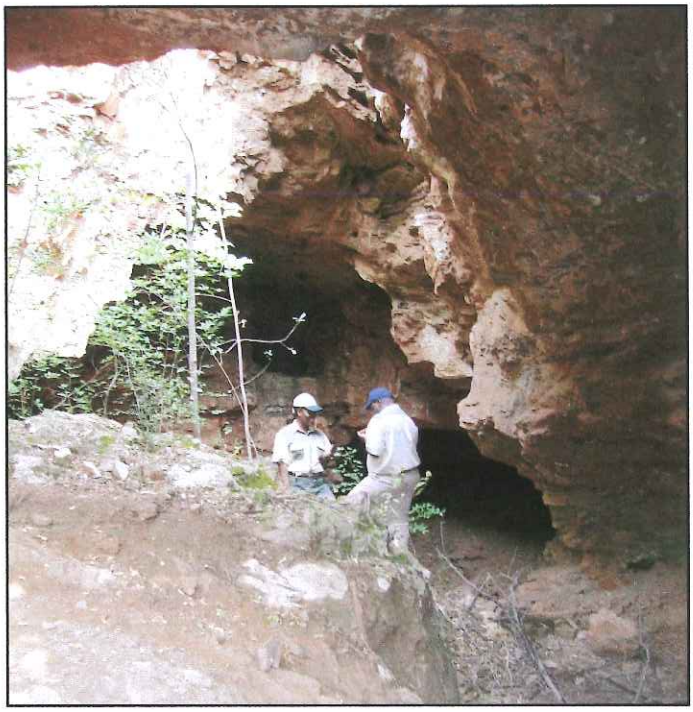
Cradle of Humankind©
World Heritage Site

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



UPDATED FOSSIL SITE MANAGEMENT PLAN
FOR

HAASGAT

2009 - 2013

GAUTENG
PROVINCIAL GOVERNMENT

DRAFT

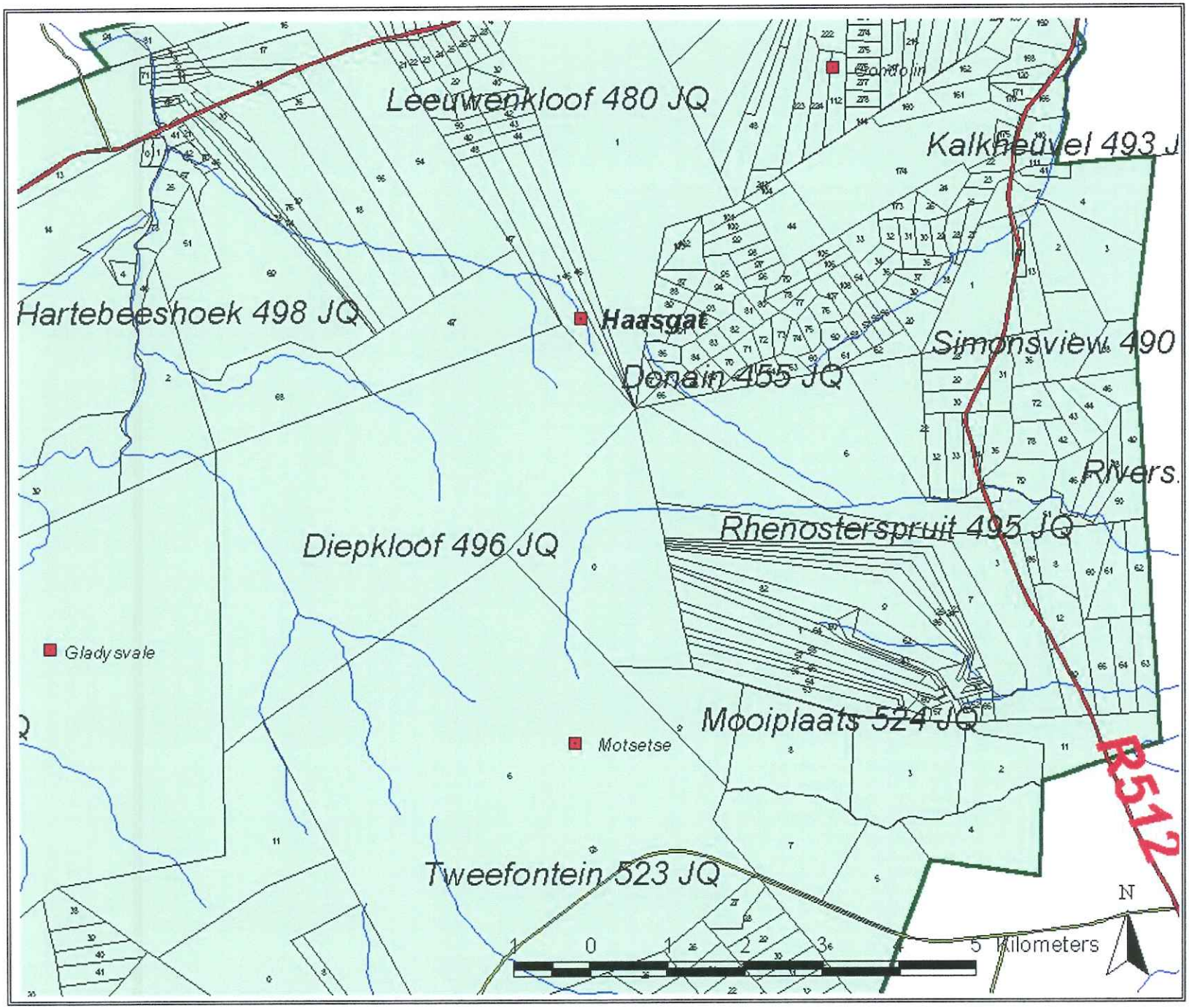
UPDATED SITE MANAGEMENT PLAN FOR HAASGAT

For 2009 - 2013

Contents

SUMMARY OF KEY ISSUES

- The Haasgat fossil site is the most difficult of access of all the sites in the Cradle of Humankind. It is not open to the general public.
- The site can only be reached after a two or more kilometer hike over rugged terrain. This makes exploration, research and excavation extremely difficult as everything has to be carried to and away from the site – there is no possibility of vehicular access.
- Surrounding landowners are sensitive to pedestrian access and trespass
- There is no water at the site or anywhere close
- The site can only be reached by passing over private properties.
- The site has much research potential, but realizing it on any meaningful scale will be extremely difficult and expensive
- There is no active research or excavation at the site at present
- For these reasons, the site has reduced educational value (although there are many interesting features), and is also not suitable for inclusion in any tourism initiative without improved access such as a footpath or bridle path..
- Fencing of the site is not supported by the landowner
- The old wagon road is perhaps the best preserved in the whole of the Cradle of Humankind (Fig 4)
- The large dump outside the site is unstable and is cascading into the valley



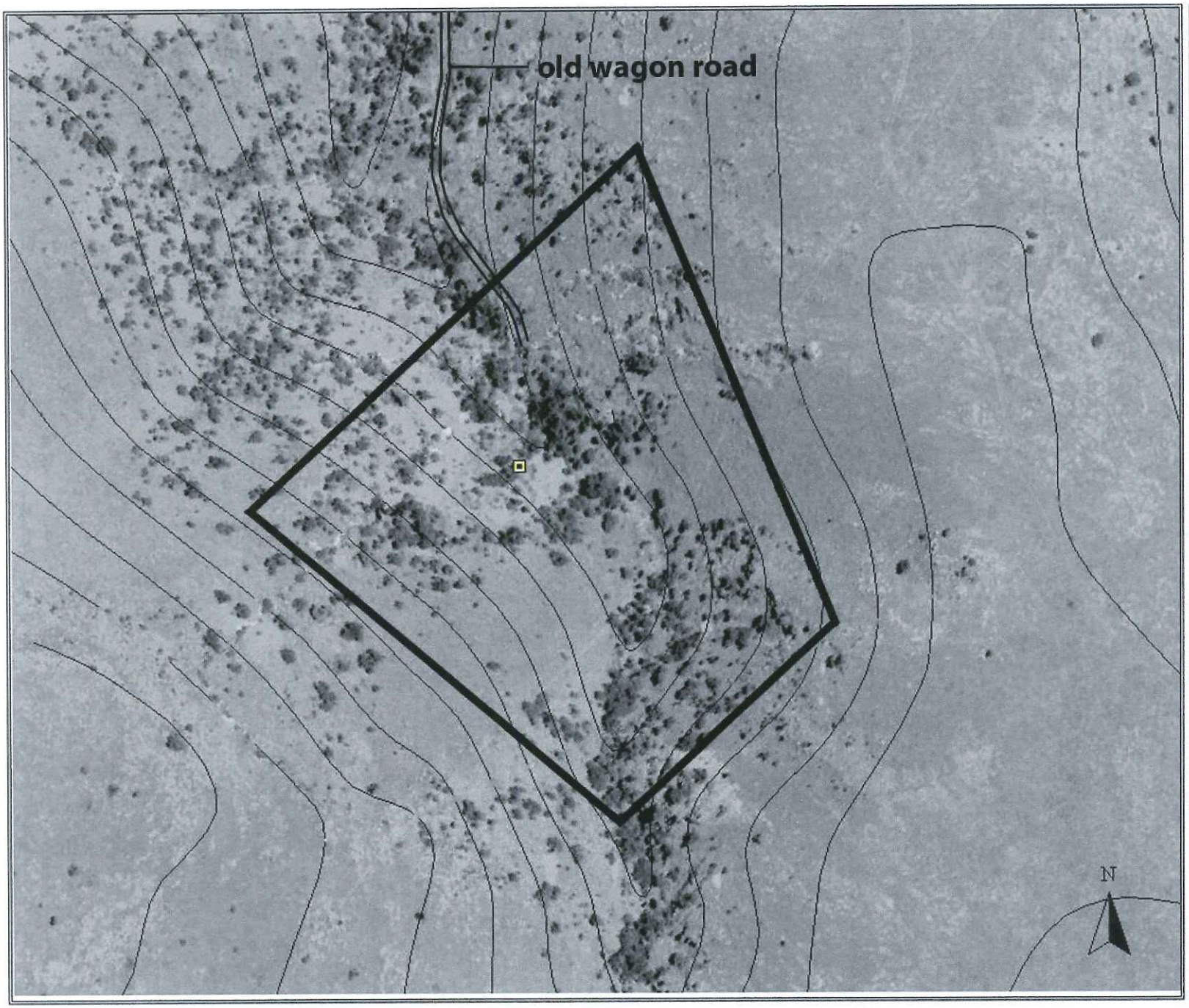
HAASGAT SITE MANAGEMENT PLAN

Legend

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

HAASGAT

Figure 1
Locality map



HAASGAT SITE MANAGEMENT PLAN

Legend

approximate position of site boundary

contours

palaeontological site

HAASGAT

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	197.88	337.37.00	A	-83 637.25	+61 424.14
B C	127.71	45.18.50	B	-83 712.60	+61 607.11
C D	186.05	135.20.00	C	-83 621.80	+61 696.92
D A	202.77	226.09.20	D	-83 491.01	+61 564.60
TRIGONOMETRICAL BEACONS					
BRIT 83			123 △	-86 245.57	+55 867.43
BRIT 87			299 △	-80 098.13	+68 249.49

SG No.
2294/2004

Approved

J.S. WEYERS
for
SURVEYOR-GENERAL
2004 -04- 16

BEACON DESCRIPTIONS
A, B, C, D .. 20mm iron peg

HAASGAT PALAEOATHROPOLOGICAL SITE

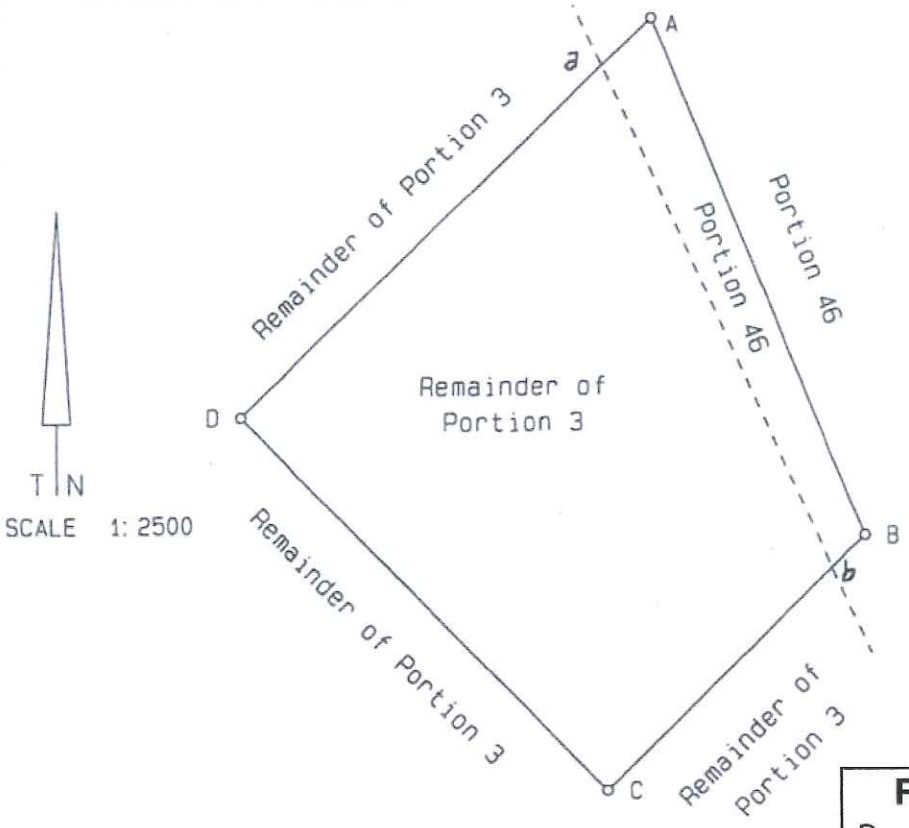


Figure 3
Proclamation diagram

The figure A B C D A
represents 3.0551 hectares of land being
a declared area on the Remainder of Portion 3 and Portion 46
of the farm LEEUWENKLOOF No. 480-JQ
Province of North West
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	The original diagram is	File -/4
No.	No.	S.R. No. 922/2004
d.d.	Transfer	T.P.
i.f.o. PTA Registrar of deeds	Grant	Comp. JQSU - 31
	C.C.T.	

1 INTRODUCTION

The Haasgat fossil site was discovered by Dr. J. E. J. Martini, a mineralogist and caver, and it was surveyed and studied by him and Dr André Keyser in the late 1980s and early 1990s. Several dozen fine primate specimens were found lying on dumps adjacent to the main entrance to the cavern, including the extinct baboon *Parapapio* and the forest monkey *Cercopithecoides*. An extinct species of specialized long-legged hunting hyaena, *Chasmaporthetes*, and fossil antelope remains have also been found. No hominins have been found to date. The fossils seem to indicate a minimum date of 1 – 1.5 million years old.

The site is situated high up against the flank of a hill – the ground rises steeply above the cave, and drops steeply to the valley in front (Fig 4). It is on the west bank of the upper reaches the Witwatersrand Spruit, a V-shaped valley in which there is a prominent drainage line, and faces east. On the opposite valley flank are other miners' pits and explorations. These are old and have become almost obliterated with re-vegetation. They fall within the gazetted area of the site, which encloses some 3.0551 ha.

The valley bottom is well-wooded (Fig 4) and during the rainy season can have water flowing in the stream. However, for much of the year, it is dry.

The site was mined for calcite in the early years of the previous century, and many tons must have been removed, judging from the voids left in the deposit (Fig 5). Almost the whole of the 'site' is subterranean, although the cavity itself is mainly man-made (the mined-out space was once filled with cave floor travertine) and is not a natural cave.

Impure travertine and fossiliferous breccia (calcified cave sediment) were discarded in dumps just outside the cave as there was no point in moving them further away. It was from these old miner's dumps that Dr Keyser recovered most of the fossil material.

The site probably has as much potential as most of the other sites, but this is as yet unproven. Its remoteness and the difficult access route detract from its potential as an educational or tourism venue.

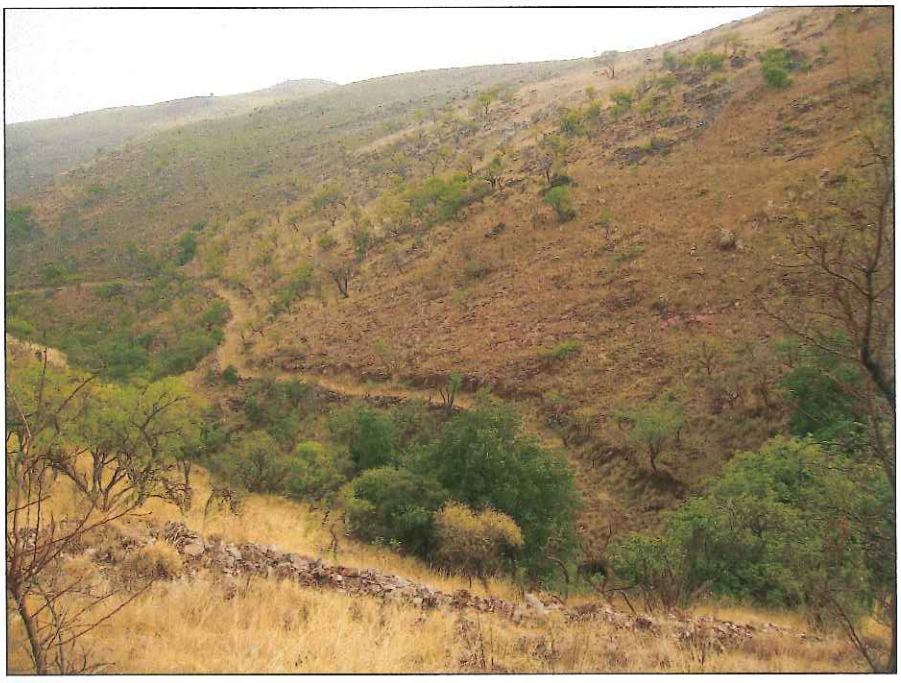


Fig 4: The Haasgat fossil site (dumps in foreground) showing the steep-sided valley, well-vegetated valley base and the old wagon road.

Fig 5: View into miners' excavations showing voids and unstable roof and walls

1.1 Objectives

- To preserve the full range of natural and cultural heritage values, the site significance and authenticity of the Haasgat fossil site
- 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 or the aspirations of the landowner
- 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. Haasgat is excellently situated to demonstrate the Highveld rocky grassland habitat and biological interactions characteristic of this biome
- 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 landowners, researchers, repository institutions and support institutions to reveal concerns, contentious issues, requirements and future plans
- 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 states and management outcomes, as well as appropriate management strategies
- 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
- The site is in North West Province

1.3 Administrative information and legal status

Site:	Haasgat
Farm Name & No.:	Remainders of Portion 3 and Portion 46 of the farm Leeuwenkloof No 480-JQ (Figs. 1,2)
Owners:	Mr Philip Tetley, Mr David Parry, Mr Dewald Aukema and Mr Frank Molteno
Contact Details:	Philip Tetley P O Box 403/170 BROEDERSTROOM 0240 Cell: 082 447 5131
Legal Status:	National Heritage Site, November 2004: World Heritage Site 1999
Servitudes:	none
NHS Boundary:	See Figs 2,3. A polygon A,B,C,D, marked with 20 mm iron pegs and enclosing 3,0551 ha. (Fig. 3)
Co- ordinates:	See proclamation diagram, Fig 3.
Area:	3.0551 ha
Permit Holder:	None at present
Designated Repository:	Geological survey – pre - NHRA Act.

1.4 Existing site management

Any management taking place at the site is being done by the landowners. It is not known what rangeland management, erosion management, fire management, or plant control measures are in place. In addition to whatever management is provided by the landowner, the following additional site management initiatives exist:

- The site is not open to the general public. Visits are by appointment only and most people are unaware of the whereabouts of Haasgat
- 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 excavation permit, if any
- 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 has been provided for. This is meant to take place on an annual basis. However, there is no easily accessible subterranean environment at Haasgat except for specialist visitors such as cavers. The subterranean part of the cave is not at present being excavated. It is only the safety of surface features that need be considered in this report.
- GDACE is available for advice to landowners regarding erosion control, fire management, alien vegetation and weed clearance, and preservation of biodiversity
- The landowner may burn firebreaks from time to time, but uncontrolled fires sometimes occur and these have the potential to cause extensive and expensive damage. The site is in a fire corridor. However, fire does not appear to threaten the heritage values of the site.
- The Heritage Agreement and appended MOU between landowners and permitted scientists addresses issues of mutual management concern and is an important management tool.

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 various 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

See also Introduction above.

The extensive mining of travertine in the early 1900's has resulted in considerable damage to the cave stratigraphic sequence. The resulting 'cave' is an elongate artificial passage with a large roof collapse which has left an opening in the ceiling near the entrance. This was probably the result of peeling away too much 'roof' travertine, causing thinning and eventual collapse of the ceiling through to surface. The apparent roof travertine was originally a large boss of floor flowstone, the original dolomitic roof of the cave having weathered off long ago, leaving calcified breccias outcropping on the hillside at places. The collapse of the breccias once supported by the floor travertine has resulted in an untidy cone of *ex situ* breccia in the middle section of the cave. This huge volume of material still awaits study.

Much of the remaining roof, ceiling and walls consists of fossiliferous breccia. During the course of mining away the travertine flowstone, unwanted blocks of breccia were discarded on the hillside outside the cave, and it is from this dump that the fossil material studied by Keyser was derived.

The hillside outside the cave is extremely steep (Fig 4) and the dumped mining waste, including fossiliferous blocks, now forms a steep-sided unstable scree which has cascaded into the valley (Fig. 6).

Fig 6: Scree from the large Haasgat breccia dump cascades downslope into the valley: a view from the opposite valley flank, at another limeworkers' exploration pit.

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

- The approach to the site offers a dramatic view over the tilted sediments of the Transvaal Supergroup, all the way to the Magaliesburg.
- Like Gladysvale, the site offers an almost wilderness experience because of the undeveloped nature of the site context, although there is no 'big' game on the property.
- The landscape is broken and hilly and very scenic.
- There is enough altitudinal variation combines with differences in geological substrate to demonstrate vegetation zoning, and plant communities which are confined to specific habitats.
- There is an interesting and varied bird life.
- Lateral-type entrances to subterranean cavern systems can be demonstrated
- The almost 360 degree vista from the site makes it extremely vulnerable to visual impact, but at the same time it provides wonderful views all round
- The approach walk to the site offers excellent examples of chert, various types of stromatolites, ripple marks and lichen growth. Prominent and thick chert bands can be demonstrated

2.2.2 Palaeontological and archaeological values

- Apart from the fossils collected by Dr Keyser, which included several good baboon skulls, the palaeontological and archaeological values of this site remain unrealized.

2.2.3 Mining and historical values

- The site was mined for calcite in the early years of the last century. Initial yields must have been entirely satisfactory, because a well-constructed wagon road was built into the valley over exceptionally rugged terrain in order to reach the site. There are the remains of kilns at the valley bottom. The dump of miners' rubble outside the cave has an overly steep angle of repose and is unstable – stepping on to its surface causes the dumped material to cascade downhill. The dump is dangerous and should be placed off-limits.
- There are the remains of a kiln and the old wagon road is well preserved

2.2.4 Research values

- Promising, but not properly realised. The site is barely explored and is little-known.
- The site retains many tons of unexcavated in situ breccia as well as many tons of fossliferous dumped breccia which is much more easily accessible
- Mining operations have dissected the cave stratigraphy but in doing so they have also exposed relationships between the cave flowstone deposits and the different sedimentary episodes. It is probably possible to obtain a good and fairly accurate idea of the former configuration of the different breccias and cave stratigraphy.
- Many years of profitable study remain in sorting the immense piles of breccia outside the cave
- Modern techniques using trace elements are now enabling the matching of breccia matrix to source areas within in situ cavern deposits

2.2.5 Biodiversity and ecological values

- Due to its small size, there can be no particular ecological value that can be attached to the fossil site per se, as opposed to the broader contextual environment in which it is embedded. It is more significant to examine this, as it is a major part of what is experienced in a visit to the site.
- First of all, the relatively 'pristine' environment which has few obtrusive built elements is an increasingly rare experience for residents of the adjacent overcrowded metropoles. The open space in itself has acquired a new value because of its increasing rarity.
- The transit experience is interesting because altitudinal variation combined with lithological changes in the substrate give rise to zoning of the vegetation. Aspect also influences vegetation and many of these changes are apparent in the walk from where the cars are parked to the site itself. The vegetation is typical Bankenveld, broken rocky grassland with sparse tree cover. Fig 7 shows a view of lower altitude vegetation, with the mountain aloe, *Aloe marlothii*, the most conspicuous of the aloes.
- A study undertaken in the mid-1970's (Mogg 1975) suggests that there might be as many as 500 species present in an area such as this. There are a great many interesting edible, medicinal, toxic and economically significant species. There is, however, as yet no species list available for any of the sites, a rather striking omission considering the well-protected status. Such plants need to be identified and mapped so that the effects of

impacts such as regular burning and collection by traditional plant users can be assessed.

- The fossil site itself has an intermittently active owl roost (*Tyto alba)* and shed quills attest to the presence of the porcupine, *Hystrix africae-australis.* Both species are and have been of taphonomic importance as bone accumulating agents in caves.
- The topography and varied vegetation offers a variety of habitats for plants and animals. However, because there are no plant, mammal or bird species lists ('checklists'), the biological values of the site are poorly understood.

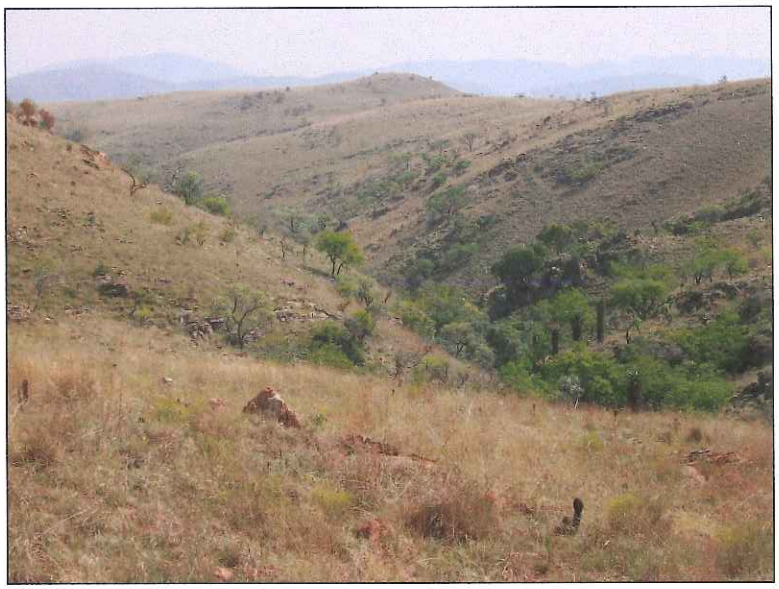


Fig 7: Vegetation of Haasgat showing Aloe marlothii, the Mountain Aloe

2.2.6 Educational, tourism and economic values

- The remoteness of the site diminishes whatever educational and tourism values which it might have. The long walk in would discourage many visitors. The lack of water is a powerful deterrent to any regular visitation and even research work.
- The area is scenically attractive and remote, attributes which are attractive to some site users, and the walk, although rugged, is neither too far nor too difficult provided a proper footpath could be constructed.
- The surrounding country is unspoilt and preserves interesting and significant botanical and geological elements which could be incorporated into a tourist or educational experience.
- However, considering what is available at other more accessible sites in the Cradle of Humankind, it is unlikely that the educational or tourism values of the site will be developed unless spectacular discoveries are made
- The site can only be reached by walking through other peoples' properties and the landowners are not keen on open tourism

2.3 Original statement of site significance

The original Statement of Site Significance prepared by J Deacon in 2002 is presented below:

"The fossil site known as Haasgat is a potentially important component of the Cradle of Humankind although no hominins have been found there as yet. Fossils discovered in breccia dumps discarded during lime mining include an extinct forest-dwelling monkey.

It was recommended by ICOMOS in 1999 that the fossil sites in the Cradle of Humankind be declared a World Heritage Site because they "contain an exceptionally large and scientifically significant group of sites which throw light on the earliest ancestors of humankind. They constitute a vast reserve of scientific information, the potential of which is enormous."

In terms of the criteria set out in Section 3(3) of the National Heritage Resources Act (Act No. 25 of 1999), and specified for Grade I national heritage resources in the draft SAHRA Regulations on Grading System and Heritage Resources Assessment Criteria, Haasgat qualifies for national heritage status because of its:

(a) Importance in the pattern of South Africa's history. Haasgat has the potential to contribute to the significance of the Cradle of Humankind.
(b) Possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage. The fossils include monkeys that live in forest habitats and are no longer found in this region.
(c) Potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage. The finds made so far indicate that the deposits are of similar age to those associated with Paranthropus robustus fossils in the Cradle of Humankind.
(d) Importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects. The full potential of Haasgat has not been reached and its characteristics are not yet known.
(e) Importance in exhibiting particular aesthetic characteristics valued by a community or cultural group. The aesthetic qualities of Haasgat have not been established.
(f) Importance in demonstrating a high degree of creative or technical achievement at a particular period. No stone or bone tools have been found at Haasgat.
(g) Strong or special association with a particular community or cultural group for social, cultural or spiritual reasons. Haasgat is important to all South Africans who are interested in the history of our species and the way in which fossil deposits are formed.
(h) Strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa. No special association has yet been established.
(i) Significance relating to the history of slavery in South Africa. The age of the deposits at Haasgat places it well before the time period of slavery in South Africa." (J Deacon 2002)

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.

In order 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 next 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, namely physical and legal access to the property, rangeland or veld condition, erosion, fire management, rare plants and animals, alien invasive species and visual aesthetics.

3.1.1 Access

Status quo:

- Access is by appointment only.
- Access is via the Kalkheuvel West country housing estate (Fig 8), and to reach the fossil site, visitors have to cross many private properties.
- The Kalkheuvel Estates are protected by a security gate and boom which is manned 24 hours.
- Cars are parked at a road verge some kilometers away from the site, and from there, one has to walk across country using a footpath which extends some part of the way. The last kilometer is steep and rough, and there is no formal pathway.
- Surrounding landowners and residents are sensitive to pedestrian crossing of their property and to trespass
- The site is remote and there are no nearby residents to provide surveillance over unauthorized persons entering the site from other directions
- Access is a serious consideration for researchers wishing to explore and excavate at this site as everything including water has to be carried in and out.

Threats and risks:

- Increased risk of fires from picnickers
- Risk that exposed fossils may be removed

Fig 8: Entrance to the Kalkheuvel West estate showing gatehouse and boom

3.1.2 Rangeland

Status quo:

- The rangeland is not overgrazed and appears to be in good condition. Rangeland management is a landowner responsibility, but GDACE is available for advice on request.
- There is no botanical checklist available

- There is no list or records of economically significant plant species such as edible and medicinal species
- There is no baseline data against which the environmental impacts of fire, for example, or fire exclusion, for another can be assessed
- There is no mechanism for acquiring such ecologically significant data unless this is undertaken as a special study by GDACE
- There are apparently no grazing herbivores and fuel build-up is high. This makes for intense and hot veld fires. The site is near the upper end of a pronounced fire corridor (strong valley winds blow fire up or down valley).

Risks and Threats:

- Biological values of the site poorly or at best incompletely understood
- No means of assessing impacts of fire and plant utilization

3.1.3 Erosion

Status quo:

- The site is against a very steep valley flank and extreme care should be exercised when planning development of any kind. Any removal of vegetation would have an effect on erosion..
- Footpaths should be along contour because there is a strong chance that they could initiate erosion problems.
- The site is near the top of the catchment for the local Witwatersrand Spruit and should be regarded and managed as a catchment zone. This catchment should receive special attention particularly upslope of the site so that no unsustainable or ecologically unsound land uses are permitted
- The drainage way at the valley bottom should be respected and should not be crossed by roads or pathways except where absolutely necessary. Drainage channels should under no circumstances be used to accommodate spoil material from any future excavations or development. The stream bed should not be narrowed or blocked in any way.

Risks and Threats:

- Any development including footpath development poses a risk of erosion
- The breccia dump is unstable and is cascading downslope, placing the area around the base at risk from avalanching material
- Natural erosion, exacerbated by the impact of blasting and other mining activity, is causing collapse in the subterranean cavern system. This impacts on site safety.

3.1.4 Fire management

Status quo:

- Fire management is a landowner responsibility
- The north-west to south east orientation of the narrow valley creates a vulnerability to fires that are fanned by the prevailing north-west and south-east winds. Such uncontrolled fires would be swept up or down valley and there would be little or no hope of containing them
- Fire is not a threat to the heritage values of the fossil site itself, however.
- Because of a lack of baseline vegetation data, it is difficult to assess the impacts of fire frequency and intensity and also of fire exclusion

Risks and Threats:

- No framework for assessing the impact of fire as yet exists. This is a generic issue relevant to the whole of the COH WHS.
- Uncontrolled fires entering the property from outside continue to pose a threat to property and rangeland.
- Uncontrolled access increases the risk of fires started by picnickers

3.1.5 Red Data Species, rare plants and animals

Status quo:

- Many rare species of plant and animal are not on the Red Data list.
- There are no plant or animal checklists and little can be said concerning rare and endangered plants and animals
- See "Rangeland" at 3.1.2 above

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

3.1.6 Alien vegetation

Status quo:

- Although there is weed growth in and around the cave, infestation with alien species is less than at many of the other sites.
- There is no species list of alien species or common weeds for the site
- Alien species have not been identified, mapped or prioritized for clearance
- There is no clearance programme or budget
- Clearance guidelines have been provided in the appendix to the generic management plan
- The clearance of alien vegetation is mentioned in the management table
- Weed infestations are worst in the disturbed ground in and around the cave site itself, and are a nuisance because they make entrance and exit an unpleasant experience. There are a number of declared weed such as bugweed and solanum.
- Fixed point photography still needs to be set up on site

Risks and Threats:

- Occurrence and density of invasive alien species has not been mapped or prioritized, making management and control difficult
- There is no agreed plan of management or budget for the control and/or clearance of invasive species within the fossil site
- Field operational guidelines for appropriate eradication treatments for different species of invasive species 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 from outside sources is a problem

3.1.7 Visual aesthetics, site context

Status quo:

- The fossil site is enclosed from the eastern, southern and north-north-eastern side by surrounding ridgelines. This provides a special attribute and sense of remoteness of the site. The visual enclosure should be protected by ensuring that no structures are built within the viewshed that extends to the ridgelines on the east, west and south and north-west.

Risks and Threats:

- The location of the site makes it particularly vulnerable to visual impact of any development. The site is on the steep side of a hillock near the top of a deep valley, and is almost totally enclosed by higher landforms all round. This location of the fossil site increases sensitivity of the contextual area to visual impact of development, especially as local landowners have the penchant for building on the tops of hills or on ridgelines.

3.2 Physical Environment: Subterranean

The subterranean environment (natural) is not an issue at Haasgat at present.
When the subterranean environment is being referred to at this site, it refers to the artificial cave excavated by lime-workers.

Status quo:

- The site has been intensively mined and this in all probability included the use of dynamite. Blasting would have caused deep fractures and instability
- The unsupported void caused by mining is unstable and has collapsed in places
- The roof of the cave has collapsed due to excessive mining operations, leaving an un-collapsed bridge. This probably happened after the lime-workers had left.
- The bridge may be dangerous and needs to be inspected by a site safety officer
- There is an intermittently active owl-roost inside the cave
- There are exposed fossils in what now appears to be the side walls of the cave
- The entrance is thickly overgrown with weeds, many of them declared species
- The centre of the subterranean area is occupied by a he cone of collapsed and potentially fossiliferous breccia
- There is no way that this site can be sensibly stabilized without huge expenditure which would be difficult to justify. Further collapse is bound to happen and this will inevitably impact on site significance, and irreparably damage the stratigraphic integrity of the site.. However, a guiding principle is that natural processes should be allowed to continue. It is likely that further piles of potentially fossiliferous breccias will result. This underlines the importance of proper recording of the site stratigraphy as it is presently exposed in order that the most accurate interpretations of the site's sedimentary history can be made. The sorting and recovery of fossils from collapsed breccias is also crucial to an understanding of the relationships of the different breccias and their respective ages.
- The aim of the management plan is to protect site values. Therefore, the initiation of a stratigraphic mapping project at this site is a top priority because the likelihood of further collapse is strong.

Risks and Threats:

- Collapse of the cave both underground and on surface in the form of sinkholes and steep drops creates a safety risk to site users

3.3 *Infrastructure*

There is no infrastructure on this site.

3.3.1 Access roads, culverts, bridges, etc.

Status quo:

- Access road is via the Klipheuvel West Country estates private road (Fig .8)
- Vehicles have to park some 2 kilometres away from the site, and visitors walk the remaining stretch

Risks and threats:

- None at present

3.3.2 Fencing and gates

Status quo:

- There is controlled access to the estate at a security gate and manned boom which controls vehicular access

Risks and threats:

- Scavenging of fossils because there is no control on pedestrian access

3.3.3 Parking

Status quo:

- Cars park on the verge of the estate road, 2 km away from the site

Risks and threats:

- None at present

3.3.4 Built environment

Status quo:

There is no built environment, no site interpretive signage and no site plaque

Risks and threats:

- None at present

3.3.5 Waste Management

- None.
- Researchers carry everything in and out again
- There is no toilet

Risks and threats:

- None at present

3.3.6 Energy

None

3.3.7 Water

None. In the rainy season, the stream in the valley may have a little water

3.3.8 Telecommunications

Poor cellular signal

3.4 Research Environment

There is no researcher on site at present. All specimens were recovered from the limeworkers' dumps. For some time to come, the main research environment might be the dumps and the collapsed breccia cone. There has been no systematic work at Haasgat since Dr Keyser left. Researchers will have to provide their own water, energy and sanitation and without direct vehicular access, this is a huge problem. They will also have to provide support for the excavations themselves and there is no infrastructure or safe shelter at Haasgat.

3.4.1 Previous and ongoing research and excavations

Status quo:

- The site was originally recognized as being fossiliferous by Dr J. E. J. Martini, a member of the caving fraternity with a special interest in cave mineralogy. The site was investigated by him and colleague Dr. A Keyser in the early 1990's. Fossiliferous material was collected from the dump of discarded material outside the cave, and further study revealed a fossil species of baboon, *Parapapio*, remains of the forest monkey *Cercopithecoides*, the extinct hunting hyaena *Chasmoporthetes* and several species of antelope.
- Since this initial exploration phase, no further research has been undertaken at the site. The fossils suggest an age similar to deposits elsewhere in the Cradle of Humankind, somewhere between 1 and 2 million years old. The chance of finding other fossil material is high, including the remains of hominins.
- Research at the site will be hampered by the lack of water, a toilet and the fact that there is no possibility of direct vehicular access.

Risks and Threats:

- Lack of funding inhibits research and site potential remains locked
- Lack of dedicated heritage officer in Management Authority prevents follow-through after site inspections and management issues remain unattended – a problem generic to all the fossil sits in the COH WHS.

3.4.2 Excavation edges

Not applicable

3.4.3 Excavation walls

Not applicable. This heading refers to palaeontological or archaeological excavation walls.

3.4.4 Access to excavations: steps, ladders, lifts etc.

Not applicable. The inner parts of the site should be declared a 'hard hat' area. The report and recommendations of a professional site safety officer are awaited.

3.4.5 Erosion

Not applicable at present

3.4.6 Compliance with conditions of excavation permit

Not applicable at present

3.4.7 Witness sections

Not applicable

3.4.8 Dumps

Status quo:

- All the existing dumps are the result of past mining operations, and were discarded by lime workers. On the dump outside the cave site, it is apparent that fossil chipping and preparation has taken place, probably in order to reduce the weight that needs to be carried out. While there is nothing wrong with this provided permits are in place, it is important not to mix waste material into the still unsorted fossiliferous dump, and care should be taken to clearly map and annotate dumps as to their possible source, method of creation ('author') and content. Mixing spoil heap stuff with unsorted material makes the sorting job that much harder

Risks and Threats:

- Loss of information concerning the source, author and content of dumps
- Loss of or languishing information, because dumps are not processed for fossil content

3.4.9 Repository

Status quo:

- The repository of the material collected to date is probable the Geological Survey but SAHRA needs to check on the whereabouts of the fossils

Risks and threats:

- Loss of, or deterioration of artefacts
- Loss of information concerning artefacts
- Lack of publicized information about artefacts
  These threats are not an issue at present.

3.5 Site safety and security

Site Safety and security needs to be considered from a number of perspectives: Firstly, the physical stability of the valuable site fabric itself, and then from the perspective that site stability (or instability) impacts on the safety of researchers and those visiting the site. The safety of surface features, infrastructure and the special safety risks of subterranean environments all need special consideration.

Site Stability is affected by two different threat sources: Firstly, by natural causes which include the ongoing weathering and decalcifying processes, and secondly from man-made influences such as the alteration of surface drainage and poor excavation techniques, or by mining activities which create unstable voids, and blasting, which shatters rock and created fractures. However, it is only by the inherently destructive twin processes of mining and excavation that site significance was or can be realised.

Site security refers to man-made threats to personal and property safety, such as crime.

3.5.1 Physical safety

- The site is extremely remote and personal safety is not a problem here

3.5.2 Safety of surface environment

Status quo:

- There has been no site safety inspection for many years
- The site is extremely steep. There is no prepared or even somewhat formal pathway to the site. There are many loose rocks and the surface is uneven.
- The dump is at an unsafe angle of repose and is cascading. The surface of the dump should be declared a no-go area because trampling initiates avalanches of loose rubble.
- There is no water on site
- Evacuation of any casualty would be extremely difficult

Risks and threats:

- The avalanching of loose dump material poses a threat to the safety of site users in the area below
- There are nests of bees in the cave area

3.5.3 Safety of excavation (mined 'cave') area

Status quo:

- There has been no site safety inspection for many years
- The excavation/mining area does not appear to be safe and the report and recommendations of a site safety officer are awaited

Risks and threats:

- The mined out area is at risk from further collapse, particularly the unsupported bridge of remaining breccia
- The bees' nest is a hazard to site users

3.5.4 Subterranean safety

There is no accessible natural subterranean area at Haasgat
See above

3.6 Presentation of site values

3.6.1 Site interpretation

Status quo:

- The values of this site are not presented anywhere, either on or off site

Risks and threats:

- Lack of presentation of site values to a wider audience prevents information concerning site significance from reaching public psyche
- Potential funders might not know about site significance
- Public not educated about full range of COH WHS values

3.6.2 Visitor numbers

Status quo:

- There is no mechanism for recording visitor number at this site. Apart from official visits, it is doubtful that many people visit it, apart from the occasional hiker from the nearby housing estate.

Risks and threats:

- None at present - formal visitation is negligible

4 MANAGEMENT OBJECTIVES; DESIRED OUTCOMES

This section notes desired states and management outcomes, and the section and Table that follow (Section 5) describe the management strategies required to achieve such outcomes. The management objectives have the preservation all site values as a goal.

4.1 Physical environment, surface

Desired outcomes include:

Rangeland:

- To ensure that contextual veld condition and rangeland in immediate vicinity of fossil site is maintained in as good a condition as possible.

Erosion:

- To ensure that the fossil site and its environs are free from active erosional problems and that existing areas of erosion are analysed, remedied, rehabilitated and monitored for follow-up action if necessary

Fire management:

- To ensure that a proper fire regime appropriate to Bankenveld is maintained on the fossil site.
- To ensure that fossil site users (when the site is active) are aware of fire hazards and can control on-site fires.
- To ensure that the fossil site does not constitute a fire hazard and that activities taking place there do not create fire hazards
- To ensure that the basic data necessary to assess the long-term impact of frequent fires is available, which information is necessary to feed back into appropriate fire management

Biodiversity, rare plants and animals:

- To ensure that a database of plant and animal species present on site is available, because biological values are as yet poorly understood

- To assess which of these are target species for use as food, medicines, economic reasons, etc., and to what extent they are being collected
- To identify, record and map special species in order to ensure their protection, and implement management interventions if necessary

Alien vegetation:

- Desired outcome is a fossil site which is free from alien invasive species, and, as far as possible, from weeds

Visual aesthetics:

- Desired outcome is protection of viewshed and contextual environment

4.2 Physical environment, subterranean

Desired outcomes include

- a subterranean environment which, if it is being visited or excavated, is safe for all site users.
- A further desired outcome is a subterranean environment in which the substrate, geological features and micro- and macrobiota are properly conserved.

4.3 Infrastructure, built environment

There is no built environment of any kind at Haasgat

4.4 Research environment

Desired outcomes include the following:

- To ensure that lack of funding does not inhibit research opportunities and prevent site potential from being realised
- To ensure that the Management Authority has in-house heritage expertise which allows for the follow-up of fossil site inspection observations and recommendations
- To ensure that all dumps, old and new, are committed to plan, with appropriate annotations
- To ensure that new dumps are appropriately sited and properly constructed
- To ensure that excavations are safely executed and compliant with permit terms and conditions
- To ensure that appropriate witness sections are left and stabilized
- To ensure that sample sites are properly recorded and that results are independently verifiable
- To ensure safe excavation edges, walls and bases, and that these are stabilized when work ceases.
- To ensure that dump management becomes part of the permit application; such as indications as to dump site selected, construction method, long-term future of dump.
- To ensure that fossils are carefully and properly prepared, catalogued, curated and housed in a safe repository
- To ensure that regular site safety inspections take place

4.5 Site safety and security

- Desired outcomes include the provision of safety interventions recommended by the professional site safety officer after inspection of the surface and subterranean environment has taken place to ensure safe working and visiting conditions

4.6 Presentation of site values

Desired outcomes include:

- To ensure that the many heritage and natural values of the site are interpreted and made available to as wide a public as possible
- To ensure that he old mining relics are properly recorded descriptively and in the form of measured drawings, photographs and mapping

5 MANAGEMENT AND MONITORING TASKS

The following are operational management tasks and issues that need to be addressed now or in the future as part of on-going management actions, and in order to achieve the desired outcomes outlined above.

The development of research at the fossil sites has been limited by the unfortunate perceptions that the State may not fund development on privately owned property and that the scientists are 'site-users'. This needs to change as it must be seen as the responsibility of the authorities to foster research and necessary associated development on these sites. It is recommended that in future, scientists be viewed rather as 'value adders' and thus eligible for some easement for the funding of heritage site management interventions which they are currently expected to fund, for example, fencing. In effect, the state has been expecting others to finance the protection of the COH WHS fossil sites.

Sites which have no active scientist are generally neglected – this is an indication of the positive influence which scientists have on fossil sites.

The following table has been drawn up with the specific aim of clarifying who should do what, and when, on the heritage site. The Table also provides some indication of priority ratings. It has been constructed in such a way as to incorporate all the key management issues, strategies and monitoring criteria so that it may be used independently of the text.

The relative priority of the management measures has been identified based on ICCROM definitions as follows:

- Immediate – to be attended to urgently as it constitutes a danger to the public or a resource;
- Urgent - to be attended to urgently to protect the resource;
- Necessary - to be attended to, to protect the resource;
- Desirable to be attended to from a development perspective;
- Keep watch - to be monitored to see if the problem is serious.

TABLE 1 MANAGEMENT AND MONITORING ISSUES FOLLOWS

Table 1 MANAGEMENT AND MONITORING TASKS FOR HAASGAT FOSSIL SITE

Issues	Threats or Risks	Desired outcomes (*) and Management Measures	Priority	Responsibility	Monitoring Criteria	Monitoring frequency
Surface environment						
Access - legal access to property	• Pedestrian access is a sensitive issue, and adjacent landowners are particular about access	• ***Maintenance of cordial relations with landowners regarding access (*)*** • Ensure that properly negotiated preferably written letters of permission are obtained by all site users or those in charge, when there are researchers on site	Desirable	All site users	• Check when relevant - Access issue should be addressed in Landowner / Scientist Agreement	Ongoing, when there are researchers on site
Unauthorised access	• Removal of rock, fossils breccia and artefacts • Removal of edible and medicinal plants • Theft of moveable property	• ***No unauthorized visitation to site (*)*** • Research and field staff to maintain surveillance • Landowner to maintain surveillance	Desirable	Landowner, research scientists when present on site	• Check stockpiled breccia for theft • Check for signs of digging out of plants • Maintain surveillance over movable property	Ongoing
Rangeland condition	• Deterioration of rangeland due to overstocking, overgrazing, trampling or too frequent fires	• ***Rangeland in optimum condition (*)*** • GDACE can advise • Plan for acquiring baseline data against which impacts can be assessed • Plant species list required	Desirable	Landowner	• Check for trampled bare areas • Check for loss of palatable grasses and forbs • Check for 'increasers' such as *Aloe greatheadii* var *davyana* and steekgras, also *Dichrostachys* which are all indicators of overgrazing of grassland	Ongoing
Retention of topsoil, surface drainage, surface erosion	• Loss and dispersal of topsoil makes re-vegetation difficult	• ***Fossil site free of erosion (*)*** • Check all tracks and footpaths • Check for suitable surface drainage and distribution of runoff over surface • Check for signs of surface erosion	Desirable	Landowner, GDACE	• Check for worn patches of vegetation • Check for erosion gulleys in tracks • Check for patches of exposed soil	Ongoing

Issues	Threats or Risks	Desired outcomes (*) and Management Measures	Priority	Responsibility	Monitoring Criteria	Monitoring frequency
Fire Management	• Too frequent fires have a negative effect on vegetation • Fire is a threat to moveable property	• ***Proper fire regime for Bankenveld maintained (*)*** • Implement a fire management policy • Record fire frequency and intensity • Provide suitable beaters for research staff (at times when they are present) and farm workers • Research workers when present are to protect and control their own work environment and infrastructure, in consultation with the landowner	desirable	Landowner, GDACE	• Rangeland study for baseline data against which fire impact can be assessed in place or complete • Fire frequency recording programme in place • Fire management and firebreaks in place • Ensure that beaters are always on hand • Check rangeland for presence or absence of fire-sensitive species • Check rangeland for encroachment of fire resistant species	ongoing
Red data species, rare and economically significant plants	• Loss of edible and medicinal plants • Many important plant species are not on RED DATA list. • Without plant lists, biological values of the site will be poorly understood	• ***Preservation of biodiversity (*)*** • Draw up a species list of medicinal, poisonous, edible and economically significant species • Identify, locate and map target species • Map preferred microhabitats • Monitor collection and utilization • Set up photographic monitoring if necessary • Implement a protection strategy	Necessary	Landowner, researchers and their staff	• Check for signs of digging geophytes out by the roots • Check local roadside vendors for plants on sale	Ongoing

Issues	Threats or Risks	Desired outcomes (*) and Management Measures	Priority	Responsibility	Monitoring Criteria	Monitoring frequency
Invasive alien plant species.	• Invasion of avens and other habitats by alien species • Loss of biodiversity • Unattractive landscape	• ***Fossil site free of invasive alien species(*)*** • Make a list of all invasive plant species • Identify, map and prioritise infestations • Determine best eradication or control programme. GDACE available for assistance • Assess costs and find budget • Begin control according to guideline provided in generic management plan • Enlist expertise of GDACE • Implement control and clearance programme • Monitor and follow up as required • There is a greater weed problem rather than invasive alien problem	desirable	Landowner,	• Visual checks for infestations and incidence density • Monitor with fixed point photography if necessary • Follow-up controls may be necessary	Ongoing
Weeds & shrub growth in excavation area	• Roots destabilize breccias in time • Plants reduce visibility of noteworthy sections • Weeds give a negative visual experience and project an air of dereliction • Weeds make entrance to the cave difficult because they are either thorny, prickly, or have burrs which catch on clothing • Weeds are spread further when clothing is stripped of seeds	• ***Weed-free fossil site or site in which weeds are not problematic (*)*** • Pull weeds by hand, or 'skoffel' • Destroy in a manner that does not spread seed further • Do not skoffel out non-weed vegetation	desirable	Landowner,	• Visual checks for weed infestations • Fixed point photography for controls • Follow-up checks for re-infestations	Ongoing

Issues	Threats or Risks	Desired outcomes (*) and Management Measures	Priority	Responsibility	Monitoring Criteria	Monitoring frequency
Development in 'viewshed'	• Negative visual impact	• ***Preservation of sense of place and natural qualities of viewshed (*)*** • COH WHS to monitor all new development plans • Do not allow ridgeline development or development within viewshed	desirable	COH WHS MA	• Check plans for visual impact on viewshed of site • Check that viewshed and catchment area not impacted upon	Ongoing
Habitat protection: Removal of stromatolites.	• Loss of Heritage material and site significance. • Loss of micro-habitats (mosaic of sunny and shady areas).	• ***Preservation of Pelndaba Stone and fossil stromatolites and associated microhabitats (*)*** • This does not appear to be an issue at present within the fossil site or the approach route, but the matter requires flagging for awareness of the problem and ongoing surveillance. • Landowner and heritage inspectors to maintain surveillance	Desirable	Landowner, Heritage Monitors	• Check for signs of disturbed soil, exposed patches of soil, overturned and disturbed rock • Check for missing size component; all portable rocks may be missing	Not an issue at present
SUBTERRANEAN ENVIRONMENT						
Porcupine lairs and owl roost	• Disturbance and displacement of animals • Porcupine lairs and owl roosts are important as modern analogues for taphonomic processes of the past	• ***Preservation of porcupine lairs and owl roosts for actualistic studies (*)*** • Protect any porcupine lairs and owl roosts on site • Encourage that their behavior and lair contents are studied without disturbing animals	necessary	All site users	• Check that porcupine lairs remain active – note presence of quills, droppings, gnawed bones	Ongoing
INFRASTRUCTURE: There is no infrastructure at this site						

Issues	Threats or Risks	Desired outcomes (*) and Management Measures	Priority	Responsibility	Monitoring Criteria	Monitoring frequency
Site plaque recognizing World Heritage Site status and National Heritage Site Status	• Required in terms of the WHC Act and NHRA. • Enhances site status •	• ***Site plaque (*)*** Re-visit the need for sites without surveillance and with an unauthorized entry problem to have such plaques installed. Landowner/s is not in favour, site is seldom visited and a plaque might simply attract people's attention to the fact that something important is in the cave. This might encourage vandalism and theft of fossils	Desirable?	SAHRA	• Check when appropriate	Ongoing
Visitor impacts	• Littering • Pollution • Erosion of pathways • Disturbance of excavations • Theft of fossils • Graffiti	• ***Visitor impacts eliminated or minimized by appropriate interventions (*)*** • These potential impacts are not yet an issue at Haasgat. • Toilet facilities non-existent	Future concern	Researchers	• Check for littering • Check for pollution of site • Check all walkways for wear and tear • Check for visitor disturbance of excavations or equipment • Check for tampering with and removal of stored fossils • Check for graffiti	Future concern
Telecommunications	• Telephone necessary for responsible tourism • Poor cell phone signal • No landline		Future concern	COH WHS MA	• None	Future concern
RESEARCH ENVIRONMENT: There is no research going on at Haasgat at present, so this part of the management table has been omitted except for 2 items:						

Issues	Threats or Risks	Desired outcomes (*) and Management Measures	Priority	Responsibility	Monitoring Criteria	Monitoring frequency
Cave sediments and stratigraphy	• The cave is systematically collapsing and stratigraphic relationships are being destroyed • There could be a loss of information • Site significance could be at risk	• ***Preservation of information regarding stratigraphy which could be lost due to collapse (*)*** • Initiate a project to record cave stratigraphy as it is currently exposed	necessary	COH WHS MA	• Check that a stratigraphic recording and mapping project has been instigated	ongoing
Repository	• Poor repository policies can result in information loss • Poor repository policy can result in problems of locating fossils	• ***Safe long-term repository (*)*** • Monitor repositories according to 'Minimum Standards for Repositories' guideline as prepared by SAHRA • It is presumed that the repository for the fossils at this site is the Geological Survey	Keep watch	SAHRA	• Monitor repositories according to 'Minimum Standards for Repositories' guideline as prepared by SAHRA	Keep watch
Site safety, security and stability						
Subterranean environments at Haasgat :	• Instability due to previous mining activities and blasting • Natural instability • Unsupported bridge of breccia could collapse	• ***Subterranean areas safe or off-limits (*)*** • No-go areas for tourists • Request a report from a site safety officer • Install interventions as suggested when the situation warrants this	Mainly future concern	COH WHS MA	• Check that no-go instruction is being obeyed	Future concern

Issues	Threats or Risks	Desired outcomes (*) and Management Measures	Priority	Responsibility	Monitoring Criteria	Monitoring frequency
Bees, "Kransbye", Wasps	• The numerous cavities and hollows are home to several bee hives and wasps' nests. Many people are allergic to bee stings in particular.	• ***Site safe for all site users (*)*** • Ensure that the necessary antihistamines are on hand. • Destroy or have hives removed if these are where people frequently work. • Post warning signage • Provide first aid post	Necessary	Researcher, Tour Operator	• Monitoring should include checking the route for insect problems. • Monitor speed at which an emergency case could reach appropriate medical help	Ongoing
Accidental falls	• Tourists suing the operator • The dump outside the site is cascading and very dangerous	• ***Site safe for all site users (*)*** • Keep group sizes small enough to control at all times • Mark no-go areas as unsafe	Necessary if tourism is taking place on site	Tourist operator, researcher	• Monitor route by walking it regularly to check for flaws in routing, infrastructure • Erect signage or psychological barriers at no-go areas	Necessary if site is being excavated or visited
Theft, crime	• The isolated situation makes the site difficult to monitor and surveillance full time is impossible • There is nothing except fossils to steal	• ***Site safety, within reason (*)*** • Control on all persons entering the area • Remove valuable fossils to laboratory	Future concern	Researchers, landowner	• Security checks	Future concern
GENERIC ISSUES RELATING TO FOSSIL SITE EXCAVATIONS: No excavations at Haasgat. This section of the Management Table has therefore been omitted						

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7 MAPS AND FIGURES