HERITAGE IMPACT ASSESSMENT (INCLUDING PHASE 1 PIA) FOR THE PROPOSED ESTABLISHMENT OF RESIDENTIAL UNITS AND HOSPITALITY FACILITIES ON PORTION 3 OF THE FARM UMGETHU No. 14830 (THE OLD MUSHROOM FARM), WITHIN THE Dr. NKOSAZANA DLAMINI ZUMA LOCAL AND HARRY GWALA DISTRICT MUNICIPALITY, KARKLOOF, KWAZULU-NATAL

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Declaration of Consultants independence

I, Gary Trower, am an independent consultant and have no business, financial, personal or other interest in the proposed development project in respect of which I was appointed to do a heritage impact assessment, other than fair remuneration for work performed. There are no circumstances whatsoever that compromise the objectivity of this specialist performing such work.

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Introduction

The applicant, 11 on Karkloof (Pty) Ltd, wishes to obtain environmental authorization for the proposed establishment of residential units and hospitality facilities on Portion 3 of the Farm Umgethu No. 14830 within the uMngeni Local and the uMgungundlovu District Municipality, Karkloof, KwaZulu-Natal. The accommodation will comprise of apartments, cottages, houses, a boutique hotel, a conference and events facility, and storage facilities. The site is located roughly 6 kilometres north of Howick, on a property which was once used for mushroom farming (Figure 1).

The site footprint is located within an area where the underlying geology is given a high (orange) palaeo-sensitivity rating on the SAHRIS map and these deposits are very likely to contain some palaeontological material (www.sahra.org.za/sahris/map/palaeo). A heritage impact assessment was thus necessary to evaluate whether any fossils or any other heritage-related material could be located within the boundaries of the proposed development, and whether any mitigation measures would be necessary.

In terms of the National Environmental Management Act 107 of 1998 and Section 38 (8) of the National Heritage Resources Act 25 of 1999 (sections 34-36), all aspects of heritage are protected. Proposed developments that are likely to impact on heritage resources (i.e. historical, archaeological, palaeontological & cosmological) require a desktop and/or field assessment to gauge the importance of such resources in order to ensure that such sites are not damaged or destroyed by developments which could negatively impact them. Identified heritage resources should be recorded through detailed documentation, mitigation measures applied if resources are threatened, or collection and/or a rescue excavation carried out if necessary.

Figure 1: Satellite image showing the layout of the site footprint, located to the north of Howick. The site was previously used for mushroom farming and the property has already been extensively transformed over the years. Modified from Google Earth, Maxar Technologies 2023

Geology

Rocks of the Karoo Basin are rich repositories for palaeontological material, necessitating measures to minimize activities which may disturb or destroy fossils preserved in underlying beds. The fossiliferous geology in the area of the proposed development consists of Middle to Late Permian deposits of the Volksrust Formation of the Ecca Group (Figure 2). The stratigraphic sequence making up this Group comprises of dark blue-grey shale and subordinate thin sandstone representing depositional settings associated with a sheltered coastal embayment of a giant inland sea. These deposits could preserve trace fossils, as well as bivalves, insects, plant and (rarely) amphibian fossils.

These deposits form an important component and subdivision of the stratigraphy of the Karoo Supergroup, an extensive inland basin which preserves a rich array of fossil plants, insects, fish and tetrapod fauna which existed through the Carboniferous, Permian, Triassic and

Jurassic of southern Gondwana (Rubidge 2005, Smith *et al*. 1993). The existence of a depositional environment in this palaeo-landscape means that fossil lifeforms which existed during the Permian may be present within these geological units, and this is also the reason why this sedimentary package has a high palaeo-sensitivity rating of orange (Figure 3).

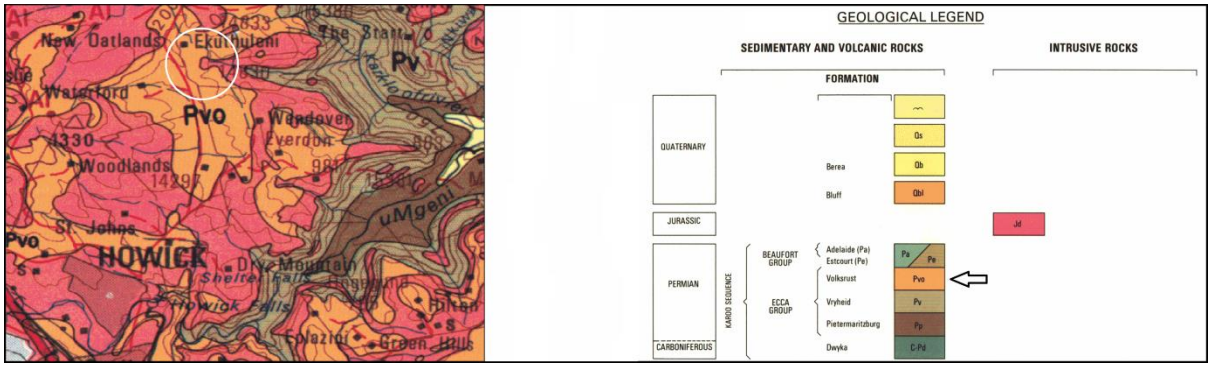

Figure 2: Map showing the geology of the region, with the location of the proposed development occurring within the white circle. The orange shading represents the Volksrust Formation of the Ecca Group (Pvo), deposits which are Middle to Late Permian in age and are marked on the legend with a black arrow. The pink patches of rock represent dolerite, which are Jurassic in age and are of no palaeontological significance. Modified from 2930 Durban, 1:250 000 Geological Series, Council for Geoscience, 1988

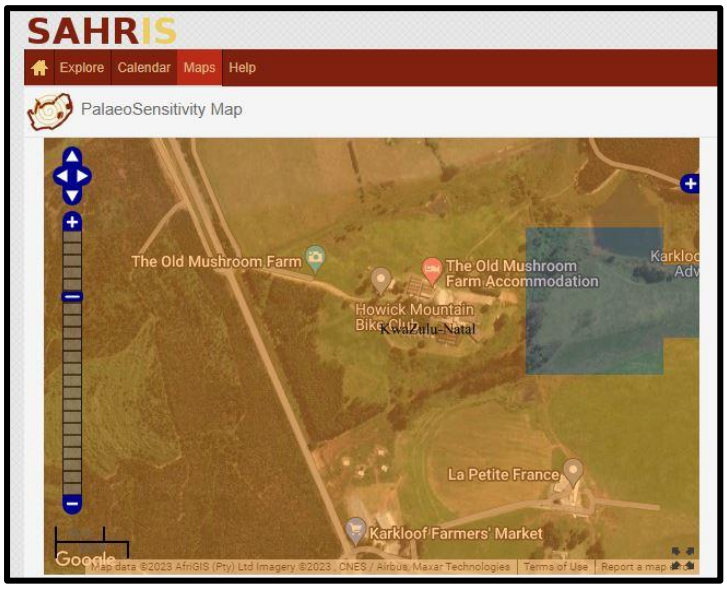

Figure 3: Map of how the geology in Fig.2 translates into palaeo-sensitivity. The geological unit which occurs beneath the proposed development has a ranking of orange and corresponds to the Volksrust Formation of the Ecca Group, a rock type which has a high likelihood of significant fossil occurrences. The grey patch (dolerite) is of no palaeontological significance. Modified from the SAHRIS map, www.sahra.org.za/sahris/map/palaeo

Site observations

The site footprint is located to the north of Howick, off the Karkloof Road at GPS coordinates 29º 25' 44.66" S, 30º 14' 48.22" E (Figure 1). Before the ground survey took place an aerial survey of the site was first carried out using Google Earth, and the relevant geology map of the area (2930 Durban) as well as the SAHRIS palaeo-sensitivity map were also consulted. These were all used in combination to gain an understanding of the site features, as well as the underlying bedrock within the site footprint and how it ranked in terms of possible fossil occurrences.

The entire property was searched on foot for areas where the underlying bedrock or stratigraphy of the upper soil profile was exposed (Figure 4 - 9). A footpath located on the southern, south-eastern and eastern edge of the site footprint revealed sections of exposed soil and loose boulders, but no fossils or archaeological material were observed (Figure 10 & 11). A stream on the eastern edge of the property (which had cut down into the soil profile) had exposed some rocks and boulders, but no archaeological material in the form of pottery fragments or stone tools was observed in the shallow banks of the stream and none of the boulders displayed any evidence of fossil material (Figure 12 & 13). The banks of a small dam located on the northern boundary of the site footprint were searched, but the eroded areas where the exposed upper soil profile was exposed contained no archaeological material (Figure 14 & 15).

Besides a few loose boulders, no bedrock was visible at the surface, and therefore no fossils were located during the ground survey. In addition, no archaeological sites or artefacts, graves or historical buildings were observed on the site footprint. Farming activities have previously taken place on the property and the ground has already been extensively disturbed, so the area in no longer in a pristine, natural state.

Figure 4 - 9: Different views of the property, taken during the ground survey. Existing houses on the southern portion of the property (Fig.4, top left); open piece of land on the western section of the site footprint proposed for new housing units (Fig.5, top right); looking south towards the Falls house and other existing infrastructure, across an open patch of land designated for new housing (Fig.6 & 7, centre left & right); looking east (Fig.8, bottom left) and west (Fig.9, bottom right) across sections of the property where new housing units are proposed. The entrance gate to the property is visible on the left edge of Figure 9

Figure 10 & 11: A footpath along the eastern edge of the property serves as a walking & horse-riding trail. This trail exposed parts of the upper soil profile, which was examined for evidence of archaeological material. No lithics, pottery fragments or historical material was observed. Several loose boulders were also noted along this section of the property, which were examined for evidence of encased palaeontological material or possible rock engravings but nothing was recorded

Figure 12 & 13: A stream was present along the eastern edge of the site footprint, which exposed a section of the uppermost part of the soil stratigraphy, as well as loose boulders and rocks of dolerite. No artefacts were visible in the soil profile and most of the rocks in the streambed comprised of non-fossiliferous dolerite

Figure 14 & 15: A small dam was located along the northern boundary of the site footprint. Patches of open ground along the edges of the dam exposed a section of the uppermost part of the soil stratigraphy, which was examined for any evidence of archaeological material. No artefacts were visible in the unvegetated patches of exposed soil (right)

To better evaluate the site, the table below summarizes the heritage impact significance:

Assessing Impact Significance

Criteria	without mitigation	with mitigation
Extent/spatial scale of impact	local	local
Duration of impact	permanent	permanent
Intensity/severity of impact	low	low
Probability of impact	improbable	improbable
Consequence	low	low
Confidence	medium	medium
Significance	very low	very low
Reversibility	irreversible	
Loss of resource	low	
Mitigation potential	none	

Identified heritage resources (NHRA status)

Formal protections	
National Heritage site (Section 27)	none
Provincial Heritage site (Section 27)	none
Provisional Protection (Section 29)	none
Place listed in heritage register (Section 30)	none
General protections	
Palaeontological site or material (Section 35)	none

Summary: FONSI - finding of no significant impact

Contingency plan for possible heritage-related discoveries:

Chance Find Protocol

Heritage-related discoveries are ranked by their nature and context; their uniqueness and completeness; their rarity and significance; as well as the contribution they can make to science. However any artefact or occurrence can turn out to be important, therefore all discoveries need to be assessed and ranked in order to determine their relevance and whether further action is required.

Based on the work of Almond *et al*. (2009) and Groenewald *et al*. (2014) and summarised on the SAHRIS website (www.sahra.org.za/sahris/map/palaeo), if a development occurs within a red zone a desktop study is required, as well as a phase 1 Palaeontological Impact Assessment (PIA) comprising a field survey and recording of fossils. A phase 2 PIA is also required, which entails the rescue of fossil material during construction activities, as well as the compulsory application for a collection and destruction permit. If the development occurs in an orange zone, a desktop survey as well as a phase 1 PIA comprising of a field survey and collection of fossils is compulsory. A prior application for a collection permit is therefore recommended and a phase 2 PIA may be necessary during the construction phase of the project. If the development occurs in a green zone, a desktop survey as well as phase 1 PIA comprising a field survey is recommended. Lastly developments which occur in a blue or grey zone may require a desktop survey, based on the known heritage sites in the area as well as the nature of surrounding geological units.

The normal procedure for recovering archaeological/palaeontological material would be to identify areas which show investigative potential through a concentration of fossils or artefacts, and whose recovery and preparation could address certain scientific questions. The process would then entail obtaining permission from the landowner/s and applying to

SAHRA (South African Heritage Resources Agency) or another provincial heritage agency for a collection permit to excavate or remove blocks of bedrock for preparation in the lab. This is a slow and time-consuming process which requires the skills of a field archaeologist/palaeontologist to spot worthy material within geological/stratigraphic exposures, and skilled fossil excavators and/or preparators who can successfully recover fossils from sediment or slabs of bedrock.

But in the case of developments fossils or artefacts may be exposed which were not being targeted as a part of a formal scientific investigation, which then requires intervention to ensure that such heritage resources are documented and evaluated, and possibly recovered. In this way, construction activities can provide an opportunity for scientists in that sediments or bedrock and other heritage related material will be exposed which otherwise would have gone unnoticed as it was hidden from view and would have been costly to excavate.

As a general rule, direct field observations are the best method to gauge the degree to which palaeontological material may be present on site, whether eroding out or visible on the surface. As many developments require a degree of digging down into the soil and/or underlying stratigraphy, fossils will be hidden from view due to their buried nature and will only be exposed by the action of a back-actor or once they have started eroding out from the stratigraphy they are preserved in. Heritage consultants such as archaeologists and palaeontologists are required to evaluate the sites of proposed development in the hope of recording and/or recovering important objects and artefacts before they are damaged or destroyed, but during the entire timeline of a project such a consultant is generally only on site for a few hours. Having a palaeontologist or archaeologist on site to examine every scoop of a back actor/JCB would be very costly and impractical, so additional site visits may be required for certain large-scale projects, or developments in highly sensitive areas.

If fossils are unearthed during the rest of the project timeline when no palaeontologist is on site, they may be difficult for the on-site layman to identify as many geological formations superficially resemble palaeontological material. Pseudo-fossils and certain mineral deposits often form into a variety of shapes which may closely resemble plant and animal fossils, making it more difficult for laypersons to positively identify chance finds in the field. With certain projects it is therefore recommended that training be provided to on-site staff on fossil identification in order to increase the chances of observing palaeontological material that may be present within the boundaries of the site footprint. Even though it is not the responsibility of site workers to keep an eye out for heritage objects and/or they may not have received the appropriate training on what to look out for, they are on the ground witnessing and observing. This is a helpful tool when there is a flow of information from on-site staff to management and protocol dictates that you convey when something unusual or out of the ordinary is observed during work operations.

The probability of on-site foremen or construction workers operating heavy earth moving equipment and working to a strict time schedule spotting heritage objects amongst tons of bedrock or sediment is not always likely but nonetheless possible. In South Africa and around the world many important archaeological and palaeontological discoveries have been made during construction projects, and companies and individuals can play their part by following the law and making the effort to report heritage resources which have been unearthed during digging operations. In so doing, developers can enhance their public image and potentially contribute to a rare fossil or object reaching a museum or tertiary institution where it can studied and eventually displayed to the public as heritage belongs to the entire nation and should be preserved as best as possible.

If by chance fossils or any other heritage-related material were to be discovered which was not anticipated in this report, construction would need to cease immediately and a protocol

should be followed whereby the relevant provincial or national heritage custodians in the relevant province would need to be informed. Developers would also need to acquire the services of a suitably qualified palaeontologist or archaeologist to rank the significance of the discoveries. If anything relevant is observed, mitigation measures may be necessary and an application for a collection permit may be required. A second site visit (Phase 2) may be necessary so that scientists can be given the opportunity to record and/or recover fossil material if it is ranked as significant and likely to make a positive contribution to the field of science.

Assumptions and limitations

A key assumption for this report is that the kml/kmz file sent to the heritage specialist accurately conveys the layout and nature of the development, which is not always the case as plans are often revised; because the site layout has not been accurately drawn in Google Earth; or lastly because the developers have understated and downplayed the degree, severity, nature or extent of the development so as to make it seem less impactful to the environment. A further assumption is that the geological maps used in this assessment are accurate and up to date, which may not be the case as there is a continuous refinement and revision of the geological model through new scientific research, some of which may still need to become incorporated into available maps. Another assumption is that developers will respect the guidelines set out in the laws of South Africa with regards to good environmental management practices and policies, and will immediately cease all construction if any fossiliferous material is discovered. It is therefore assumed that the developers will practice integrity and embrace an unwavering mind-set with regards to respecting and protecting all aspects of heritage, including due consideration for the fact that such objects cannot simply be sacrificed to meet project deadlines.

A limitation with large scale maps (1:250 000) is that smaller outcrops of fossiliferous bedrock may not be indicated within the represented geological model. In addition, several potentially fossiliferous outcrops may have been weathered and eroded over millennia, buried under younger deposits such as alluvial and colluvial sediments, or capped by topsoil. Palaeontologically-sensitive bedrock may have also been metamorphosed through its contact with intrusive lavas, damaging or destroying fossil specimens along the contact zone.

The professional opinion given in this HIA report is based on the results of a site visit, which was used to gauge the fossiliferous potential of the bedrock likely to be exposed during the proposed development, and the impact significance. This process involved careful scrutiny of the best available maps and data sets as well as a ground survey, and all attempts were made to take a holistic, informed decision. Yet in spite of this, it is possible that fossils may be present somewhere in or around the area of the development but were not visible due to their buried nature. Moreover, certain predictions about the likelihood of encountering fossils was based on all available evidence and may prove to be less or more likely than anticipated.

Conclusion and recommendations

When scrolling back the time bar on Google Earth, it reveals that this property has undergone extensive transformation in its recent history. Large sections of it have been disturbed through grading, levelling out and through previous farming and construction projects. This greatly reduces the chances that any potential artefacts which may have been present will still be *in-situ*. Furthermore, the small stream, footpath and dam noted on the property exposed sections of the upper soil surface, and this revealed that the upper soil profile comprised of unstratified archaeologically-sterile sediment.

Excavation work required for the foundations of the housing units and their associated waste-water infrastructure (septic tanks and soakaways) will be limited to the upper soil surface,

and the deep trenches required for linking sewerage outflows to the municipal network will not be required. Construction work required for the building of the housing units and other additional structures is therefore unlikely to have a significant impact on heritage resources as nothing was observed during the ground survey, i.e. no artefacts, archaeological sites, graves, historical buildings or fossils were found during the site visit. The project can therefore proceed as planned.

If any palaeontological or heritage-related material were to be unearthed during future construction or farming activities, developers and/or landowners are reminded that according to the National Heritage Resources Act 1999 (Act No. 25) and KwaZulu-Natal Heritage Act 2008 (Act No. 4), work should immediately cease and the **Chance Find Protocol** outlined above should be followed to ensure that developments comply with the law, and to ensure that a rare object/fossil stands a good chance of being recorded and/or relocated before being damaged or destroyed by construction activities present on-site.

References

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