HERITAGE IMPACT ASSESSMENT: PROPOSED EXPANSION OF THE "GOUE AKKER" CEMETERY ON THE RE/185, BEAUFORT WEST, WESTERN CAPE

(Assessment conducted under Section 38 (8) of the
National Heritage Resources Act No 25 of 1999)

HWC Case Number: 20072207

Prepared for:
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18 November 2020

Prepared by:

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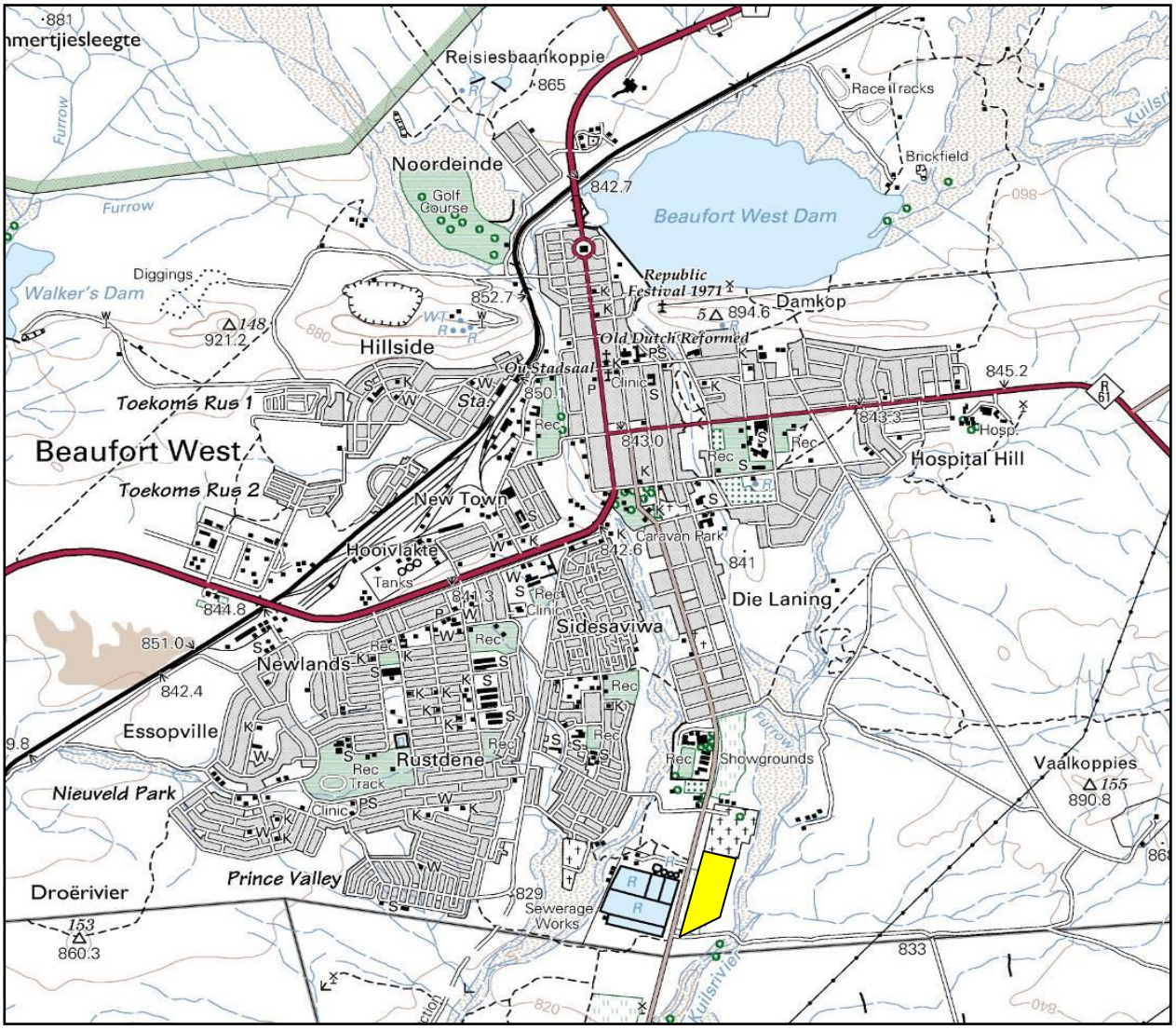
EXECUTIVE SUMMARY

Site Name:
The expansion of the existing Goue Akker Cemetery in Beaufort West.

Location:
Cadastres: Re/185, Beaufort West
Address: Off Blyth Street (opposite the wastewater treatment plant). Ward 4, Beaufort West Local Municipality, Central Karoo District Municipality.
Co-ordinates: 32°22'50.06"S; 22°35'23.51"E

Locality Plan:



The Location of the proposed cemetery extension in yellow

Description of the Proposed Development:

The proposed expansion will entail an outdoor cemetery (of around 10 ha or approximately 82 500m²) as well as ablution and caretaker facilities (69m²). The latter will require sewage and water pipelines. The existing informal roads on the proposed cemetery land are not sufficient to accommodate regular traffic. New gravel roads need to be constructed in line with the proposed layout of the site. Two alternative layouts were considered for the proposed development, along with the No-Go alternative, which remains as a baseline comparison.

Land use applications will require for the rezoning of a portion of the Remainder of the Farm 185 from “Agricultural Zone 1” to a “Subdivisional area”.

Heritage Resources Identified:

- The site is adjoining, and directly south, of the existing Goue Akker Cemetery and on the banks of the Kuils River.
- The current site is undeveloped and covered in a mix of indigenous and exotic vegetation. There are no structures on the site. No archaeological remains were identified by M. Tusenius.
- The Palaeontological Impact Assessment was conducted by Dr John Almond on the 8th November 2020. He notes the following: “No Permian or Caeonozoic fossils were observed within the cemetery expansion study area itself. No fossil remains were recorded in good exposures of the Teekloof Fromation and overlying alluvial deposits in the beds and banks of the Kuils River which are all situated on the periphery of and outside the study area”.

Anticipated Impacts on Heritage Resources:

According to Almond: “It is concluded that the palaeo-sensitivity of the site is in fact Low and the Impact Significance of the development is rated as LOW (-ve) without mitigation. This assessment applies to all project alternatives. The No-Go option (i.e. no cemetery expansion) would have a neutral impact on local fossil heritage resources”.

The expansion of the cemetery will have no impact on the local archaeology of the area. While there is a possibility of informal burials in the alluvial soils of the Kuils River, such as elsewhere in Beaufort West, the likelihood of this is considered Low. Similarly, the impacts on the Cultural Landscape, which include the banks of the Kuils River are considered to be low in view of the Goue Akker Cemetery to the north, and the waste water treatment works to the west of the site.

Comments from Conservation Bodies & Municipality:

The HIA was submitted to the Simon van der Stel Foundation and to the Beaufort West Municipality on the 18th November 2020 for a 30-day commenting period: i.e. until 17 December 2020.

Recommendations:

Pending the potential discovery of important new fossil remains – such as vertebrate fossil bones and teeth, petrified wood, plant-rich lenses or layers, fossil shells, fish remains or dense fossil burrow assemblages – during the construction of operational phases of the cemetery, no further specialist palaeontological studies or mitigation area recommended for this project.

No preference is expressed for either Alternative Layout 1 or Alternative Layout 2, and both are acceptable.

- A protocol for Chance Fossil Finds is in the Appendix of both the HIA and the PIA report and should be incorporated into the Environmental Management Programme (EMPr) for the proposed cemetery extension development.

The Chance Fossil Finds Protocol stipulates that should significant fossils be found during the construction or operational phase of the cemetery expansion; the responsible Environmental Control Officer should safeguard them and alert Heritage Western Cape as soon as possible. This is so that appropriate action can be taken by a professional palaeontologist. Mitigation could include scientific recording and sampling, or collection of fossil material as well as that of associated geological data.

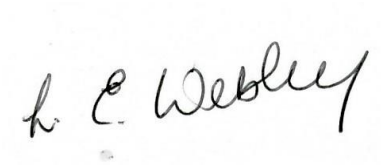
Author and Date:
Palaeontological Study: Dr John Almond, November 2020
Integrated HIA: Dr Lita Webley, November 2020.

SPECIALIST DECLARATION

I, Lita Webley (PhD in Archaeology, University of Cape Town), herewith confirm that I am a member of the Association of Southern African Professional Archaeologists (ASAPA: Membership No 175). I am an accredited Principal Investigator Stone Age archaeology, Shell Midden Archaeology and Colonial Archaeology and Field Director for Grave Relocation. I am a member of the Association of Professional Heritage Practitioners. I have worked as a heritage practitioner since 1997 and have completed more than 250 archaeological and heritage impact assessments.

As the appointed independent specialist for this application declare that I –

- act as an independent specialist (archaeologist) in this application.
- regard the information contained in this report as it relates to my specialist input/study to be true and correct.
- do not have and will not have any financial interest in the undertaking of the activity, other than renumeration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act.
- have and will not have no vested interest in the proposed activity proceeding.
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2014 (specifically in terms of regulation 13 of GN No.R. 982) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- am aware that a false declaration is an offense in terms of regulation 48 of GN No. R. 982.



Signature of the specialist

Name of company: Dr Lita Webley
Professional Archaeologist and Specialist Heritage Practitioner

Date: 15 November 2020

ILifa leMveli leNtshona Koloni
Erfenis Wes-Kaap
Heritage Western Cape

Our Ref: HM/ CENTRAL KAROO/ BEAUFORT WEST / REMAINDER OF FARM 185
Case No.: 20072207SB0724E
Enquiries: Stephanie-Anne Barnardt
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Date: 18 August 2020

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Managr.technservice@beaufortwestmun.co.za

RESPONSE TO NOTIFICATION OF INTENT TO DEVELOP: HIA REQUIRED
In terms of Section 38(8) of the National Heritage Resources Act (Act 25 of 1999) and the Western Cape Provincial Gazette 6061, Notice 298 of 2003

NOTIFICATION OF INTENT TO DEVELOP: PROPOSED EXPANSION OF GOUE AKKER CEMETERY, REMAINDER OF FARM 185, BEAUFORT WEST, SUBMITTED IN TERMS OF SECTION 38(1) OF THE NATIONAL HERITAGE RESOURCES ACT (ACT 25 OF 1999)

CASE NUMBER: 20072207SB0724E

The matter above has reference.

Heritage Western Cape is in receipt of your application for the above matter received on 27 July 2020 This matter was discussed at the Heritage Officers meeting held on 17 August 2020.

You are hereby notified that, since there is reason to believe that the proposed expansion of Goue Akker Cemetery, Remainder of Farm 185, Beaufort West will impact on heritage resources, HWC requires that a Heritage Impact Assessment (HIA) that satisfies the provisions of section 38(3) of the NHRA be submitted. This HIA must have specific reference to the following:

- A field based palaeontological impact assessment.

The required HIA must have an integrated set of recommendations.
Please note, should you require the HIA to be submitted as a Phased HIA, a written request must be submitted to HWC prior to submission. HWC reserves the right to determine whether a phased HIA is acceptable on a case by case Basis.

The comments of relevant registered conservation bodies; all Interested and Affected parties; and the relevant Municipality must be requested and included in the HIA where provided. Proof of these requests must be supplied.

HWC reserves the right to request additional information as required.

Applicants are strongly advised to review and adhere to the time limits contained the Standard Operational Procedure (SOP) between DEADP and HWC. The SOP can be found using the following link http://www.hwc.org.za/node/293

Should you have any further queries, please contact the official above and quote the case number.

Yours faithfully

pp.

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Dr. Mxolisi Dlamuka
Chief Executive Officer, Heritage Western Cape

NHRA REQUIREMENTS FOR HERITAGE REPORTS

NHRA requirements for Heritage Reports – National Heritage Resources Act (No 25 of 1999)		
Section 38(3)	The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2)(a): provided that the following must be included:	
38(3)(a)	The identification and mapping of all heritage resources in the area affected;	Part of BAR
(b)	An assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;	Part of BAR
(c)	An assessment of the impact of the development on such heritage resources	Part of BAR
(d)	An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development	Part of BAR
(e)	The results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;	Part of BAR
(f)	If heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and	Part of BAR
(g)	Plans for mitigation of any adverse effects during and after the completion of the proposed development	Part of BAR

GLOSSARY

Archaeology: Remains resulting from human activity which is 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.

Early Stone Age: The archaeology of the Stone Age between 2 500 000 and 200 000 years ago.

Fossil: Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999.

Holocene: The most recent geological time period which commenced 10 000 years ago.

Late Stone Age: The archaeology of the last 20 000 years associated with fully modern people.

Middle Stone Age: The archaeology of the Stone Age between 200 000 and 20 000 years ago associated with early modern humans.

National Estate: The collective heritage assets of the Nation

Palaeontology: 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.

Pleistocene: A geological time period (of 2.5 million – 10 000 years ago).

SAHRA: South African Heritage Resources Agency – the compliance authority which protects national heritage in the Northern Cape.

Structure (historic:) 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. Protected structures are those which are over 60 years old.

ABBREVIATIONS

AIA	Archaeological Impact Assessment
BAR	Basic Assessment Report
DEA	Department of Environmental Affairs
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
ESA	Early Stone Age
EMP	Environmental Management Program
GPS	Global Positioning System
HIA	Heritage Impact Assessment
LSA	Late Stone Age
MSA	Middle Stone Age
NHRA	National Heritage Resources Act, No 25 of 1999
PIA	Palaeontological Impact Assessment
SAHRIS	South Africa Heritage Resources Information System

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1. INTRODUCTION

The Beaufort West Local Municipality proposes to expand the existing Goue Akker Cemetery, which is located on the southern side of Beaufort West, by an additional + 10 ha due to a shortage of burial sites at the existing cemetery. The existing cemetery has approximately 16 months remaining before reaching capacity, hence the urgency for the expansion.

A NID was completed and submitted by Sharples Environmental Services cc to Heritage Western Cape and they have requested:

"A field based palaeontological impact assessment. The required HIA must have an integrated set of recommendations. The comments of relevant registered conservation bodies, all interested and affected parties, and the relevant Municipality must be requested and included in the HIA where provided. Proof of these requests must be supplied" (18 August 2020).

Dr John Almond was appointed by Sharples Environmental Services cc to undertake the palaeontological Impact Assessment and Dr Lita Webley was appointed compile the integrated HIA report. The HIA forms part of the Draft Basic Assessment Report.

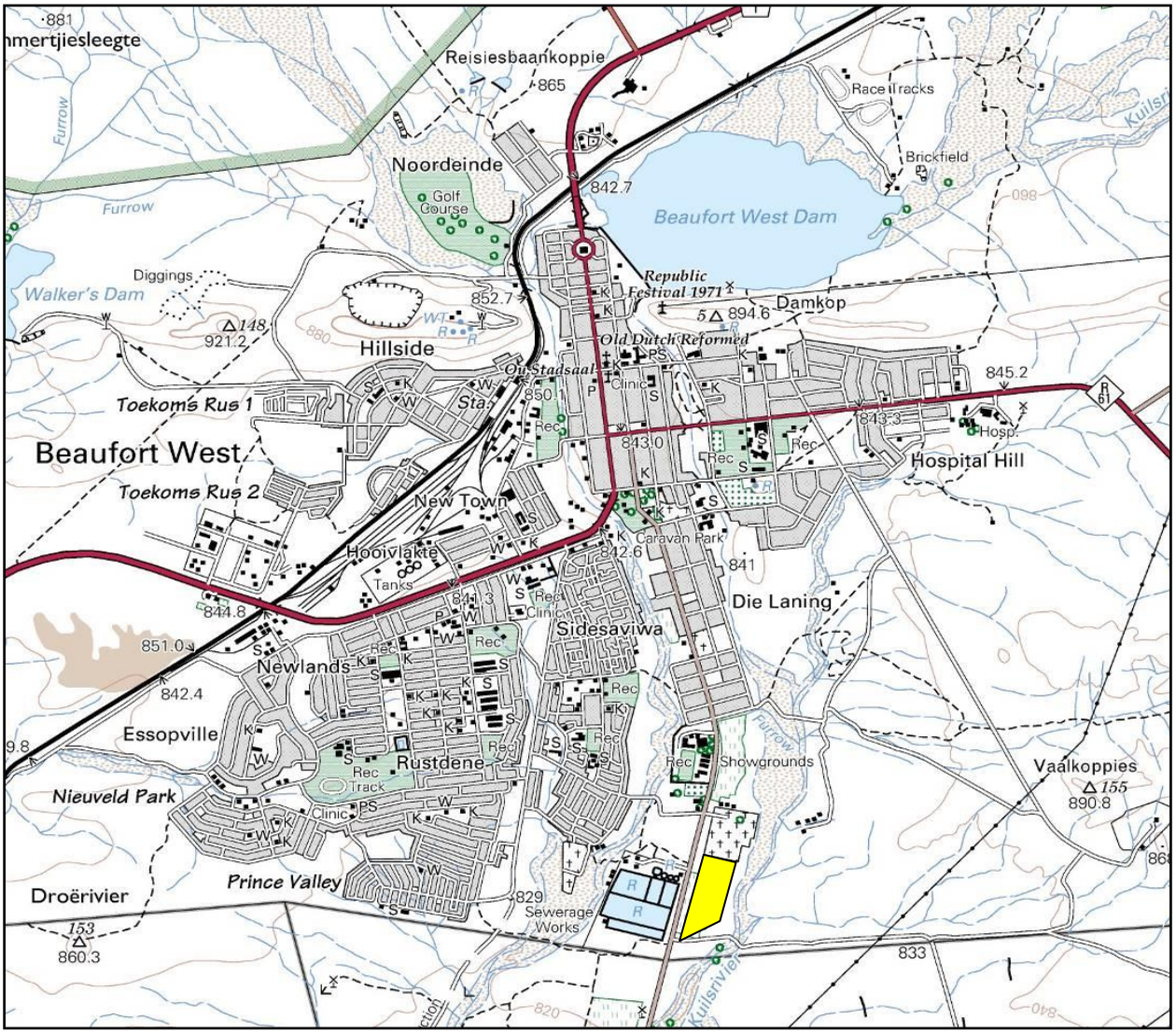

Figure 1: Extract from the 1:50 000 topographic map 3222BC, showing the proposed extension to the Goue Akker Cemetery to the south of Beaufort West shaded in yellow. Source of basemap: Chief Directorate: National Geo-Spatial Information. Website: www.ngi.gov.za

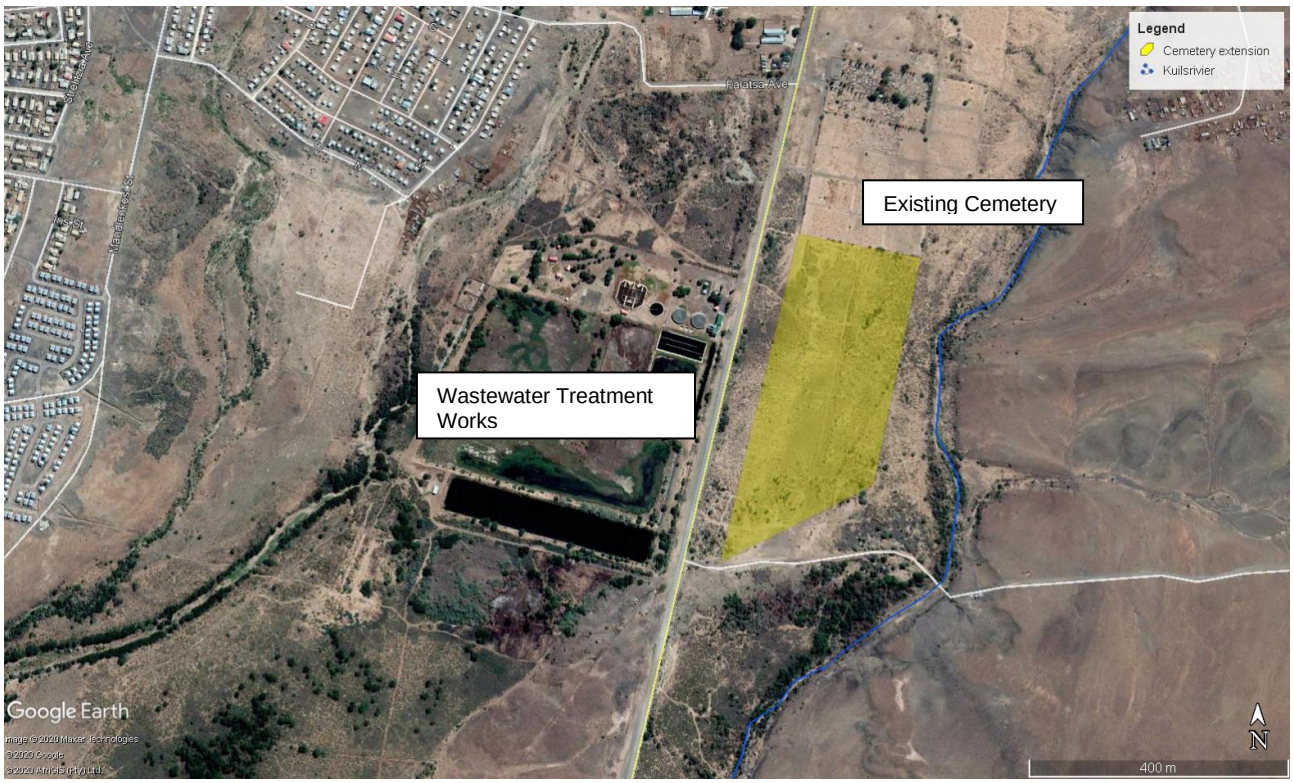

Figure 2: Google Earth image of the proposed expansion (in yellow) to the west of the Kuils River and south of the existing Goue Akker Cemetery.

The site is accessible from Blyth Street, with the Kuils River on the eastern side (Figure 2). The wastewater treatment works in located to the west, and the existing Goue Akker Cemetery to the north.

2. PROJECT DESCRIPTION AND LAYOUT

The Municipality has identified an imminent shortage in future burial space and that the existing cemeteries are near their full capacity. It is estimated that the grave site at the “Goue Akker” cemetery has capacity for approximately 16 months. There is therefore an urgent need to expand the cemetery. The Municipality has identified the vacant land next to the existing “Goue Akker” cemetery for expansion purposes. The existing informal roads on the proposed cemetery land are not sufficient to accommodate regular traffic. New gravel roads need to be constructed in line with the proposed layout of the site. Currently, there are no existing ablution and caretaker facilities on the proposed site. The exact location and level of service of these proposed facilities will be determined during the site planning and layout study by Aurecon.

The proposed expansion will entail an outdoor cemetery (approximately 82 500m²) as well as ablution and caretaker facilities (69m²). There will be:

- Approximately 100m of 160mm diameter heavy duty sewage pipeline and two manholes
- Approximately 100m of 90mm water pipes
- About 15 730m² gravel wearing course surfaced roads, with a road width of 4.5m.
- A 640m stormwater berm and stormwater detention pond.

Two alternative layouts were considered for the proposed development, along with the No-Go alternative, which remains as a baseline comparison.

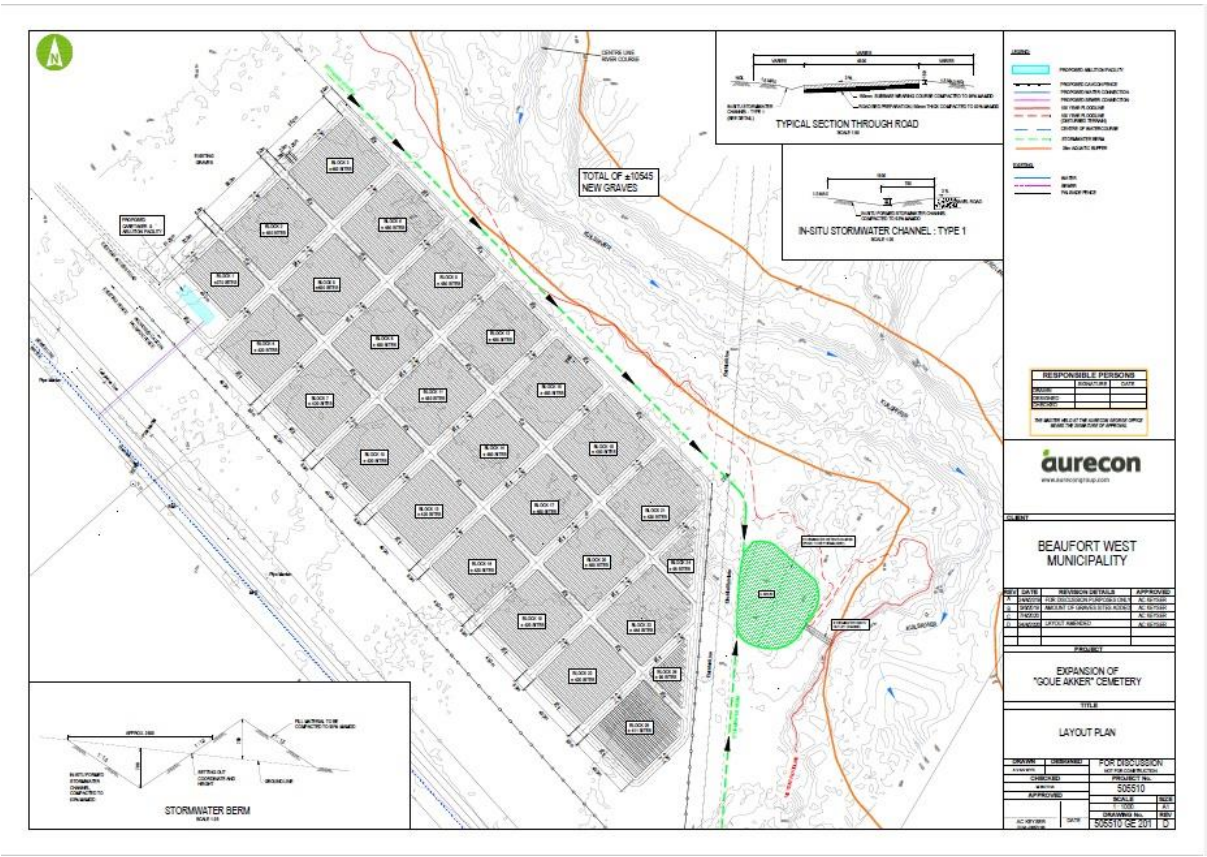

Figure 3: Preferred Alternative 1 – Layout.

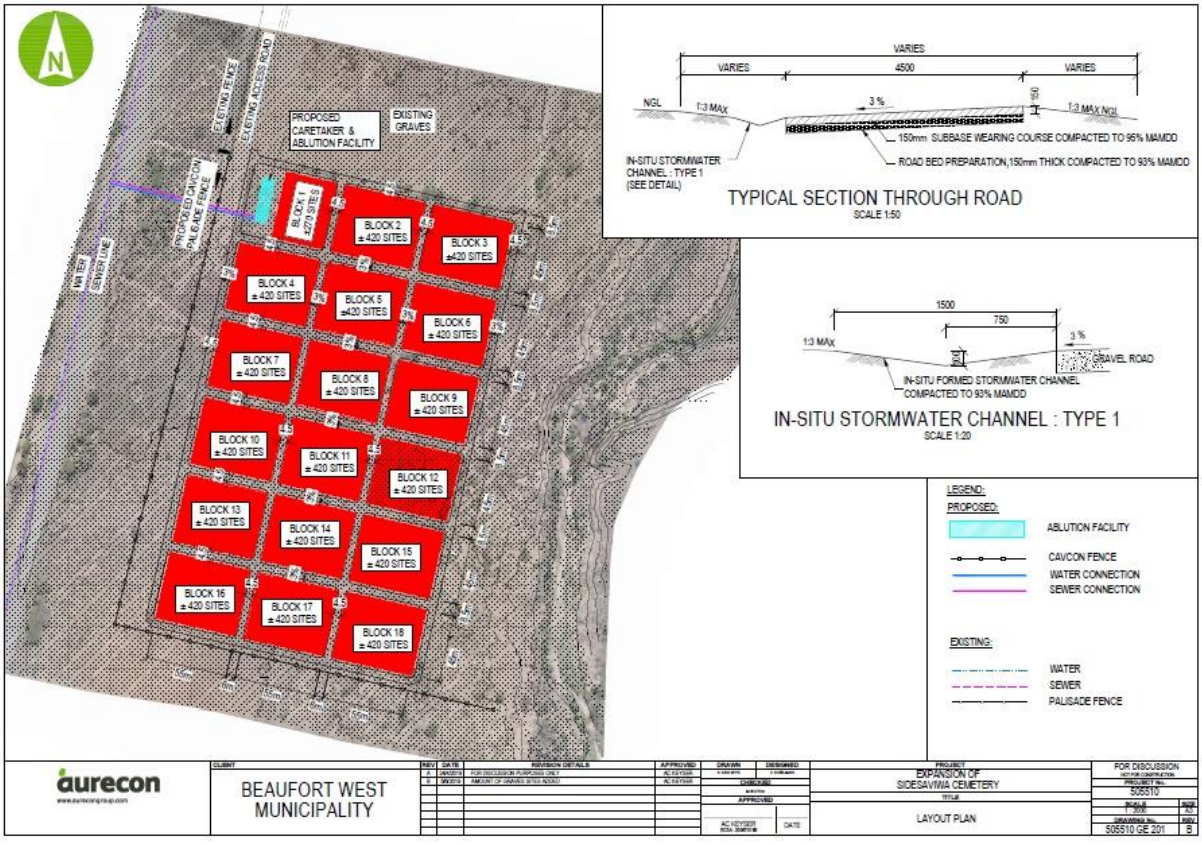

Figure 4: Alternative 2 – Layout.

Land use applications will require for the rezoning of a portion of the Remainder of the Farm 185 from “Agricultural Zone 1” to a “Subdivisional area” to make provision for:

- 1 Open Space Zone II erf
- 1 Utility Zone erf
- 1 Remainder Agricultural Zone 1 erf.

3. HERITAGE LEGISLATION

While the National Department of Environmental Affairs is the decision making authority acting in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA) and Regulations (2014), they must ensure that the evaluation of the statutorily defined broad range of heritage resources fulfils the requirements of the relevant heritage resources authority in terms of Section 38 (8) of the National Heritage Resources Act (Act 25 of 1999) (NHRA) and that any comments and recommendations of the relevant heritage resources authority with regard to proposed development have been taken into account prior to the granting of the consent.

The NHRA provides protection for the following categories of heritage resources:

- Landscapes, cultural or natural (Section 3 (3))
- Buildings or structures older than 60 years (Section 34);
- Archaeological Sites, palaeontological material and meteorites (Section 35);
- Burial grounds and graves (Section 36);
- Public monuments and memorials (Section 37);
- Living heritage (defined in the Act as including cultural tradition, oral history, performance, ritual, popular memory, skills and techniques, indigenous knowledge systems and the holistic approach to nature, society and social relationships) (Section 2 (d) (xxi)).

3.1 Palaeontology and Archaeology (Section 35(4))

No person may, without a permit issued by HWC, destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite. Archaeological is defined as: “material remains resulting from human activity which is in a state of disuse and is in or on land and which is older than 100 years, including artefacts, human and hominid remains and artificial features and structures”. In terms of the definition, an archaeological survey therefore includes any ruined structures older than 100 years.

3.2 Burial grounds and graves (Section 36(3))

No person may, without a permit issued by the South African Heritage Resources Authority (SAHRA), destroy, damage, alter, exhume or 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.

3.3 Grading

Heritage resources are graded following the grading guidelines, “Grading: Purpose and Management Implications” as approved by Heritage Western Cape in 2016.

Table 1: Grading of Heritage Resources

Grade	Level of significance	Description
I	National	Of high intrinsic, associational and contextual heritage value within a national context, i.e. formally declared or potential Grade 1 heritage resources.

II	Provincial	Of high intrinsic, associational and contextual heritage value within a provincial context, i.e. formally declared or potential Grade 2 heritage resources.
IIIA	Local	Of high intrinsic, associational and contextual heritage value within a local context, i.e. formally declared or potential Grade IIIA heritage resources.
IIIB	Local	Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade IIIB heritage resources.
IIIC	Local	Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade IIIC heritage resources.
NCW		Not conservation-worthy. The Heritage Authority has applied its mind and the resourced does not have enough heritage significance to be included in the National Estate.

4. RECEIVING ENVIRONMENT

The site is located inside Southern Karoo Riviere (i.e. low-lying saline areas associated with watercourses) with Gamka Karoo vegetation found to the east of the Kuils River (Mark Berry Environmental Consultants 2020). The botanical survey noted that the terrain Is relatively flat, due to the eroding effects of numerous small seasonal streams, and this has left extensive saline flats covered with salt bushes. Significant waste dumping, including building rubble, was noted on the southern part of the site (Plate 3). Considerable disturbance was also noted in the north-western corner of the study area, where the vegetation had been stripped next to the existing cemetery. Invasive cacti were reported in disturbed areas and along the Kuils River.

Plate 1: View of the landscape – saline flats covered in salt bushes (Mark Berry Environmental Consultants)

Plate 2: Kuils River running after good rains (Mark Berry Environmental Consultants)

Plate 3: Disturbance across sections of the site (Mark Berry Environmental Consultants).

5. METHODOLOGY

5.1 Purpose and Scope of Study

This report is conducted in terms of Section 38 (8) of the National Heritage Resources Act, No 25 of 1999. A field based Palaeontological survey was undertaken by Dr John Almond of Natura Viva cc on the 8th November 2020. Madelon Tusenius undertook a brief archaeological survey of the site, although this was not specifically requested by Heritage Western Cape. Dr Lita Webley was appointed to undertake the integrated Heritage Impact Assessment (HIA).

5.2 Assumptions and Limitations

Although it is clear that the study area was used for agricultural purposes in the recent past (Figure 5), it is possible, although unlikely, that it may have functioned as an informal graveyard such as Erf 909 to the north of the study area along the alluvial soils of the Kuils River (ASHA Consulting (Pty) Ltd: 2018). However, geotechnical exploration on the site has failed to identify any sub-surface human or archaeological remains.

6. HERITAGE BACKGROUND

6.1 Pre-Colonial Archaeology

A number of archaeological surveys have been conducted in and around the Beaufort West (Webley & Halkett 2015; Webley 2011). Pre-colonial material spanning the Early, Middle and Later Stone Ages have been found in the general area. ESA and MSA material are ubiquitous, with LSA material more commonly located close to dry river courses or around small pans (Webley & Halkett 2015). No pre-colonial archaeological material has been reported from the immediate study area.

6.2 Historical Background

The village of Beaufort (later Beaufort West) was established on the loan farm “Hooyvlakte in de Carro” initially granted to GR Opperman in 1760, as well as the adjoining farm of Boesjesmanberg. In 1818, a narrow strip of land between the Gamka and the Kuils River was selected for the establishment of the town. The Dutch Reformed Church parish was established in 1825 and the municipality in 1837. The early town plans in Fransen (2006) clearly show the development of the town. They show that the banks of the Kuils River were considered “good arable land” and this is supported by aerial photographs of 1945 (Fransen 2006: 172) and the Google Earth images which indicate that the study area was being used for agricultural purposes as recently as 2005 (Figure 5). The history of the town is marked by frequent floods which are further described by Fransen (2006) and Marais (1977) and suggest that the banks of the both the Gamka and Kuils River have been much altered by flooding.

6.3 Cemeteries

Although the BAR identifies 5 formal cemeteries in Beaufort West, the 2018 Permit report by ASHA Consulting (Pty) Ltd identify several more graveyards associated with various religious denominations in town. In addition to the formal cemeteries, ASHA Consulting (Pty) Ltd was contracted to exhume human burials which had been uncovered accidentally on Erf 909, on the corner of Thompson and Grimbeeck Streets, some 2 km north of the Goue Akker Cemetery. The report concludes that this “informal burial ground” may have been a paupers’ burial ground dating to between the mid-19th century and early 20th century. It is clear that the banks of the Gamka and Kuils River may have been used informally as burial grounds in the past.

6.4 Cultural Landscape

The landscape can be described as undeveloped lands covered in a mix of indigenous salt bushes and exotic cacti, located on the banks of the Kuils River which flows through Beaufort West. Historically, a portion of the site was used for agriculture (Figure 5) as also indicated by the black plastic irrigation pipes recorded by Tusenius. A wastewater treatment plant is situated immediately to the west of the site. There are therefore already significant impacts on the landscape of the area. The proposed cemetery, to the south of the existing Goue Akker Cemetery, is in keeping with the current use of the land. It is not anticipated that the expansion of the cemetery will have any impacts on the cultural landscape of the area.

Figure 5: The extent of the old agricultural lands on the property (Google Earth 2005) outlined in black.

7. RESULTS

7.1 Palaeontological Field Survey

The cemetery extension project area is underlain at depth by sedimentary bedrocks of the Late Permian Teekloof Formation (Lower Beaufort Group, Karoo Supergroup) that are known to contain scientifically important continental vertebrate and other fossil remains in this region of the Great Karoo. However, these Permian bedrocks will not be impacted directly by the development. Although this is not indicated on the relevant 1: 250 000 geological map (geology sheet 3222 Beaufort West), the entire cemetery project area is mantled by unconsolidated, fine-grained alluvial deposits up to several meters in thickness that are associated with the major Gamka – Kuils – Hans River drainage system. These younger (possibly Pleistocene – Recent) alluvial sediments are generally of low palaeontological sensitivity in the Great Karoo region, though they may occasionally contain important fossil and subfossil remains of mammals, freshwater molluscs, trace fossils, microfossils and plant material as well as reworked petrified wood. Significant palaeontological occurrences here are likely to be, at most, very sparse and of widespread occurrence.

No fossil remains were recorded in good exposures of the Teekloof Formation and overlying alluvial deposits in the bed and banks of the Kuils River which are all situated on the periphery of and outside the project area. Likewise, no Permian or Caenozoic fossils were observed within the cemetery expansion study area itself.

7.2 Archaeological Comment

Madelon Tusenius (a qualified archaeologist with a MA degree in Archaeology from the University of Stellenbosch) accompanied John Almond on his palaeontological survey and has prepared the following comment:

The proposed expansion of the Goue Akker Cemetery, to the south of the existing cemetery, is located on land disturbed by previous agricultural activity *e.g.* rows of black plastic irrigation pipes projecting from the alluvium, the presence of alien vegetation and the dumping of rubbish. The

area is located on the floodplain of a small watercourse (the Kuils River), a tributary of the Hans River, and may have provided a convenient place for burials as such areas were favoured by people in the past. The study area and the adjoining western bank of the watercourse (outside the study area) were surveyed but did not reveal any signs of burials, such as stone cairns, mounds of earth with headstones or decorated with quartz clasts. A single stone flake of indeterminate age (Later or Middle Stone Age) was observed amongst a patch of exposed gravels within the disturbed and eroded study area. No evidence of built structures was observed.

In terms of archaeology, the study area is of low sensitivity.

8. SOURCES OF RISK, IMPACT IDENTIFICATION AND ASSESSMENT

According to Almond: "It is concluded that the palaeo-sensitivity of the site is in fact Low and the Impact Significance of the development is rated as LOW (-ve) without mitigation. This assessment applies to all project alternatives. The No-Go option (i.e. no cemetery expansion) would have a neutral impact on local fossil heritage resources".

The expansion of the cemetery will have no impact on the local archaeology of the area. Similarly, the impacts on the cultural landscape, which include the banks of the Kuils River are considered to be low in view of the Goue Akker Cemetery to the north, and the waste water treatment works to the west of the site.

8.1 Consultation

The draft BAR has been submitted for Public Participation process.

The draft HIA was submitted to the Simon van der Stel Foundation (Southern Cape) who have registered an interest in the area with HWC as well as to the Beaufort West Municipality. They have been invited to comment by the 17th December 2020.

9. NEED FOR THE PROJECT

The Municipality has identified an imminent shortage in future burial space and that the existing cemeteries are near their full capacity. It is estimated that the grave site at the "Goue Akker" cemetery currently holds 691 burial spaces. The average monthly funerals are 41, leaving the cemetery with a capacity of approximately 16 months. There is therefore an urgent need to expand the cemetery. The Municipality has identified the vacant land next to the existing "Goue Akker" cemetery for expansion purposes. This area will provide an additional capacity of 7410 burial spaces with space for the next 13 years.

10. RECOMMENDATIONS

Pending the potential discovery of important new fossil remains – such as vertebrate fossil bones and teeth, petrified wood, plant-rich lenses or layers, fossil shells, fish remains or dense fossil burrow assemblages – during the construction of operational phases of the cemetery, no further specialist palaeontological studies or mitigation area recommended for this project.

- A protocol for Chance Fossil Finds is in the Appendix of the PIA report and should be incorporated into the Environmental Management Programme (EMPr) for the proposed cemetery extension development.

The Chance Fossil Finds Protocol stipulates that should significant fossils be found during the construction or operational phase of the cemetery expansion, the responsible Environmental Control Officer should safeguard them and alert Heritage Western Cape as soon as possible. This is so that appropriate action can be taken by a professional palaeontologist. Mitigation could

include scientific recording and sampling, or collection of fossil material as well as that of associated geological data.

11. ACKNOWLEDGEMENTS

Thanks are expressed to Madelon Tusenius who undertook the archaeological survey.

12. REFERENCES

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https://www.beaufortwest.net/explore/beaufort-west/history/beaufort-west-place-of-pioneers.html accessed on 15 November 2020

<table>
<tr><td colspan="3">Appendix 1: CHANCE FOSSIL FINDS PROCEDURE: Expansion of the Goue Akker Cemetery, Beaufort West</td></tr>
<tr><td>Province & region:</td><td colspan="2">Western Cape, Ward 4 of the Beaufort West Local Municipality (Central Karoo District Municipality)</td></tr>
<tr><td>Responsible Heritage Resources Agency</td><td colspan="2">HERITAGE WESTERN CAPE (Contact details: Protea Assurance Building, Green Market Square, Cape Town 8000. Private Bag X9067, Cape Town 8001. Tel: 086-142 142. Fax: 021-483 9842. Email: hwc@pgwc.gov.za)</td></tr>
<tr><td>Rock unit(s)</td><td colspan="2">Teekloof Formation (Lower Beaufort Group, Karoo Supergroup), Late Caenozoic alluvium.</td></tr>
<tr><td>Potential fossils</td><td colspan="2">In Beaufort Group bedrocks: tetrapod skeletal remains, vascular plants, petrified wood, trace fossil assemblages including vertebrate burrows . In alluvium: teeth, bones and horn cores of mammals, calcretised trace fossils (e.g. termitaria), freshwater molluscs, plant debris, reworked petrified wood.</td></tr>
<tr><td rowspan="5">ECO protocol</td><td colspan="2">1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (N.B. safety first!), safeguard site with security tape / fence / sand bags if necessary.</td></tr>
<tr><td colspan="2">2. Record key data while fossil remains are still in situ:
Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo
Context – describe position of fossils within stratigraphy (rock layering), depth below surface
Photograph fossil(s) in situ with scale, from different angles, including images showing context (e.g. rock layering)</td></tr>
<tr><td>3. If feasible to leave fossils in situ:
Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation
Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Agency for work to resume</td><td>3. If not feasible to leave fossils in situ (emergency procedure only):
Carefully remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock)
Photograph fossils against a plain, level background, with scale
Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags
Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist
Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation</td></tr>
<tr><td colspan="2">4. If required by Heritage Resources Agency, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.</td></tr>
<tr><td colspan="2">5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Agency</td></tr>
<tr><td>Specialist palaeontologist</td><td colspan="2">Record, describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy). Ensure that fossils are curated in an approved repository (e.g. museum / university / Council for Geoscience collection) together with full collection data. Submit Palaeontological Mitigation report to Heritage Resources Agency. Adhere to best international practice for palaeontological fieldwork and Heritage Resources Agency minimum standards.</td></tr>
</table>

13. QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

Lita Webley
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Email: lita@webleyonline.com

ACADEMIC QUALIFICATIONS:

- Matriculated: 1974, Kloof High School, Kwa-Zulu Natal, South Africa
- BA (Hons) Archaeology, 1978, University of Stellenbosch
- MA (cum laude) Archaeology, 1984, University of Stellenbosch
- PhD Archaeology, 1992, University of Cape Town

PROFESSIONAL CAREER:

- 1979-1980: Junior lecturer, Semitic Languages, University of South Africa
- 1981: Junior Lecturer, Archaeology, University of Stellenbosch
- 1982-1983: Research Assistant, Anthropology, University of Stellenbosch
- 1984: Temporary Lecturer, Archaeology, University of Fort Hare
- 1985-1986: Teaching Assistant, Archaeology, University of Cape Town
- 1988-1990: Archaeologist, Natal Museum Services, Pietermaritzberg
- 1990-1997: Archaeologist, Albany Museum, Grahamstown
- 1997-1998: Assistant Director, Albany Museum, Grahamstown
- 1999-2005: Acting Head (Acting Deputy Director), Albany Museum, Grahamstown.
- 2005-2008: Director: Albany Museum
- 2008-2017: Principle Heritage Investigator, ACO Associates cc
- 2017-present: Self-employed

HERITAGE COMMITTEES:

- 1994: Heritage sub-committee responsible for drafting new heritage legislation for the Eastern Cape
- 1997-2001: Member of the transitional Eastern Cape Regional Committee of the National Monuments Council.
- 2013-2014: Member of the Eastern Cape Provincial Heritage Resources Agency (ECPHRA) permit committee
- 2003-2008: Executive member of Makana Heritage Forum (Makana Municipality) Grahamstown
- 2013 – 2016: Member of the Council of Heritage Western Cape
- 2014 – 2016: Member of the Impact Assessment Committee (IACom) of Heritage Western Cape
- 2013 – 2019: Member of permits committee (APM) of Heritage Western Cape
- 2018 – 2020: Member of the Impact Assessment Committee (IACom) of Heritage Western Cape
- 2020 – to present: Chairperson of permits committee (APM) of Heritage Western Cape

FIELDS OF SPECIALITY AND COMPETENCE:

- Heritage and Archaeological Impact Assessments in Western Cape, Eastern Cape, and Northern Cape;
- Accredited as Principal Investigator for Stone Age Archaeology, Shell Midden Archaeology, Colonial Period Archaeology, and as Field Director for Grave Relocations
- Ethno-archaeology (anthropology) and oral history in Northern and Eastern Cape
- Specialised in Archaeology of Northern Cape
- Presentation of Heritage Workshops to communities and government officials
- Excavations at over 50 archaeological sites
- Design and implementation of museum displays

CONSULTANCY WORK

- Completion of 285 Heritage/Archaeological Impact Assessments since 1996

PUBLICATIONS:

A list of publications can be supplied on request

- Five chapters in books
- Total of 20 articles in refereed journals
- Total 20 popular articles
- Numerous conference presentations in South Africa and abroad (United States and Europe)

COURSES COMPLETED:

- GIS Course at Rhodes University in 2004
- Architectural and Urban Conservation Course (Skills Development) presented by Dr S Townsend in the Faculty of Engineering and the Built Environment, University of Cape Town, 2008.

PROFESSIONAL STATUS:

- Association of Southern African Professional Archaeologists (**ASAPA**). Accredited Principle Investigator for CRM (Stone Age, Coastal Shell Middens and Colonial Archaeology) and Field Director (Burials and Exhumations).
- Member of Association of Professional Heritage Practitioners (**APHP**).

PALAEONTOLOGICAL HERITAGE ASSESSMENT: COMBINED DESKTOP & FIELD-BASED STUDY

Proposed expansion of the Goue Akker Cemetery in Ward 4 of the Beaufort West Local Municipality (Central Karoo District Municipality), Beaufort West, Western Cape

John E. Almond
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naturaviva@universe.co.za

November 2020

EXECUTIVE SUMMARY

The Beaufort West Local Municipality is proposing to expand the existing "Goue Akker" cemetery located within Ward 4 of the Beaufort West Local Municipality, situated on the south-eastern margins of Beaufort West, Central Karoo District Municipality, Western Cape. The cemetery extension project area is underlain at depth by sedimentary bedrocks of the Late Permian Teekloof Formation (Lower Beaufort Group, Karoo Supergroup) that are known to contain scientifically important continental vertebrate and other fossil remains in this region of the Great Karoo. However, these Permian bedrocks will not be impacted directly by the development. Although this is not indicated on the relevant 1: 250 000 geological map (geology sheet 3222 Beaufort West), the entire cemetery project area is mantled by unconsolidated, fine-grained alluvial deposits up to several meters in thickness that are associated with the major Gamka – Kuils – Hans River drainage system. These younger (possibly Pleistocene – Recent) alluvial sediments are generally of low palaeontological sensitivity in the Great Karoo region, though they may occasionally contain important fossil and subfossil remains of mammals, freshwater molluscs, trace fossils, microfossils and plant material as well as reworked petrified wood. Significant palaeontological occurrences here are likely to be, at most, very sparse and of widespread occurrence.

No fossil remains were recorded in good exposures of the Teekloof Formation and overlying alluvial deposits in the bed and banks of the Kuils River which are all situated on the periphery of and *outside* the project area. Likewise, no Permian or Caenozoic fossils were observed within the cemetery expansion study area itself. It is concluded that the palaeosensitivity of the site is in fact Low and the Impact Significance of the development is rated as LOW (-ve) without mitigation. This assessment applies equally to all project alternatives, including the two cemetery layouts under consideration. The No-Go option (*i.e.* no cemetery expansion) would have a neutral impact on local fossil heritage resources.

Pending the potential discovery of important new fossil remains - such as vertebrate bones and teeth, petrified wood, plant-rich lenses or layers, fossil shells, fish remains or dense fossil burrow assemblages – during the construction or operational phases of the cemetery, no further specialist

palaeontological studies or mitigation are recommended for this project. There are no objections on palaeontological heritage grounds to authorization of this development.

Should significant fossils be found during the construction or operational phase of the cemetery, the responsible Environmental Control Officer should safeguard them and alert Heritage Western Cape, HWC as soon as possible (Contact details: Protea Assurance Building, Green Market Square, Cape Town 8000. Private Bag X9067, Cape Town 8001. Tel: 086-142 142. Fax: 021-483 9842. Email: hwc@pgwc.gov.za). This is so that appropriate action can be taken in good time by a professional palaeontologist at the developer's expense. Palaeontological mitigation would normally involve the scientific recording and judicious sampling or collection of fossil material as well as of associated geological data (*e.g.* stratigraphy, sedimentology, taphonomy). The palaeontologist concerned with mitigation work will need a valid fossil collection permit from HWC and any material collected would have to be curated in an approved repository (*e.g.* museum or university collection). All palaeontological specialist work should conform to international best practice for palaeontological fieldwork and the study (*e.g.* data recording fossil collection and curation, final report) should adhere as far as possible to the minimum standards for Phase 2 palaeontological studies developed by SAHRA (2013) and Heritage Western Cape (2016).

A protocol for Chance Fossil Finds is provided in tabular form in Appendix 1 and should be incorporated into the Environmental Management Programme (EMPr) for the proposed cemetery extension development.

1. PROJECT OUTLINE & BRIEF

The Beaufort West Local Municipality is proposing to expand the existing "Goue Akker" cemetery located within Ward 4 of the Beaufort West Local Municipality, situated on the south-eastern margins of Beaufort West, Central Karoo District Municipality, Western Cape. The proposed site is located within the Remainder of Farm 185, along the southern border of the existing "Goue Akker" cemetery, extending to the unnamed road at the southern border of RE/185 (Figs. 1 & 3). The site is confined between a proposed riverine buffer zone along the Kuils River to the East, and Blythe Street to the West. The proposed expansion will comprise an outdoor cemetery (approximately 82 500 m^2) as well as an ablution and caretaker facility (approximately 69 m^2), resulting in a total footprint of approximately 82 569 m^2.

The cemetery extension project area is underlain at depth by potentially fossiliferous bedrocks of the Lower Beaufort Group (Karoo Supergroup) as well as near-surface by geologically young alluvial deposits. In their response to the NID for the proposed development Heritage Western Cape have made the following stipulations (letter dated 18 August 2020, HWC Case No: 20072207SB0724E):

> HWC requires that a Heritage Impact Assessment (HIA) that satisfies the provisions of section 38(3) of the NHRA be submitted. This HIA must have specific reference to the following: - A field based palaeontological impact assessment. The required HIA must have an integrated set of recommendations.

The present combined desktop and field-based Palaeontological Heritage Assessment (PIA) contributes to the overarching HIA for the cemetery development that is being compiled by Dr Lita Webley, Cape Town (Dr Lita Webley. Heritage Practitioner. 5 Oaktree, Cornwall Place, Kenilworth

7708. Tel: 021 761 6354; E-mail: lita@webleyonline.com). The Environmental Assessment Practitioner (EAP) for the development project is Sharples Environmental Services cc (Contact details: John Sharples. SES. PO Box 443, Milnerton 7435. Tel: 021 554 5195. E-mail: john@sescc.net).

Figure 1: Google Earth© satellite image of Beaufort West, Western Cape, showing the location of the proposed Goue Akker cemetery expansion situated on the Remainder of Farm 185 on the south-eastern edge of town (yellow polygon). The site is underlain by alluvial deposits (pale brown areas) between the Gamka and Kuils Rivers. Scale bar = 2 km. N towards the top of the image (See Figure 3 for more detail of the project area).

2. STUDY APPROACH

The approach to this palaeontological heritage study can be briefly summarized as follows. Fossil bearing rock units occurring within the broader study area (including all relevant land parcels) are determined from geological maps and relevant geological sheet explanations as well as satellite images. Known fossil heritage associated with each rock unit is inventoried from published and unpublished scientific literature, previous palaeontological impact assessments (PIAs) of the broader study region, and the author's field experience and palaeontological database (*cf* Almond & Pether 2008, Almond 2020a). Based on this data as well as field examination of representative exposures of all major sedimentary rock units present, both within and in the vicinity of the project footprint, the impact significance of the proposed development is assessed and recommendations for any further studies or mitigation are outlined for inclusion within the Environmental Management Programme

(EMPr) for the development. Minimum standards for the palaeontological component of heritage impact assessment reports (PIAs) relevant to this study have been published by Heritage Western Cape (2016) and SAHRA (2013).

2.1. Sources of data

The present combined desktop and field-based palaeontological heritage assessment for the proposed cemetery expansion at Beaufort West is based on:

1. A project outline, kmz files and maps provided by Sharples Environmental Services cc;
2. A desktop review of (a) the relevant 1: 50 000 and 1: 250 000 scale topographic maps, (b) Google Earth© satellite imagery, (c) scientific literature, including published 1: 250 000 geological maps and accompanying sheet explanations (geology sheet 3222 Beaufort West, Johnson & Keyser 1979) as well as (d) several previous fossil heritage assessments in the Beaufort West region by the author (*e.g.* See References under Almond, especially reviews by Almond 2010a, 2020a, 2020b);
4. The author's extensive field experience with the formations concerned and their palaeontological heritage (*cf* Almond & Pether 2008 and References);
5. A short field assessment of the project area and nearby bedrock exposures, on 8 November 2020.

2.2. Assumptions and limitations

The accuracy and reliability of palaeontological specialist studies as components of Heritage Impact Assessments are generally limited by the following constraints:

- Inadequate database for fossil heritage for much of the RSA, given the large size of the country and the small number of professional palaeontologists carrying out fieldwork here. Most development study areas have never been surveyed by a palaeontologist.
- Variable accuracy of geological maps which underpin these desktop studies. For large areas of terrain these maps are largely based on aerial photographs alone, without ground-truthing. The maps generally depict only significant ("mappable") bedrock units as well as major areas of superficial "drift" deposits (alluvium, colluvium) but for most regions give little or no idea of the level of bedrock outcrop, depth of superficial cover (soil etc.), degree of bedrock weathering or levels of small-scale tectonic deformation, such as cleavage. All these factors may have a major influence on the impact significance of a given development on fossil heritage and can only be reliably assessed in the field.
- Inadequate sheet explanations for geological maps, with little or no attention paid to palaeontological issues in many cases, including poor locality information;
- The extensive relevant palaeontological "grey literature" - in the form of unpublished university theses, impact studies and other reports (e.g. of commercial mining companies) - that is not readily available for desktop studies;
- Absence of a comprehensive computerized database of fossil collections in major RSA institutions which can be consulted for impact studies. A Karoo fossil vertebrate database is now accessible for impact study work.

In the case of palaeontological desktop studies without supporting Phase 1 field assessments these limitations may variously lead to either:
(a) underestimation of the palaeontological significance of a given study area due to ignorance of significant recorded or unrecorded fossils preserved there, or
(b) overestimation of the palaeontological sensitivity of a study area, for example when originally rich fossil assemblages inferred from geological maps have in fact been destroyed by tectonism or weathering or are buried beneath a thick mantle of unfossiliferous “drift” (soil, alluvium etc.).

Since most areas of the RSA have not been studied palaeontologically, a palaeontological desktop study usually entails inferring the presence of buried fossil heritage within the study area from relevant fossil data collected from similar or the same rock units elsewhere, sometimes at localities far away. Where substantial exposures of bedrocks or potentially fossiliferous superficial sediments are present in the study area, the reliability of a PIA may be significantly enhanced through field assessment by a professional palaeontologist. In the present case, site visits to the study areas in some cases considerably modified our understanding of the rock units (and hence potential fossil heritage) represented there.

In the case of the present study area near Beaufort West, Western Cape, exposures of potentially fossiliferous older bedrocks is are limited to the periphery of the project area, due to extensive cover by superficial sediments and locally dense riparian vegetation. However, sufficient exposures were examined to allow a realistic assessment of the palaeontological sensitivity of the key rock units (See Section 5), while additional relevant geological and palaeontological data is available from several previous PIAs carried out in the region, notably the reviews by Almond (2010a, 2020a, 2020b). Confidence levels for this assessment are accordingly rated as High. Comparatively few academic palaeontological studies have been carried out in the region, so any new data from impact studies here are of scientific interest.

3. LEGISLATIVE CONTEXT AND PERMIT REQUIREMENTS

All South African fossil heritage, including palaeontological sites and specimens, is protected by law (South African National Heritage Resources Act, 1999). South African fossils cannot be collected, damaged, destroyed or disturbed without a permit from SAHRA or the relevant Provincial Heritage Resources Agency.

Where palaeontological mitigation of a development project in the Western Cape is required, the palaeontologist concerned with mitigation work would need a valid fossil collection permit from Heritage Western Cape (HWC). Any material collected would have to be curated in an approved depository (*e.g.* museum or university collection). All palaeontological specialist work should conform to international best practice for palaeontological fieldwork and the study (*e.g.* data recording fossil collection and curation, final report) should adhere as far as possible to the minimum standards for palaeontological studies developed by HWC (2016) and SAHRA (2013).

The present palaeontological heritage assessment falls under Sections 35 and 38 (Heritage Resources Management) of the South African Heritage Resources Act (Act No. 25 of 1999), and it will

also inform the EMPr for this project. The various categories of heritage resources recognised as part of the National Estate in Section 3 of the National 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 of the National Heritage Resources Act, dealing with archaeology, palaeontology and meteorites:

(1) The protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority.
(2) All archaeological objects, palaeontological material and meteorites are the property of the State.
(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 assist 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.

3.1 Legislative and Permit Requirements for potential specialist mitigation

(1) Should professional palaeontological mitigation be necessary during the operational phase of the cemetery development, the palaeontologist concerned will need to apply for a Fossil Collection Permit from HWC. (2) Palaeontological collection should comply with international best practice. (3) All fossil material collected must be deposited, together with key collection data, in an approved depository (museum / university), such as the Iziko Museum, Cape Town. (4) Palaeontological mitigation work including the ensuing Fossil Collection Reports should comply with the minimum standards specified by HWC (2016) and SAHRA (2013).

4. GEOLOGICAL CONTEXT

The Goue Akker cemetery extension project area is situated in semi-arid, flat-lying sandy terrain at an elevation of *c*. 830 m amsl between the course of the shallowly incised Kuils River in the east and the Waste Water Treatment Works along Blythe Street to the west (Fig. 1). Much of the area is already extensively disturbed at surface by previous agricultural activities, tracks and dumping and is partially colonized by riverine acacia scrub and weedy vegetation (Fig. 3).

The geology of the Beaufort West area is shown on the – now somewhat outdated - 1: 250 000 geology sheet 3222 Beaufort West (Council for Geoscience, Pretoria) (Johnson & Keyser 1979) (See Fig. 2). The Goue Akker cemetery extension project area lies close to the confluences of the Gamka, Kuils and Hans Rivers to the south of Beaufort West. The entire area is underlain by thick sandy to sparsely gravelly **alluvial deposits of Late Caenozoic age** (Figs. 6 to 10). These unconsolidated, and therefore relatively easily excavated, alluvial deposits (pale brown areas in Fig. 1) extend much further north than mapped on the 1: 250 000 geology sheet 3222 Beaufort West (Fig. 2) where they underlie a series of cemeteries in the southern part of town. River bank sections along the Kuils River expose up to 7 m or more of soft alluvium with only sparse gravelly lenses overlying bedrock. Within the cemetery extension project area several test pits also penetrate into fine-grained alluvium. Downwasted pebbly to cobbly, angular to rounded surface gravels of Beaufort Group wacke, mudrock, dolerite and occasional hornfels have been modified by modern sheetwash processes.

At depth the cemetery project area is underlain by Late Permian fluvial sediments of the lower **Teekloof Formation (Poortjie Member),** Lower Beaufort Group (Karoo Supergroup) of Late Permian age (Pt, blue in Fig. 2). Good accounts of the geology, including sedimentology, age, palaeontology and environmental interpretation, of the lower part of the Teekloof Formation are provided by Smith & Keyser (1995) and Smith *et al*. (2012), among others. Further illustrated accounts of the Poortjie Member bedrocks on the SE outskirts of Beaufort West are provided in previous palaeontological assessments by the author (See References under Almond). Approximately one kilometre to the south of the cemetery project area these Beaufort Group sediments are intruded and thermally metamorphosed or baked by the WNW-ESE trending Droërivier – Langrug dyke of the Early Jurassic Karoo Dolerite Suite (Jd, red in Fig. 2). The Beaufort Group (Poortjie Member) bedrocks are well-exposed along the banks of the Kuils River to the northeast and east of the cemetery project area (Figs. 4 & 5). Exposures examined during the field survey include massive, hackly-weathering, purple-brown and blue-grey overbank mudrocks with horizons of brown ferruginous carbonate pedocrete concretions, thin crevasse-splay sandstones (locally with small scale wave rippled bed tops), and single-storey channel sandstones.

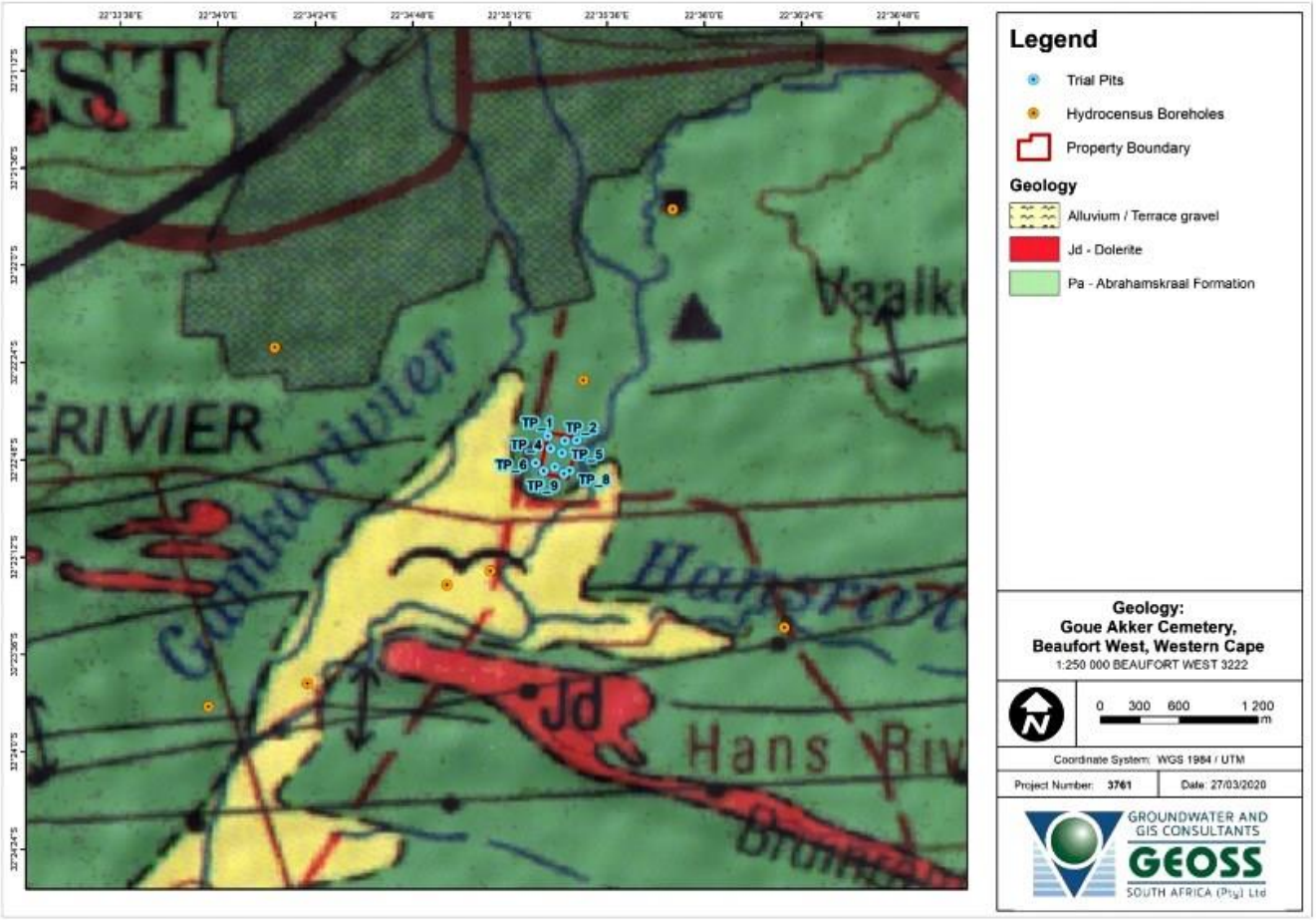

Figure 2: Geological map of the area on the southern margins of Beaufort West showing the location of the project area for the proposed Goue Akker cemetery extension (blue dots – test pits) (Image prepared by GEOSS). The site is underlain at depth by Late Permian fluvial sediments of the Teekloof Formation (Lower Beaufort Group, Karoo Supergroup) (Pt, blue; not Pa, Abrahamskraal Formation as indicated in the legend) but is mantled at surface by several meters of Late Caenozoic alluvium (pale yellow with "flying bird" symbol). Note that thick alluvial deposits around the confluences of the Gamka, Kuils and Hans Rivers in fact extend northwards well beyond the area mapped here where they underlie a series of cemeteries in Beaufort West. The black triangle symbol to the NE of the cemetery project area indicates a fossil site within the previously recognized *Pristerognathus* Assemblage Zone (now incorporated within the upper part of the *Tapinocephalus* Assemblage Zone). The red area (Jd) indicates the WNW-ESE trending Droërivier – Langrug dolerite dyke. Thin black lines are the fold axes of roughly E-W trending fold axis within the Lower Beaufort Group.

Figure 3: Detailed Google Earth© satellite image of the Goue Akker cemetery expansion project area on the SE outskirts of Beaufort West (yellow polygon) showing the low-relief, disturbed terrain between the Kuils River in the east and Blythe Street in the west. Note the absence of bedrock exposure here. North is towards the LHS of the image where the existing cemetery can be seen.

Figure 4: Good exposures of overbank mudrocks, crevasse splay sandstones and channel sandstones of the Teekloof Formation (Poortjie Member) along the Kuils River just to the northeast of the cemetery extension project area.

Figure 5: Hackly-weathering, purple-brown and blue-grey overbank mudrocks of the Teekloof Formation with horizons of coffee-brown ferruginous carbonate pedocrete concretions exposed on the SE side of the Kuils River just to the SE of the cemetery extension project area.

Figure 6: View north-westwards into the cemetery extension project area from the bed of the shallowly incised Kuils River showing modern gravelly alluvium in the foreground and thick mantle of pale brown silty to sandy Late Caenozoic alluvium on the western side of the river.

Figure 7: Thick, fine-grained alluvial deposits on the eastern margins of the project area have been dissected by sheet flooding to leave relict vegetated hummocks of unconsolidated sediment.

Figure 8: Patches of oligomict, pebbly surface gravels modified by sheetwash processes overlying alluvial sediment in the southern portion of the project area (view NW towards the waste water treatment plant seen in the background).

Figure 9: Detail of downwasted sheetwash surface gravels within the project area, mainly consisting of angular to subrounded clasts of wacke, hornfels and dolerite (Hammer = 30 cm).

Figure 10: Shallow test pits into thick, fine-grained alluvial deposits in the NW corner of the cemetery extension project area. Note the well-vegetated, flat-lying terrain here with bare patches within which surface gravels are locally exposed.

5. PALAEONTOLOGICAL HERITAGE

Impoverished Late Permian continental biotas within the Poortjie Member at the base of the Teekloof Formation were until recently assigned to the *Pristerognathus* Assemblage Zone (Smith & Keyser 1995, Smith et al. 2012). Fossil biotas within the upper part of the Abrahamskraal Formation (Moordenaars and Karelskraal Members) as well as within the the lowermost portion of the Poortjie Member of the Teekloof Formation are now assigned to the ***Diictodon – Styracocephalus* Subzone** of the revised ***Tapinocephalus* Assemblage Zone** (AZ) that is of Late Capitanian age (*c*. 262-260 Ma) (Day & Rubidge 2020). These biotas are of special palaeobiological interest in that they reflect the major Capitanian or Guadalupian (Late Middle Permian) Mass Extinction Event on land. The highly impoverished, post-extinction vertebrate fauna represented in the uppermost part of the *Diictodon – Styracocephalus* Subzone (lowermost Poortjie Member) includes – or is inferred to include – only a few representatives of several tetrapod subgroups including amphibians, parareptiles (pareiasaurs, *Eunotosaurus*), dinocephalians (*e.g. Criocephalosaurus,* perhaps also *Styracocephalus*), dicynodonts (*e.g. Diictodon*), therocephalians (*e.g. Pristerognathus*) and gorgonopsians.

A fossil site of the *Pristerognathus* Assemblage Zone is recorded just to the NE of the present project area on the 1: 250 000 geological map 3222 Beaufort West (black triangle in Fig. 2). A range of additional fossil sites, including tetrapod skeletal remains, vertebrate burrows and plant material, has been recorded from the Poortjie Member on the outskirts of Beaufort West (See reviews by Almond in the References, especially Almond 2010a, 2020a). Of particular scientific interest are the post-extinction dinocephalian remains from the SW edge of Beaufort West described by Day *et al.* (2015). No further

fossil remains were recorded from the Beaufort Group bedrocks exposed along the banks of the Kuils River during the present study.

The thick, late Caenozic fine-grained alluvial deposits mantling the entire cemetery project area are generally of low palaeontological sensitivity in the Great Karoo region. Fossil or subfossil remains of palaeontological interest that might potentially occur within these units include concentrations of petrified wood reworked from the underlying Beaufort Group bedrocks as well as Pleistocene mammalian remains (teeth, bones, horn cores), freshwater molluscs, trace fossils and plant debris (*e.g.* Klein 1984, Bousman *et al.* 1988, Churchill *et al*. 2000, Brink & Rossouw 2000, Rossouw 2006, De Ruiter *et al.* 2010, Backwell *et al.* 2017).

No fossil remains were recorded within the Late Caenozoic alluvial deposits within or on the margins of the Beaufort West cemetery extension project area during the recent field survey.

6. CONCLUSIONS & RECOMMENDATIONS

The Beaufort West Goue Akker cemetery extension project area is underlain at depth by sedimentary bedrocks of the Late Permian Teekloof Formation (Lower Beaufort Group, Karoo Supergroup) that are known to contain scientifically important continental vertebrate and other fossil remains in this region of the Great Karoo. However, these Permian bedrocks will not be impacted directly by the development since (1) the shallow excavations anticipated within the cemetery footprint will not penetrate to bedrock while (2) existing bedrock exposures in the vicinity are protected within the proposed riverine buffer zone. Although this is not indicated on the relevant 1: 250 000 geological map (geology sheet 3222 Beaufort West), the entire cemetery project area is in fact mantled by unconsolidated, fine-grained alluvial deposits up to several meters in thickness that are associated with the major Gamka – Kuils – Hans River drainage system. These younger (possibly Pleistocene – Recent) alluvial sediments are generally of low palaeontological sensitivity in the Great Karoo region, though they may occasionally contain important fossil and subfossil remains of mammals, freshwater molluscs, trace fossils, microfossils and plant material as well as reworked petrified wood. Significant palaeontological occurrences here are likely to be, at most, very sparse and of widespread occurrence.

No fossil remains were recorded in good exposures of the Teekloof Formation and overlying alluvial deposits in the bed and banks of the Kuils River which are all situated on the periphery of and *outside* the project area. Likewise, no Permian or Caenozoic fossils were observed within the cemetery expansion study area itself. It is concluded that the palaeosensitivity of the site is in fact Low.

Anticipated impacts of the proposed development on local palaeontological heritage resources concern the disturbance, damage or destruction of fossil remains preserved at or below the ground surface, particularly resulting from surface clearance and excavations during the construction and operational phases of the cemetery. These impacts are negative, direct, site-specific and permanent / irreversible. However, significant impacts on scientifically important fossil heritage are considered to be improbable, while the loss of irreplaceable fossil heritage is unlikely. The prospect of mitigation of chance fossil finds is high. The impact significance of the proposed development is rated as LOW (negative) without mitigation. Consistent implementation of the Chance Fossil Finds procedure (Appendix 1) should lead to positive outcomes, *viz*. an improved palaeontological database for the Karoo region. This assessment applies equally to all project alternatives, including the two cemetery layouts under consideration. The

No-Go option (*i.e.* no cemetery expansion) would have a neutral impact on local fossil heritage resources.

Pending the potential discovery of important new fossil remains - such as vertebrate bones and teeth, petrified wood, plant-rich lenses or layers, fossil shells, fish remains or dense fossil burrow assemblages – during the construction or operational phases of the cemetery, no further specialist palaeontological studies or mitigation are recommended for this project. There are no objections on palaeontological heritage grounds to authorization of this development.

Should significant fossils be found during the construction or operational phase of the cemetery, the responsible Environmental Control Officer should safeguard them and alert Heritage Western Cape, HWC as soon as possible (Contact details: Protea Assurance Building, Green Market Square, Cape Town 8000. Private Bag X9067, Cape Town 8001. Tel: 086-142 142. Fax: 021-483 9842. Email: hwc@pgwc.gov.za). This is so that appropriate action can be taken in good time by a professional palaeontologist at the developer's expense. Palaeontological mitigation would normally involve the scientific recording and judicious sampling or collection of fossil material as well as of associated geological data (*e.g.* stratigraphy, sedimentology, taphonomy). The palaeontologist concerned with mitigation work will need a valid fossil collection permit from HWC and any material collected would have to be curated in an approved repository (*e.g.* museum or university collection). All palaeontological specialist work should conform to international best practice for palaeontological fieldwork and the study (*e.g.* data recording fossil collection and curation, final report) should adhere as far as possible to the minimum standards for Phase 2 palaeontological studies developed by SAHRA (2013) and Heritage Western Cape (2016).

A summary protocol for Chance Fossil Finds is provided in tabular form in Appendix 1 and should be incorporated into the Environmental Management Programme (EMPr) for the proposed cemetery extension development.

7. ACKNOWLEDGEMENTS

I am grateful to Mr John Sharples Sharples of Environmental Services cc, Milnerton for commissioning this study and for providing the relevant background project information. Madelon Tusenius is thanked for assistance and companionship in the field. I would also like to thank my colleagues Dr Lita Webley and Dr Jayson Orton for helpful discussions concerning heritage aspects of the cemetery project.

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9. QUALIFICATIONS & EXPERIENCE OF THE AUTHOR

Dr John Almond has an Honours Degree in Natural Sciences (Zoology) as well as a PhD in Palaeontology from the University of Cambridge, UK. He has been awarded post-doctoral research fellowships at Cambridge University and in Germany, and has carried out palaeontological research in Europe, North America, the Middle East as well as North and South Africa. For eight years he was a scientific officer (palaeontologist) for the Geological Survey / Council for Geoscience in the RSA. His current palaeontological research focuses on fossil record of the Precambrian - Cambrian boundary and the Cape Supergroup of South Africa. He has recently written palaeontological reviews for several 1: 250 000 geological maps published by the Council for Geoscience and has contributed educational material on fossils and evolution for new school textbooks in the RSA.

Since 2002 Dr Almond has also carried out palaeontological impact assessments for developments and conservation areas in the Western, Eastern and Northern Cape, Limpopo, Northwest, KwaZulu-Natal, Mpumalanga and the Free State under the aegis of his Cape Town-based company *Natura Viva* cc. He has served as a long-standing member of the Archaeology, Palaeontology and Meteorites Committee for Heritage Western Cape (HWC) and an advisor on palaeontological conservation and management issues for the Palaeontological Society of South Africa (PSSA), HWC and SAHRA. He is currently compiling technical reports on the provincial palaeontological heritage of Western, Northern and Eastern Cape for SAHRA and HWC. Dr Almond is an accredited member of PSSA and APHP (Association of Professional Heritage Practitioners – Western Cape).

Declaration of Independence

I, John E. Almond, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.

<table>
<tr><td colspan="3">Appendix 1: CHANCE FOSSIL FINDS PROCEDURE: Expansion of the Goue Akker Cemetery, Beaufort West</td></tr>
<tr><td>Province & region:</td><td colspan="2">Western Cape, Ward 4 of the Beaufort West Local Municipality (Central Karoo District Municipality)</td></tr>
<tr><td>Responsible Heritage Resources Agency</td><td colspan="2">HERITAGE WESTERN CAPE (Contact details: Protea Assurance Building, Green Market Square, Cape Town 8000. Private Bag X9067, Cape Town 8001. Tel: 086-142 142. Fax: 021-483 9842. Email: hwc@pgwc.gov.za)</td></tr>
<tr><td>Rock unit(s)</td><td colspan="2">Teekloof Formation (Lower Beaufort Group, Karoo Supergroup), Late Caenozoic alluvium.</td></tr>
<tr><td>Potential fossils</td><td colspan="2">In Beaufort Group bedrocks: tetrapod skeletal remains, vascular plants, petrified wood, trace fossil assemblages including vertebrate burrows . In alluvium: teeth, bones and horn cores of mammals, calcretised trace fossils (e.g. termitaria), freshwater molluscs, plant debris, reworked petrified wood.</td></tr>
<tr><td rowspan="5">ECO protocol</td><td colspan="2">1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (N.B. safety first!), safeguard site with security tape / fence / sand bags if necessary.</td></tr>
<tr><td colspan="2">2. Record key data while fossil remains are still in situ:
● Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo
● Context – describe position of fossils within stratigraphy (rock layering), depth below surface
● Photograph fossil(s) in situ with scale, from different angles, including images showing context (e.g. rock layering)</td></tr>
<tr><td>3. If feasible to leave fossils in situ:
● Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation
● Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Agency for work to resume</td><td>3. If not feasible to leave fossils in situ (emergency procedure only):
● Carefully remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock)
● Photograph fossils against a plain, level background, with scale
● Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags
● Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist
● Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation</td></tr>
<tr><td colspan="2">4. If required by Heritage Resources Agency, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.</td></tr>
<tr><td colspan="2">5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Agency</td></tr>
<tr><td>Specialist palaeontologist</td><td colspan="2">Record, describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy). Ensure that fossils are curated in an approved repository (e.g. museum / university / Council for Geoscience collection) together with full collection data. Submit Palaeontological Mitigation report to Heritage Resources Agency. Adhere to best international practice for palaeontological fieldwork and Heritage Resources Agency minimum standards.</td></tr>
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