Phase 1 Heritage Impact Assessment of proposed new agricultural pivots on Farm Stockenstroms Kop 77 near Norvalspont, Northern Cape Province.

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Summary

A Phase 1 Heritage Impact Assessment were carried out for the expansion of 2 existing agricultural pivots and the establishment and 4 new agricultural pivots on the farm Stockenstroms Kop 77 near Norvalspont in the Northern Cape Province. The site is characterized by flat, open grassland and old agricultural land primarily located on old floodplain deposits of the Orange River. The area flanking the river bank has largely been disturbed by previous and ongoing farming activities. The proposed study area is underlain by potentially fossil-bearing sedimentary strata of the Late Permian Adelaide that are capped by superficial deposits of low to moderate palaeontological sensitivity. No evidence was found for the accumulation and preservation of intact fossil material within the superficial sediments capping the terrain. Visibility of Adelaide Subgroup outcrop sediments is low given the low topography terrain and generally well-developed Quaternary overburden flanking the riverbank, so it will be difficult to determine the potentially adverse effect of the development in the area except to assume that given the nature of the project (aboveground agricultural activity), it will primarily affect geologically recent soils in the form of severely degraded alluvial deposits and residual top soils. The fact that pivot farming will largely effect already degraded top soil layers, potential impact on Quaternary fossils or intact Karoo sedimentary strata is considered very low. As far as the palaeontological heritage is concerned, the proposed development may proceed with no additional heritage assessments necessary, provided that all agricultural activities are restricted to within the boundaries of the development footprints. The pedestrian survey revealed no indication of *in situ* Stone Age archaeological material, capped or distributed as intact surface scatters on the landscape. There are also no indications of rock art (engravings on dolerite outcrop), prehistoric structures, graves or buildings with historical significance older than 60 years situated within the boundaries of the study area. The fact that pivot farming will largely effect already degraded top soil layers, potential impact on capped Stone Age archaeological remains is considered very low. The terrain in general is regarded as of low archaeological significance and is assigned a rating of Generally Protected C (GP.C).

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Introduction

A Phase 1 Heritage Impact Assessment were carried out for the expansion of 2 existing agricultural pivots and the establishment and 4 new agricultural pivots on the farm Stockenstroms Kop 77 near Norvalspont in the Northern Cape Province (**Fig. 1**). The region's unique and non-renewable archaeological and palaeontological heritage sites are 'Generally' protected in terms of the National Heritage Resources Act (Act No 25 of 1999, section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority. As many such heritage sites are threatened daily by development, both the environmental and heritage legislation require impact assessment reports that identify all heritage resources including archaeological and palaeontological sites in the area to be developed, and that make recommendations for protection or mitigation of the impact of the sites.

The primary legal trigger for identifying when heritage specialist involvement is required in the Environmental Impact Assessment process is the National Heritage Resources (NHR) Act (Act No 25 of 1999). The NHR Act requires that all heritage resources, that is, all places or objects of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance are protected. Thus any assessment should make provision for the protection of all these heritage components, including archaeology, shipwrecks, battlefields, graves, and structures over 60 years of age, living heritage and the collection of oral histories, historical settlements, landscapes, geological sites, palaeontological sites and objects. The Act identifies what is defined as a heritage resource, the criteria for establishing its significance and lists specific activities for which a heritage specialist study may be required. In this regard, categories of development listed in Section 38 (1) of the NHR Act are:

- The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- The construction of a bridge or similar structure exceeding 50m in length;
- Any development or other activity which will change the character of the site
- a) exceeding 5000 m² in extent; or

- b) involving three or more existing erven or subdivisions thereof; or
- c) involving three or more subdivisions thereof which have been consolidated within the past five years;
- The rezoning of a site exceeding 10 000 m²; or
- Any other category of development provided for in regulations by the South African Heritage Resources Agency (SAHRA).

A range of contexts can be identified which typically have high or potential cultural significance and which would require some form of heritage specialist involvement (**Table 1**). This may include formally protected heritage sites or unprotected, but potentially significant sites or landscapes. The involvement of the heritage specialist in such a process is usually necessary when a proposed development may affect a heritage resource, whether it is formally protected or unprotected, known or unknown. In many cases, the nature and degree of heritage significance is largely unknown pending further investigation (e.g. capped sites, assemblages or subsurface fossil remains). On the other hand, it is also possible that a site may contain heritage resources (e.g. structures older than 60 years), with little or no conservation value.

Methodology

The archaeological significance of the affected area was evaluated through a desktop study and carried out on the basis of existing field data, database information and published literature. This was followed by a field assessment by means of a pedestrian survey. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used for recording purposes. Relevant heritage information, aerial photographs and site records were consulted and integrated with data acquired during the on-site inspection.

Terms of Reference:

- Identify and map possible heritage sites and occurrences using available resources.
- Determine and assess the potential impacts of the proposed development on potential heritage resources;
- Recommend mitigation measures to minimize potential impacts associated with the proposed development.

Field Rating

Site significance classification standards as prescribed by SAHRA (2005) for archaeological sites were used for the purpose of this report (**Table 3**).

Locality data

1:50 000 scale topographic map: 3025 CB Norvalspont

1:250 000 scale geological map 3024 Coleserg

The study area comprises four 34 ha sites and one 30 ha area on the farm Stockenstroms Kop 77, located about 3 km northwest Norvalspont (**Fig. 2 & 3**).

Site coordinates (Fig. 2):

A) 30°36'25.18"S 25°24'46.98"E

- B) 30°35'30.34"S 25°25'5.19"E
- C) 30°36'24.26"S 25°26'25.70"E

Background

The geology of the region has been described by Le Roux (1993) and Johnson (2006) and is shown on the 1: 250 000 geological map 3024 Colesberg (Council for Geoscience, Pretoria 1997). According to the SAHRIS Palaeo-sensitivity map and 1:250 000 scale geological map 3024 Colesberg, the study area is located on moderately sensitive, Late Cenozoic alluvial deposits underlain by palaeontologically significant, Late Permian Beaufort Group sediments of the Adelaide Subgroup (*Pa*) (**Fig. 4**). The former may include sheet wash, alluvium and unconsolidated residual soils. Dykes and sills of resistant Jurassic dolerites (*Jd*) determine the relief of the study in the form of the surrounding koppies.

The affected area is situated within the *Dicynodon* Assemblage Zone (AZ) near the latter's eastern boundary with the Early Triassic sediments of the overlying *Lystrosaurus* AZ (Rubidge 1995) (**Fig. 5 & 6**). The *Dicynodon* Assemblage represents the terminal phase of the Palaeozoic continental biota, that was dominated by therapsid "mammal-like reptiles" and *Glossopteris* Flora before it was largely wiped out by the end-Permian Mass Extinction Event (Ward *et al.* 2005). This Late Palaeozoic extinction event, which severely reduced the diversity of life represented in the terrestrial fossil record (a disappearance of over 70% in the number of tetrapod families), is used as a marker to define the boundary between the Permian and

Triassic periods. The area around Bethulie in particular, produces a wealth of Karoo vertebrate localities related to the Permian-Triassic transition and extinction event. For example, the principal casualties of the end-Permian extinction include all Gorgonopsian predators, and most Dicynodontian herbivores, with the exception of *Lystrosaurus*. Late Cenozoic valley fill deposits may occasionally contain much younger fossil biotas, including the skeletal remains of Quaternary mammals, non-marine molluscs and a variety of other microfossils (Klein 1984; Berger & Brink 1996; Rossouw 1999; Rossouw 2006). Unlike the wealth of Karoo vertebrate fossil localities found in the region, the distribution of Late Cenozoic (primarily Quaternary) palaeontological deposits is localized and infrequent.

The upper Orange River valley represents a long and rich archaeological record that spans back to the Early Stone Age. Prehistoric archaeological remains previously recorded in the region include Stone Age artifacts and mammal fossil remains from sealed and or exposed contexts as well as rock engravings. Well-known sites near the study area include Riversmead Shelter, Glen Elliot and Holmsgrove Shelter. Along much of the course of the upper Orange River and its tributaries alluvial deposits in the form of river terraces occur that contain occurrences of Middle and Later Stone Age material eroding out of the overbank sediments. Surface sites are common along valley floors, dolerite hills and ridges (Samson 1984). Stone tools found in the region are mostly made of hornfels, a dark, fine-grained isotropic rock found in the hotcontact zone between the dolerites and shales in the area.

Norval's Pont was established in 1848 when a Scot named Norval built a ferry at this point to cross the Orange River. The ferry was replaced by a rail bridge in 1890 when the railway line from Colesberg Junction to Bloemfontein was opened. A section of the old railway line, which was abandoned when a newer line was laid further to the north to serve the construction a few kilometers upstream of the Gariep Dam, is still visible (from GPS coordinates 30°37'45.62"S 25°26'37.08"E to 30°37'48.07"S 25°26'43.25"E) (**Fig. 7**). A formal graveyard and the Norvalspont Concentration Camp Memorial Site are respectively located 1 km southwest and 1.6 km south of Norvalspont (**Fig. 7, Table 2**). The concentration camp was established on the southern banks of the Orange River by the British in November 1900. By 4 April 1901 the Superintendent Mr Cole-Bowen stated in his report that 3 215 people were in the camp of which 517 were men, 1 022 were women and 303 children.

Field Assessment

The site is characterized by flat, open grassland and old agricultural land primarily located on old floodplain deposits of the Orange River (**Fig. 8**). The area flanking the river bank has largely been disturbed by previous and ongoing farming activities (**Fig. 9**). No evidence was found for the accumulation and preservation of intact fossil material within the superficial sediments capping the terrain (**Fig. 10**). Outcrop visibility is generally poor along the footprint, but fine- to coarse-grained, sandstones and mudrocks are occasionally exposed along low weathered ridges located to the south and southwest of the footprints (**Fig. 11**). The pedestrian survey revealed no indication of *in situ* Stone Age archaeological material, capped or distributed as intact surface scatters on the landscape (**Fig. 12**). There are also no indications of rock art (engravings on dolerite outcrop), prehistoric structures, graves or buildings with historical significance older than 60 years situated within the boundaries of the study area.

Impact Statement and Recommendation

The proposed study area is underlain by potentially fossil-bearing sedimentary strata of the Late Permian Adelaide that are capped by superficial deposits of low to moderate palaeontological sensitivity. Visibility of Adelaide Subgroup outcrop sediments is low given the low topography terrain and generally well-developed Quaternary overburden flanking the riverbank, so it will be difficult to determine the potentially adverse effect of the development in the area except to assume that given the nature of the project (aboveground agricultural activity), it will primarily affect geologically recent soils in the form of severely degraded alluvial deposits and residual top soils. The fact that pivot farming will largely effect already degraded top soil layers, potential impact on capped Stone Age archaeological remains, Quaternary fossils or intact Karoo sedimentary strata is considered very low.

As far as the palaeontological heritage is concerned, the proposed development may proceed with no additional heritage assessments necessary, provided that all agricultural activities are restricted to within the boundaries of the development footprints. The terrain in general is regarded as of low archaeological significance and is assigned a rating of Generally Protected C (GP.C) (**Table 3**).

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DECLARATION OF INDEPENDENCE

I, Lloyd Rossouw, declare that I act as an independent specialist consultant. I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference. I have no interest in secondary or downstream developments as a result of the authorization of this project and have no conflicting interests in the undertaking of the activity.

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Tables and Figures

Table 1: Relationship between different heritage contexts, heritage resources likely to occur within these contexts, and likely sources of heritage impacts in the region.

Heritage Context	Heritage Resources	Impact
Palaeontology	Palaeozoic and Mesozoic fossil	Subsurface excavations
	remains, e.g. Karoo Supergroup.	including ground
	• Neogene regolith, e.g. Quaternary	levelling,
	alluvial deposits, lacustrine sediments,	landscaping & foundation
	natural springs, pans	preparation, road cuttings,
		quarries, mining
Archaeology	Localized Stone Age sites, containing	development, bridge and
Early Stone Age	cultural remains, animal and human	pipeline construction, new
Middle Stone Age	remains found near or at <i>inter alia</i> the	cemeteries, construction of
LSA - Herder	following: river courses and natural	electrical infrastructure
	springs; pans and natural deflation	facilities township
	hollows; stone tool making sites (e.g.	development demolition
	dolerite contact zones); cave sites and	or alteration work
	rock shelters; freshwater shell	of alteration work.
	middens;	
	• Ancient, kraais and stonewaned	
	• Abandonad areas of past human	
	• Additioned areas of past number	
	vears old	
Historical	Historical sites and structures older	
mstoricar	than 60 years old including rubbish	
	dumps/middens.	
	 Objects including industrial 	
	machinery older than 60 years	
	 Burial sites, e.g. concentration camps: 	
	• Burial architecture older than 60	
	vears;	
	• Graves (marked or unmarked, known	
	or unknown);	
	Places associated with social	
	identity/displacement, e.g.	
	Witsieshoek Cave;	
	• Mission settlements, e.g. Bethulie and	
	Beersheba	
Natural	Formally proclaimed nature reserves	
Landscapes	Evidence of pre-colonial occupation	
	• Scenic resources, e.g. view corridors,	
	viewing sites,	
	Historical structures/settlements older	
	than 60 years	
	Geological sites of cultural	
	significance.	
Relic Landscapes	Battle /military sites and graveyards	
	Pre-colonial settlements	

Fig. 7	Site	Coordinates
no.		
2	SA War Concentration Camp Memorial	30°38'41.71"S 25°27'21.44"E
5	Graveyard	30°38'11.78"S 25°26'38.23"E
6	SA War Blockhouse	30°37'21.78"S 25°27'49.06"E
7	Old Train Station	30°37'44.78"S 25°27'5.04"E

Table 2. Additional sites located near but outside the development footprint.

Table 3. Field rating categories as prescribed by SAHRA.

Field Rating	Grade	Significance	Mitigation
National	Grade 1	-	Conservation;
Significance (NS)			national site
			nomination
Provincial	Grade 2	-	Conservation;
Significance (PS)			provincial site
			nomination
Local Significance	Grade 3A	High significance	Conservation;
(LS)			mitigation not
			advised
Local Significance	Grade 3B	High significance	Mitigation (part of
(LS)			site should be
			retained)
Generally Protected	-	High/medium	Mitigation before
A (GP.A)		significance	destruction
Generally Protected	-	Medium	Recording before
B (GP.B)		significance	destruction
Generally Protected	-	Low significance	Destruction
C (GP.C)			



Figure 1. Map of the study area (portion of 1:50 000 scale topographic 3025CB Norvalspont).



Figure 2. Aerial view of the study area.



Figure 3. Layout of the proposed new pivot sites.



Figure 4. According to the 1:1 Ma scale geological map of SA and 1: 250 000 geological map 3024 Colesberg (Council for Geoscience, Pretoria 1997). the area between Colesberg and Norvalspont is underlain by highly sensitive sedimentary strata represented by Late Permian Adelaide Subgroup mudrocks and sandstones (*Pa*).







Figure 6. Lateral and dorsal views of biozone-defining fossils of the *Dicynodon* AZ (top) and stratigraphic section showing ranges of vertebrate taxa present in the *Dicynodon* AZ (after Kitching 1995).



Figure 7. Locality map of historical sites and features found near the study area.



Figure 8. The area is characterized by flat, open grassland and old agricultural land primarily located on old floodplain deposits of the Orange River - looking northwest, north, northeast and northeast respectively..







Figure 9. The area flanking the river bank has largely been disturbed by previous and ongoing farming activities.



Figure 10. The study area is capped by well-developed Quaternary overburden made up of alluvium and locally derived residual soils. Scale 1 = 10 cm.



Figure 11. Fine- to coarse-grained, sandstones and mudrocks exposed along low ridges located to the south and southwest of the footprints. Scale 1 = 10 cm.



Figure 12. Highly weathered, locally derived, isolated and very low density stone tool scatters observed during the survey.