

MANAGEMENT, MONITORING AND EVALUATION OF THE CRADLE OF HUMANKIND FOSSIL SITES



**UPDATED FOSSIL SITE MANAGEMENT PLAN
FOR**

STERKFRONTEIN

2009 - 2013



SITE MANAGEMENT PLAN FOR STERKFORTEIN

UPDATED FOR PERIOD 2009 - 2013

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SUMMARY OF KEY ISSUES

Sterkfontein is the flagship site, the most important of the 13 fossil sites making up the Cradle of Humankind. For the average visitor, Sterkfontein is the first, and for most visitors the only fossil site that they will see. The visitor experience at Sterkfontein will therefore have a powerful 'first impression' effect, and set the tone for what visitors think and feel about the World Heritage Site as a whole. This places Sterkfontein in the limelight of centre stage, but it also makes it vulnerable to close public scrutiny and criticism, a fate not shared by the other fossil sites.

There are five important management areas at Sterkfontein, only two of which will be dealt with in the present document. The five areas are:

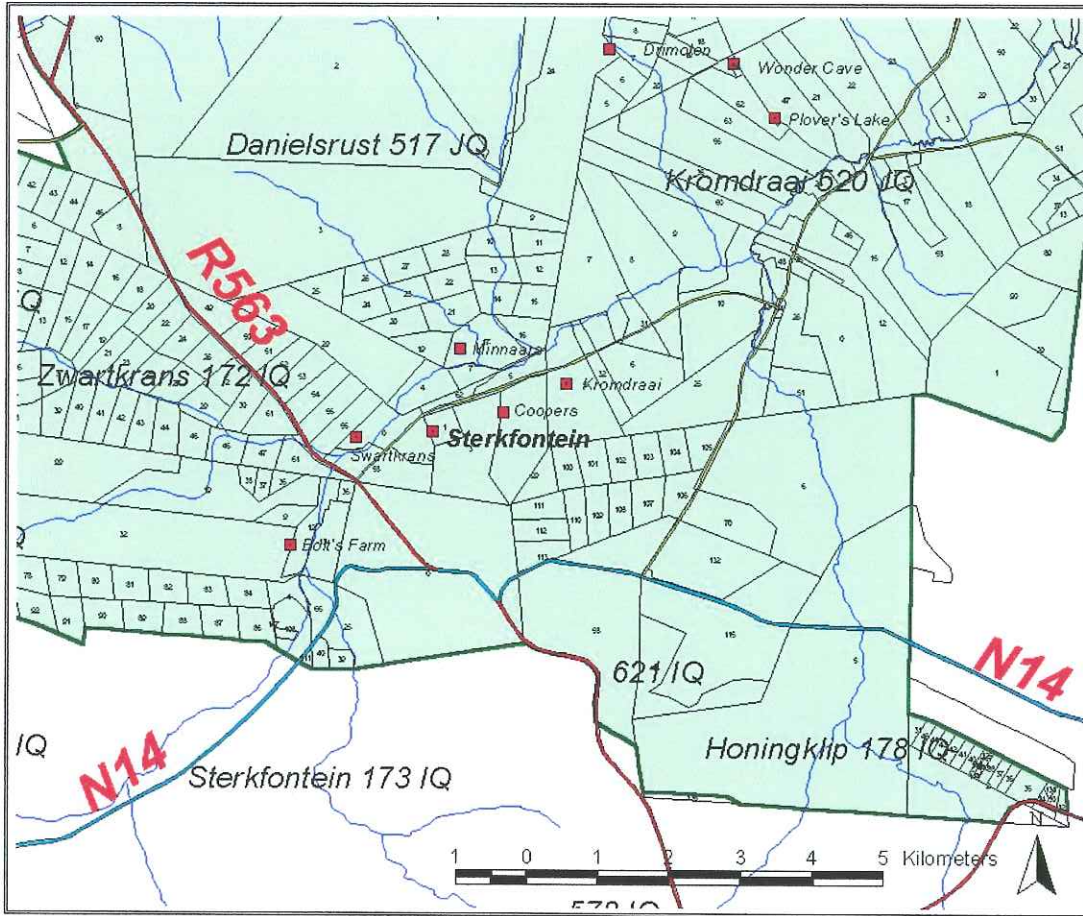
1. The 'Compound' precinct, which is the old single and married staff quarters erected by the University of the Witwatersrand for the resident excavators and preparators engaged on the long-term excavation of the Sterkfontein fossil site. It comprises a partially fenced area which encloses a number of permanent houses for married couples and hostel-type single quarters and an ablution block, closely adjacent to the Sterkfontein Visitor Interpretation Centre. Its management is the responsibility of the University of the Witwatersrand (Fig.5). The Compound is old and in need of attention, but its management is addressed by a separate management plan.
2. The Sterkfontein Visitor's centre, comprising a restaurant, curio shop, conference rooms, museum, store room and toilets. Its management is the responsibility of the Concessionaire (Fig. 6). A report on the manner of presentation of World Heritage Site values may be required by UNESCO, as part of the periodic report, which also needs an assessment of the human and financial resources available for management and presentation.
3. The Isaac Edwin Stegmann Reserve itself, a piece of land donated to the University of the Witwatersrand by the Stegmann family, on which the Sterkfontein fossil site is situated. Its management is likewise the responsibility of the Concessionaire. This with Tourist Cave, the fenced excavation and remaining grassland below it form the National Heritage Site.
4. The small fenced portion enclosing the long-standing Sterkfontein excavation site, including the Type Site where the original *Australopithecus* fossils were found, and the more recent extensions of the excavation, now many metres deep (Fig. 7). The enclosure also contains a metal shed or store, a shelter for parked vehicles and for sorting, some toilets and an outbuilding. The area inside the enclosure is not accessible to the general public, and it is managed jointly by the permitted researcher and the university. The deepest of the current excavations have intersected with the subterranean cave through which visitors are allowed to walk. The tourist route has been re-designed in order to avoid sensitive areas underground.
5. The Tourist Cave, which directly underlies part of the surface excavation and which in places intersects with the lowermost breccias of the fossil site. The Tourist Cave and its tourist-related infrastructure such as power supply, lighting, boardwalks, tourist guides, interpretative material, etc., is managed by the Concessionaire and has a separate plan of management. This document confines its interest to aspects of site safety, presentation of the site, and palaeontological and environmental aspects of the cave.

This Sterkfontein Fossil Site Management Plan therefore deals only with number 4, and portion of number 5

An unintended consequence of this fragmented site management is a lack of integration: the different management plans do not 'speak' to each other and there is no conjoint forum where the landowner, management authorities, scientists and concessionaire can co-operate to resolve management problems. Problems in one management domain often impact on others (for

example, tourist numbers on cave atmospheric environment) and such issues are best resolved jointly. An integrated site management plan is essential.

Management issues in the Tourist Cave have been noted and listed in order to highlight issues requiring attention (Section 5), but no recommendations have been made.



**STERKFORTEIN SITE
MANAGEMENT
PLAN**

Legend

- Fossil sites
- Arterial Road
- National Road
- Secondary Road
- Farm boundaries
- River
- World Heritage Site

STERKFORTEIN

Figure 1
Locality map






**STERKFONTIEN SITE
MANAGEMENT
PLAN**

Legend

 approximate
position of
site boundary

 palaeontological
site

STERKFONTIEN

Figure 2
Aerial view
of site

PROCLAMATION DIAGRAM

REGISTRATION COPY

SIDES metres	ANGLES OF DIRECTION	CO-ORDINATES			
		Y	System: WG.27°	X	
		Constants	+0,00	+2 800 000,00	
A B	102,92	245.10.40	A	-73 288,05	+78 655,80
B C	285,90	251.10.50	B	-73 381,46	+78 612,59
C D	442,65	341.11.36	C	-73 652,08	+78 520,36
D E	388,26	71.10.40	D	-73 794,78	+78 939,38
E A	431,90	161.11.42	E	-73 427,28	+79 064,64

SG No.
2292/2004

Approved



J.S. WEYERS
for

SURVEYOR-
GENERAL
2004-04-16

TRIGONOMETRICAL BEACONS		
STERKFORTEIN B	84 Δ	-75 558,23 +74 089,49
KRUG 117	412 Δ	-69 559,89 +81 488,68

BEACON DESCRIPTIONS
A, B, C 20mm iron peg
D, E Iron standard

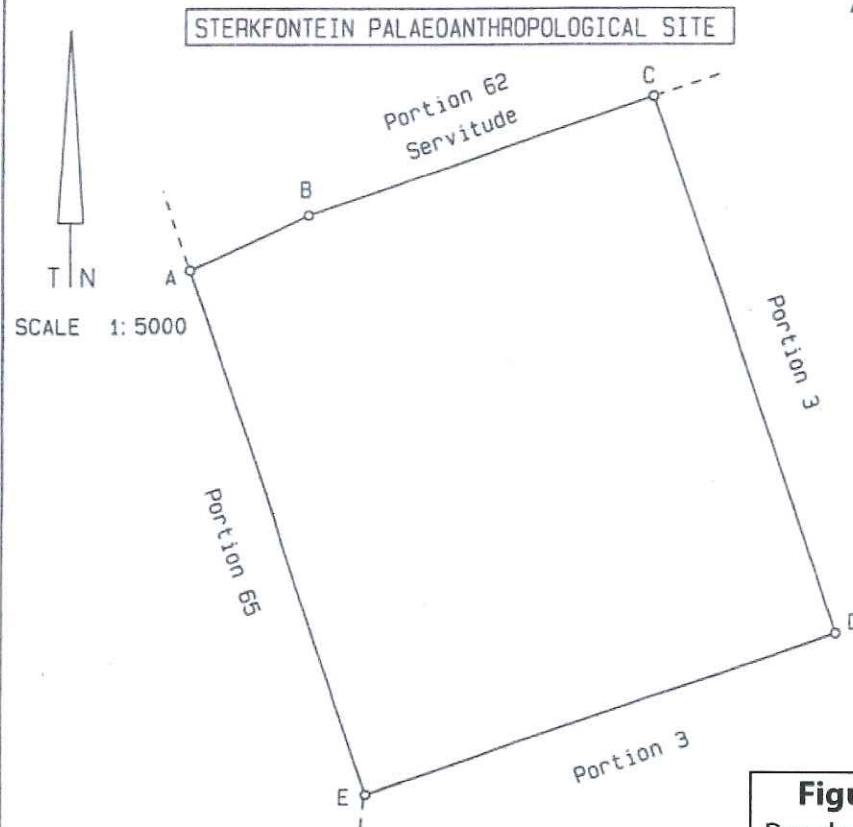



Figure 3
Proclamation
diagram


The figure A B C D E A represents 17,1314 hectares of land being a declared area over Portion 65

of the farm ZWARTKRANS No. 172-IQ Province of Gauteng

Framed for National Heritage Site declaration purposes in terms of the National Heritage Resources Act No 25 of 1999

Surveyed in January 2004


by me P.H. KOHRS
Professional Land Surveyor PLS0314

This diagram is annexed to No. d.d. i.f.o.	The original diagram is No. 3461/2002 Transfer Grant C.C.T.	File -/21
		S.R. No. 922/2004
		T.P.
		Comp.  IQND - 2

PTA
Registrar of deeds

1 INTRODUCTION

Sterkfontein is the oldest, in terms of the discovery date of hominids, of the COH WHS fossil sites. Alerted by H. le Riche and G. W. H Schepers, two students of Professor Raymond Dart, who had recognized the scientific and evolutionary significance of the Taung Skull in 1925, Dr Robert Broom discovered the first adult *Australopithecus africanus* material in the Sterkfontein Type Site in 1936. This and many subsequent discoveries went a long way towards corroborating and confirming Dart's controversial claims for the Taung hominid, and firmly established Africa, rather than Asia, as the Cradle of Humankind.

In 1945, after several further important discoveries, the National Monuments Commission declared the Sterkfontein site a National Monument. In 1958, the then owners of the property, the Stegmann family, donated a piece of their larger property to the University of the Witwatersrand. It became known as The 'Isaac Edwin Stegmann Reserve', and Wits developed a field research facility on the site devoted to the further exploration and excavation of the Sterkfontein cave and its fossils. The Sterkfontein excavation represents the world's longest sustained excavation programme, with excavations continuing since the 1950s to the present day. The new phase of continuous excavation began in 1966, instigated by Prof P V Tobias, with excavations under the guidance of A Hughes, and currently under Prof. Ron Clarke.

More hominid fossils have been recovered from Sterkfontein than from any other site in the Cradle of Humankind, and, for that matter, any other fossil site in the world. It remains the only readily accessible fossil site which can offer a glimpse of an active excavation to visitors, and which also offers an underground experience by means of an underground tour of the associated cavern system.

1.1 Objectives

- To preserve the full range of natural and cultural heritage values, the site significance and authenticity of the Sterkfontein fossil site. This can only be done by integrating the several different management plans for Sterkfontein.
- To identify and understand the issues that threaten site significance and to provide management measures and monitoring to address them
- To balance opportunities for research, education and tourism without compromising the integrity of the site, and taking the aspirations of the permitted scientists, the landowner, and the concessionaire into account. Integrated management is a requirement.
- To recommend appropriate infrastructure and management strategies to achieve the above goals
- To preserve as much as possible of site context and sense of place in an area that is subject to unprecedented development. Sterkfontein is excellently situated to demonstrate the Highveld rocky grassland habitat and the biological interactions characteristic of this biome. The management of this domain, however, is the responsibility of the concessionaire
- To foster and maintain communication links between management bodies, landowners and researchers as partners in management and conservation of the fossil site.

1.2 Method

- Consultation with researchers, repository institutions, and management authorities (COH WHS, SAHRA and GDACE) to reveal concerns, contentious issues, requirements and future plans which might impact on site values

- Research and understand the full range of natural, cultural, scientific, educational and ecological values of the site. Collation of information gained from a series of fossil site inspections has been incorporated.
- Provide an updated list of site values
- Refresh statement of site significance, in consultation with scientists
- Provide an illustrated status quo report against which change can be assessed
- Update the list of risks and threats
- Define desired management outcomes
- Provide a new management table with management strategies backed, where possible, by operational guidelines for use in the field
- Monitor and evaluate progress at each fossil site inspection, review management strategies where necessary

1.3 Administrative information and legal status

Site:	Sterkfontein Caves
Farm Name & No.:	Portion 65 of Zwartkrans 172-IQ
Owner:	University of the Witwatersrand
Contacts	Registrar Legal officer; Dawn Taylor T 011 717 1242 E 160dawn@atlas.wits.ac.za – update please
Legal Status	Declared as National Monument: "Sterkfontein Caves" in 1945 (4.0242 morgen). This was repealed and declared in 1963 as the Sterkfontein Caves with the Isaac Edwin Stegmann Reserve (20 0000 morgen); National Heritage Site, November 2004; World Heritage Site, 1999
Servitudes & Restrictions	Terms of the Isaac Edwin Stegmann bequest
Co-ordinates:	26.01 54S 27 44.06E See Figure 1
Altitude:	1470m a.m.s.l
NHS Boundaries	A polygon ABCDE, marked with 20 mm steel pegs, iron standards at D and E, measuring 17.1314 ha. See Figures 2 & 3
Co-ordinates	See proclamation diagram, Fig 3.
Area:	17.1314 ha
Permit holder	Prof. Ron Clarke.
Designated repository	University of the Witwatersrand.
Access to public	Sterkfontein is a well-established tourism attraction, both for general visitors and for education groups Visitors have access to a site museum, cave tour and views over the excavations, with site interpretation provided by a site guide.

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1.4 Existing site management

- The management of the Sterkfontein Visitor and Site Interpretation Centre, the surrounding nature reserve, the entire tourist route both above-ground and subterranean, and site interpretation including the tourist guides, is the responsibility of the Concessionaire.
- The management of the Compound is the responsibility of the University of the Witwatersrand
- The management of the proclaimed fossil site is the joint responsibility of the landowner (the University of the Witwatersrand) and the permitted scientists together with SAHRA.
- The COH WHS MA plays a facilitating, co-ordinating and monitoring role.
- The sensitive fossil site excavation is fenced and off limits to tourists and visitors.
- Tourists are confined to a non-sensitive route through the site and underground caves, and are under constant supervision of a tourist guide. Those persons permitted to enter the excavation area are under the guidance of the permitted scientist (Dr Ron Clarke).
- A SAHRA Permit Committee member inspects the excavation site and ongoing excavations on a twice-annual basis, particularly with a view to assessing compliance with terms and conditions of the permit.
- The permit holders manage and supervise the activities of the excavators and support staff of preparators.
- The site inspection team, including COH WHS MA, SAHRA and GDACE officials, plus a contracted specialist service provider, inspects the entire site on a twice-annual basis, monitoring the management criteria noted in the generic site management plan (see Table 1, generic management plan) and particularly Table 1 of this document.
- The COH WHS MA monitors development within the surrounding COH WHS properties with a view to protecting heritage values such as sense of place and visual aesthetics.
- A site safety inspection is meant to take place on an annual basis. A site safety inspection is planned for the near future.
- GDACE is available for advice to the landowner and concessionaire regarding erosion control, fire management, alien vegetation and weed clearance, and preservation of biodiversity.
- The landowner burns firebreaks from time to time, but uncontrolled fires sometimes occur and these have the potential to cause extensive and expensive damage. The scientists note that there is no firebreak around the new lab and that tall vegetation has been encouraged or allowed to encroach right against the verandah of the lab, which is undesirable. This part of the site is the responsibility of Maropeng Management.
- The Heritage Agreement and appended MOU between landowners and permitted scientists addresses issues of mutual management concern can be an important management tool. The permitted scientists are in any case both employees of the University.

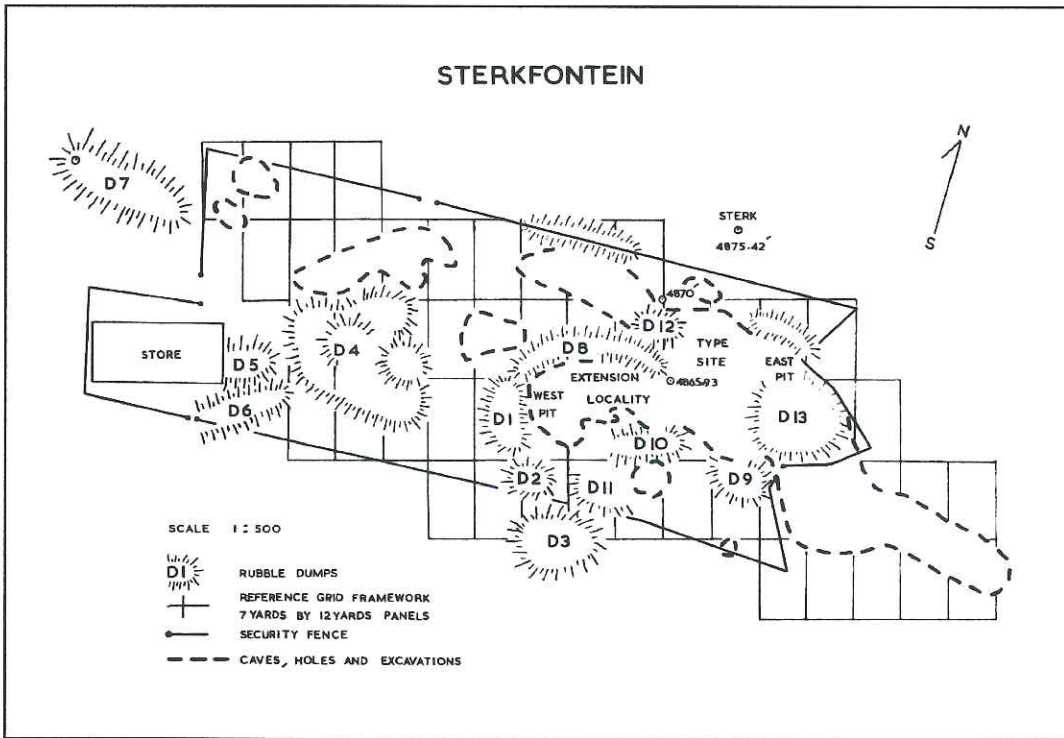


Fig 4a: Detailed fossil site plan showing infrastructure, dumps and main features on the excavation

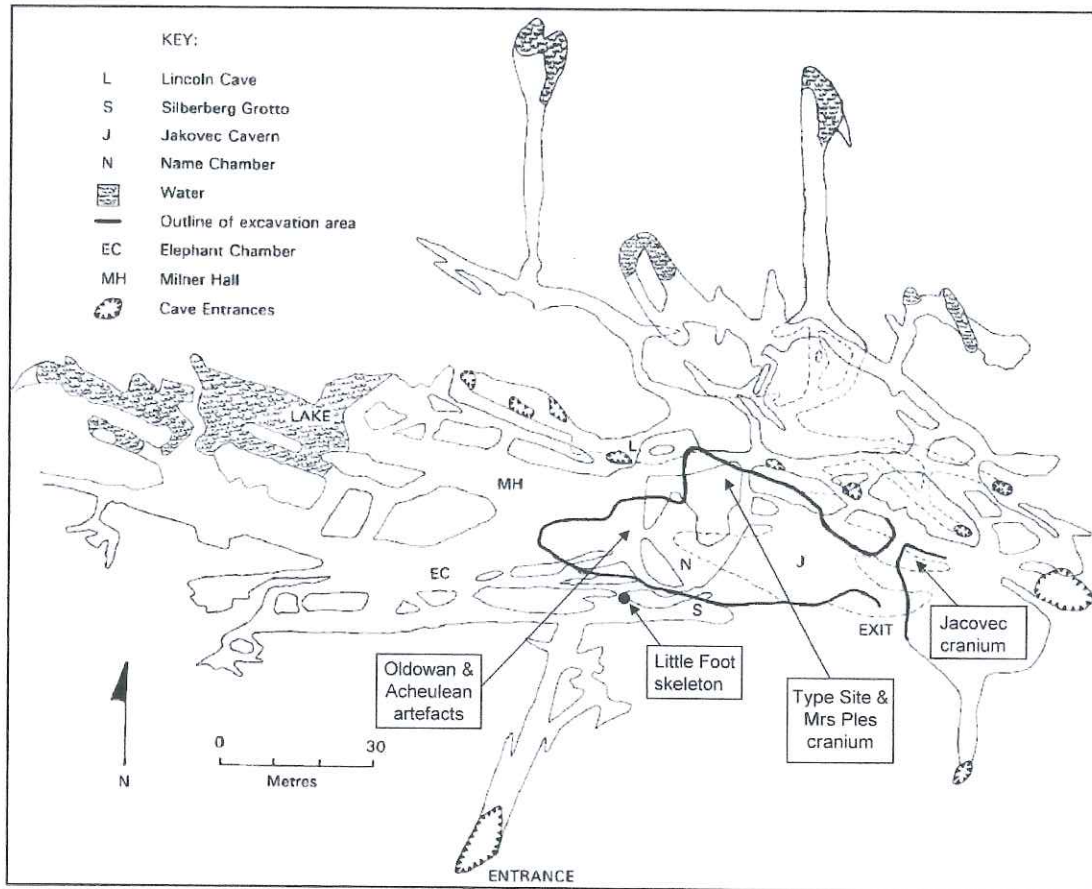


Fig 4b: Site plan showing outline of the excavation area and major site features against a background of an outline of the underground cave (simplified after Wilkinson 1983)

Fig 4 c: Plan of excavation area showing grid squares and disposition of exposed breccias by Member (source R. Clarke)

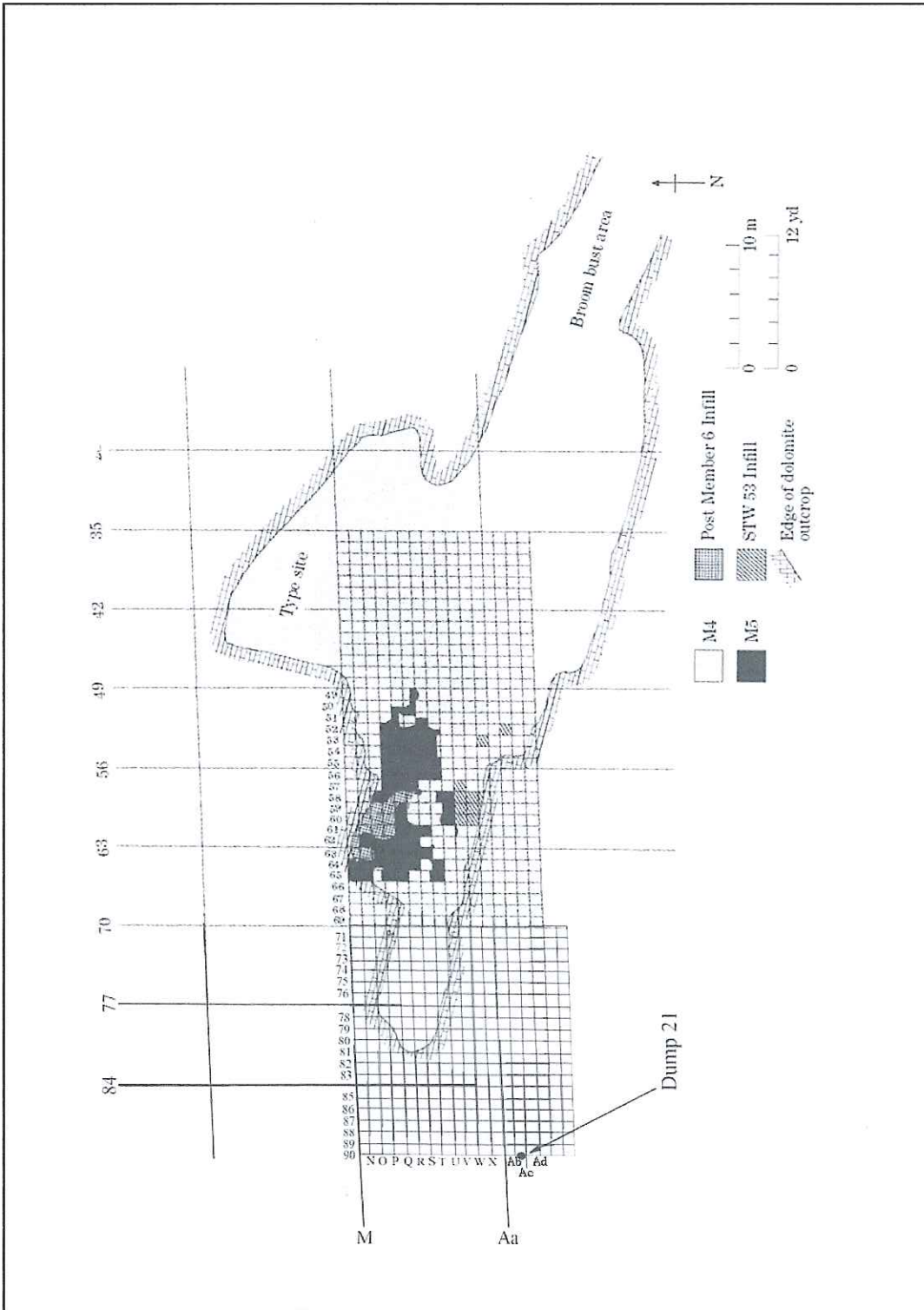




Fig 5: The old "Compound" complex, which houses the resident excavators working on the Sterkfontein Fossil Site and their families. Its management and upkeep are the responsibility of the University of the Witwatersrand. It requires a facelift and screening from public view, with the dual purpose of providing privacy for residents and to reduce visual impact.



Fig 6: The Sterkfontein Caves Visitor Centre, as seen from Swartkrans, the view partially blocked by the signifier. It is raised on stilts to avoid seasonally waterlogged soils of the drainage line across which it is built. Its long double verandahs provide for shady areas for outdoor sitting and viewing. The complex includes a museum, restaurant, toilets and restroom, conference facilities, storage and a curio shop.



Fig 7: The current excavation area, occupying much of what was once known as the 'Extension Site', now excavated to a depth of some 9-10 metres at its deepest points. The metal walkway provides easy access to different sectors of the ongoing excavation.

2 SITE DESCRIPTION: PHYSICAL FEATURES, VALUES AND SIGNIFICANCE

The fossil site management plan adopts a values-based approach and seeks to ensure that the many and varied values of the site are conserved. Site values extend beyond those formally recognized as being of 'universal value' and this section seeks to provide an updated list of old, new and previously unrecorded or unrecognized values (2.2). Section 2.3 provides an updated statement of site significance which was prepared in consultation with permitted scientists working on site.

2.1 General site description

The main fossiliferous breccia of the Sterkfontein 'Type Site' (of *Plesianthropus transvaalensis*, now *Australopithecus africanus*) and 'Extension Site' occupies a long slit-like position near the top of the Sterkfontein hill, which provides an excellent view of Swarkrans on the opposite side of the valley, and Cooper's and Kromdraai to the east (Figs.8 and 9). The fossiliferous breccias were first exposed by mining activities in the latter part of the 19th century when Guglielmo Martinaglia began removing limestone exposed on the side of the Sterkfontein hillock. Towards the end of 1896 or early 1897, he blasted through to the caves below. Prior to this, access had been blocked by surface rubble which had filled the natural entrances. The 'original' entrance into the caves remains as a neat round hole in the roof of the cave, through which the miners were lowered by means of a type of windlass and a bucket.



Fig 8: View of Swartkrans hill from Sterkfontein

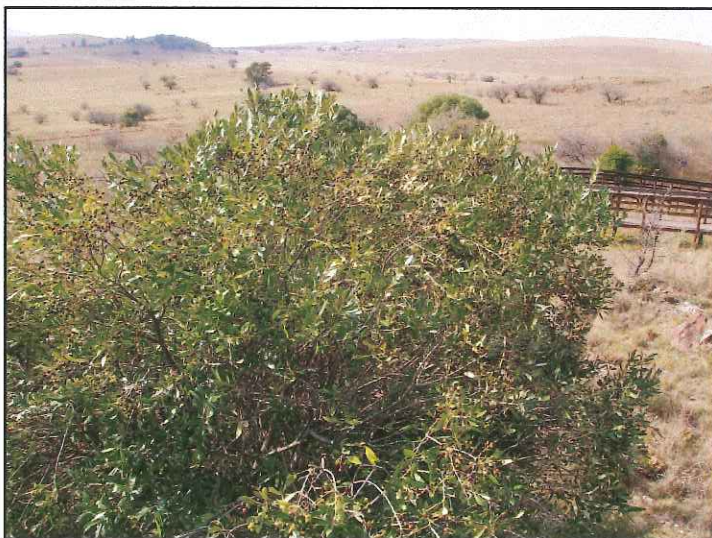


Fig 9: View towards Cooper's Site from Sterkfontein hillock tourist route

Sterkfontein is well-known not only as a hominin-bearing fossil deposit but also for its extensive underground cave system. Since the days of lime-mining, the caves have interested the general public, and early tours were conducted by the lime workers, who conducted tours through the cave using carbide lamps. Unfortunately, the limeworkers have removed most of the attractive speleothem lining of the subterranean system, permanently diminishing its tourism potential. What remains to be seen today is the dying and desiccating remnant of a once pristine cavern. In terms of World Heritage, the subterranean site is impressive for the dramatic water-sculpted dolomitic formations. However, without excellent site interpretation, support activities and educational material, it risks being a disappointment to non-academic visitors.

The site is reached via the Sterkfontein tar road or D1701, the entrance being marked by a tall vertical concrete signifier (Fig 10). A short drive brings the visitor to a paved car park. Buses park in the unpaved bus park outside the Compound which is unscreened (Fig 5, 11). The visitor reception centre is built across a seasonally wet drainage line and is raised on stilts (Fig 6). It comprises a restaurant, seating for visitors on shaded verandahs running the length of the building on north and south aspects, a museum, a small curio-cum-tuck shop, toilets and conference facilities. Paved pathways lead to the cave entrance and on exiting the cave, there is a wooden boardwalk which skirts the excavation and from which glimpses of the dig can be seen. Interpretative signage explains the site (Fig 12). The reasonably well-preserved relics of the mining phase of the site's history (a number of kilns) have not been included in the tourist route. Visitors stick to the paved pathway and there is no interpretation of the natural environment, such as named trees and shrubs, rock types, etc. The return pathway passes the new storage and preparation facility erected for the use of scientists as a preparation and storage area, and general laboratory for the Sterkfontein and Swartkrans excavation staff. Whatever its original planning status might have been (there are, or were, viewing benches placed opposite the large windows), scientists find it disruptive to have the public staring in through or tapping at the windows, or sometimes walking in and asking to see the work. The management of this area falls beyond the scope of the Fossil Site management plan.

Deleted:



Fig 10: The tall concrete column-like signifier marking the entrance to the Sterkfontein caves matches the series of similar signifiers at the entrance to Maropeng. The logos and font types are used throughout the COH WHS, on all on-site public notices, posters and brochures. The column has a powerful visual impact but interferes with views of Swartkrans from Sterkfontein. The Swartkrans fossil site can be seen behind the pillar



Fig 11: The unpaved bus park outside the Compound gate. Note the unscreened rubbish tip, which has no net, and the bus park sign



Fig 12: Interpretative signage on the tourist route through the site explains the site. Exposure to harsh extremes of weather conditions causes deterioration and replacement will be necessary from time to time.

2.2 Site values

Certain values, particularly the World Heritage values, are well documented but others have not been sufficiently recognized until now. Six sets of values have been identified: landscape values, palaeontological and archaeological values, mining and historical values, research values, biodiversity and ecological values and finally, educational and tourism values. The relative

importance of these values differ – there are several that have allowed for World Heritage Status and National Heritage Site status while others are of a more regional or local value.

2.2.1 Landscape: Geological and geomorphological values

- From the crest of the Sterkfontein hillock, the site offers excellent views west and east along the valley of the Blaauwbank River, and Bolt's Farm fossil site, Swartkrans, Cooper's, and Kromdraai can all be pointed out from there (Figs 8, 9, 10)
- The viewsite can be used to point out the location of the river terrace gravels which seem to be the source of the lithic material used to make the Sterkfontein stone tools.
- It is possible to show how in this gently rolling grassland landscape of low hills and shallow valleys, entrances to underground caverns are marked by small copses of trees growing from the sheltered sinkholes and cavern entrances
- The Isaac Edwin Stegmann reserve preserves excellent geological examples of ripple-marked chert, surface weathered dolomite, stromatolitic layers, oolites and pisolites (Fig 13).
- Underground, control on cavern form can be demonstrated as being the result of the position of joints, bedding planes, and prominent weathering-resistant chert bands.
- Cave structures such as avens and debris cones can be demonstrated
- The underground lake with its rising and falling water level is also significant in the geological history of the cave.
- Speleothems and different mineralogical phenomena can be shown to visitors in the cave, the most conspicuous being the stalactites and stalagmites
- The role of cave form as a factor which can control the manner in which bones enter caves can be explained.
- The relationship between the older, upper cave and the more recent lower cave can be explained to visitors as this is often a puzzling area: why aren't the bones inside the cave, why are they lying about outside?

There is relatively poor integration of these values into the present visitor experience.



Fig 13: Chert bands interspersed with dolomite bands and stromatolites can be demonstrated both outside the Sterkfontein caves and in the subterranean environment

2.2.2 Palaeontological and archaeological values

The fossils demonstrate conclusively that this part of South Africa was home to some of our earliest ancestors between 1 and 4 million years ago, and that it was within the distribution range of some of the earliest species of tool-making humans between 1.7 and 2 million years ago.

Early hominin fossils are rare worldwide because of their limited geographical distribution and the rarity of natural conditions for fossilisation and preservation. The unusually large number of hominin fossils in the Sterkfontein breccias (over 500), and the variety of species (*Australopithecus africanus*, *Paranthropus robustus* and *Homo ergaster/habilis*) are therefore of national and international significance.

With both cranial and post-cranial remains of *Australopithecus africanus*, and the almost complete skeleton of an as yet formally unnamed species of *Australopithecus* species known as 'Little Foot', the Sterkfontein collection offers more information on the physical characteristics of these species than any other site in South Africa and the world.

Summary of palaeontological and archaeological values:

- The site yielded the first adult material of the hominin *Australopithecus africanus* (originally named *Plesianthrops transvaalensis* by Broom, hence "Mrs Ples"), an adult version of the type specimen (a juvenile) from Taung described by Dart in 1925.
- The site has yielded the remains of an adult, possibly female, almost intact and undistorted *Australopithecus africanus* skull, the famous Mrs Ples skull
- Discovery of 'Mrs Ples' was a turning point in the acceptance of *Australopithecus* as it negated criticism that the Taung Skull, recognized by Dart as being an early hominin, was nothing more than a mere juvenile ape.
- The site demonstrated conclusively that Africa and not Asia, as was previously thought, was the true Cradle of Humankind.
- Fossil specimens of *Homo habilis/ergaster* were subsequently found.
- Discovery of foot and lower leg bones led to the discovery of an almost complete fossil skeleton of a hominin, known colloquially as 'Little Foot' as yet incompletely described (Fig 14).
- 'Little Foot' is the oldest almost complete hominin skeleton ever discovered, with more bones preserved than even the famous 'Lucy' skeleton from Ethiopia.
- Sterkfontein is the richest hominin-bearing site of all the fossil sites of the Cradle of Humankind.
- Sterkfontein has produced more hominids than any other fossil hominin site in the world
- The site has yielded many thousands of fossil mammals and micromammals.
- The site has yielded fossil plant remains, including over 300 fragments of fossil wood, one species represented being that of a tropical liana, indicating different climatic and vegetation conditions in the remote past.
- The site is unique in South Africa as having yielded stratified early Stone Age tools belonging to the Oldowan and early Acheulian. Oldowan tools are known elsewhere in Africa only from open sites, Stratified Acheulian tools are known only from a few sites worldwide, including Swartkrans, Kromdraai A, Cooper's D, and Gladysvale in the COH WHS, the Cave of Hearths in the Makapan Valley, Montagu Cave in the Western Cape and the lowermost strata of Wonderwerk Cave.



Fig 14: No document about Sterkfontein would be complete without reference to 'Little Foot', here seen at an early stage of preparation

2.2.3 Mining and historical values

- On the route through the cave, the original hole in the ceiling through which lime workers entered is preserved, and should be pointed out to visitors.
- Lime dumps are preserved. Interpretation on the uses and importance of lime in the early 20th century should also be pointed out.
- It should also be noted that much of the beauty of the cave was destroyed in the course of speleothem harvesting – there are several blasted remnants of stalactites.
- The three historic miner's lime burning kilns are fairly well preserved and should be accommodated in a walk through the site. The area needs rehabilitation and signage, but the residual lime dumps and loading platforms should not be removed as they are part of the story. The function of the kilns (inappropriately described as being used for firing pottery, in the guidebook) should be explained. The kilns are not included in the tourist route.
- The area is infested with *Pyracantha* and *Opuntia*.
- The mining values of the site are not integrated into the tourist experience of the site. There is a brief display concerning the mining history of the site in the museum

2.2.4 Research values

Discussions with the scientists involved have confirmed the considerable remaining scientific value of the site, and excavations will continue as they have done for the last 36 years, including the exposure of the world's most complete hominin skeleton – 'Little Foot' - from the Silberberg Grotto.

Current excavation is concentrated in the Silberberg grotto and the following excavations are either planned or underway:

- The safe delivery of the "Little Foot" skeleton from the Silberberg Grotto (Member 2) is a top priority in the short term. Continued exploration of Member 2 underground.
- Excavations in the vicinity of the Name Chamber beneath the collapse area, in the debris cone.
- Possible future excavations in the "Jacovec Cave".
- Future plans include returning to the area of the original quarrying operations of Robert Broom in Member 4, undertaken during the 1930s.
- Future excavation plans also include the Broom-Robinson excavation area (late 1940s excavation).
- An extension of the excavation of the western extent of the Member 5 breccia, which is artefact-bearing as well as fossiliferous.
- Continued excavation of members 4 and 5 on the grid system set up by Tobias and Hughes, to allow for the systematic and methodical excavation of the breccia deposit as a whole, and the further elucidation of its stratigraphy. The inherent quality of the breccia being worked determines the excavation technique employed.
- An excavation of the overburden - possibly representing the decalcified breccia of an ancient entrance debris cone.

Future research therefore involves pursuing the excavation of the deposit in much the same way as it has been done for the last 40 years or so.

There is a huge volume of unexplored breccia remaining, even in those places where previous excavations have taken place. The research potential of the site remains great.

2.2.5 Biodiversity and ecological values

- The Edwin Isaac Stegmann reserve, even though quite small, retains a representative patch of Highveld grassland, one which has not been subject to sustained grazing pressure for many years, probably since the property was bequeathed to the University in 1958.
- In the early 1970s, Wits botanist 'Bertie' Mogg undertook a plant survey of the reserve which resulted in the publication of an interesting little book entitled "Important Plants of Sterkfontein" which noted the rich diversity of species, many of them significant edible, medicinal, magic or toxic. These economically important plants have never been mapped or properly recorded, and with increasing pressure from the surrounding residents who collect plants for various purposes, their current status is unknown. Even in 1975, it was noted that collection was reducing the numbers of some targeted species.
- If natural assets are unrecorded, they cannot be properly managed and monitored and this is true of the indigenous plants.
- The Sterkfontein cave used to boast several colonies of bats but these have disappeared since the advent of electric light, and the changed air flow and temperature patterns in the cave.
- The owl which used to roost in one of the avens has also been disturbed, and has disappeared.
- Porcupines are inhabiting the Lincoln Cave and steps should be taken to ensure that these are not disturbed or snared.
- The underground lake, however, still contains an interesting pigment-less species of blind shrimp.
- There is relatively poor integration of these biological values into the tourist experience. There should be displays of the modern inhabitants of the area compared to the prehistoric fauna

The management and presentation of these biological resources is the responsibility of the landowner and Concessionaire; GDACE is available for assistance.

2.2.6 Educational, tourism and economic values

- The site retains a great many geological, palaeontological, archaeological, historical, mining and natural heritage assets which can be incorporated into an interesting and interactive tour, interpreting both surface and subterranean environments. Using the site museum as an educational support tool, most of the above values can be demonstrated on site in an authentic and convincing way, which has the potential to create a powerful educational impact.
- The site has a visitor reception centre which it did not have at the time of the first management plan, and this is a step forward.
- The visitor reception centre is equipped with a site museum, which interprets the main features of the Sterkfontein site and its history. Brief mention is made of some of the other sites
 - There is a restaurant which serves basic meals
 - There is a curio-cum-tuck shop where snacks can be bought
 - There are several tourist guides who take visitors around the cave
 - There is the opportunity of an underground experience with interpretation along the route
- The site preserves many geological, palaeontological, archaeological, historical and mining values which can be incorporated into an interesting and interactive visitor experience
- The site could be linked with adjacent sites to create a richer and more varied tourism experience, on which would flesh out the thinner areas in the adjacent sites and add value to the Sterkfontein experience as a whole

The COH WHS MA is responsible for reporting on the scientific research, education, information and awareness building programmes and the communication of the heritage values of the property to visitors, resident, local communities, and the general public; and is also responsible for ensuring that such programmes are put in place.

2.3 Revised statement of site significance (R Clarke, 2009)

Sterkfontein caves represent the most prolific localized source of fossilized remains of *Australopithecus* in the world. The fossils include crania, mandibles and teeth, as well as isolated skeletal parts from many individuals, two partial skeletons, and one nearly complete skeleton with skull. These remains are found within cave infills covering the period from 3.3 to 2.1 million years ago. They are associated with large quantities of animal fossils representing a variety of bovids, carnivores, monkeys and small mammals—all very informative on the palaeoenvironments. There are also microfauna, consisting of rodents, insectivores, amphibians, reptiles and birds. The youngest of the *Australopithecus* deposits (Member 4) has also yielded quantities of fossil wood belonging to lianas and shrubs representing a semi-tropical gallery forest environment. The *Australopithecus* fossils are representative of two species, *A. africanus* and a second species with larger cheek teeth and flatter face. The near-complete *Australopithecus* skeleton from Sterkfontein. Member 2 dating to 3.3 My ago probably belongs to, or is related to, this second species. The Jacovec Cavern is a separate ancient infilling which has yielded some excellent *Australopithecus* fossils, including a partial cranium and the most complete femur of *Australopithecus* from Sterkfontein. It is believed to be of similar antiquity to the Silberberg Grotto deposits. It has also yielded some excellent limb bone fossils of *Chasmaporthetes*, the long-legged hyaena.

The Member 5 deposits immediately overlying the Member 4 *Australopithecus* infills are also of great archaeological importance as they contain the earliest stone tools in southern African, assigned to the Oldowan industry dating to ca 2 Ma. This is in turn overlain by another Member 5 deposit containing one of the rare occurrences in Africa of early Acheulean handaxes and cleavers, cores and flakes. The Member 5 Acheulean infills contain fossils indicating a shift to more open habitats that include Equid, ostrich, springhare and gelada baboon, with the Acheulean associated with a considerably more open grassland environment than the Oldowan deposit. There are very few hominid fossils from Member 5. The Oldowan is associated with three fossil teeth of *Paranthropus*, and the early Acheulean is associated with a *Homo ergaster* mandible (StW 80). This one fragmentary mandible is of great significance because it represents so far the only direct association in Africa of a *Homo ergaster* fossil with early Acheulean artefacts.

Mid to late Pleistocene deposits with fossils and Middle Stone Age artefacts are also represented at Sterkfontein in the main excavation and the Lincoln Cave. Uranium series dates are available from the latter deposits.

3 SITE ANALYSIS: STATUS QUO, RISKS AND THREATS JULY 2008

In order to provide a basis against which change can be assessed, a status quo report is necessary. Ideally, change is assessed by means of comparison of 'fixed point photography' and such fixed points are in the process of being selected and installed. For scientific excavations, the datum point has been used where possible.

To assess the management strategies that may be necessary in order to preserve site values, threats and risks to site values have been analysed as part of the status quo, and the following section (Section 4) describes desired states and management outcomes.

3.1 Physical Environment: Surface

This section addresses the status quo of seven elements of the physical environment.

3.1.1 Access, legal and physical

Status quo:

- The excavation site is fenced off from the public space and access is tightly controlled (Fig 7).
- There is no free-range visitation to the enclosure, and all site visitors need to go via the permitted scientist, who accompanies all visitors around the site.
- There is a locked gate which can be used by the resident excavators who work on site doing preparation and/or excavation.
- Tourists cannot actually see into the excavation area because of the fence, but the site of the original discovery of Mrs Ples is marked with a plaque and this should be highlighted in some way so that it can be recognized by visitors from the other side of the fence.
- The barricade is high, and gives off a somewhat hostile ambience which visitors feel. Other World Heritage Sites elsewhere in the world have balanced the need to exclude visitors and yet allow them to view in a participating manner, in a more accommodating and sensitive way. However, experience has shown that the fence needs to be high in

places to prevent stones, rubbish and drink cans from being thrown into the site. Re-structuring and alignment of the current boardwalk could be discussed at some future date, perhaps when it needs replacement.

- Break-ins and thefts are becoming more frequent than they were previously.

Risks and threats:

- The enclosure fence protects the heritage values from scavenging and tampering but creates an unwelcoming ambience
- The fence does not prevent break-ins and theft

3.1.2 Rangeland, wetland and river gravels

Status quo:

- The Rangeland (or unimproved veld), is the responsibility of the Concessionaire. The interpretation and presentation of its many values also all under this management agent.
- The heritage values of the natural environment of Sterkfontein are not well integrated into the tourist experience and have no place in the museum

Risks and threats:

- Lack of information concerning the significance of the old river terraces of the Blaauwbank could lead to their opportunistic use as road fill or other fill material, or sterilization by some other land use. A beautiful later Acheulean handaxe and several flakes were found in gravel near the old entrance gate.

3.1.3 Erosion

Status quo:

- There is no erosion within the fences of fossil site and erosion occurring elsewhere on site is the responsibility of the concessionaire. The bus park is an area of concern (Fig 11) and the overflow car park where schoolchildren de-bus (Fig 15)



Fig 15: Schoolchildren on a visit. Large buses inevitably park in the turning circle where they interrupt traffic flow, or passengers disembark in the unpaved bus park (Fig 11)

3.1.4 Fire management

The management of uncontrolled grassland fires is part of the overall management policy for the greater property provided by the landowner and Concessionaire. Despite this, there have been several destructive fires which caused considerable damage to planted trees and the septic tank reed beds within the heritage site (Fig 16). Many of the landscape plantings also succumbed (Fig 17).



Fig 16: Reed beds damaged by fire. The reed beds are an integral part of the series of filtration ponds and repeated fires will destroy them Individual fire-breaks need to be cut around each installation.



Fig 17: Landscaping with planted trees damaged by fire – fires have started in the car park (unpaved area in background) where bus drivers make small fires in the winter to keep warm (Fig 23). Many trees were burnt beyond recovery

It is recommended that the landowner approach GDACE to ensure that an appropriate fire management program is applied to the site. Without detailed studies, the impact of repeated fire (or its long-term exclusion) on the rangeland is difficult to assess.

It is recommended that fire incidence be recorded, and that the impacts of fire be monitored with the help of GDACE. Heritage monitors can assist in this regard.

Status quo:

- Fire management is the responsibility of the landowner. Fire impacts negatively on the septic tank sewage system in that it affects the reed beds which are a part of the filtering and water-purifying system. When the reed beds are repeatedly burnt off, they eventually die and the filtering function is impaired and eventually destroyed. Actively growing post-fire sprouts do, however, take up excess nutrients.
- It is recommended that a fire management plan for the entire property be put in place (landowner/concessionaire). It is noted that the landowner burns firebreaks from time to time.
- It is recommended that a fire incidence recording system for the property as a whole be put in place (landowner)
- It is recommended that baseline rangeland data (a generic requirement, for the whole COH WHS) against which the impact of fire can be assessed be created. This will require as a first step a plant species list and studies of their response to repeated fires and/or long-term exclusion
- Within the fossil site enclosure, there are fire extinguishers and because fuel is stored on site, special fire-fighting precautions need to be taken. The site will shortly be inspected by a professional safety officer and recommendations regarding the safety of the fuel depot need to be made at this time
- There are no fire-prone structures – the storeroom and the walkways are made of metal
- The fuel load around the premises are kept to a minimum by the field staff and researchers
- There is a notable risk of fire in the accommodation area in and around the Compound and bus car park, which are potential sources of uncontrolled fires. There are faulty electric plates, exposed old electric wiring, gas cylinders stored inside, no fire escapes and no extinguishers. This falls within the management domain of the landowner and concessionaire respectively. The dangers of the compound need to be brought to the attention of the landowner by the MA.
- Fire management strategy within and around the accommodation area needs to be set up (see site safety), e.g. fire extinguishers, training on how to use and maintain, and beaters provided. (landowner)

Risks and threats:

- The report of the professional site safety inspector is awaited.
- The fuel supply tank area is a potential fire hazard and special precautions may be required
- The on-site storage of chemicals may also require assessment as to the fire risk

3.1.5 Red Data Species, rare plants and animals

Status quo:

- The management area inside the fossil site enclosure is small and there are no red data species of plants or animals.

- The surrounding reserve contains a number of interesting edible, medicinal, toxic and otherwise economically significant plants. These have not been recorded or mapped, so their status cannot be monitored. Nobody would know if all medicinal plants were removed from the site.
- The management and interpretation of these falls within the area of responsibility of the landowner and Concessionaire.
- The natural site values of Sterkfontein are poorly integrated into the tourist experience

Risks and Threats

- There is no up-to-date list or mapping of vegetation – over 500 species are known to occur in the Sterkfontein area (Mogg 1975) in this type of Highveld grassland. Rare and endangered species cannot be protected if not located and mapped.
- Edible, medicinal and toxic plant species not recorded – full values of site not clearly understood.
- There are probably no significant occurrences of rare or endangered species within the scientific area enclosure.

3.1.6 Alien vegetation and weeds

Status quo:

- There are some alien plants within the excavation enclosure, but a great many have been eradicated over the years.
- *Pyracantha* still occurs, especially outside the fence, where it is the responsibility of the concessionaire, as are the sisal plant and prickly pear infestations. These need to be mapped, prioritized and cleared – see generic plan
- Weeds and sapling growth within the excavation area are well controlled by the full-time resident excavators.
- Alien vegetation and weed infestations outside the excavation enclosure have not been mapped and prioritized and no regular clearance of aliens or follow-up treatments have been observed .
- Field operational guidelines for appropriate eradication treatments for different species of invasive plants are not yet available
- There is no comprehensive or integrated action plan to address the problem of invasives within the broader COH WHS – re-infestation of cleared sites is a problem

3.1.7 Visual aesthetics, site context

Status quo:

- There is a relatively undisturbed natural skyline, extended and restful views north-westwards, southwards and eastwards (Fig 18 and 19). The rural landscape provides an evocative setting for the caves and its adjacent trees and bushes.
- Infill buildings in all directions are beginning to intrude on this view, and are beginning to impact on the rural ambience.
- The sense of place is offended by the obtrusively situated, conspicuous accommodation for the support staff. If this is due for a revamp it is suggested that it be replaced with suitable building materials and screened from view (Fig. 5). This would also give the residents privacy from the tourists.
- There is still a great deal of redundant infrastructure that needs to be removed and the site rehabilitated. The redundant infrastructure is unsightly and destroys the sense of connectedness of the cave to the surrounding grassland landscape (Fig 20).
- The infrastructure in the excavation area is cumbersome and unsightly, but necessary at this point in the history of the site and its excavation (Fig 7). The perimeter fence,

although effective, creates an unwelcoming feel to the excavation area, as if tourists are there on sufferance. There are a variety of psychologically more favourable ways of protecting sites.

- The integrity of the visual landscape is protected by the COH WHS MA which attempts to curb unsuitable developments planned for within the viewshed of the cave sites. However, it is not possible to deprive people of their property rights in order to do this, and encroachments in this regard are almost inevitable.
- It is suggested that fixed point photography be set up from appropriate points on the restaurant verandas (because this is where most people would sit to enjoy the view) and monitor change from these points – the only positive change that can be expected is clearing of redundant infrastructure on the fossil site itself, development is definitely going to impact on the view in time.

Risks and threats:

- That infill development and inappropriate land use impairs sense of place or offends visual aesthetics



Fig 18: View looking north from Sterkfontein caves Visitor centre



Fig 19: View looking south from Sterkfontein Caves Visitor centre



Fig 20: Redundant infrastructure has a negative effect on visual aesthetics and needs to be removed. This includes old water pipes and taps in the old restaurant area.

3.2 Physical Environment: Subterranean

The subterranean environment, its infrastructure, and tourist guide management (training and supervision), is managed by the Concessionaire. Cave infrastructure includes a cement stairway, with metal handrails in places, a fence along the margin of the underground lake in two places, a former railway-sleeper stairway (now cemented) and lighting. There is no boardwalk but instead

a honeycomb rubber mat that defines where people are expected to walk, and which has no geotextile underlay and does little to prevent compaction. There is a large television screen and video concerning the discovery and excavation of Little Foot at the foot of the entrance stairway. Formerly, pre-recorded tapes were installed to assist in the interpretation of the caves, but because these were often dysfunctional, it is not known whether or not they still play a role in site interpretation. There are a number of site guides who take large parties of children around the site. The existing infrastructure in the cave is neither of an International Standard, nor is it ecologically sound.

Status quo:

- There are many sign boards outside the cave of different styles and ages, several of them repetitious or duplicating information provided more appropriately elsewhere (Fig.21)
- The entrance steps have been restructured but this has not solved the former problem of different riser heights and tread breadths
- The metal handrail is already corroding at a depth where the humidity is high
- The steps channel rainwater into the depths of the cave and make the naked floor at the foot of the stairway muddy and slippery
- The video is awkwardly situated for large school groups and the noise from the adjacent excavation (a generator) makes the 'voice over' practically inaudible. For a variety of reasons, relocating this asset would be worth considering.
- There is no boardwalk and the floor of the cavern is dimpled and severely compacted. The mat does not stop visitors from walking wherever they choose.
- The lighting is not everywhere correct and vegetation is taking root (literally a little tree growing close to the lights), indicating over-illumination.
- The lighting is too bright, destroying the sense of place, and should be concealed at foot level, and
- There are too few 'highlights' picking out particularly attractive cave features with spots. The few that have been chosen have been lit for so long that algal growth is now a problem.
- The ambient lighting consists of regularly spaced rows of vertical posts with unshielded lights at the top (Fig 22). The lights, the cable and distribution boxes are not on any way concealed and detract from the experience, totally destroying sense of place. The trailing electrical cables are a safety hazard. International best practice suggests that foot-level lighting with cables and other equipment concealed under a boardwalk is more appropriate for show caves.
- Neither the access steps, nor the rubber mats or lighting are of appropriate International standards for a World Heritage Site.
- There is new graffiti everywhere it is light enough to see (which is almost at every ground-level spotlight) what is being written or scratched. This is indicative of too little supervision, or group sizes that are too large
- The water table has dropped drastically exposing rough floor of the lake and making it appear as if the protective fences have been incorrectly situated, too far from the water.
- The geology and mining assets of the site are poorly integrated into the tourist experience.
- Ecological management of the cave is not being adequately managed at present and it has been recommended in several previous fossil site reports that an expert in 'show caves' be approached and asked what steps should be taken to improve, for example, the problematic lighting.

These issues have been dealt with in greater detail in the fossil site inspection report dated October 2006, and will not be elaborated upon here.

Threats and risks

- Visitor recoil at the quality of the underground experience. This may not be factor with schoolchildren, but may impact on more discerning tourists.

(to add when obtained from SAHRA)

Fig 21 Signage overkill at the entrance to Sterkfontein caves



Fig 22: The inappropriate lighting (and rubber matting) on the tourist route through the Sterkfontein caves. Electrical cables and transformer boxes need to be concealed or disguised. The excess cabling is unsightly besides being a safety hazard at foot level

3.3 Infrastructure

3.3.1 Access roads, culverts, bridges, etc.

Status quo:

- There is a paved all-weather access road to the site, which ends in a car park and turning circle
- There are humps to prevent speeding and to direct runoff of the road surface
- The drainage is adequate
- The turning circle is too small to allow buses to turn easily and passengers usually disembark half way round the circle causing congestion to traffic wishing to use the circle or enter or leave the car park (Fig 15)
- The excavation area has its own private road and gates
- Access to the enclosed fossil site is well controlled and unauthorized visitors do not seem to be a problem although break-ins are increasing in frequency.

Risks and threats:

- Congestion at the traffic circle – Concessionaire management problem

3.3.2 Fencing and gates

Status quo:

- The entire property is fenced
- The fossil site is fenced and there is a locked gate
- The high fence around the fossil site is needed to exclude visitors and to deter unauthorized visitors and thieves
- The high fence and the location of the tourist boardwalk does not allow a particularly good or informative view into the excavation area
- The fence around the Compound is broken and decrepit in many places, and being non-functional, should be removed, replaced and the view screened where necessary
- Redundant portions of the fence should be removed (Fig.5).

Risks and threats:

- None, at the fossil site

3.3.3 Parking

Status quo:

- The main car park is paved while the overflow car park is grassed. This is showing signs of becoming eroded.
- Trees have been planted to provide shade.
- The bus park is heavily used by large buses used to transport school children, the 'bread and butter' paying visitors to the site.
- The bus park is also the disembarking point for many, and the Compound area and rubbish tip is the first impression vista (Figs. 5, 11,)
- There is no shelter against wind, sun or cold for bus drivers who have to wait for the full duration of the tour
- Bus drivers make fires to keep warm in winter and fires can be started in this way (Fig. 23)
- The bus park is very small and congested and buses are often blocked by others parked in front – it is not well designed for either parking or through flow of bus traffic (Fig 24)
- There is a separate parking area for the excavation site

The management of the car and bus parking areas is the responsibility of the Concessionaire and will not be discussed further here as it part of a separate reporting forum.

Risks and threats:

- None, at the fossil site