iLifa leMveli leNtshona Koloni
Erfenis Wes-Kaap
Heritage Western Cape

NOTIFICATION OF INTENT TO DEVELOP

Completion of this form is required by Heritage Western Cape for the initiation of all impact assessment processes under Section 38(1) & (8) of the National Heritage Resources Act.

Whilst it is not a requirement, it may expedite processes and in particular avoid calls for additional information if certain of the information required in this form is provided by a heritage specialist/s with the necessary qualifications, skills and experience.

A. BASIC DETAILS

PROPERTY DETAILS:

Name of property:	
Street address or location (eg: off R44): Divisional Road 02308 Beaufort West	
Erf or farm number/s:	Coordinates: 22.8'25.29"S 32.24'58"E (A logical centre point. Format based on WGS84.)
Town or District: Central Karoo	Responsible Municipality: Beaufort West Local Municipality
Extent of property:	Current use: Borrow pit
Predominant land use/s of surrounding properties: Predominantly grazing livestock	

REGISTERED OWNER OF PROPERTY:

Name Road Reserve c/o Department Transport and Public Works 12.9 Antonie Botha Farm Tamboersfontein, 24.8 Teens Jordaan Farm Brakwater, 36.6 Farm Rietkuil, 44.4 Jan C Bosman Family Trust, 59.0 S Dercksen Grootfontein		
Address c/o Dept. Transport & Public Works: WCPA: P O Box 2603, Cape Town, 8000		
Telephone 021 483 2020	Cell	E-mail quahnita@vidamemoria.co.za

By the submission of this form and all material submitted in support of this notification (ie: 'the material'), all applicant parties acknowledge that they are aware that the material and/or parts thereof will be put to the following uses and consent to such use being made: filing as a public record; presentations to committees, etc; inclusion in databases; inclusion on and downloading from websites; distribution to committee members and other stakeholders and any other use required in terms of powers, functions, duties and responsibilities allocated to Heritage Western Cape under the terms of the National Heritage Resources Act. Should restrictions on such use apply or if it is not possible to copy or lift information from any part of the digital version of the material, the material will be returned unprocessed.

I confirm that I enclose with this form four hardcopies of all material submitted together with a CD ROM containing digital versions of all of the same.

Signature of owner or authorised agent
(Agents must attach copy of power of attorney to this form.)

Date 14 / 09 / 2011

DEVELOPMENT DETAILS:

Please indicate below which of the following Sections of the National Heritage Resources Act, or other legislation has triggered the need for notification of intent to develop.

☐ S38(1)(a) Construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier over 300m in length.	S38(1)(c) Any development or activity that will change the character of a site -
☐ S38(1)(b) Construction of a bridge or similar structure exceeding 50m in length.	☒ (i) exceeding 5 000m^2 in extent;
☐ S38(1)(d) Rezoning of a site exceeding 10 000m^2 in extent.	☐ (ii) involving three or more existing erven or subdivisions thereof;
☒ Other triggers, eg: in terms of other legislation, (ie: National Environment Management Act, etc.) Please set out details: Environmental Management Programmes (EMProgs) as called for by the Mineral and Petroleum Resources Development Act (49 of 2008)	☐ (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years.
	If you have checked any of the three boxes above, describe how the proposed development will change the character of the site: Borrow pits are used to obtain material for the maintenance of gravel roads

If an impact assessment process has also been / will be initiated in terms of other legislation please provide the following information:

Authority / government department (ie: consenting authority) to which information has been /will be submitted for final decision: Department of Mineral Resources

Present phase at which the process with that authority stands: Submission of EMProg pending comment from Heritage Western Cape

Provide a full description of the nature and extent of the proposed development or activity including its potential impacts (eg: changes in land use, envisaged timeframes, provision of additional bulk services, excavations, landscaping, total floor area, height of development, etc. etc.): As per the requirements of the Minerals and Petroleum Resources Development Act. all mining activities including extraction of material from borrow pits and quarries requires authorisation from the Department of Mineral Resources. Where the WCPA: Dept Transport and Public Works is undertaking the maintenance and / or upgrading of roads under its control, no application needs to be submitted for a mining right or permit, however, as per the provisions of Section 106(2) of the MPRDAct, they are required to prepare and submit an EMProg to DMR for their approval, prior to the extraction of any material from a proposed borrow pit or quarry. According to the MPRDAct, mineral resources are in the custodianship of the State, where the WCPA would temporarily acquire the right to mine the borrow pits, subject to approval by the DMR.

Material excavated from the borrow pits will be used for the re-gravelling to portions of road DR02308 km 0 to 30.5, 33.5 to 37.0 and 41.8 to 48.62 so as to benefit road users in terms of road safety and user economy as well as to minimise maintenance-related disruptions.

A strategic site is located in a dam to the south of DR02308 at kilometre 12.9, at the intersection with DR02306, 65km west-southwest of Beaufort West. The geology consists of dark grey, thickly bedded mudstone of the Abrahamskraal Formation, which is highly suitable as gravel wearing course. Estimated Proven Reserves: ~11 000 m3 over an area of about 100m x 100 m wide to a maximum depth of about 1,1 m utilising 1v:3h cut face slopes. A discontinuous overburden layer consists of sandy silty gravel with a variable thickness up to about 0,1m in places.

At kilometer 24.8 southwest of Beaufort West, located on moderately to highly weathered mudstone of the Abrahamskraal Formation, which is considered to be highly suitable as gravel wearing course for use in the regravelling of roads is an existing borrow pit.

At kilometre 36.6 is a new strategic site. The topography is flat to very gently undulating, and there is a small ridge to the northwest. The geology consists of mudstone of the Abrahamskraal Formation (Beaufort Group), covered by a thin layer of topsoil 0.1 to 0.2m thick. Estimated Proven Reserves: ~65 000 m3 over an area of about 250m x 250 m wide to a maximum depth of about 1,2 m utilising 1v:3h cut face slopes. The overburden layer consists of organic sandy silty gravel topsoil with a variable thickness up to about 0,1m in places. Sufficient material is available to identify this source as a future strategic pit

At kilometre 44.4 is an existing site which is proposed to be a strategic gravel pit. It is located on DR02308, 36km west-southwest of Beaufort West. It is located to the north of the road and situated in an existing dam built across a wide, shallow ephemeral stream. A low rise north of the road would shield a large part of the proposed pit from the road, ensuring a low visual impact despite the size of the proposed pit. Estimated Proven Reserves: ~49 000 m3 over an area of about 200m x 200m to a maximum depth of about 1,3 m utilising 1v:3h cut face slopes. A thin discontinuous overburden layer consists of sandy silty gravel with a variable thickness up to about 0,1m in places. Sufficient material is available to identify this source as a future strategic pit.

At kilometre 59.0 on DR02308 is an existing, strategic borrow pit located in a shallow dam, 22km west of Beaufort West. It is proposed to increase the size of this borrow pit in order to supply material for the maintenance of DR02308. Estimated Proven Reserves: ~30 800 m3 over an area of about 150m x 150 m wide to a maximum depth of about 1,5 m utilising 1v:3h cut face slopes. A discontinuous overburden layer consists of sandy silty fine gravel with a variable thickness up to about 0,4m in places.

Existing borrow pits are used are water retention facilities (dams) to supply water for livestock. The expanded borrow pits and the new borrow pits proposed will serve the same purpose and will not have a significant negative impact on the visual aesthetics of the area. No new roads would have to be constructed as borrow pits / quarries are accessed either directly off main / divisional roads or via existing access tracks. The borrow pits and access tracks would be fenced for the duration of the mining activities. There will be no site buildings located at the borrow pits / quarry sites.

B. HERITAGE RESOURCES AND IMPACTS THEREUPON

Section 3 of the National Heritage Resources Act sets out the following categories of heritage resource as forming part of the national estate. Please indicate the known presence of any of these by checking the box alongside and then providing a description of each occurrence, including nature, location, size, type

Failure to provide sufficient detail or to anticipate the likely presence of heritage resources on the site may lead to a request for more detailed specialist information.

(The assistance of relevant heritage professionals is particularly relevant in completing this section.)

Provide a short history of the site and its environs (Include sources where available): Beaufort West was established in 1818 as a sub-drostdy of Graaf-Reinet. The town was laid out between the Gamka and Kuils Rivers. (Fransen H 2004: 549 The Old Buildings of the Cape and Fransen H 2006: 170 – 173 in Old Towns and Villages of the Cape). The proposed borrow pits are to be located some distance from the town, do not form part of scenic routes nor contribute to cultural landscape quality.	
Please indicate which heritage resources exist on the site and in its environs, describe them and indicate the nature of any impact upon them:	
☐	**Places, buildings, structures and equipment of cultural significance** Description of resource: Description of impact on heritage resource:
☐	**Places to which oral traditions are attached or which are associated with living heritage** Description of resource: Description of impact on heritage resource:
☐	**Historical settlements and townscapes** Description of resource: Description of impact on heritage resource:
☐	**Landscapes and natural features of cultural significance** Description of resource: Description of impact on heritage resource:
☐	**Geological resources of scientific or cultural importance** Description of resource: The geology consists of dark grey, thickly bedded mudstone of the Abrahamskraal Formation, which is highly suitable as gravel wearing course (Aurecon geological strategic gravel pit summary report by R M Galliers Jan, 2011) Geotechnical investigations were carried out by Aurecon (borrow pit exploration) and Outeniqua Lab (laboratory testing) Description of impact on heritage resource:
☐	**Archaeological resources** (Including archaeological sites and material, rock art, battlefields & wrecks)**:** Description of resource: Early to late stone age sites may be present and paintings may exist in rocky outcrops. No studies are known from the immediate vicinity, however the general context is predicted to be of high significance based on a desktop study (Manhire & Patrick September 2011) of sites known to exist in the general area. Description of impact on heritage resource: None
☐	**Palaeontological resources** (ie: fossils)**:** Description of resource: Key geological units and age are Abrahamskraal formation of middle permian age with diverse terrestrial and freshwater tetrapods trace fossils and sparse vascular plants and Teekloof formation of mid to late permian age with a low diversity terrestrial and freshwater tetrapods (desktop survey conducted by Dr John Almond, August 2011) Description of impact on heritage resource:
☐	**Graves and burial grounds** (eg: ancestral graves, graves of victims of conflict, historical graves & cemeteries)**:** Description of Resource: Description of Impact on Heritage Resource:
☐	**Other human remains:** Description of resource: Description of impact on heritage resource:

☐	**Sites of significance relating to the history of slavery in South Africa:** Description of resource: Description of impact on heritage resource:
☐	**Other heritage resources:** Description of resource: Description of impact on heritage resource:

Describe elements in the environs of the site that could be deemed to be heritage resources:

Description of impacts on heritage resources in the environs of the site: None

Summary of anticipated impacts on heritage resources: Sites have been identified as possessing no cultural significance and / or value and proposed expansion of existing borrow pits will result in no impact on heritage resources. Therefore no further studies are required in terms of Section 38.

If any archaeological and / or palaeontological material is discovered during earth moving activities, work should be stopped and HWC notified immediately.

ILLUSTRATIVE MATERIAL (This form will not be processed unless the following are included):

Attach to this form a minimum A4 sized locality plan showing the boundaries of the area affected by the proposed development, its environs, property boundaries and a scale. The plan must be of a scale and size that is appropriate to creating a clear understanding of the development.

Attach also other relevant graphic material such as maps, site plans, satellite photographs and photographs of the site and the heritage resources on it and in its environs. These are essential to the processing of this notification.

Please provide all graphic material on paper of appropriate size and on CD ROM in JPEG format. It is essential that graphic material be annotated via titles on the photographs, map names and numbers, names of files and/or provision of a numbered list describing what is visible in each image.

C. RECOMMENDATION

In your opinion do you believe that a heritage impact assessment is required? ☐ Yes ☒ No

Recommendation made by:

Name Quahnita Samie

Capacity Town planner and heritage consultant at vidamemoria heritage consultants

PLEASE NOTE: No Heritage Impact Assessment should be submitted with this form or conducted until Heritage Western Cape has expressed its opinion on the need for such and the nature thereof.

D. INFORMATION TO BE PROVIDED AND STUDIES TO BE CONDUCTED AS PART OF THE HERITAGE IMPACT ASSESSMENT (HIA)

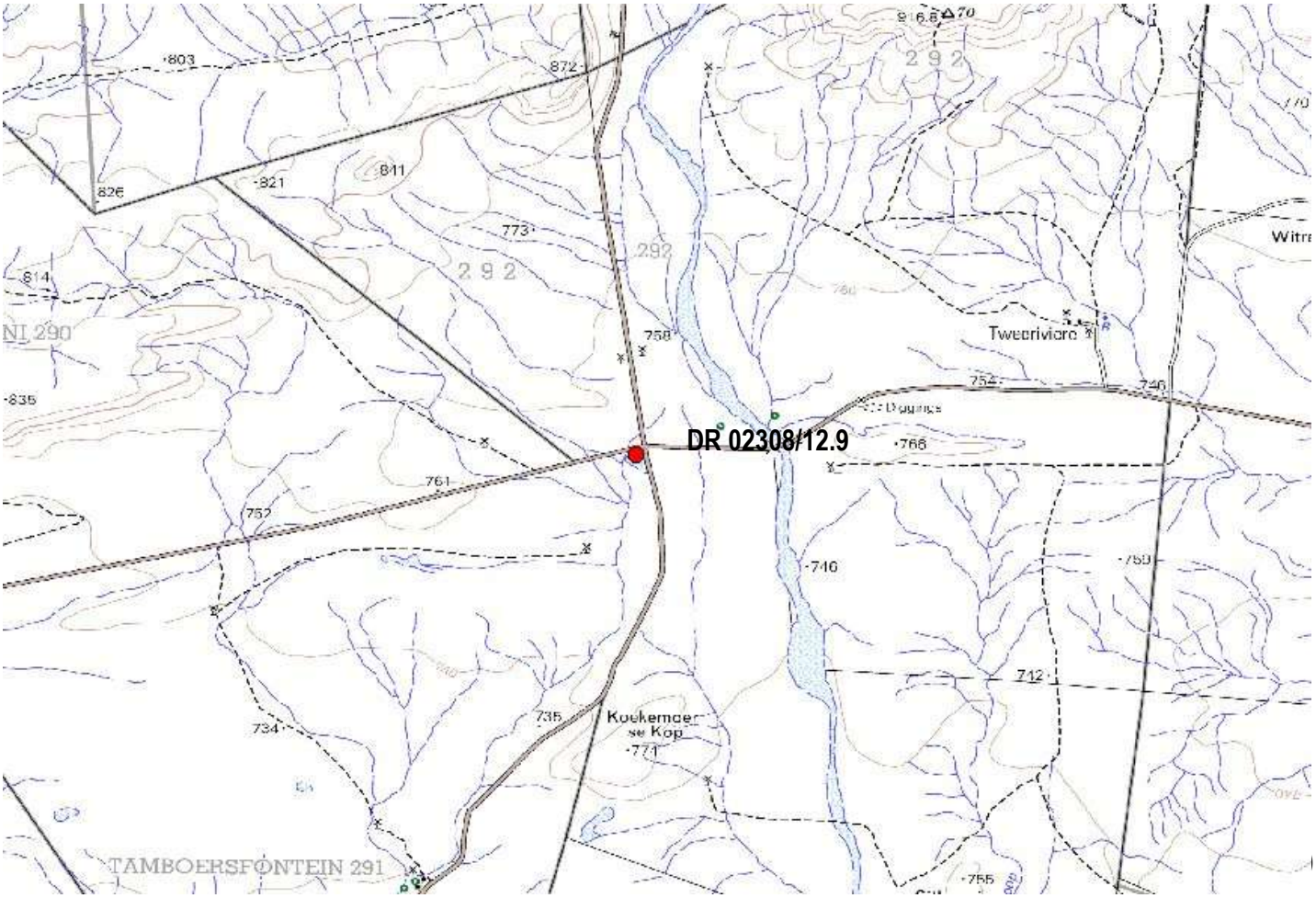
If it is recommended that an HIA is required please complete this section of the form.

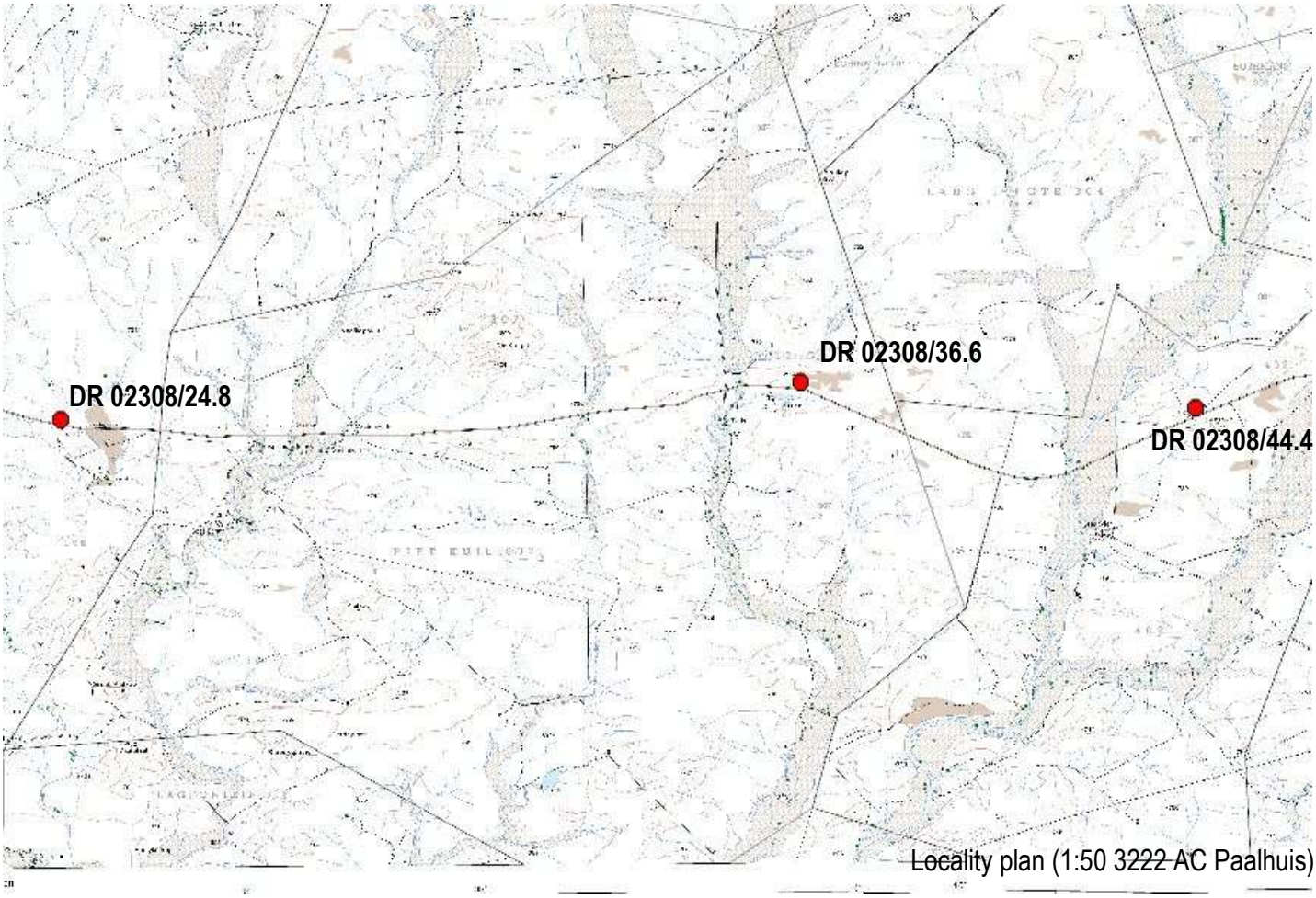
DETAILS OF HERITAGE PRACTITIONERS AND SPECIALISTS INTENDING TO CONDUCT THE HIA:

1.	Name of individual: Name of Practice: Area of specialisation: Qualifications: Experience: Standing in heritage resource management: E-mail Address: Telephone: Cell:
2.	Name of individual: Name of Practice: Area of specialisation: Qualifications: Experience: Standing in heritage resource management: E-mail Address: Telephone: Cell:
3.	Name of individual: Name of Practice: Area of specialisation: Qualifications: Experience: Standing in heritage resource management: E-mail Address: Telephone: Cell:
4.	Name of individual: Name of Practice: Area of specialisation: Qualifications: Experience: Standing in heritage resource management: E-mail Address: Telephone: Cell:
5.	Name of individual: Name of Practice: Area of specialisation: Qualifications: Experience: Standing in heritage resource management: E-mail Address: Telephone: Cell:
If this submission is made in terms of Section 38(8) of the National Heritage Resources Act indicate below the particulars of the principle environmental consultant on the project.	
Name of individual: Name of Practice: Area of specialisation: E-mail Address: Telephone: Cell: Postal Address:	

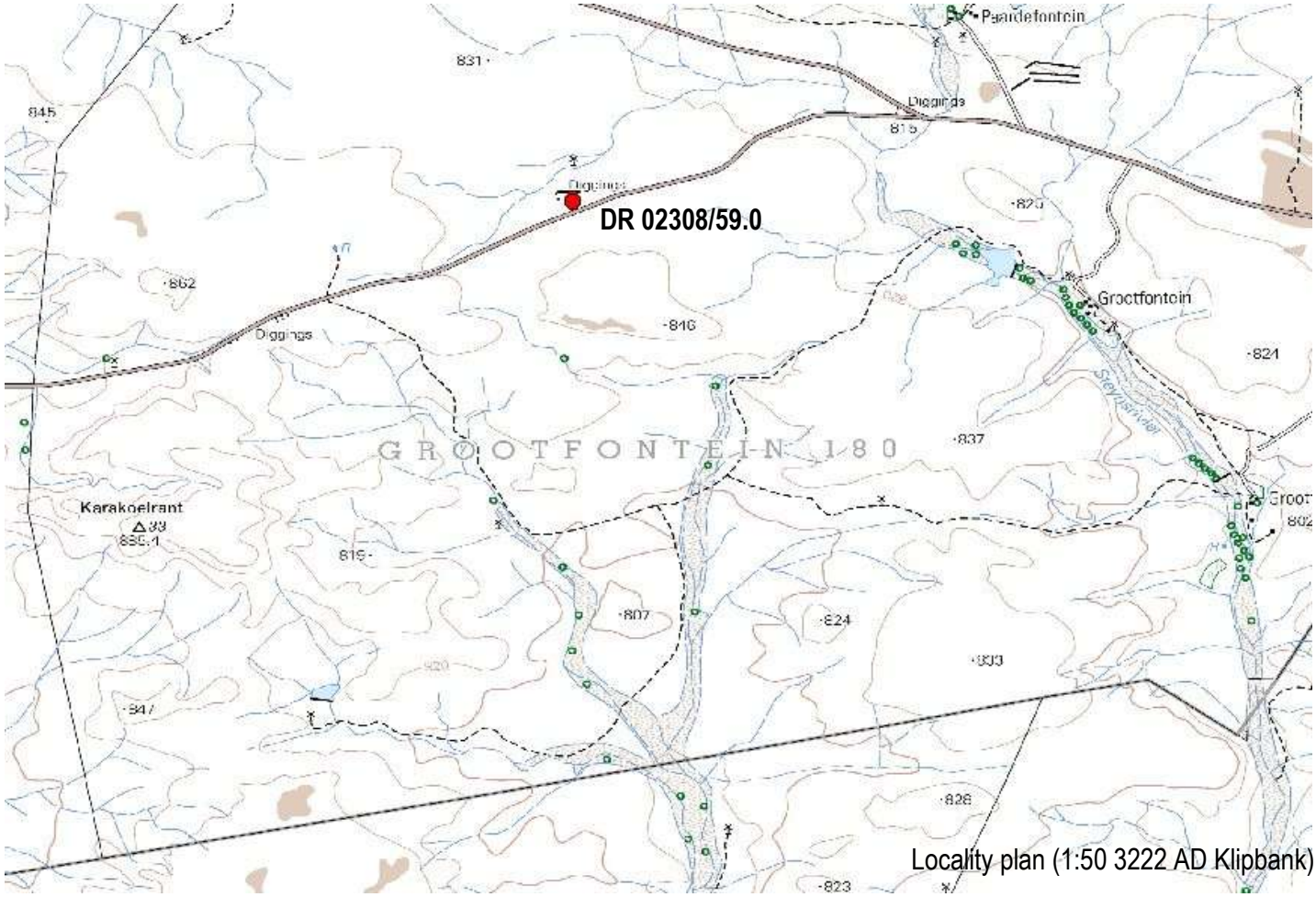
DETAILS OF STUDIES TO BE CONDUCTED IN THE INTENDED HIA

In addition to the requirements set out in Section 38(3) of the NHRA, indicate envisaged studies:	
☐	Heritage resource-related guidelines and policies.
☐	Local authority planning and other laws and policies.
☐	Details of parties, communities, etc. to be consulted.
☐	Specialist studies, eg: archaeology, palaeontology, architecture, townscape, visual impact, etc. Provide details:
☐	Other. Provide details:
PLEASE NOTE: Any further studies which Heritage Western Cape may resolve should be submitted must be in the form of a single, consolidated report with a single set of recommendations. Specialist studies must be incorporated in full, either as chapters of the report, or as annexures thereto.	





Locality plan (1:50 3222 AC Paalhuis)



Locality plan (1:50 3222 AD Klipbank)

DR 02308/12.9 View from existing dam embankment towards borrow pit extension area

Looking southwest towards the site of the proposed BP, southwest of the intersection of roads DR02308 and DR02306 (April 2011).

Looking northwest across the site of the existing dam which will be expanded under the proposed programme (April 2011).

Looking west across the proposed site. DR02311 is in the background (April 2011).

Looking west at the basin of the existing dam which will be deepened as part of the proposed activities (April 2011).

Looking east across the site of the existing borrow pit to be expanded, located south of road DR02311 (April 2011).

Looking south across the site of the existing borrow pit and adjacent farm road (April 2011).

Looking southwest across the existing site showing the presence of stockpiles.(April 2011).

Looking southeast towards the existing borrow pit showing the access road (left), farm road (right) and electricity pole (April 2011). Operations is to reinforce ground around the pole and excavate mine from where it will not pose a risk to the electricity line.

DR 02308 36.6 View of site above ridgeline

Looking northwest across the site of the proposed borrow pit, north of road DR02308 (April 2011).

Looking northeast across the site of the proposed borrow pit, north of road DR02308 (April 2011).

DR 02308/ 44.4 View across site

Looking north from the access to the proposed borrow pit, north of road DR02311 (April 2011).

Looking north from the access of the existing borrow pit, north of road DR02311. Most of the expanded borrow pit will be hidden behind the low rise in the left of the image (April 2011).

DR 02308/ 59.0 General view of site

Looking northwest across the site of the proposed borrow pit, located in an existing shallow dam north of road DR02311 (April 2011).

Looking north across the site of the proposed borrow pit from the access gate (on left). The proposed borrow pit will be located to the left of the fence between the two gates (April 2011).

GENERAL APPROACH TO PALAEONTOLOGICAL HERITAGE SPECIALIST STUDIES

John E. Almond (PhD, Cantab.)
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tel: (021) 462 3622

The RSA has an unusually rich fossil heritage stretching back in time for over 3.5 billion years. Fossil sites of national and international significance occur along the coast as well as throughout much of the interior, including the Karoo, the Cape Fold Mountains and elsewhere. This wealth of palaeontological heritage is protected as a valuable but vulnerable public good by the **South African Heritage Resources Act** (Act No. 25 of 1999). The various categories of heritage resources recognised as part of the National Estate in Section 3 of the Heritage Resources Act include, among others:

- geological sites of scientific or cultural importance
- palaeontological sites
- palaeontological objects and material, meteorites and rare geological specimens

According to Section 35 (Archaeology, palaeontology and meteorites) and Section 38 (Heritage Resources Management) of the South African Heritage Resources Act, palaeontological heritage studies (previously referred to as PIAs) are required by law in the case of developments in areas underlain by potentially fossiliferous (fossil-bearing) rocks, especially where substantial bedrock excavations are envisaged. Depending on the sensitivity of the fossil heritage and the scale of the development concerned, the palaeontological study required may take the form of (a) a stand-alone desktop study, or (b) a field assessment *plus* desktop study leading to a consolidated report. In some cases these studies may recommend further palaeontological mitigation, usually at the construction phase. These recommendations would normally be endorsed by the responsible heritage management authority (*e.g.* Heritage Western Cape or SAHRA) to whom the reports are submitted for review. Heritage Western Cape now requires that the results and recommendations of the palaeontological study be combined with those of other heritage specialists as part of an integrated heritage impact assessment report with an integrated set of recommendations.

In order to compile an authoritative **palaeontological desktop study** for a proposed development the contracted palaeontologist will need to know in advance:

- the location and extent of the development (*e.g.* boundaries of all land parcels concerned delineated on a map or satellite image). Note that the precise development footprint is often less critical since PIAs are essentially regional in character.
- the nature of the development (*e.g.* outline in BID document)
- the extent (area, depth, location) of bedrock excavations envisaged. These may include quarries or borrow pits for building materials as well as excavations for infrastructure (roads, buildings, pylons *etc*)
- the companies or organisations proposing the development and responsible for commissioning the palaeontological study
- any RODs concerning palaeontological heritage issued by the responsible heritage management authority (*e.g.* SAHRA, HWC). Here it is important to clarify whether a desktop study alone or a field assessment study has been required.

In preparing a palaeontological desktop study the potentially fossiliferous rock units (groups, formations *etc*) represented within the study area are determined from geological maps. The known fossil heritage within each rock unit is inventoried from the published scientific literature, previous palaeontological impact studies in the same region, and the author's field experience (Consultation with professional colleagues as well as examination of institutional fossil collections may play a role

here, or later during the compilation of the final report). This data is then used to asses the palaeontological sensitivity of each rock unit to development (Provisional tabulations of palaeontological sensitivity of all formations in the Western, Eastern and Northern Cape have already been compiled by J. Almond and colleagues). The likely impact of the proposed development on local fossil heritage is then determined on the basis of (1) the palaeontological sensitivity of the rock units concerned and (2) the nature of the development itself, most notably the extent of fresh bedrock excavation envisaged. When rock units of moderate to high palaeontological sensitivity are present within the development footprint, a field assessment study by a professional palaeontologist is usually warranted.

The focus of **palaeontological field assessment** work is *not* simply to survey the development footprint or even the development area as a whole (*e.g.* farms or other parcels of land concerned in the development). Rather, the palaeontologist seeks to assess the diversity, density and distribution of fossils within and beneath the study area, as well as their heritage or scientific interest. This is primarily achieved through a careful field examination of one or more representative exposures of all the sedimentary rock units present (*N.B.* Metamorphic and igneous rocks rarely contain fossils). The best rock exposures are generally those that are easily accessible, extensive, fresh (*i.e.* unweathered) and include a large fraction of the stratigraphic unit concerned (*e.g.* formation). These exposures may be natural or artificial and include, for example, rocky outcrops in stream or river banks, cliffs, quarries, dams, dongas, open building excavations or road and railway cuttings. Uncemented superficial deposits, such as alluvium, scree or wind-blown sands, may occasionally contain fossils and should also be included in the field assessment study where they are well-represented in the study area. It is normal practice for impact palaeontologists to collect representative, well-localized (*e.g.* GPS and stratigraphic data) samples of fossil material during field assessment studies. The palaeontologist concerned will require a valid collection permit from SAHRA, and all fossil material collected must be properly curated within an approved repository (usually a museum or university collection).

Note that while fossil localities recorded during field assessment work within the study area itself are obviously highly relevant, most fossil heritage here is embedded within rocks beneath the land surface or obscured by surface deposits (soil, alluvium *etc*) and by vegetation cover. In many cases where levels of fresh (*i.e.* unweathered) bedrock exposure are low, the hidden fossil resources have to be *inferred* from palaeontological observations made from better exposures of the same formations elsewhere in the region but outside the immediate study area. Therefore a palaeontologist might reasonably spend far *more* time examining road cuts and borrow pits close to, but outside, the study area than within the study area itself. Field data from localities even further afield (*e.g.* an adjacent province) may also be adduced to build up a realistic picture of the likely fossil heritage within the study area.

Here it is assumed that fossil heritage is fairly uniformly distributed throughout the outcrop area of a given formation. Experience shows that this assumption does not always hold, however. The original depositional setting of sediments within a formation that now stretches cross-country for hundreds of kilometres may vary significantly from place to place - *e.g.* from a nearshore alluvial plain across a coastline into a deeper water environment. This obviously has profound palaeoecological implications affecting the types and density of fossils preserved in different areas. Furthermore fossil organisms, like living ones, were often patchy in their occurrence. Most importantly, the levels of tectonic deformation (folding, cleavage development *etc*), as well as the intensity and nature of metamorphism and weathering experienced by a given formation may change markedly across its outcrop area. These factors, which can often only be assessed during the field assesment phase, may seriously compromise the preservation of fossil remains originally present within the sedimentary rock and hence *lower* the palaeontological sensitivity of the development concerned. Palaeontological field assessment might therefore either (a) identify and delineate areas within the development area of high palaeontological sensitivity that will trigger specialist mitigation, usually at the construction phase, or (b) exclude the need for any further mitigation concerning rock units that are often highly fossiliferous

but which are found *in this particular region* to be too weathered, metamorphised or deformed to warrant special protection.

The **palaeontological field assessment report** provides an illustrated, fully-referenced review of the (a) actual or known as well as (b) inferred palaeontological heritage within all rock units represented in the study area based on the initial desktop study as well as new data from fieldwork and any subsequent palaeontological analysis (*e.g.* lab identification of fossil material). Palaeontological sensitivity is highly dependent on rock formations whose distribution is depicted on geological maps. A geological map of the study area therefore forms a standard component of a PIA report. Normally the report will also incorporate:

- identification and ranking of highlights and sensitivities to development of fossil heritage within the study area (*e.g.* distribution of sensitive formations and specific fossil sites)
- specific recommendations for further palaeontological mitigation (if any)
- recommendations and suggestions regarding fossil heritage management on site, including conservation measures as well as promotion of local fossil heritage (*e.g.* for public education, schools)

It should be emphasized that an authoritative palaeontological assessment report is not only of value to the developer who commissions the study, in terms of fulfilling the legislative requirements and outlining the need for any further palaeontological mitigation. By summarizing and updating our understanding of the palaeontological resources within a specific area a good, well-referenced and -illustrated report also fulfils a valuable archival function for heritage managers, the scientific community and the interested public.

Projects entailing large-scale excavation into potentially fossil-rich rocks will usually trigger **palaeontological mitigation** – normally at the construction phase since adverse palaeontological impacts (*e.g.* destruction, disturbance or sealing-in of fossils) can be expected at this time rather than during the operational phase. Mitigation by a professional palaeontologist normally involves the recording and judicious sampling of fossil material and associated geological information (*e.g.* sedimentological data). This work is contracted at the developer's expense and is usually most effective during the construction phase when fresh fossiliferous bedrock has been exposed by new excavations but has not yet been sealed-in. In order to carry out mitigation, the palaeontologist concerned will need to apply for a palaeontological collection permit from the relevant heritage management authority (*i.e.* Heritage Western Cape for the Western Cape, Amafa for Kwazulu-Natal and SAHRA for all the remaining provinces). Feedback from any mitigation work, including new palaeontological observations and any recommendations for further mitigation, will need to be provided to the developer and the responsible heritage management authorities in the form of one or more reports, culminating in a **final palaeontological assessment report**.

It should be emphasized that most developments do not trigger specialist palaeontological mitigation. Even when this is required, timely consultation between the developer and contracted palaeontologist - well before construction begins - should ensure that mitigation does not delay or otherwise interfere with the construction programme. Finally, *providing appropriate mitigation is carried out*, the majority of developments involving bedrock excavation can make a *positive* contribution to our understanding of local palaeontological heritage. A collaborative relationship between palaeontologists, heritage managers and developers is therefore the desirable norm.

WESTERN CAPE BORROW PITS – INITIAL PALAEONTOLOGICAL HERITAGE ASSESSMENT (August 2011) **Dr John E. Almond, *Natura Viva* cc, CAPE TOWN**						
Borrow pit	**Location (DMS)**		**Key Geological Units & Age**	**Potential fossil heritage**	**Palaeont-ological sensitivity**	**Recommended mitigation**
	East	**South**				
22 Beaufort West DR02308/12.9/0.1R New	21°53'19.93''	32°24'28.84''	**Abrahamskraal Formation** (Lower Beaufort Group, Karoo Supergroup) Middle Permian	Diverse terrestrial and freshwater tetrapods of *Tapinocephalus* Assemblage Zone (amphibians, true reptiles, synapsids – especially therapsids), palaeoniscoid fish, freshwater bivalves, trace fossils (including tetrapod trackways), sparse vascular plants (*Glossopteris* Flora, including petrified wood)	HIGH	Palaeontological field assessment before excavation commences
28 Beaufort West DR02308/24.8/0.5R Existing	22°0'38.31''	32°25'22.21''	**Abrahamskraal Formation** (Lower Beaufort Group, Karoo Supergroup) Middle Permian	Diverse terrestrial and freshwater tetrapods of *Tapinocephalus* Assemblage Zone (amphibians, true reptiles, synapsids – especially therapsids), palaeoniscoid fish, freshwater bivalves, trace fossils (including tetrapod trackways), sparse vascular plants (*Glossopteris* Flora, including petrified wood)	HIGH	Palaeontological field assessment before further excavation commences
35 Beaufort West DR02308/36.6/0.05L New	22°8'25.29''	32°24'58''	**Abrahamskraal Formation** (Lower Beaufort Group, Karoo Supergroup) Middle Permian	Diverse terrestrial and freshwater tetrapods of *Tapinocephalus* Assemblage Zone (amphibians, true reptiles, synapsids – especially therapsids), palaeoniscoid fish, freshwater bivalves, trace fossils (including tetrapod trackways), sparse vascular plants (*Glossopteris* Flora, including petrified wood)	HIGH	Palaeontological field assessment before excavation commences

34 Beaufort West DR02308/44.4/0.1L Existing	22°12'34.95''	32°25'14.11''	**Abrahamskraal Formation** (Lower Beaufort Group, Karoo Supergroup) Middle Permian	Diverse terrestrial and freshwater tetrapods of *Tapinocephalus* Assemblage Zone (amphibians, true reptiles, synapsids – especially therapsids), palaeoniscoid fish, freshwater bivalves, trace fossils (including tetrapod trackways), sparse vascular plants (*Glossopteris* Flora, including petrified wood)	HIGH	Palaeontological field assessment before further excavation commences
33 Beaufort West DR02308/59.0/0.02L Existing	22°20'54.59''	32°22'1.32''	**Teekloof Formation** (Lower Beaufort Group, Karoo Supergroup) Mid / Late Permian	Low diversity terrestrial and freshwater tetrapods of *Pristerognathus* Assemblage Zone (amphibians, true reptiles, synapsids – especially therapsids), palaeoniscoid fish, freshwater bivalves, trace fossils (including tetrapod trackways, burrows), sparse vascular plants (*Glossopteris* Flora, including petrified wood)	HIGH	Palaeontological field assessment before further excavation commences

ARCHAEOLOGICAL COMPONENT FOR BEAUFORT WEST NID

The defining character of the Karoo is one of vast open spaces, thinly populated territory and extensive low-yield farms. For this reason the area has not been systematically studied and, with the exception of the Seacow River Valley Project (Sampson 1986), very few archaeologically orientated research projects have been carried out. All the pre-colonial sites registered in the desk top study from the general area of Beaufort West are listed below in Table 1. Although none of these sites occur within the precise vicinity of the proposed borrow pit excavations they provide a very useful indicator of the type of archaeology likely to be encountered. The Karoo is known to have been a focus for Stone Age activity from very early on with extensive scatters of both Early and Middle Stone Age artefacts. Due to the erosional nature of the environment these artefacts have remained on the surface since time immemorial. Later Stone Age people also occupied this part of the Karoo as testified to by the number of cave deposit and rock art sites.

It has been predicted (Smith 2009) that in the open country of the Karoo that there could be at least 16 archaeological sites in every kilometre. It is, therefore, almost inevitable that some archaeological site locations will coincide with the borrow pits and the buffer zones around the development footprint. This is especially true for the central Karoo borrow pits where the shallow nature of the soil profile requires large surface excavations.

In terms of pre-colonial archaeology the most commonly encountered sites are likely to be large surface scatters of Middle Stone Age artefacts. Early Stone Age artefacts are also probable along with Later Stone Age occurrences. Rock paintings and rock engravings are to be expected in rocky outcrops. Although more ephemeral, pastoral sites relating to herder populations are likely to be found along the main drainage lines.

The range of possibilities may be summarised as follows:

(a) The presence of Acheulian stone artefacts of Early Stone Age origin which are older than 100 000 years

(b) Middle Stone Age artefacts dating from approximately 100 000 to 30 000 years ago.

(c) Later Stone Age artefacts dating to within the last 30 000 years

(d) The presence of Khoikhoi herders within the area over the last 1500 years

(e) Rock art, in the form of paintings or engravings, dating mainly to the last 5000 years

(f) Structures or modifications to the landscape within the colonial era including buried residues.

(g) The presence of unmarked graves dating from the colonial era to the recent past as well pre-colonial burials.

Recommendations

In view of the high probability that pre-colonial sites will be found at, or in close proximity of, the borrow pits it is strongly recommended that a full Heritage Impact Assessment be carried out for each of the eight Beaufort West borrow pit sites.

Table 1. Pre-colonial sites known to exist in the Beaufort West area.

Map Sheet	Location	Coordinates (South)	Coordinates (East)	Cultural Material	References
3220 CC	Bizarsgat	32º 50.5´	20º 00´	Stone tools, ostrich eggshell	ADRC, Iziko Museum
3220 DC	Fortuin	32º 58´	20º 33´	MSA stone artefacts	Kaplan 2001
3221 CC	Swaerskraal	32º 46´	21º 05´	MSA stone artefacts	Kaplan 2001
3221 CD	Amandelboom	32º 48´	21º 18´	Rock paintings, human skeleton	ADRC, Iziko Museum
÷	Buffelsvlei	32º 46´	21º 26´	MSA stone artefacts	Kaplan 2001
3221 DC	Koedoesfontein	32º 47´	21º 31´	Rock paintings	ADRC, Iziko Museum
3222 AD	Doornhoek	32º 15´	22º 22´	Rock engravings	ADRC, Iziko Museum
÷	La-De-Da	32º 23´	22º 25´	LSA tools, ostrich eggshell	Kaplan 2001
3222 BB	Klipkraal	32º 05´	22º 58.5´	Stone artefacts, rock engravings	ADRC, Iziko Museum

÷	Courlands Kloof	32º 04´	22º 56´	Rock Engravings	ADRC, Iziko Museum
3222 BC	Loxton Road	32º 16´	22º 33´	ESA, MSA & LSA artefacts	ADRC, Iziko Museum
÷	Kleinplaat	32º 16.5´	22º 33.3´	MSA & LSA flakes	ADRC, Iziko Museum
3222 DC	Eerste Water (9 sites)	32.67718º	22.92856º	ESA & MSA, stone walling	ACO, UCT
÷	Ryst Kuil (8 sites)	32.64752º	22.85646º	ESA & MSA artefacts, graves	ACO, UCT
÷	North of B. West	N/A	N/A	Rock Art - several sites	Woodhouse 1978
÷	Varsfontein se Kop	32.92667º	22.64349º	MSA stone artefacts	Patrick & Manhire 2011
÷	Amospoortjie (4 sites)	32.89433º	22.5591º	Extensive MSA scatters	Patrick & Manhire 2011
÷	Poortjie se Deel	32.86737º	22.53787º	Dense MSA scatter	Patrick & Manhire 2011
÷	Trakas Kuilen	32.95744º	22.5574º	MSA blade industry	Patrick & Manhire 2011
÷	Palmietfontein	32.78753º	22.51986º	MSA stone artefacts	Patrick & Manhire 2011

References

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Sampson, C.G. 1986. *Stylistic Boundaries among Mobile Hunter-Foragers*. Washington, DC: Smithsonian Institution Press.

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Woodhouse, H.C. 1978. *Rock Art of South Africa*. Cape Town: Purnell.

Borrow Pit	Location (DMS)		1:50 000	Key archaeological components	Potential archaeological	Archaeological	Recommended	
	(East)	(South)	Map Sheet	and age	heritage	sensitivity	mitigation	
22	21°53'19.93''	32°24'28.84''	3221 BD Petrusrust	The range of possibilites include:	ESA artefacts are probable	HIGH	As no archaeological	
Beaufort West				Early Stone Age artefacts	MSA artefacts are highly		surveys have been	
DR02308/12.9/0.1R				(older than 100 000 years)	likely to occur		conducted at the borrow	
New				Middle Stone Age artefacts	LSA sites may be present		borrow pit site, a Scoping	
				(approx. 100 000 to 30 000 years)	Rock paintings and engravings		Fieldwork Study which	
				Later Stone Age artefacts	may exist in rocky outcrops		includes GIS mapping and	
				(dating to within the last 30 000 years)			analysis is required	
				The presence of Khoekhoe herders				
				(over the last 1500 years)	These predictions are based			
				Rock paintings & rock engravings	on a desktop study (Manhire &			
				(mainly within last 5000 years)	Patrick 2011) of known sites			
				Graves and unmarked burials	in the vicinity			
28	22°0'38.31''	32°25'22.21''	3222 AC Paalhuis	The range of possibilites include:	ESA artefacts are probable	HIGH	As no archaeological	
Beaufort West				Early Stone Age artefacts	MSA artefacts are highly		surveys have been	
DR02308/24.8/0.5R				(older than 100 000 years)	likely to occur		conducted at the borrow	
Existing				Middle Stone Age artefacts	LSA sites may be present		borrow pit site, a Scoping	
				(approx. 100 000 to 30 000 years)	Rock paintings and engravings		Fieldwork Study which	
				Later Stone Age artefacts	may exist in rocky outcrops		includes GIS mapping and	
				(dating to within the last 30 000 years)			analysis is required	
				The presence of Khoekhoe herders				
				(over the last 1500 years)	These predictions are based			
				Rock paintings & rock engravings	on a desktop study (Manhire &			
				(mainly within last 5000 years)	Patrick 2011) of known sites			
				Graves and unmarked burials	in the vicinity			
34	22°12'34.95''	32°25'14.11''	3222 AC Paalhuis	The range of possibilites include:	ESA artefacts are probable	HIGH	As no archaeological	
Beaufort West				Early Stone Age artefacts	MSA artefacts are highly		surveys have been	
DR02308/44.4/0.1L				(older than 100 000 years)	likely to occur		conducted at the borrow	
Existing				Middle Stone Age artefacts	LSA sites may be present		borrow pit site, a Scoping	
				(approx. 100 000 to 30 000 years)	Rock paintings and engravings		Fieldwork Study which	
				Later Stone Age artefacts	may exist in rocky outcrops		includes GIS mapping and	
				(dating to within the last 30 000 years)			analysis is required	
				The presence of Khoekhoe herders				
				(over the last 1500 years)	These predictions are based			
				Rock paintings & rock engravings	on a desktop study (Manhire &			
				(mainly within last 5000 years)	Patrick 2011) of known sites			
				Graves and unmarked burials	in the vicinity			
35	22°8'25.29''	32°24'58''	3222 AC Paalhuis	The range of possibilites include:	ESA artefacts are probable	HIGH	As no archaeological	
Beaufort West				Early Stone Age artefacts	MSA artefacts are highly		surveys have been	

DR02308/36.6/0.05L				(older than 100 000 years)	likely to occur		conducted at the borrow	
New				Middle Stone Age artefacts	LSA sites may be present		borrow pit site, a Scoping	
				(approx. 100 000 to 30 000 years)	Rock paintings and engravings		Fieldwork Study which	
				Later Stone Age artefacts	may exist in rocky outcrops		includes GIS mapping and	
				(dating to within the last 30 000 years)			analysis is required	
				The presence of Khoekhoe herders				
				(over the last 1500 years)	These predictions are based			
				Rock paintings & rock engravings	on a desktop study (Manhire &			
				(mainly within last 5000 years)	Patrick 2011) of known sites			
				Graves and unmarked burials	in the vicinity			
33	22°20'54.59''	32°22'1.32''	3222 AD Klipbank	The range of possibilites include:	ESA artefacts are probable	HIGH	As no archaeological	
Beaufort West				Early Stone Age artefacts	MSA artefacts are highly		surveys have been	
DR02308/59.0/0.02L				(older than 100 000 years)	likely to occur		conducted at the borrow	
Existing				Middle Stone Age artefacts	LSA sites may be present		borrow pit site, a Scoping	
				(approx. 100 000 to 30 000 years)	Rock paintings and engravings		Fieldwork Study which	
				Later Stone Age artefacts	may exist in rocky outcrops		includes GIS mapping and	
				(dating to within the last 30 000 years)			analysis is required	
				The presence of Khoekhoe herders				
				(over the last 1500 years)	These predictions are based			
				Rock paintings & rock engravings	on a desktop study (Manhire &			
				(mainly within last 5000 years)	Patrick 2011) of known sites			
				Graves and unmarked burials	in the vicinity			