposed quarry sites (Quarries 1.1; 1.3 & 1.5). Low density Stone Age artefacts, inferred to be the *ex-situ* result of post depositional processes which affected nearby sites on higher lying areas over many thousands of years were encountered in the areas. Stone Age artefact deposits at all 3 quarry locales are of a SAHRA *Low Significance* and a *Generally Protected C* Field Rating. It is recommended that the Stone Age deposits at Quarries 1.1; 1.3 & 1.5 be destroyed *in lieu* of the development, without the developer having to apply for SAHRA *Site Destruction Permits*.

In addition to the established Stone Age presence on the landscape stone wall foundations dating to the Historical Period was encountered in close proximity to proposed Quarry 1.1. Quarrying in the area may well impact on the foundations. Foundations are interpreted as Historical Period farm / camp fence lines and are of a SAHRA *Low Significance* and *Generally Protected C* Field Rating. Development may be restricted to the immediate vicinity of the existing quarry / restricted to the portion east (E) of the foundations, thereby following a conservation approach. However, should development requirements not allow conservation it is recommended that the site be destroyed without the developer having to apply for a SAHRA *Site Destruction Permit*.



Two proposed quarry sites (Quarries 1.7 & 1.9) are located on archaeologically sensitive areas:

1. Quarry 1.7: The general surface area, sections of and disturbed deposits in the Quarry 1.7 site area yielded a number of Stone Age artefacts interpreted as the perimeter of the site primarily located on the surrounding hills. Artefacts were discovered in the top approximate 20cm layer of the exposed stratigraphic section. Artefacts are typologically ascribed to the Later and Middle Stone Age. Macolithic artefacts are indicative of a Later Stone Age presence on the landscape while the Middle Stone Age is represented by typical flake and blade *fossils directeurs*. Faded rock art, located in a shelter at the site proper, increase the significance of Later Stone Age artefact deposits. The site is ascribed a SAHRA *Medium Significance* and a *Generally Protected B* field rating: The site should be conserved. Alternatively development should be preceded by Phase 2 archaeological mitigation. It is however recommended that development proceed at proposed Quarry 1.7, an already impacted area and located at the perimeter of the site proper, provided development be restricted to the current fenced area of the quarry, implying primarily vertical quarrying in shale deposits.
  
2. Quarry 1.9: The proposed quarry site is located at the perimeter of a Historical Period stock post, identified by stone stock enclosure foundations, associated stone features and midden deposits. The Historical Period site is ascribed a SAHRA *Medium Significance* and *Generally Protected B* Field Rating: The site should be conserved. Alternatively development should be preceded by Phase 2 archaeological mitigation. The developer may opt for either a conservation or mitigation management option:
  - Conservation of the site would imply a no development option: It is recommended that the Quarry 1.9 site be moved to the existing quarry across the road at S31°18'00.7"; E25°13'12.0". Should more gravel be required the existing quarry can be expanded in the direction of the dam where no archaeological or cultural heritage resources will be impacted on.
  - Mitigation as management option would imply Phase 2 archaeological rescue excavations at the Historical Period site to precede sourcing of gravels at Quarry 1.9. In accordance with the SAHRA requirements excavations should be done by an ASAPA (Association of Southern African Professional Archaeologist) accredited CRM (Cultural Resources Management) archaeologist and under a SAHRA *Excavation Permit*.

Other than the abovementioned encountered resources the landowner of the property Knoffelsvlei (Quarries 1.6 & 1.7) reported on what is interpreted as San burials; crouched skeletons discovered years ago while building a dam on the property. Whereabouts of the skeletal remains are unknown. A known Anglo-Boer war marked mass burial of unknown British soldiers is also situated on the property, albeit a fair distance away from the proposed quarry sites and the road. Due to time constraints the site was not visited at the time of the assessment.

In order to preliminary test the hypothesis that Stone Age deposits are concentrated on higher lying hills with lower lying areas yielding the disturbed result of site depositional processes, all known quarries on

the Grootfontein property was visited in the company of the farms manager. The assessment included 3 additional quarries not included in the project. Stone Age artefacts were discovered at 2 of the quarries, in both cases located at the foot of hills, with higher umbers of artefact present in the hill deposits. No cultural material as discovered at a quarry located on a plain, a notable distance from significant relief in the landscape.

The landowner of the property Nooitgedaght (Quarry 1.9) reported on periodic palaeontological research seasons by Dr. Jennifer Botha (National Museum, Bloemfontein) on his, and surrounding farms.

The above serves to further establish the general heritage sensitivity of the area. Should any archaeological (including burial sites) or palaeontological resources / sites be encountered during the course of development, the developer should immediately cease operation in the vicinity of the find and report the site to SAHRA.

---

2.2.1) QUARRY 1.1 (S31°27'27.1"; E25°04'10.9" - GROOTFONTEIN)

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Quarry 1.1 is characterized by a shallow pit located west (W) of the DR2629 on the Grootfontein property. The site is demarcated by a series of hills / ridge running west (W) of the site. Stone Age artefacts of inferred secondary context were present on the surface of the general area and within the shallow quarry sections. Artefact quantities were however too low to attempt an artefact ratio (artefacts: m<sup>2</sup>). Stone tools are of mixed Later and Middle Stone Age typology; represented by macrolithic and flake and blade *fossils directeurs*. The proposed quarry locale is situated at what is interpreted as the perimeter of the site with the site proper being focused on the ridge and immediate surrounds. The site proper is a low density site with limited numbers of lithics. Stone Age deposits at Quarry 1.1 are formally protected under the NHRA 1999.

Stone wall foundations dating to the Historical Period was encountered in close proximity to the quarry. Quarrying in the area may well impact on the foundations. Foundations are interpreted as Historical Period farm / camp fence lines and are formally protected under the NHRA 1999.

- **SITE SIGNIFICANCE & RECOMMENDATIONS:** Development at Quarry 1.1 will impact on Stone Age deposits and may well impact on Historical Period stone wall foundations. The low density Stone Age material and the Historical Period stone feature at the site is ascribed a SAHRA *Low Significance* and a *Generally Protected C* Field Rating. It is recommended that the Stone Age deposits be destroyed *in lieu* of the development without the developer having to apply for a SAHRA *Site Destruction Permit*. The Historical Period stone feature may well be conserved by restricting quarrying to the vicinity of the existing quarry / east (E) of the foundations. Should development requirements not allow conservation, it is recommended that the Historical Period foundations be destroyed without the developer having to apply for a SAHRA *Site Destruction Permit*.



Figure 6: Map of the Quarry 1.1 area

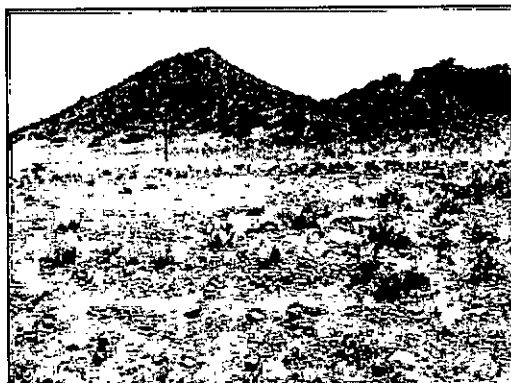


Figure 7: General view of Quarry 1.1

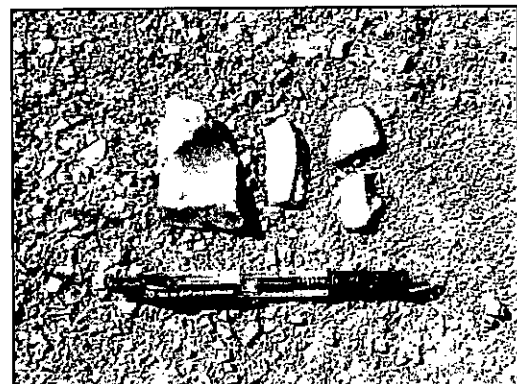


Figure 8: Stone Age artefacts from the Quarry 1.1 area



Figure 9: Historical Period stone wall foundations at the general Quarry 1.1 locality

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2.2.2) **QUARRY 1.2** (S31°28'34.6"; E25°03'31.3" - GROOTFONTEIN)

---

Quarry 1.2 is identified by shallow surface scrapings, located west (W) of the DR2629 on the Grootfontein property. No archaeological or cultural heritage resources as defined and protected by the NHRA 1999 were identified either on the surface of the general area or within the shallow exposed quarry sections.

o **SITE SIGNIFICANCE & RECOMMENDATIONS:** Development at Quarry 1.2 will not impact on any identified archaeological or cultural heritage resources. It is recommended that development proceed without the developer having to comply with further archaeological or cultural heritage legislative requirements.

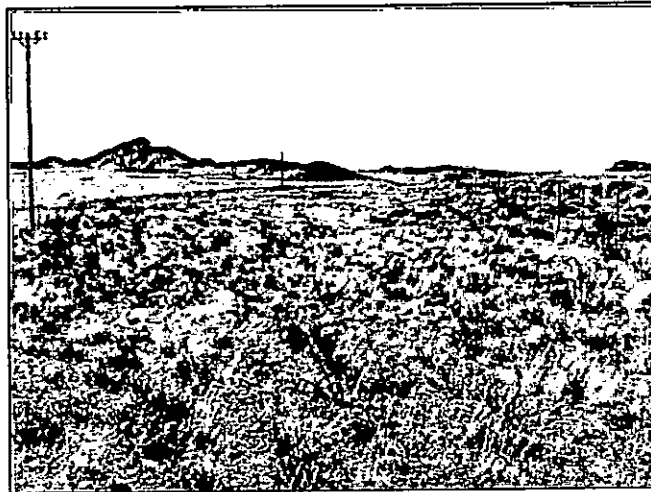


Figure 10: General view of Quarry 1.2



Figure 11: Sections at Quarry 1.2 proved anthropically sterile

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2.2.3) **QUARRY 1.3** (S31°26'26.7"; E25°06'18.0" - WATERVOOR/VLEIPOORT)

---

Quarry 1.3 is located east (E) of the DR2629 on the farm Watervoor / Vleipoort and approximately 150-200m north east (NE) of contemporary farming infrastructure. A low density of Stone Age artefacts were encountered on the surface of the site and primarily within disturbance caused by former quarrying activities. The rolled appearance of the artefacts supports a secondary context. Artefact quantities were very low with recorded artefact ratios (artefacts: m<sup>2</sup>) not exceeding 4:1. The lithics can typologically be ascribed to the later Middle Stone Age, with flake and blade types dominating and a high degree of scraper edges. The cultural member comprises the top approximate 20cm of the more or less 1.5m exposed section of the quarry. Stone Age archaeological deposits are formally protected under the NHRA 1999.

[Landowner authorization for use of the quarry was not yet given at the time of the Phase 1 AIA.]

- o **SITE SIGNIFICANCE & RECOMMENDATIONS:** Based on the low quantity of artefacts and their inferred secondary context a SAHRA *Low Significance and Generally Protected C* Field Rating is ascribed to the Quarry 1.3 Stone Age deposits. It is recommended that the deposits be destroyed *in lieu* of the development without the developer having to apply for a SAHRA *Site Destruction Permit*.

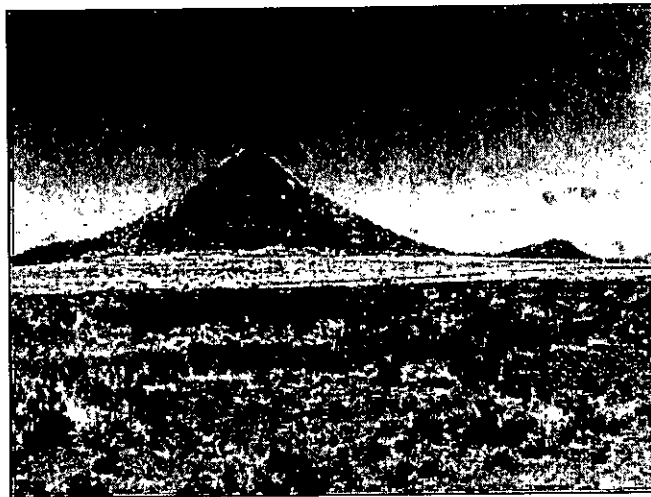


Figure 12: General view of Quarry 1.3



Figure 13: The Quarry 1.3 area with contemporary farming infrastructure in the background



Figure 14: Stone Age artefacts from the Quarry 1.3 area

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#### 2.2.4 QUARRY 1.4 (S31°24'10.8"; E25°09'08.1" - DASSIEFONTEIN)

---

The formally fenced Quarry 1.4 site is located south west (SW) of the DR2629 on the Dassiefontein property. No archaeological or cultural heritage resources as defined and protected by the NHRA 1999 were identified either on the surface of the general area or within the approximate 1.5+m exposed stratigraphic sections.

- *SITE SIGNIFICANCE & RECOMMENDATIONS:* Development at Quarry 1.4 will not impact on any identified archaeological or cultural heritage resources. It is recommended that development proceed without the developer having to comply with further archaeological or cultural heritage legislative requirements.

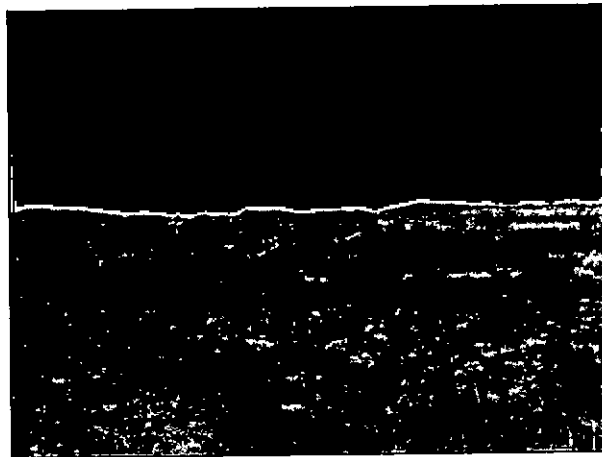


Figure 15: General view of Quarry 1.4



Figure 16: Exposed sections at Quarry 1.4



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2.2.5) QUARRY 1.5 (S31°23'32.4"; E25°10'13.5" - DASSIEFONTEIN)

---

The Quarry 1.5 site is located immediately south east (SE) of the DR2629 on the farm Dassiefontein. A low density of Stone Age artefacts was present on the surface of the general area and within the approximate top 20cm of the exposed stratigraphic section. Artefact ratios (artefacts: m<sup>2</sup>) of approximately 4:1 to 1:25 were recorded amongst the low density concentrations on the surface. Artefact context is inferred to be of secondary nature. The collection can typologically be ascribed to the later Middle Stone Age, with flake and blade types dominating. Stone Age archaeological deposits are formally protected under the NHRA 1999.

- **SITE SIGNIFICANCE & RECOMMENDATIONS:** Based on the low quantity of artefacts and their inferred secondary context a SAHRA *Low Significance* and *Generally Protected C* Field Rating is ascribed to the Quarry 1.5 Stone Age deposits. It is recommended that the deposits be destroyed *in lieu* of the development without the developer having to apply for a SAHRA *Site Destruction Permit*.



Figure 17: General view of Quarry 1.5

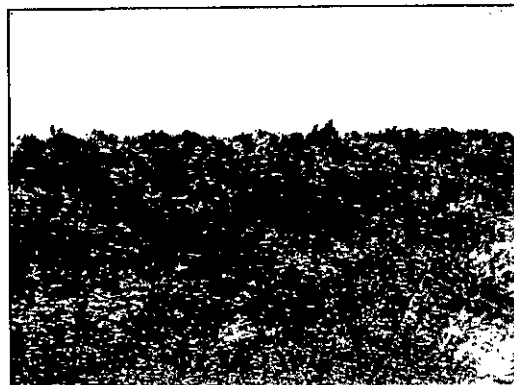


Figure 18: Sections at Quarry 1.5 yielded Stone Age artefacts in the top approximate 20cm layer

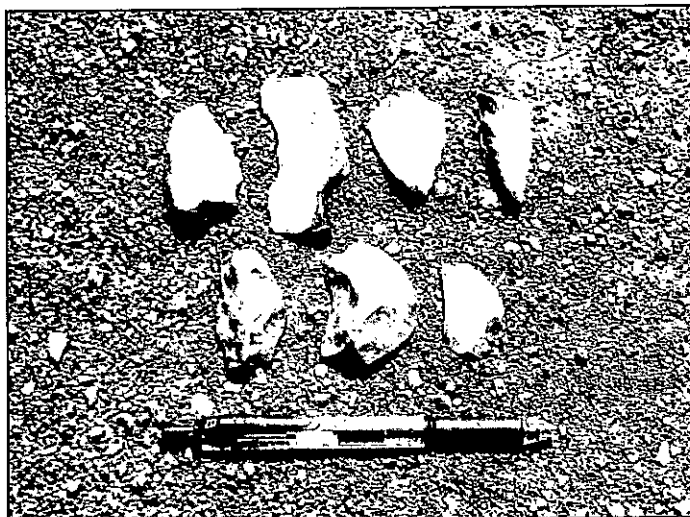


Figure 19: Stone Age artefacts from the Quarry 1.5 area

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2.2.6) **QUARRY 1.6** (S31°22'54.0"; E25°11'28.2" - *KNOFFELSVLEI*)

---

Quarry 1.6 is identified by a large shallow burrowed area located north west (NW) of the DR2629 on the property Knoffelsvlei. No archaeological or cultural heritage resources as defined and protected by the NHRA 1999 were identified either on the surface of the general area or within the shallow exposed quarry sections.

- o **SITE SIGNIFICANCE & RECOMMENDATIONS:** Development at Quarry 1.6 will not impact on any identified archaeological or cultural heritage resources. It is recommended that development proceed without the developer having to comply with further archaeological or cultural heritage legislative requirements.



Figure 20: General view of Quarry 1.6



Figure 21: View of a portion of Quarry 1.6 and shallow stratigraphic sections

### 2.2.7) QUARRY 1.7 (S31°21'57.6"; E25°12'45.5" – KNOFFELSVLEI)

The fenced Quarry 1.7 locality is situated immediately west (W) of the DR2629 on the property Knoffelsvlei. The general surface area, sections of and disturbed deposits at the Quarry 1.7 site area yielded a number of Stone Age artefacts interpreted as the perimeter of the site primarily located on the surrounding hills. Artefacts were discovered in the top approximate 20cm layer of the exposed stratigraphic section. Disturbance in the fenced quarry area did not allow an artefact ratio (artefacts: m<sup>2</sup>). Lithics are typologically ascribed to the Later and Middle Stone Age: Macolithic artefacts are indicative of a Later Stone Age presence on the landscape while the Middle Stone Age is represented by typical flake and blade fossils *directeurs*. Faded rock art, located in a shelter at the site proper, increase the significance of Later Stone Age artefact deposits. Stone Age deposits in close proximity to and within disturbed deposits at Quarry locality 1.7 are formally protected by the NHRA 1999.

Disturbance in the already impacted Quarry 1.7 area decreases the significance of the deposits, while also interpreted as the perimeter of the site proper, located on the surrounding higher lying areas.

- **SITE SIGNIFICANCE & RECOMMENDATIONS:** Existing impact at Quarry 1.7 decreases the significance of the Stone Age deposits in the fenced Quarry 1.7 area. The area is ascribed a SAHRA *Low Significance* and a *Generally Protected C* Field Rating. The site proper, located on the surrounding hills, with in tact deposits, higher artefact ratios and rock art are ascribed a SAHRA *Medium Significance* and a *Generally Protected B* Field Rating. It is recommended that development proceed in the already fenced and impacted area of the Quarry 1.7 locality only, implying primarily vertical burrowing, thereby conserving the site proper. It is proposed that development proceed without the developer having to apply for a SAHRA *Site Destruction Permit* for development within the demarcated and already impacted Quarry 1.7 area.

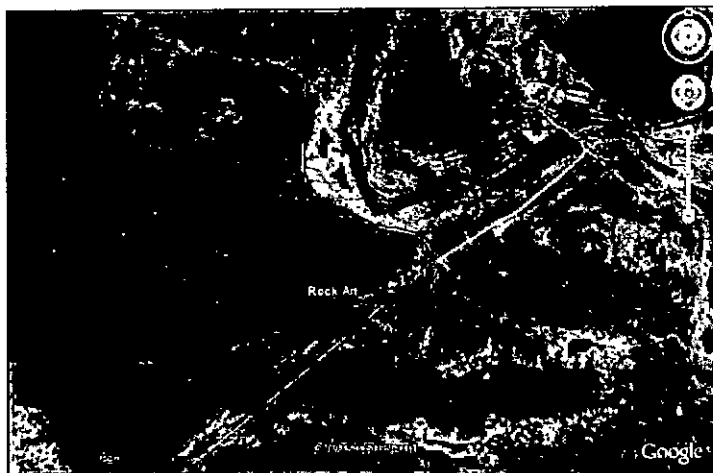


Figure 22: Map of the Quarry 1.7 locality indicating higher lying areas demarcating the site proper and located rock art



Figure 23: General view of Quarry 1.7



Figure 24: High quantities of Stone Age artefacts were discovered in sections and the immediate surrounds of proposed Quarry 1.7

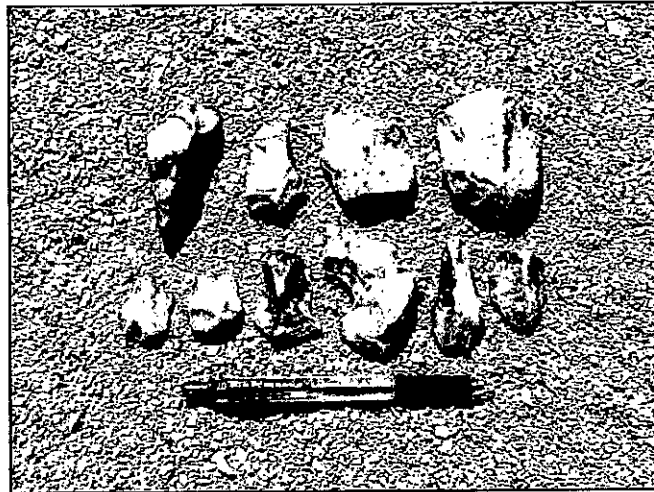


Figure 25: Artefacts from the Quarry 1.7 area



Figure 26: General view of the site proper at Quarry 1.7



Figure 27: Faded rock art at the Quarry 1.7 site proper

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2.2.8) QUARRY 1.8A (S31°19'24.9"; E25°13'53.1" - ELIM)

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Quarry 1.8A is identified by silt dam deposits located east (E) of the DR2629 on the property Elim. No archaeological or cultural heritage resources as defined and protected by the NHRA 1999 were identified either on the surface of the general area or within dam sections and associated disturbance.

- *SITE SIGNIFICANCE & RECOMMENDATIONS:* Development at Quarry 1.8A will not impact on any identified archaeological or cultural heritage resources. It is recommended that development proceed without the developer having to comply with further archaeological or cultural heritage legislative requirements.

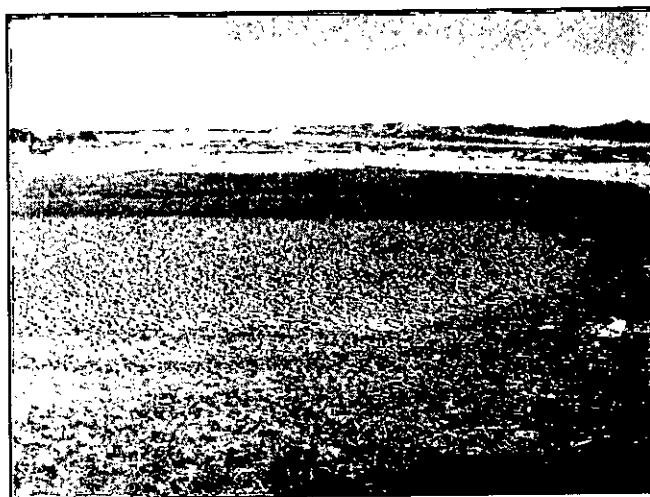


Figure 28: General view of the proposed dam deposits; Quarry 1.8A



Figure 29: Section inspection at Quarry 1.8A proved anthropically sterile

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2.2.9) **QUARRY 1.8B** (S31°19'59.1"; E25°13'23.9" - ELIM)

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Quarry 1.8B is identified by shallow former quarrying with surface sections varying between 0.5-1m in depth and located west (W) of the DR2629 on the property Elim. No archaeological or cultural heritage resources as defined and protected by the NHRA 1999 were identified either on the surface of the general area or within the shallow exposed quarry sections.

[Landowner authorization for the use of the quarry was no yet granted at the time of assessment.]

- o **SITE SIGNIFICANCE & RECOMMENDATIONS:** Development at Quarry 1.8B will not impact on any identified archaeological or cultural heritage resources. It is recommended that development proceed without the developer having to comply with further archaeological or cultural heritage legislative requirements.



Figure 30: General view of Quarry 1.8B



Figure 31: Existing sections at Quarry 1.8B

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2.2.10) QUARRY 1.9 (S31°18'03.3"; E25°13'14.9" - NOOITGEDAGHT)

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The proposed Quarry 1.9 site is located at the perimeter of a Historical Period stock post of colonial association, identified by stone stock enclosure foundations, associated stone features and midden deposits. At least 4 large rectangular stock enclosures with white dung deposits demarcate the general area, at the perimeter of which the Quarry 1.9 shale deposits are present. Rectangular stone walling in varying degrees of decay are present at the site. A number of the middens on site may well post date occupation, however associated midden material are expected. The site is inferred to date to the late 1700's / early 1800's, at the time of colonial occupation in the area. The Historical stock post is formally protected by the NHRA 1999.

[An existing quarry is located immediately across the road from proposed Quarry 1.9 and the Historical Period stock post at S31°18'00.7"; E25°13'12.0". Adjacent to the quarry is a dam, the deposits of which may well yield suitable material for the project. No archaeological or cultural heritage resources as defined and protected by the NHRA 1999 were identified in the vicinity of the existing quarry and dam.]

o **SITE SIGNIFICANCE & RECOMMENDATIONS:** The Historical Period stock post, located at proposed Quarry locality 1.9 is formally protected under the NHRA 1999. Limited Historical Period research in the area, expected *in situ* deposits and the extent of the site warrants a SAHRA *Medium Significance* and a *Generally Protected B* Field Rating: The site should be conserved. Alternatively development should be preceded by Phase 2 archaeological mitigation. The developer may opt for either a conservation or mitigation management option:

1. **CONSERVATION:** Conservation of the site would imply a no development option: It is recommended that the Quarry 1.9 site be moved to the existing quarry across the road at S31°18'00.7"; E25°13'12.0". Should more gravel be required the existing quarry can be expanded in the direction of the dam where no archaeological or cultural heritage resources will be impacted on.
2. **PHASE 2 MITIGATION:** Mitigation as management option would imply Phase 2 archaeological rescue excavations at the Historical Period site to precede sourcing of gravels at Quarry 1.9. In accordance with the SAHRA requirements excavations should be done by an ASAPA (Association of Southern African Professional Archaeologist) accredited CRM (Cultural Resources Management) archaeologist and under a SAHRA *Excavation Permit*.

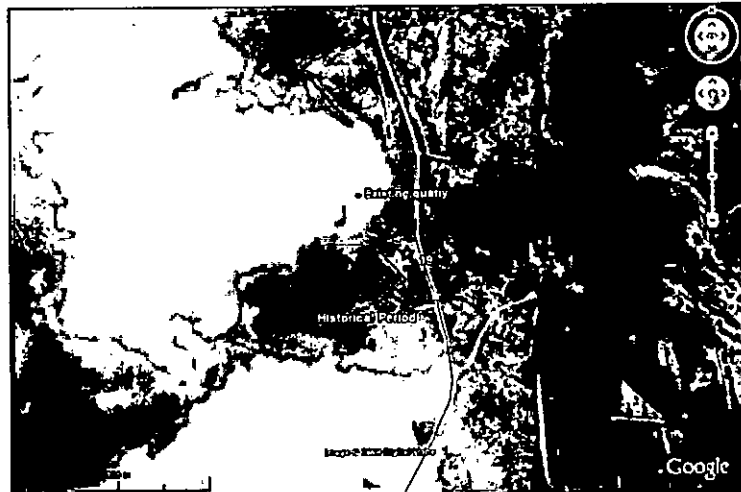


Figure 32: Map of the Quarry 1.9 area indicating proximity to the Historical Period stock post and the existing quarry and dam



Figure 33: View of the proposed Quarry 1.9 site with portions of the Historical Period heritage site in the foreground



Figure 34: General view - the Historical Period site



Figure 35: Close-up of remaining structures at the Historical Period site



Figure 36: The existing quarry located across the road from proposed Quarry 1.9



## 2.3) 5 QUARRIES ALONG ROAD NR 654

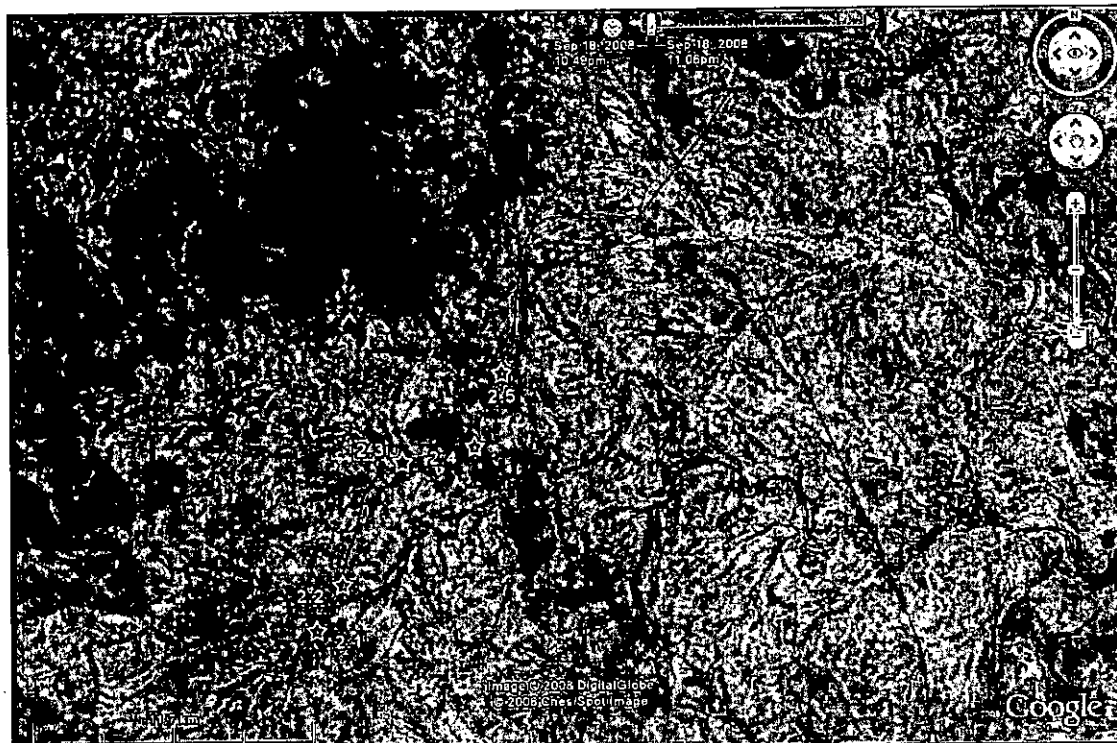


Figure 37: Proposed quarry development locations along Road nr 654

ROAD NR 654 (HOFMEYER / CONAWAY) R.						
QUARRY NR	DISTANCE	CO-ORDINATES	PROPERTY NAME	ARCHAEOLOGICAL & CULTURAL RESOURCES		
				Y/NR	TYPE	RECOMMENDATIONS
2.1	2.2km	S31°56'47.5", E25°03'14.4"	Spitskopvlei (P/5)	No	N/A	N/A
2.2	4.6km	S31°55'43.1", E25°03'56.3"	Spitskopvlei (P/3)	No	N/A	N/A
2.3	10.5km	S31°52'58.2", E25°05'30.7"	Willemburgersrivier	No	N/A	N/A
2.4	14.5km	S31°52'37.5", E25°07'27.2"	Gladstone / De Róort	No	N/A	N/A
2.5	17.0km	S31°50'59.1", E25°08'11.1"	Wolwevlei	No	N/A	N/A

Figure 38: Road nr 654 quarry development co-ordinates and Phase 1 AIA findings

o **ROAD NR 654 ROAD SURFACE & RESERVE:** An approximate 38 /48.8km of Road nr 654 proposed for the road upgrading development was covered by the assessment. No archaeological or cultural heritage resources as defined and protected by the NHRA 1999 were identified either on the existing built-up road surface or within the road reserve.

The remainder of the surface of the road portion to be upgraded is similar to the assessed portion. Gravel from the same quarries was used for construction / upgrading purposes, lessening the possibility that cultural heritage sites will be encountered on the remainder of the road surface or within the reserve.

The sourcing of gravel at Quarry 2.2 had already stated at the time of the Phase 1 AIA. Upgrading of the road portion in the immediate vicinity of the quarry was in progress.

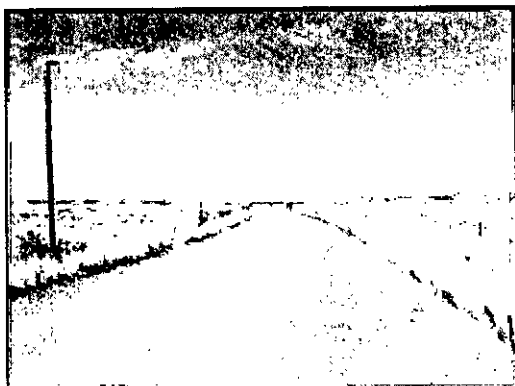


Figure 39: Road nr 654 - General view of the gravel road surface



Figure 40: Upgrading of Road nr 654 in progress

o *SUMMARY & RECOMMENDATIONS - QUARRIES 2.1 TO 2.5:* No archaeological or cultural heritage resources as defined and protected by the NHRA 1999 were located either on the surface or within exposed sub-surface sections at any of the proposed quarry sites (Quarries 2.1; 2.2; 2.3; 2.4 & 2.5) cited along Road nr 654. Sourcing of gravel from the quarries will not impact on any identified archaeological or cultural heritage sites / resources. It is recommended that development at all 5 quarry sites proceed without the developer having to comply with further archaeological or cultural heritage legislative requirements.

The landowner of Spitskopvlei (P/3) (Quarry 2.2) reported on a marked Historical Period grave located approximately 200m from his farmstead, and at a safe distance from Quarry 2.2. Stone Age shelters, rock art and Historical Period walling are known from the general area. Particular reference was made to a paleontological fossil discovered approximately 30 years ago in the road reserve at the locality of Quarry 2.2 (the time of initial road construction). The landowner relayed that the jackal-like carnivore skull had double pairs of canines both in the upper and lower jaws. The fossil is believed to be housed at the Albany Museum, Grahamstown. Further palaeontological fossils is understood to be periodically discovered in the general area and an amateur palaeontological group, based in Cradock, works in association with Dr. Billy de Klerk (Albany Museum, Grahamstown) in the reporting and site documentation of fossil finds.

The presence of paleontological deposits was supported by the owner of Gladstone / De Poort and Wolwevlei, who recalled having encountered plant and animal fossils in shale section deposits on his and other properties in the area.

The lack of Stone Age lithic artefacts along Road nr 654 may well be ascribed to the general geology of the area, however not excluding the possibility of related anthropic material such as graves and art.

Should any archaeological (including burial sites) or palaeontological resources / sites be encountered during the course of development, the developer should immediately cease operation in the vicinity of the find and report the site to SAHRA.

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2.3.1) **QUARRY 2.1** (S31°56'47.5"; E25°03'14.4" - SPITSKOPVLEI: PORTION 5)

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Quarry 2.1 is located immediately east (E) of Road nr 654 on the property Portion 5 of Spitskopvlei. The area is characterized by shallow shale rich deposits bearing evidence of limited former quarrying. No archaeological or cultural heritage resources as defined and protected by the NHRA 1999 were identified either on the surface of the general area or within exposed quarry and erosion sections.

o **SITE SIGNIFICANCE & RECOMMENDATIONS:** Development at Quarry 2.1 will not impact on any identified archaeological or cultural heritage resources. It is recommended that development proceed without the developer having to comply with further archaeological or cultural heritage legislative requirements.

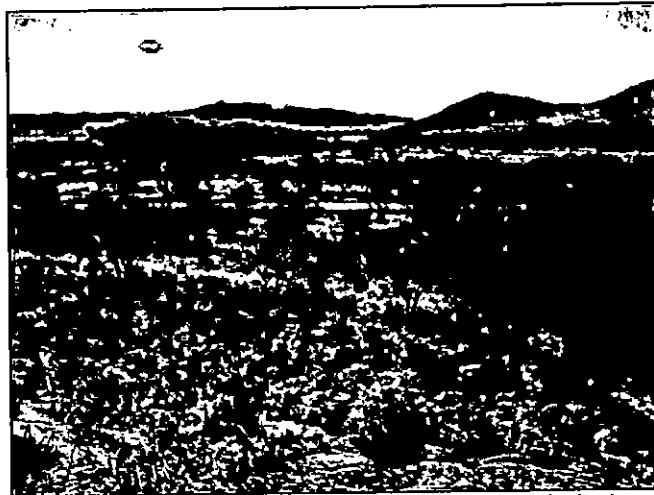


Figure 41: General view of Quarry 2.1 with Road nr 654 in the background



Figure 42: Close-up of the quarry area

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2.3.2) **QUARRY 2.2** (S31°55'43.1"; E25°03'56.3" – SPITSKOPVLEI: PORTION 3)

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Quarry 2.2 is located immediately east (E) of Road nr 654 on the property Portion 3 of Spitskopvlei. Gravel quarrying at the site has already started at the time of the assessment. No archaeological or cultural heritage resources were identified on or within the deposits being sourced or in the immediate vicinity of the site. Shale layers are however known to be fossil rich; the landowner relayed that, approximately 30 years ago at the time of initial road construction, a jackal-like carnivore skull with double pairs of canines both in the upper and lower jaws was discovered within the road reserve immediately adjacent to the quarry site. The fossil is believed to be housed at the Albany Museum, Grahamstown. Though not the subject of this report, palaeontological fossils are formally protected under the NHRA 1999; the known resource evidently indicative of the palaeontological sensitivity at the site itself, and the general area. No further fossil finds have been made in the immediate vicinity of the site.

- **SITE SIGNIFICANCE & RECOMMENDATIONS:** Development at Quarry 2.2 will not impact on any identified archaeological or cultural heritage resources. It is recommended that development proceed without the developer having to comply with further archaeological or cultural heritage legislative requirements.

The immediate area is however known to be fossil bearing; palaeontological deposits / sites are formally protected under the NHRA 1999. Recommendations as per the Palaeontological Impact Assessment (PIA) should be complied with.

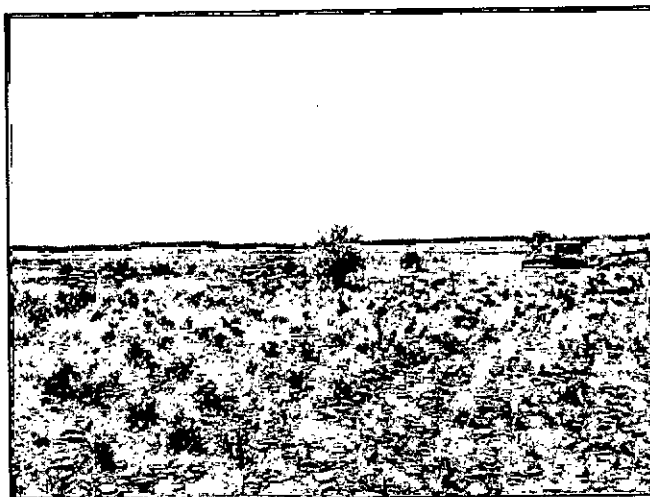


Figure 43: General view of Quarry 2.2

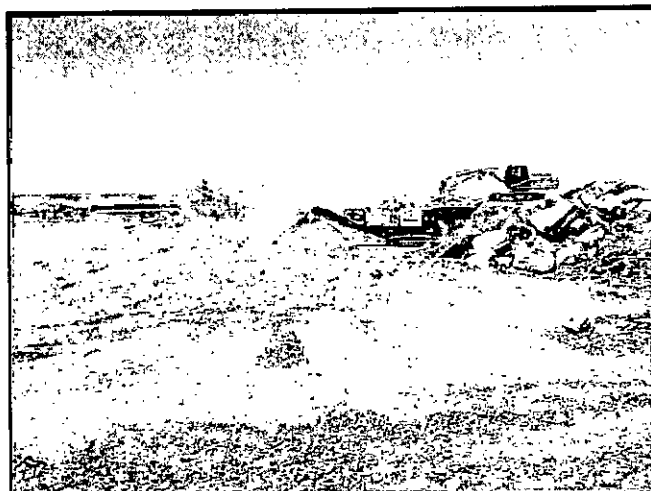


Figure 44: Quarrying operations at Quarry 2.2 at the time of the assessment



Figure 45: Shallow lying shales may well contain fossils of palaeontological nature

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2.3.3) **QUARRY 2.3** (S31°52'58.2"; E25°05'30.7" - WILLEMBURGERSRIVIER)

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Quarry 2.3 is located immediately north (N) of Road nr 654 on the property Willemburgersrivier. The area is characterized by low impact former quarrying in shale rich deposits. No archaeological or cultural heritage resources as defined and protected by the NHRA 1999 were identified either on the surface of the general area or within exposed quarry sections.

- o **SITE SIGNIFICANCE & RECOMMENDATIONS:** Development at Quarry 2.2 will not impact on any identified archaeological or cultural heritage resources. It is recommended that development proceed without the developer having to comply with further archaeological or cultural heritage legislative requirements.



Figure 46: General view of Quarry 2.3 with Road nr 654 in the background



Figure 47: Section deposits at Quarry 2.3

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2.3.4) **QUARRY 2.4** (S31°52'37.5"; E25°07'27.2" - GLADSTONE/DE POORT)

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Quarry 2.4 is located south east (SE) of Road nr 654 on the property Gladstone / De Poort. The large quarry is situated at the foot of a ridge that runs north-west (NW) south-east (SE) immediately to the north of the site. No archaeological or cultural heritage resources as defined and protected by the NHRA 1999 were identified either on the surface of the general area, including the ridge and adjacent plain, or within exposed quarry sections.

- o **SITE SIGNIFICANCE & RECOMMENDATIONS:** Development at Quarry 2.4 will not impact on any identified archaeological or cultural heritage resources. It is recommended that development proceed without the developer having to comply with further archaeological or cultural heritage legislative requirements.



Figure 48: View of Quarry 2.4 from the higher lying NW-SE running ridge

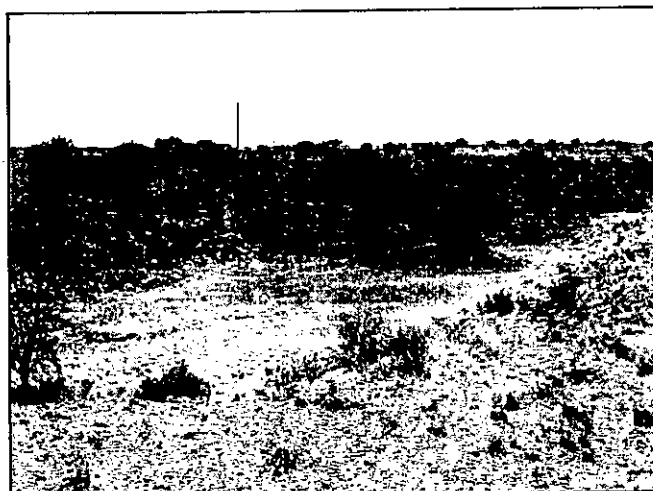


Figure 49: General view of Quarry 2.4



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2.3.5) **QUARRY 2.5** (S31°50'59.1"; E25°08'11.1" - WOLWEVLEI)

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The large Quarry 2.5 site is located immediately east (E) of Road nr 654 on the property Wolwevlei. Deep shale sections of up to 2m in depth are proof of extensive former quarrying. No archaeological or cultural heritage resources as defined and protected by the NHRA 1999 were identified either on the surface of the general area or within exposed quarry and erosion sections.

- o **SITE SIGNIFICANCE & RECOMMENDATIONS:** Development at Quarry 2.5 will not impact on any identified archaeological or cultural heritage resources. It is recommended that development proceed without the developer having to comply with further archaeological or cultural heritage legislative requirements.



Figure 50: General view of Quarry 2.5



Figure 51: Exposed sub-surface sections at Quarry 2.5

## 2.4) 3 QUARRIES ALONG THE DR2631

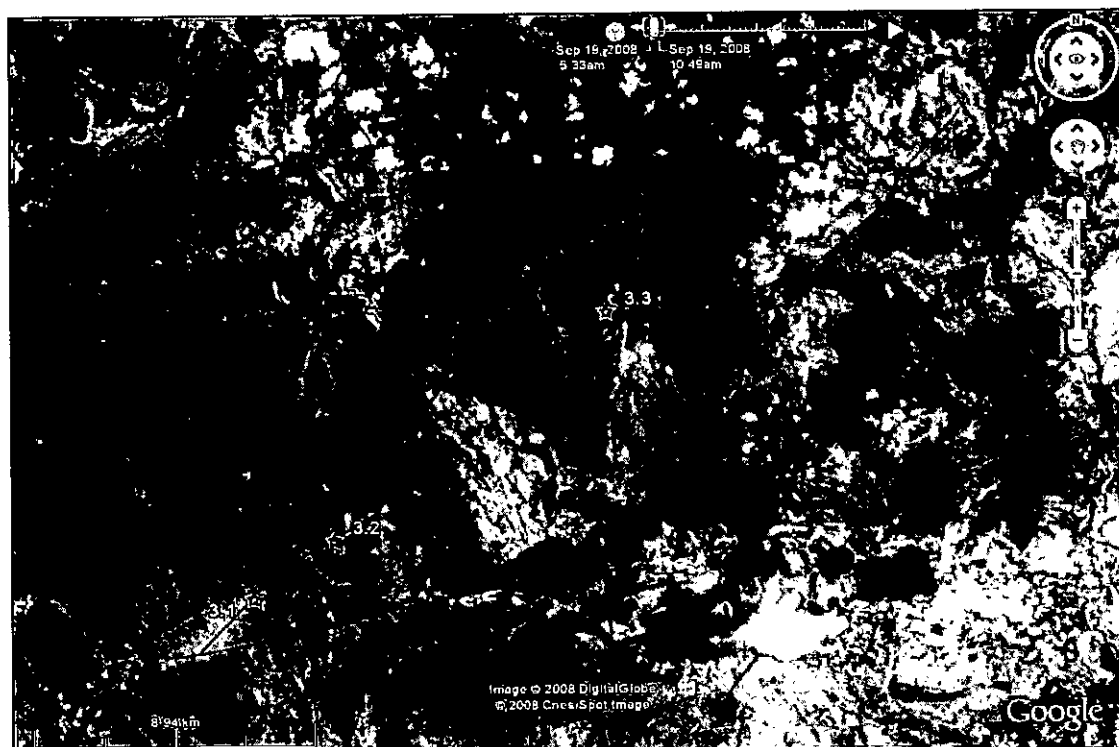


Figure 52: Proposed quarry development locations along the DR2631

DR2631 (SUURBERG)						
QUARRY NR	DISTANCE	CO-ORDINATES	PROPERTY NAME	HERITAGE RESOURCES		
				Y/N	TYPE	RECOMMENDATIONS
3.1	2.5km	S31°27'21.3"; E25°11'24.1"	Farm nr 86	Yes	Stone Age	Destruction
3.2	5.6km	S31°26'19.7"; E25°13'04.3"	Wonderheuvel	Yes	Stone Age	Destruction
3.3	17.8km	S31°22'24.8"; E25°18'33.9"	Watervoor / Belvedere	No	N/A	N/A

Table 3: DR2631 quarry development co-ordinates and Phase 1 AIA findings

- o **THE DR2631 ROAD SURFACE & RESERVE:** The assessment covered approximately 33/26km of the DR2631 to be upgraded by the development. No archaeological or cultural heritage resources as defined and protected by the NHRA 1999 were identified either on the existing built-up road surface or within the road reserve.

The total of the proposed road surface and reserve area comprising the 3<sup>rd</sup> portion of the development has been addressed in the assessment.

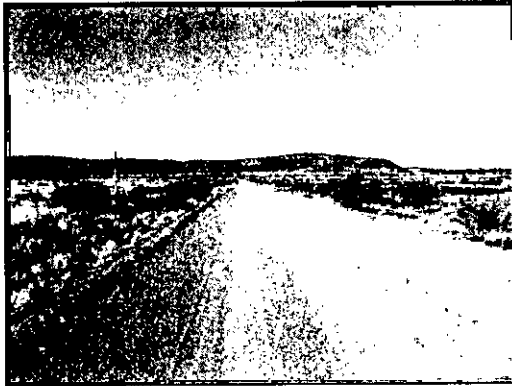


Figure 53: General view of the road surface and reserve: DR2631



Figure 54: General view of the DR2631

- **SUMMARY & RECOMMENDATIONS - QUARRIES 3.1-3.3:** One of the proposed quarry sites (Quarry 3.3) proved to be anthropically sterile. Sourcing of gravel at the site will not impact on any identified archaeological or cultural heritage sites / resources. It is recommended that development at Quarry 3.3 proceed without the developer having to comply with further archaeological or cultural heritage legislative requirements.

Cultural heritage material of low significance and in assumed *ex-situ* contexts were discovered at 2 of the proposed quarry locales (Quarries 3.1 & 3.2). At both sites low density Stone Age artefacts in secondary contexts are interpreted as the result of post depositional slope / hill wash which affected higher lying sites over many thousands of years. Stone Age artefact deposits at both quarries are of a SAHRA *Low Significance* and a *Generally Protected C* Field Rating. It is recommended that Stone Age deposits at Quarries 3.1 & 3.2 be destroyed *in lieu* of the development, without the developer having to apply for SAHRA *Site Destruction Permits*.

No archaeological or cultural heritage resources were known. Proximity of the DR2629 to the DR2631 raises caution for inferred sensitivity and cultural heritage material such as unmarked graves and fossil finds that may well be encountered during the course of development. Should any such material be discovered the developer should immediately cease operation in the vicinity of the find and report the site to SAHRA.

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#### 2.4.1) QUARRY 3.1 (S31°27'21.3"; E25°11'24.1"- FARM NR 86)

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The formally fenced Quarry 3.1 site is located immediately east (E) of the DR2631 on the property Farm nr 86. A low density of Stone Age artefacts were encountered on the surface of the site and primarily within disturbance caused by prior burrowing. The rolled appearance of the artefacts supports a secondary context. Artefact quantities are too low to ascribe an artefact ratio (artefacts: m<sup>2</sup>). The stone tools can typologically be ascribed to the later Middle Stone Age, with flake and blade types dominating. The anthropic layer comprises the top approximate 20cm of the more or less 1.5m exposed section of the quarry. Stone Age archaeological deposits are formally protected under the NHRA 1999.

- **SITE SIGNIFICANCE & RECOMMENDATIONS:** Based on the low quantity of artefacts and their inferred secondary context a SAHRA *Low Significance* and *Generally Protected C* Field Rating is ascribed to the Quarry 3.1 Stone Age deposits. It is recommended that the deposits be destroyed *in lieu* of the development without the developer having to apply for a SAHRA *Site Destruction Permit*.



Figure 55: General view of Quarry 3.1

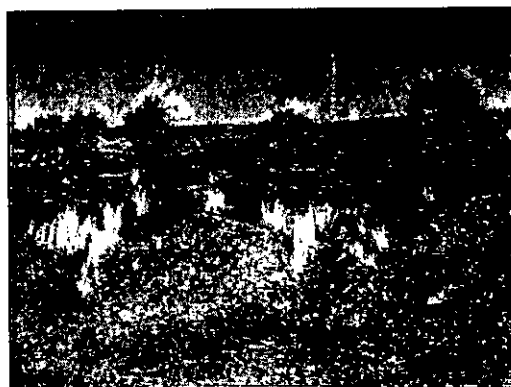


Figure 56: Stone Age artefacts were present in the top approximate 20cm of the stratigraphic section at Quarry 3.1



Figure 57: Stone Age artefacts from Quarry 3.1

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2.4.2) QUARRY 3.2 (S31°26'19.7"; E25°13'04.3"- WONDERHEUWEL)

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The Quarry 3.2 site is located immediately east (E) of the DR2631 on the property Wonderheuvel. The surface of the general area yielded a low density of Stone Age artefacts with estimated ratios (artefacts: m<sup>2</sup>) varying between 4:1 and 1:25. Artefact context is inferred to be of secondary nature. Lithic material can typologically be ascribed to the later Middle Stone Age, with flake and blade types dominating and a strong emphasis on scraper edges. The approximate 20cm in depth cultural layer can clearly be identified within exposed sections of the quarry, overlying the shale anthropic bedrock. Stone Age archaeological deposits are formally protected under the NHRA 1999.

- o **SITE SIGNIFICANCE & RECOMMENDATIONS:** Based on the low quantity of artefacts and their inferred secondary context a SAHRA *Low Significance* and *Generally Protected C* Field Rating is ascribed to the Quarry 3.2 Stone Age deposits. It is recommended that the deposits be destroyed *in lieu* of the development without the developer having to apply for a SAHRA *Site Destruction Permit*.



Figure 58: General view of Quarry 3.2



Figure 59: Exposed sections at Quarry 3.2

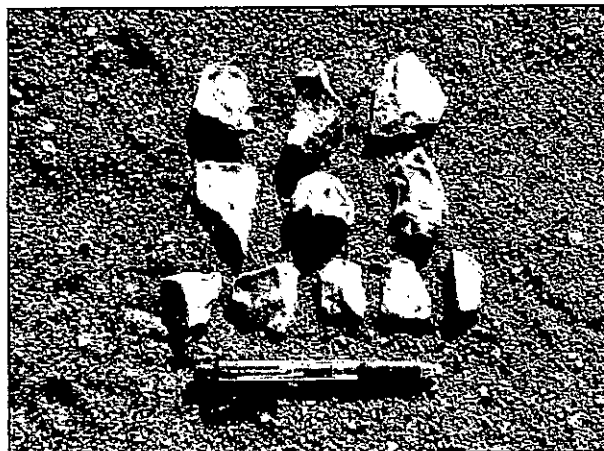


Figure 60: Surface artefacts from the immediate Quarry 3.2 area

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2.4.3) **QUARRY 3.3** (S31°22'24.8"; E25°18'33.9" – WATERVOOR/BELVEDERE)

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Quarry 3.3 is identified by shallow surface scrapings, located west (W) of the DR2629 on the Grootfontein property. No archaeological or cultural heritage resources as defined and protected by the NHRA 1999 were identified either on the surface of the general area or within the shallow exposed quarry sections.

- **SITE SIGNIFICANCE & RECOMMENDATIONS:** Development at Quarry 1.1 will not impact on any identified archaeological or cultural heritage resources. It is recommended that development proceed without the developer having to comply with further archaeological or cultural heritage legislative requirements.

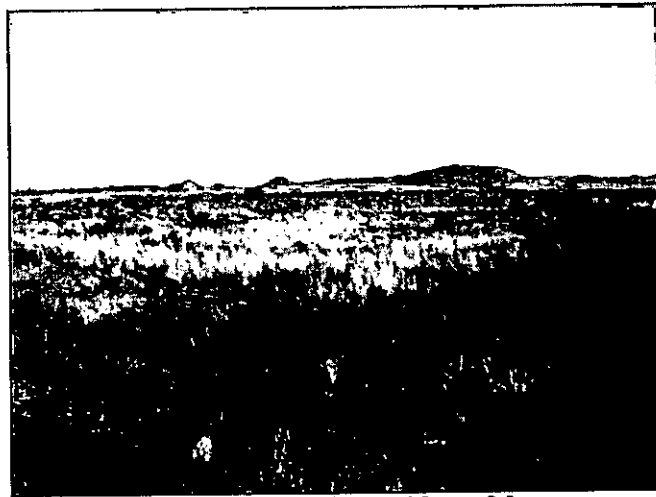


Figure 61: General view of Quarry 3.3



Figure 62: View of Quarry 3.3 from the east (E)

### 3) RECOMMENDATIONS

The cultural heritage sensitivity of the general area was clearly established by oral testimonies of landowners who commented specifically on graves of the Later Stone Age and the Historical Period. Later Stone Age human remains were however years ago informally removed while known Historical Period, Anglo Boer war, graves are formally marked are conserved. No graves were known from the direct area of impact by the proposed development. In addition to graves, Later Stone Age shelters, rock art and stone walling is known to occur in the area. Palaeontological fossil finds, albeit not the subject of this report, are known from a number of locales, directly affected by the development and from the general area.

The proposed development will directly affect 5 *Low Significance* and 2 *Medium Significance* archaeological and cultural heritage sites and can thus be described as a low impact development proposal. Recommendations include mitigation measures at locales where development will impact on protected sites / resources.

No archaeological or cultural heritage sites / resources were located during assessment of 11 proposed locales namely at:

Quarry 1.2; Quarry 1.4; Quarry 1.6; Quarry 1.8A; Quarry 1.8B; Quarry 2.1; Quarry 2.2; Quarry 2.3; Quarry 2.4; Quarry 2.5; & Quarry 3.3.

IT IS RECOMMENDED THAT DEVELOPMENT IN THESE AREAS PROCEED AS APPLIED FOR WITHOUT THE DEVELOPER HAVING TO COMPLY WITH FURTHER ARCHAEOLOGICAL OR CULTURAL HERITAGE LEGISLATIVE REQUIREMENTS.

Archaeological and cultural heritage material of low significance / inferred secondary context was located at 5 proposed development sites. In all cases the sites / deposits were assigned a SAHRA *Low Significance* and *Generally Protected C* Field Rating. The sites include:

Quarry 1.2; Quarry 1.3; Quarry 1.5; Quarry 3.1; & Quarry 3.2.

IT IS RECOMMENDED THAT DEPOSITS AT THESE SITES BE DESTROYED IN LIEU OF THE DEVELOPMENT WITHOUT THE DEVELOPER HAVING TO APPLY FOR SAHRA SITE DESTRUCTION PERMITS.

Two cultural heritage resources of significance will directly be affected by the proposed development. Both sites were assigned a SAHRA *Medium Significance* and *Generally Protected B* Field Rating. The sites include:

Quarry 1.7; & Quarry 1.9

**QUARRY 1.7:** IT IS RECOMMENDED THAT DEVELOPMENT PROCEED IN THE ALREADY FENCED AND IMPACTED AREA OF THE QUARRY 1.7 LOCALITY ONLY, IMPLYING PRIMARILY VERTICAL BURROWING, THEREBY CONSERVING THE SITE PROPER. IT IS PROPOSED THAT DEVELOPMENT PROCEED WITHOUT THE DEVELOPER HAVING TO APPLY FOR A SAHRA *SITE DESTRUCTION PERMIT*.

**QUARRY 1.9:** IT IS RECOMMENDED THAT THE QUARRY 1.9 SITE BE EITHER CONSERVED OR THAT DEVELOPMENT BE PRECEDED BY PHASE 2 ARCHAEOLOGICAL MITIGATION.

- o **CONSERVATION:** Conservation of the site would imply a no development option: It is recommended that the Quarry 1.9 site be moved to the existing quarry across the road at S31°18'00.7"; E25°13'12.0".
- o **PHASE 2 MITIGATION:** Development at the Quarry 1.9 site should be preceded by a Phase 2 archaeological recue excavation. Excavations should be done by an ASAPA (Association of Southern African Professional Archaeologist) accredited CRM (Cultural Resources Management) archaeologist and under a SAHRA *Excavation Permit*.

It is recommended that the proposed development proceed as applied for provided the developer complies with SAHRA approved archaeological and cultural heritage requirements. Should any archaeological or cultural heritage sites / resources be discovered during the course of development the developer should immediately cease operation in the vicinity of the site and report the find to SAHRA.

QUARRY NR	DISTANCE	CO-ORDINATES	PROPERTY NAME	HERITAGE RESOURCES		RECOMMENDATIONS
				Y/N	TYPE	
<b>DR2629 (MIDDELBURG)</b>						
1.1	2.4km	S31°28'34.6"; E25°03'31.3"	Grootfontein	Yes	Historical Stone Age	Destruction/Conservation Destruction
1.2	4.8km	S31°27'27.1"; E25°04'10.9"	Grootfontein	No	N/A	N/A
1.3	8.6km	S31°26'26.7"; E25°06'18.0"	Watervoor / Vleipoort	Yes	Stone Age	Destruction
1.4	14.5km	S31°24'10.8"; E25°09'08.1"	Dassiefontein	No	N/A	N/A
1.5	16.8km	S31°23'32.4"; E25°10'13.5"	Dassiefontein	Yes	Stone Age	Destruction
1.6	19.2km	S31°22'54.0"; E25°11'28.2"	Knoffelsvlei	No	N/A	N/A
1.7	21.9km	S31°21'57.6"; E25°12'45.5"	Knoffelsvlei	Yes	Stone Age	Conservation
1.8A	(26.5km)	S31°19'24.9"; E25°13'53.1"	Elim	No	N/A	N/A
1.8B	(26.5km)	S31°19'59.1"; E25°13'23.9"	Elim	No	N/A	N/A
1.9	30.6km	S31°18'03.3"; E25°13'14.9"	Nooitgedaght	Yes	Historical	Conservation
<b>ROAD NR 654 (HOFMEYER / CONAWAY)</b>						
2.1	2.2km	S31°56'47.5"; E25°03'14.4"	Spitskopvlei (P/5)	No	N/A	N/A
2.2	4.6km	S31°55'43.1"; E25°03'56.3"	Spitskopvlei (P/3)	No	N/A	N/A
2.3	10.5km	S31°52'58.2"; E25°05'30.7"	Willeburgersrivier	No	N/A	N/A
2.4	14.5km	S31°52'37.5"; E25°07'27.2"	Gladstone / De Poort	No	N/A	N/A
2.5	17.0km	S31°50'59.1"; E25°08'11.1"	Wolwevlei	No	N/A	N/A
<b>DR2631 (SUURBERG)</b>						
3.1	2.5km	S31°27'21.3"; E25°11'24.1"	Farm nr 86	Yes	Stone Age	Destruction
3.2	5.6km	S31°26'19.7"; E25°13'04.3"	Wonderheuvel	Yes	Stone Age	Destruction
3.3	17.8km	S31°22'24.8"; E25°18'33.9"	Watervoor / Belvedere	No	N/A	N/A

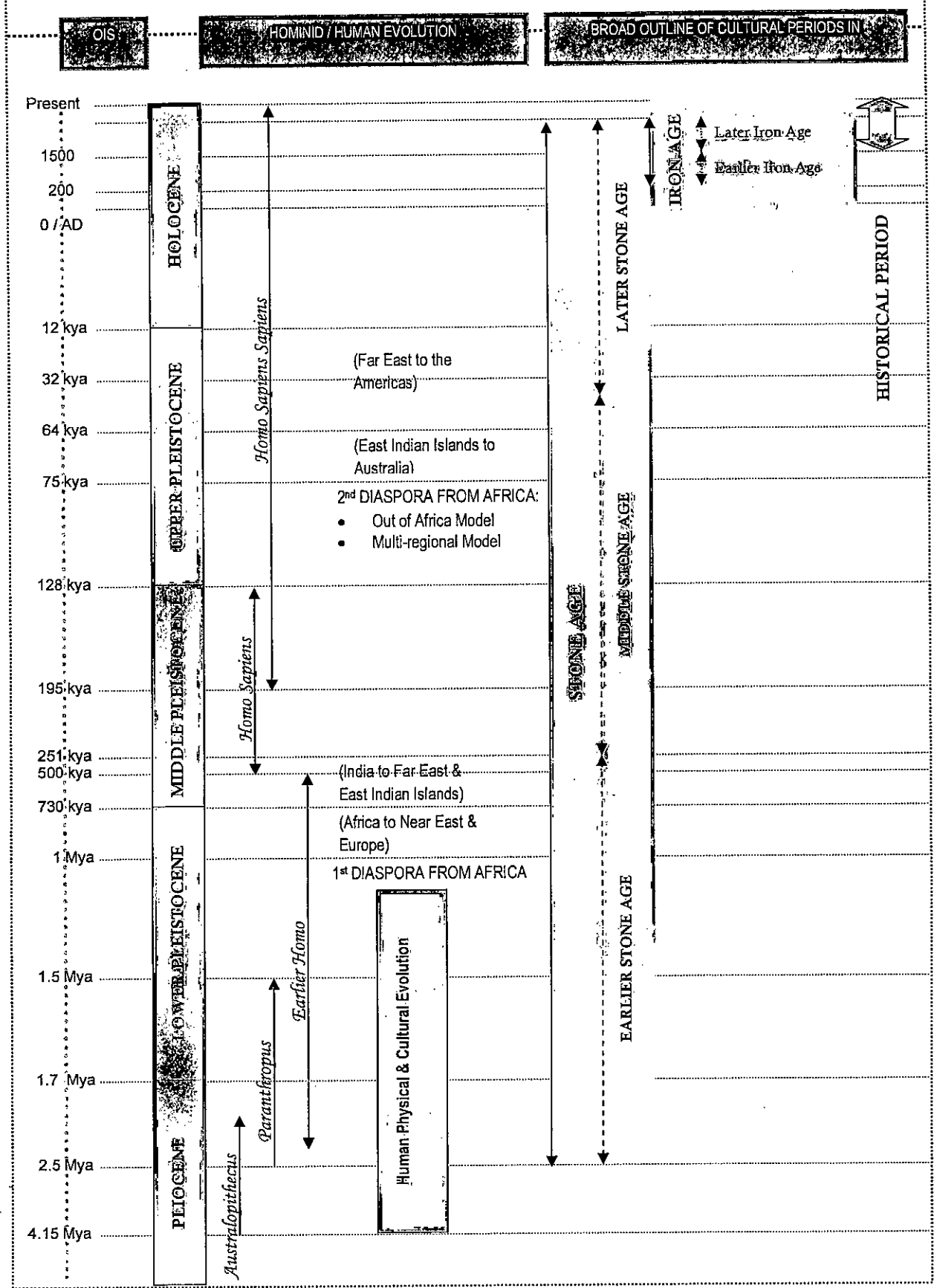
Table 4: Summarized conclusion of the proposed development with reference to archaeological and cultural heritage resources



#### 4) REFERENCES CITED

1. South African Government. (No. 28) of 2002. *Minerals and Petroleum Resources Development Act*.
2. South African Government. (No. 107) of 1998. *National Environmental Management Act*.
3. South African Government. (No. 25) of 1999. *National Heritage Resources Act*.
4. South African Heritage Resources Agency. 2005. *Minimum standards for the archaeological and heritage components of impact assessments*. Unpublished guidelines.

**SCHEMATIC OUTLINE OF THE PRE-HISTORIC AND HISTORIC PERIODS (SOUTHERN AFRICA)**



EXTRACTS FROM THE  
**NATIONAL HERITAGE RESOURCES ACT (NO 25 OF 1999)**

**DEFINITIONS**

**Section 2**

In this Act, unless the context requires otherwise:

ii. "Archaeological" means –

- a) material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;
- b) rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10 m of such representation;
- c) wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the Republic, ... and any cargo, debris, or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation.

viii. "Development" means any physical intervention, excavation or action, other than those caused by natural forces, which may in the opinion of a heritage authority in any way result in a change to the nature, appearance or physical nature of a place, or influence its stability and future well-being, including –

- a) construction, alteration, demolition, removal or change of use of a place or structure at a place;
- b) carrying out any works on or over or under a place;
- c) subdivision or consolidation of land comprising, a place, including the structures or airspace of a place;
- d) constructing or putting up for display signs or hoardings;
- e) any change to the natural or existing condition or topography of land; and
- f) any removal or destruction of trees, or removal of vegetation or topsoil;

xiii. "Grave" means a place of interment and includes the contents, headstone or other marker of such a place, and any other structure on or associated with such place;

xxi. "Living heritage" means the intangible aspects of inherited culture, and may include –

- a) cultural tradition;
- b) oral history;
- c) performance;
- d) ritual;
- e) popular memory;
- f) skills and techniques;
- g) indigenous knowledge systems; and
- h) the holistic approach to nature, society and social relationships.

xxxi. "Palaeontological" means any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace;

xli. "Site" means any area of land, including land covered by water, and including any structures or objects thereon;

xliv. "Structure" means any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith;

**NATIONAL ESTATE**

**Section 3**

1) For the purposes of this Act, those heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations must be considered part of the national estate and fall within the sphere of operations of heritage resources authorities.

2) Without limiting the generality of subsection 1), the national estate may include –

- a) places, buildings, structures and equipment of cultural significance;
- b) places to which oral traditions are attached or which are associated with living heritage;
- c) historical settlements and townscapes;
- d) landscapes and natural features of cultural significance;
- e) geological sites of scientific or cultural importance;
- f) archaeological and palaeontological sites;
- g) graves and burial grounds, including –
  - i. ancestral graves;
  - ii. royal graves and graves of traditional leaders;
  - iii. graves of victims of conflict;
  - iv. graves of individuals designated by the Minister by notice in the Gazette;
  - v. historical graves and cemeteries; and
  - vi. other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No 65 of 1983)
- h) sites of significance relating to the history of slavery in South Africa;
- i) movable objects, including –

- i. objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
- ii. objects to which oral traditions are attached or which are associated with living heritage;
- iii. ethnographic art and objects;
- iv. military objects;
- v. objects of decorative or fine art;
- vi. objects of scientific or technological interest; and
- vii. books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1 xiv) of the National Archives of South Africa Act, 1996 (Act No 43 of 1996).

## STRUCTURES

### Section 34

1) No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.

## ARCHAEOLOGY, PALAEOLOGY AND METEORITES

### Section 35

3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.

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;
- c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or
- d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assists in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

5) When the responsible heritage resources authority has reasonable cause to believe that any activity or development which will destroy, damage or alter any archaeological or palaeontological site is under way, and where no application for a permit has been submitted and no heritage resources management procedure in terms of section 38 has been followed, it may –

- a) serve on the owner or occupier of the site or on the person undertaking such development an order for the development to cease immediately for such period as is specified in the order;
- b) carry out an investigation for the purpose of obtaining information on whether or not an archaeological or palaeontological site exists and whether mitigation is necessary;
- c) if mitigation is deemed by the heritage resources authority to be necessary, assist the person on whom the order has been served under paragraph a) to apply for a permit as required in subsection 4); and
- d) recover the costs of such investigation from the owner or occupier of the land on which it is believed an archaeological or palaeontological site is located or from the person proposing to undertake the development if no application for a permit is received within two weeks of the order being served.

6) The responsible heritage resources authority may, after consultation with the owner of the land on which an archaeological or palaeontological site or meteorite is situated, serve a notice on the owner or any other controlling authority, to prevent activities within a specified distance from such site or meteorite.

## BURIAL GROUNDS AND GRAVES

### Section 36

3) 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.

4) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction of any burial ground or grave referred to in subsection 3a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.

5) SAHRA or a provincial heritage resources authority may not issue a permit for any activity under subsection 3b) unless it is satisfied that the applicant has, in accordance with regulations made by the responsible heritage resources authority –

- a) made a concerted effort to contact and consult communities and individuals who by tradition have an interest in such grave or burial ground; and
- b) reached agreements with such communities and individuals regarding the future of such grave or burial ground.

6) Subject to the provision of any other law, any person who in the course of development or any other activity discovers the location of a grave, the existence of which was previously unknown, must immediately cease such activity and report the discovery to the responsible heritage resources authority which must, in co-operation with the South African Police Service and in accordance with regulations of the responsible heritage resources authority –

- a) carry out an investigation for the purpose of obtaining information on whether or not such grave is protected in terms of this Act or is of significance to any community; and
- b) if such grave is protected or is of significance, assist any person who or community which is a direct descendant to make arrangements for the exhumation and re-interment of the contents of such grave or, in the absence of such person or community, make any such arrangements as it deems fit.

## HERITAGE RESOURCES MANAGEMENT

### Section 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 300 m in length;
- b) the construction of a bridge or similar structure exceeding 50 m in length;
- c) any development or other activity which will change the character of a site –
  - i. exceeding 5 000 m<sup>2</sup> in extent; or
  - ii. involving three or more existing erven or subdivisions thereof; or
  - iii. involving three or more erven or subdivisions thereof which have been consolidated within the past five years; or
  - iv. the costs which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- d) the rezoning of a site exceeding 10 000 m<sup>2</sup> in extent; or
- e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at 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.

2) The responsible heritage resources authority must, within 14 days of receipt of a notification in terms of subsection 1) –

- a) if there is reason to believe that heritage resources will be affected by such development, notify the person who intends to undertake the development to submit an impact assessment report. Such report must be compiled at the cost of the person proposing the development, by a person or persons approved by the responsible heritage resources authority with relevant qualifications and experience and professional standing in heritage resources management; or
- b) notify the person concerned that this section does not apply.

3) The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection 2a) ...

4) The report must be considered timeously by the responsible heritage resources authority which must, after consultation with the person proposing the development decide –

- a) whether or not the development may proceed;
- b) any limitations or conditions to be applied to the development;
- c) what general protections in terms of this Act apply, and what formal protections may be applied, to such heritage resources;
- d) whether compensatory action is required in respect of any heritage resources damaged or destroyed as a result of the development; and
- e) whether the appointment of specialists is required as a condition of approval of the proposal.

## APPOINTMENT AND POWERS OF HERITAGE INSPECTORS

### Section 50

7) Subject to the provision of any other law, a heritage inspector or any other person authorised by a heritage resources authority in writing, may at all reasonable times enter upon any land or premises for the purpose of inspecting any heritage resource protected in terms of the provisions of this Act, or any other property in respect of which the heritage resources authority is exercising its functions and powers in terms of this Act, and may take photographs, make measurements and sketches and use any other means of recording information necessary for the purposes of this Act.

8) A heritage inspector may at any time inspect work being done under a permit issued in terms of this Act and may for that purpose at all reasonable times enter any place protected in terms of this Act.

9) Where a heritage inspector has reasonable grounds to suspect that an offence in terms of this Act has been, is being, or is about to be committed, the heritage inspector may with such assistance as he or she thinks necessary –

- a) enter and search any place, premises, vehicle, vessel or craft, and for that purpose stop and detain any vehicle, vessel or craft, in or on which the heritage inspector believes, on reasonable grounds, there is evidence related to that offence;
- b) confiscate and detain any heritage resource or evidence concerned with the commission of the offence pending any further order from the responsible heritage resources authority; and
- c) take such action as is reasonably necessary to prevent the commission of an offence in terms of this Act.

10) A heritage inspector may, if there is reason to believe that any work is being done or any action is being taken in contravention of this Act or the conditions of a permit issued in terms of this Act, order the immediate cessation of such work or action pending any further order from the responsible heritage resources authority.

***Annexure C: Paleontological  
Impact Assessment***

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Phase 1 Palaeontological Impact Assessment of 17  
burrow pits near Middelburg, Eastern Cape Province.

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## **Executive Summary**

- The palaeontological footprint of the region around Middelburg suggests high potential for possible impact on Karoo vertebrate and trace fossils and to a lesser degree, localized Quaternary fossil deposits.
- The burrow pits are located entirely on rocks of the Beaufort Group (Karoo Supergroup) and areas where Karoo Dolerite and more recent, unconsolidated Quaternary sediments occur.
- The baseline study involved a foot survey of the area flanking both sides of the access road leading to each pit, the surroundings along each pit margin, and the exposures inside each pit.
- The burrow pits are easily accessible, being directly adjacent to the secondary roads.
- Burrow Pit no. 3 and 17 could not be located based on the coordinates provided.
- No fossils of Quaternary age were located near or in the vicinity of the burrow pits during the baseline survey.
- Two burrow pits exclusively comprise igneous (dolerite) rock and are not palaeontologically significant.
- Thirteen burrow pits contain fossil-bearing mudstone related to depositional events at the boundary between the Permian and Triassic periods.



- Thirteen burrow pits are identified as potentially sensitive based on the stratigraphic position and lithology of their deposits.
- A high degree of probability exists for locating *in situ* palaeontological remains in these sediments during implementation of the project.
- It is advised that newly uncovered objects of palaeontological significance, found during the course of excavation activities, may require a Phase 2 rescue operation at the cost of the developer.
- **It is recommended that:** 1) Excavation procedures related to the reparation of the gravel roads within the inspected area, must be accompanied by a follow-up palaeontological investigation at the cost of the developer by the following action: 2) a Karoo vertebrate specialist should check the mudstone-bearing burrow pits before and when earth-moving commences in order to determine whether, as is probable, palaeontological remains or features are exposed *in situ*.

## **Table of Contents**

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Recommendations	18
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## **Introduction**

A Phase 1 Palaeontological Impact Assessment was carried out on seventeen burrow pits in the Middelburg, Karoo area. These are pre-existing, but presently unused quarries that will be used for the reparation of three existing gravel roads in the vicinity (Fig 1). It is anticipated that the extent of the development will be localized and the duration short-term.

The survey is required as a prerequisite for new development in terms of the National Environmental Management Act and is also called for in terms of the National Heritage Resources Act 25 of 1999. The site visit and assessment took place from 24 to 25 September 2008.

### **Terms of reference**

- Identify and map palaeontological heritage resources in the proposed areas of impact;
- determine the importance of palaeontological heritage resources in the proposed areas of impact;
- determine and assess the potential impacts of the proposed development on palaeontological heritage resources in the proposed areas of impact, and
- recommend mitigation measures to minimize impacts associated with the proposed development.

## **Description of the Affected Area**

### **Details of area surveyed**

#### Locality data

The survey areas are shown on the following 1:50 000 maps:

3125 CA Tafelberg

3125 CB Conway

3125 CC Spitskopvlei

3125 CD Visrivier

The burrow pits are located alongside three separate gravel roads (Table 1 & Fig 1). All the pits are easily accessible, being directly adjacent to the road.

Table 1. Position of the burrow pits along the three marked gravel roads in Figure 1.

Road no.	Burrow Pit	Coordinates
DR2629	MID1	S31 28.574 E25 03.520
	MID2	S31 27.480 E25 03.520
	MID3	S31 26.447 E25 04.158
	MID4	S31 24.170 E25 09.116
	MID5	S31 23.553 E25 10.229
	MID6	S31 22.903 E25 11.461
	MID7	S31 21.966 E25 12.755
	MID8	S31 20.000 E25 13.395
	MID9	S31 18.055 E25 13.249
	MID10	S31 56.780 E25 03.222
654	MID11	S31 55.742 E25 03.914
	MID12	S31 52.976 E25 05.508
	MID13	S31 52.616 E25 07.418
DR2631	MID14	S31 50.978 E25 08.159
	MID15	S31 27.347 E25 11.375
	MID16	S31 26.310 E25 11.375
	MID17	S31 27.388 E25 13.551

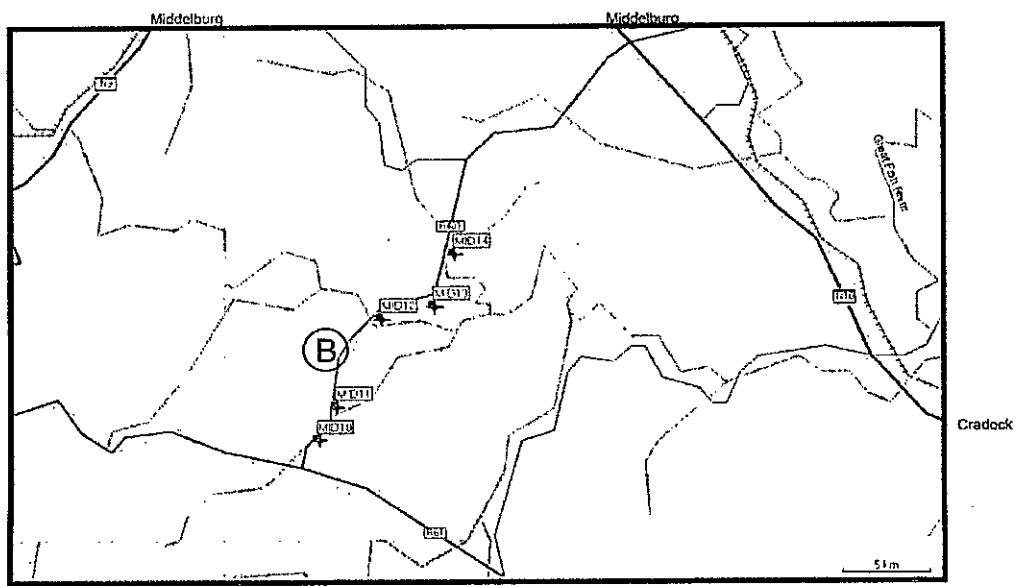
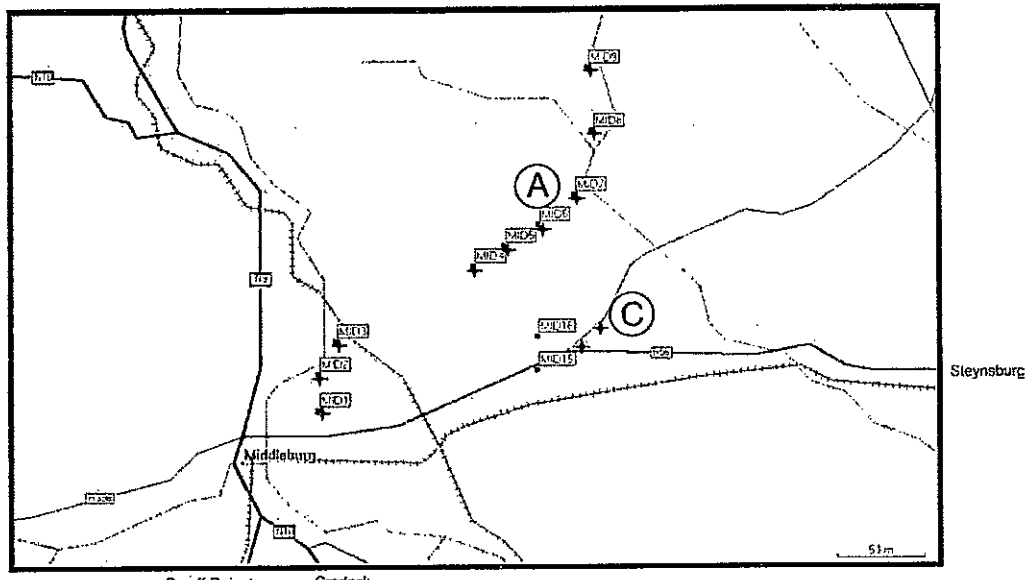


Figure 1. Position of the burrow pits. Road nos. (A) DR 2629, (B) 654 (R401), and (C) DR2631 (Suurberg)

## Geology

The burrow pits are located entirely on rocks of the Karoo Supergroup and areas where Karoo Dolerite, and more recent, unconsolidated Quaternary sediments occur. The deposits of the Karoo Supergroup in the south-western part of the Karoo Basin are assigned to the Beaufort Group, which is further subdivided into the Adelaide and Tarkastad subgroups (Table 2). The Beaufort Group of rocks is interpreted as a fluvio-lacustrine system characterized by a change from meandering to multi-channeled braided river systems following the end of the Permian Period. The change in depositional context from silts and mud to mostly sand in the Lower Triassic is reflected by the Katberg Formation, which marks the lower boundary of the Tarkastad Subgroup. In terms of the underlying geology, Roads *DR2629* and *DR2631* are more or less located on rocks of the lower Katberg Formation, while Road *654* dissects the underlying Permian rocks of the Adelaide Subgroup.

**Table 2. A simplified stratigraphic column of the geology in the Middelburg region.**

Geological Period	Stratigraphic Unit		Lithology
Quaternary			Sand, silt, alluvium and colluvium; gravels in river valleys; calcrete and calcretised sediments; scree
Jurassic		Karoo Dolerite	Dykes and sills of igneous rock consisting of feldspar and pyroxene
Triassic	Karoo Supergroup	Beaufort Group	Tarkastad Subgroup, Silt and white-weathering feldspathic sandstones, maroon and grey mudstones
			Katberg Formation
Permian		Beaufort Group	Adelaide Subgroup
			Mottled grey and rare maroon mudstones with scattered calcareous concretions, thin fine-grained sandstones

## **Methodology**

The baseline study involved a foot survey of each gravel pit and its access road where present. Three features were identified for investigation – the area flanking both sides of the access road leading to each pit, the surroundings along each pit margin, and the exposures inside each pit. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used to record relevant data.

## **Palaeontological Background**

The south-western part of the Karoo Basin accounts for what has been described as continuous continental sedimentation across the Permian-Triassic boundary, around 250 million years ago. The transition between Upper Permian and Lower Triassic rocks also record a mass extinction event dubbed “The Mother of Mass Extinctions”. This Late Palaeozoic extinction event, which severely reduced the diversity of life represented in the terrestrial fossil record (a disappearance of over 70% in the number of tetrapod families), is used as a marker to define the boundary between the Permian and Triassic periods. The area around the Lootsberg Pass in particular, produces a wealth of Karoo vertebrate localities related to the Permian-Triassic transition and extinction event (Fig. 2, D). For example, the principal casualties of the end-Permian extinction include all Gorgonopsian predators, and most Dicynodontian herbivores, with the exception of *Lystrosaurus*. A shift to *Lystrosaurus*-dominated vertebrate faunas is seen in early Triassic sections of the Katberg Formation. Unlike the wealth of Karoo vertebrate fossil localities found in the region, the distribution of Late Cenozoic (primarily Quaternary) palaeontological deposits is localized and rare. A 36 000 year old prehistoric human skull, discovered in 1952 in a dry channel bed of the Vlekpoort River

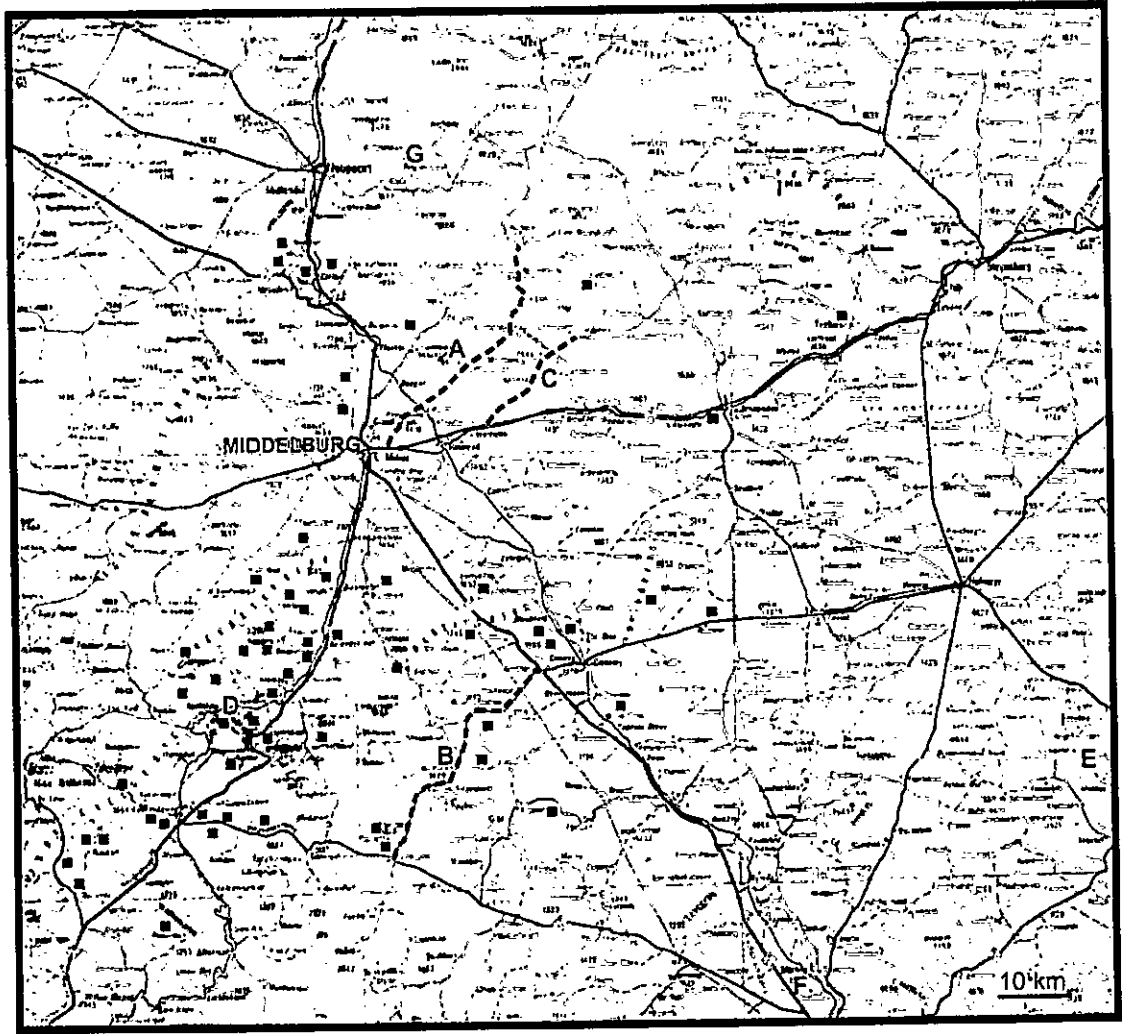


Figure 2. Location of roads where burrow pits are situated and general positions of previously recorded fossil sites in the region.

- Karoo vertebrate fossil localities
- A Road No. DR 2629
- B Road No. 654
- C Road No. DR 2631
- D Lootsberg Pass
- E Quaternary fossil site (Hofmeyr Skull)
- F Quaternary fossil site ("Cradock Springs")
- G Quaternary fossil site (Blydefontein)



near Hofmeyr, corroborates genetic evidence about the African origins of modern humans (Fig 2, E). A faunal assemblage of mostly extinct, Florisian ungulates (*Syncerus antiquus*, *Damaliscus niro* and *Antidorcas bondi*) was recorded in a fluvial context at Buysfontein, between Aliwal North and Burgersdorp. Another late Pleistocene faunal assemblage, that contains five extinct taxa, was recovered at a depth of 8m from spring deposits on the farm Driefontein near Cradock (Fig. 2, F). The extinct forms from Driefontein include a number of open grassland adapted herbivores, namely *Equus capensis*, *Syncerus antiquus*, *Damaliscus niro*, *Megalotragus priscus* and *Antidorcas bondi*. The abundance of these different sized grazers in the Karoo is a reflection of the availability of abundant seasonal grassland and offers strong evidence for a stable and sustainable grassland ecosystem in the central interior of South Africa thousands of years ago. Further north, the Blydefontein Basin near Noupoot includes late Pleistocene and Holocene valley fills with associated pollen spectra, and fossil faunal remains (Fig. 2, G).

### **Brief description of the burrow pits**

#### **MID 1**

Situated next to a dolerite outcrop. Approximately 2000m<sup>2</sup>. Blue-grey mudstones capped by a thin layer of red sand, silt and colluvium.

#### **MID 2**

Situated in open veld. Approximately 3000m<sup>2</sup>. Weathered maroon shales with intercalated grey-green shale. Thin cover of red-coloured gravel.

**MID 3 (could not be located)**

**MID 4**

Maroon mudstone with grey-green capping. Approximately 4000m<sup>2</sup>. Inclusions of fine-grained sand bodies and calcrete concretions. Thin veneer of, red windblown sand and silt.

**MID 5**

Situated in open veld. Maroon mudstone with grey-green shale intercalations and capping. Approximately 3400m<sup>2</sup>. Calcrete concretions occur for c. 0.5 – 1.0 m in top of exposure. A 20cm of red sand and silt capping.

**MID 6**

Situated in open veld. Approximately 3600m<sup>2</sup>. Weathered maroon mudstone capped by grey-green shale. Approximately 5000m<sup>2</sup>. Thin veneer of recent sand and silt. About 2km from a dolerite outcrop.

**MID 7**

Next to a dolerite outcrop. Approximately 3200m<sup>2</sup>. Grey-green shale, possibly indurated. Red-brown colluvial gravel.

**MID 8**

About 1 km from dolerite outcrop. Approximately 1500m<sup>2</sup>. Grey-green shale, with some ripple marks visible on a horizontal exposure. Potential for fossil tracks (Fig 3).

**MID 9**

Situated against dolerite outcrop. Approximately 3400m<sup>2</sup>. Contact zone between weathered maroon mudstone and dolerite. Thin cover of yellow-red to brown sandy gravel capping.



**Figure 3. Burrow Pit no. 8. Partly exposed bedding plane.  
Potential for fossil tracks.**

**MID. 10**

Near dolerite outcrop. Approximately 5000m<sup>2</sup>. Grey-green mudstone, with purple patination of bedding planes. Thin red to brown sandy capping.

**MID 11**

Grey-green shale with red-purple bedding planes. – Approximately 4500m<sup>2</sup>. Thin layer of red-brown cover sandy gravel and silt. Excavation of sediments already undergoing (Fig. 4).

**MID 13**

Dolerite outcrop. Weathered dolerite with calcrete infillings in cracks. – Approximately 3500m<sup>2</sup>. Yellow-brown sand, silt and colluvium capping.

**MID 14**

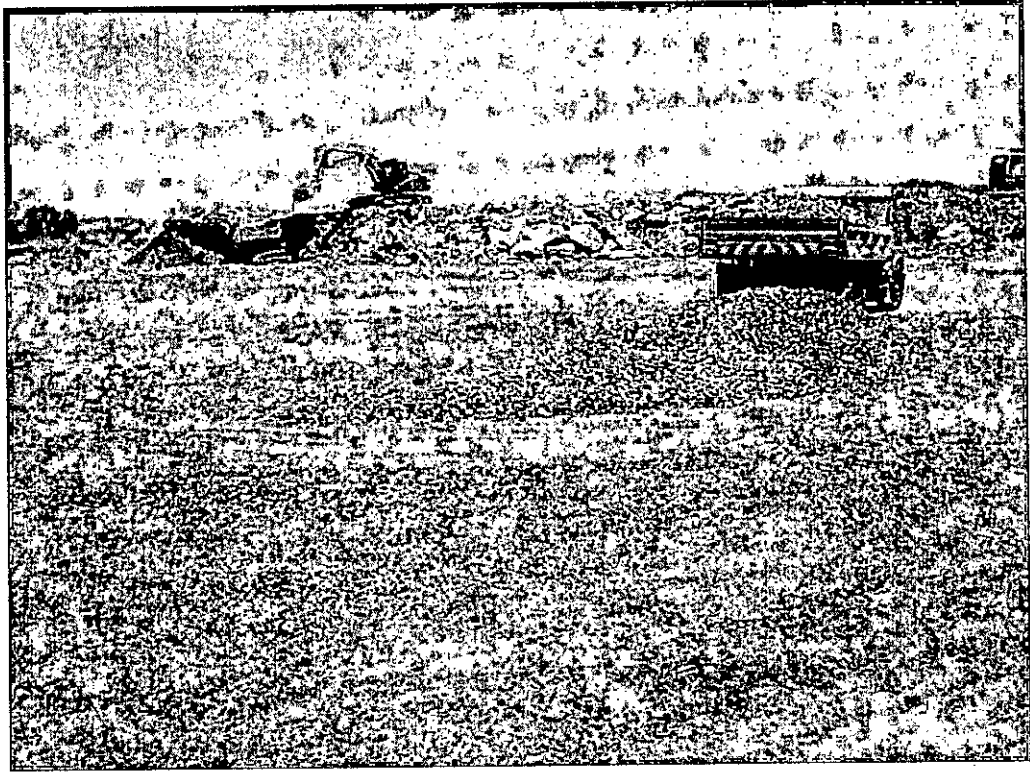
Dolerite outcrop. Weathered dolerite with calcrete infillings in cracks. Approximately 3000m<sup>2</sup>. Thin lens of yellow-brown sand and colluvium capping.

**MID 15**

Situated in open veld. Maroon mudstone with intercalations of grey-green shale. Approximately 3500m<sup>2</sup>. At the top of the section the purple shale is filled in by calcrete along bedding planes and cracks.

**MID 16**

Situated in open veld. Approximately 3000m<sup>2</sup>. Weathered maroon mudstones, Red sand and silt capping.



**Figure 4. Burrow Pit no. 11. Excavations are already underway in the mudstone deposits**

**MID 17** (could not be located)

## **Results of Survey**

The assessment of the potential impact on palaeontological resources within the inspected area is summarized in Table 3. No fossils or trace fossils were located during the survey of the burrow pits and their surroundings. Pits 3 and 17 could not be located based on the coordinates provided. The unconsolidated Quaternary sediments overlying the Permian-Triassic rocks around the burrow pits are made up of thin deposits and are not fossiliferous. The geology of Pits 13 and 14 are exclusively doleritic and therefore not palaeontologically significant. The geology of the remaining pits consists of fossil-bearing strata of Permian and Triassic age. A partly exposed bedding plane in Pit no. 8 may hold potential for fossil tracks (Fig 3). Excavation activities have already started at Pit no. 11 with potential consequences for palaeontological impact.

## **Statement of Significance**

The palaeontological footprint of the region suggests high potential for Karoo vertebrate and trace fossils and to a lesser degree, localized Quaternary fossil deposits. This region is also one of the most intensively studied sections of the continental Permian-Triassic boundary. Thirteen burrow pits were identified as potentially sensitive based on the stratigraphic position and lithology of their deposits. A high degree of probability exists for locating *in situ* palaeontological remains in these sediments during implementation of the project. It is also advised that newly uncovered objects of palaeontological significance, found during the course of excavation activities, may require a Phase 2 rescue operation at the cost of the developer.

Table 3. Palaeontological impact assessment of the burrow pits in the vicinity of Middelburg

Road no.	Burrow Pit	Coordinates	Lithology	Palaeontological significance of sediments		Potential Impact
				Permian-Triassic	Quaternary	
DR2629	MID1	S31 28.574 E25 03.520	Grey mudstone, indurated shale, colluvium, calcretised sediments	High	Low	High
	MID2	S31 27.480 E25 03.520	Maroon & grey mudstone, red sand and silt	High	Low	High
	MID3	S31 26.447 E25 04.158		?	?	?
	MID4	S31 24.170 E25 09.116	Maroon mudstone with sand inclusions & calcretions, red sand	High	Low	High
	MID5	S31 23.553 E25 10.229	Maroon mudstone with calccrete intercalations, red sand & silt	High	Low	High
	MID6	S31 22.903 E25 11.461	Maroon mudstone, red sand & silt	High	Low	High
	MID7	S31 21.966 E25 12.755	Grey-green & purple mudstone, colluvial gravels	High	Low	High
	MID8	S31 20.000 E25 13.395	Grey blue mudstone (potential for fossil tracks), red sand & silt	High	Low	High
	MID9	S31 18.055 E25 13.249	Maroon mudstone, dolerite, colluvium, silt, calcretised sediments	High	Low	High
	MID10	S31 56.780 E25 03.222	Grey-green & purple mudstone, colluvium, red sand & silt	High	Low	High
654	MID11	S31 55.742 E25 03.914	Grey-green mudstone, red sand & silt	High	Low	High
	MID12	S31 52.976 E25 05.508	Grey mudstone, colluvium	High	Low	High
	MID13	S31 52.616 E25 07.418	Weathered dolerite, calcretised infillings	Low	Low	Low
	MID14	S31 50.978 E25 08.159	Weathered dolerite, calcretised infillings	Low	Low	Low
DR2631	MID15	S31 27.347 E25 11.375	Maroon mudstone, red sand & silt	High	Low	High
	MID16	S31 26.310 E25 11.375	Maroon & grey mudstone, red sand & silt	High	Low	High
	MID17	S31 27.388 E25 13.551		?	?	?

## Recommendations

It is recommended that: 1) Excavation procedures related to the reparation of the gravel roads within the inspected area, must be accompanied by a follow-up palaeontological investigation of the Karoo strata at the cost of the developer; 2) a Karoo vertebrate specialist should check the mudstone-bearing burrow pits before and when earth-moving commences in order to determine whether, as is probable, palaeontological remains or features are exposed *in situ*.

The South African Heritage Resources Agency can be contacted to obtain a list of suitable qualified specialists.

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