

**Archaeological impact survey report for
THE PROPOSED TOWNSHIP DEVELOPMENT IN OLIFANTSHOEK,
NORTHERN CAPE PROVINCE**

ARCHAEOLOGICAL IMPACT SURVEY REPORT FOR THE PROPOSED TOWNSHIP DEVELOPMENT IN OLIFANTSHOEK, NORTHERN CAPE PROVINCE

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Declaration:

I, J.A. van Schalkwyk, declare that I do not have any financial or personal interest in the proposed development, nor its developers or any of their subsidiaries, apart from the provision of heritage assessment and management services.



J A van Schalkwyk (D Litt et Phil)
Heritage Consultant
May 2010

EXECUTIVE SUMMARY

ARCHAEOLOGICAL IMPACT SURVEY REPORT FOR THE PROPOSED TOWNSHIP DEVELOPMENT IN OLIFANTSHOEK, NORTHERN CAPE PROVINCE

Gamagara Municipality proposes to expand the town of Olifantshoek in the Northern Cape. For this purpose seven sections of land of uneven size, all located to the east of the town of Olifantshoek, have been identified.

An independent archaeological consultant was appointed by **Cultmatrix** to conduct a survey to locate, identify, evaluate and document sites, objects and structures of cultural importance dating to the Stone Age and Iron Age found within the boundaries of the areas where it is planned to develop the township extensions.

This AIA report forms part of the Environmental Impact Assessment (EIA) as required by the EIA Regulations in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and was done in accordance with Section 38 of the National Heritage Resources Act, No. 25 of 1999 and is intended for submission to the South African Heritage Resources Agency (SAHRA).

- As no heritage sites are known to occur in the study area, there would be no impact resulting from the proposed development.

Therefore, from a heritage point of view we recommend that the proposed development can continue. However, we request that if archaeological sites or graves are exposed during construction work, it should immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.



J A van Schalkwyk
Heritage Consultant
May 2010

TECHNICAL SUMMARY

Property details						
Province	Northern Cape					
Magisterial district	Postmasburg					
Topo-cadastral map	2722DC, 2722DD					
Closest town	Olifantshoek					
Farm name & no.	Olifantshoek Allotment Area					
Portions/Holdings	Portion of erf 155, Portion of portion 1 of erf 155, Portion of erf 1267, Portion of erf 1268, Portion of erf 1266, Portion of erf 1355 and Portion of erf 454.					
Coordinates	Centre point					
	No	Latitude	Longitude	No	Latitude	Longitude
	1	S 27.94555	E 22.74395			

Development criteria in terms of Section 38(1) of the NHR Act	Yes/No
Construction of road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length	No
Construction of bridge or similar structure exceeding 50m in length	No
Development exceeding 5000 sq m	Yes
Development involving three or more existing erven or subdivisions	Yes
Development involving three or more erven or divisions that have been consolidated within past five years	No
Rezoning of site exceeding 10 000 sq m	Yes
Any other development category, public open space, squares, parks, recreation grounds	No

Development	
Description	Expansion of the town of Olifantshoek
Project name	

Land use	
Previous land use	Farming
Current land use	Vacant/urban

Heritage sites assessment		
<i>Site type</i>	<i>Site significance</i>	<i>Site grading (Section 7 of NHRA)</i>
Impact assessment		
<i>Impact</i>	<i>Mitigation</i>	<i>Permits required</i>

TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	II
TECHNICAL SUMMARY	III
TABLE OF CONTENTS	IV
LIST OF FIGURES.....	IV
GLOSSARY OF TERMS AND ABBREVIATIONS.....	V
1. INTRODUCTION.....	1
2. TERMS OF REFERENCE	1
3. HERITAGE RESOURCES.....	1
4. STUDY APPROACH AND METHODOLOGY	3
5. DESCRIPTION OF THE AFFECTED ENVIRONMENT	4
6. SITE SIGNIFICANCE AND ASSESSMENT	6
7. RECOMMENDATIONS.....	7
8. REFERENCES.....	8
APPENDIX 1: CONVENTIONS USED TO ASSESS THE IMPACT OF PROJECTS ON HERITAGE RESOURCES.....	9
APPENDIX 2. RELEVANT LEGISLATION	11
APPENDIX 3: SURVEY RESULTS	13
APPENDIX 4: ILLUSTRATIONS.....	15

LIST OF FIGURES

	Page
Fig. 1. Location of the study area (green circle) in regional context	4
Fig. 2. The study area, showing the two identified cemeteries.....	13
Fig. 3. Layout of the proposed development areas.	14
Fig. 4. Aerial photograph of the site.....	15
Fig. 5. The study area looking north.	16
Fig. 6. Different section of the study area.	16
Fig. 7. Northern section of the study area where agricultural fields have been made.....	17
Fig. 8. View over the north-eastern section of study area.	17
Fig. 9. Reserves in the Olifantshoek area.....	18

GLOSSARY OF TERMS AND ABBREVIATIONS**STONE AGE**

Early Stone Age	2 000 000 - 150 000 Before Present (BP)
Middle Stone Age	150 000 - 30 000 BP
Late Stone Age	30 000 - until c. AD 200

IRON AGE

Early Iron Age	AD 200 - AD 900
Middle Iron Age	AD 900 - AD 1300
Late Iron Age	AD 1300 - AD 1830

HISTORIC PERIOD

Since the arrival of the white settlers - c. AD 1840 in this part of the country

ASAPA	Association of Southern African Professional Archaeologists
EIA	Early Iron Age
ESA	Early Stone Age
LIA	Late Iron Age
LSA	Late Stone Age
MSA	Middle Stone Age
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Agency
SAHRA	South African Heritage Resources Agency

ARCHAEOLOGICAL IMPACT SURVEY REPORT FOR THE PROPOSED TOWNSHIP DEVELOPMENT IN OLIFANTSHOEK, NORTHERN CAPE PROVINCE

1. INTRODUCTION

Gamagara Municipality proposes to expand the town of Olifantshoek in the Northern Cape. For this purpose seven sections of land of uneven size, all located to the east of the town of Olifantshoek, have been identified.

An independent archaeological consultant was appointed by **Cultmatrix** to conduct a survey to locate, identify, evaluate and document sites, objects and structures of cultural importance dating to the Stone Age and Iron Age found within the boundaries of the areas where it is planned to develop the township extensions.

This AIA report forms part of the Environmental Impact Assessment (EIA) as required by the EIA Regulations in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and was done in accordance with Section 38 of the National Heritage Resources Act, No. 25 of 1999 and is intended for submission to the South African Heritage Resources Agency (SAHRA).

2. TERMS OF REFERENCE

The scope of work consisted of conducting a Phase 1 archaeological survey of the site in accordance with the requirements of Section 38(3) of the National Heritage Resources Act (Act 25 of 1999).

This include:

- Conducting a desk-top investigation of the area
- A visit to the proposed development site

The objectives were to

- Identify possible archaeological, cultural and historic sites within the proposed development areas;
- Evaluate the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources;
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance.

3. HERITAGE RESOURCES

3.1 The National Estate

The NHRA (No. 25 of 1999) defines the heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations that must be considered part of the national estate to include:

- places, buildings, structures and equipment of cultural significance;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features of cultural significance;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds, including-
 - ancestral graves;
 - royal graves and graves of traditional leaders;
 - graves of victims of conflict;
 - graves of individuals designated by the Minister by notice in the Gazette;
 - historical graves and cemeteries; and
 - other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);
- sites of significance relating to the history of slavery in South Africa;
- movable objects, including-
 - objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
 - objects to which oral traditions are attached or which are associated with living heritage;
 - ethnographic art and objects;
 - military objects;
 - objects of decorative or fine art;
 - objects of scientific or technological interest; and
 - books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

3.2 Cultural significance

In the NHRA, Section 2 (vi), it is stated that “cultural significance” means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. This is determined in relation to a site or feature’s uniqueness, condition of preservation and research potential.

According to Section 3(3) of the NHRA, a place or object is to be considered part of the national estate if it has cultural significance or other special value because of

- its importance in the community, or pattern of South Africa's history;
- its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
- sites of significance relating to the history of slavery in South Africa.

4. STUDY APPROACH AND METHODOLOGY

4.1 Extent of the Study

This survey and impact assessment covers the area as presented in Section 5 and as illustrated in Figure 1.

4.2 Methodology

4.2.1 Preliminary investigation

4.2.1.1 Survey of the literature

A survey of the relevant literature was conducted with the aim of reviewing the previous research done and determining the potential of the area: Breutz (1963), Legasick (1969), SA Manganese Amcor (1977), Beaumont & Vogel (1984), Snyman (1986), Beaumont & Morris (1990), Couzens (2004) and Dreyer (2007) were consulted.

- An overview of the history of the larger region was obtained, indicating the wide range of possible heritage sites that could be expected.

4.2.1.2 Data bases

The *Heritage Atlas Database*, the *Environmental Potential Atlas* and the *National Archives of South Africa* were consulted.

- Information on a number of sites located outside the study area was obtained. These sites are mostly contemporary graves and cemeteries.

4.2.1.3 Other sources

Aerial photographs and topocadastral and other maps were also studied - see the list of references below.

- Little information of actual use was obtained from these sources.

4.2.2 Field survey

The field survey was done according to generally accepted archaeological practices, and was aimed at locating all possible sites, objects and structures. The areas that had to be investigated was identified by members of **Cultmatrix** by means of maps and during a site visit. A number of transects were walked across each of the seven sites.

4.2.3 Documentation

All sites, objects and structures that are identified are documented according to the general minimum standards accepted by the archaeological profession. Coordinates of individual localities are determined by means of the *Global Positioning System (GPS)*¹ and plotted on a map. This information is added to the description in order to facilitate the identification of each locality.

Map datum used: Hartebeeshoek 94 (WGS84).

¹ According to the manufacturer a certain deviation may be expected for each reading. Care was, however, taken to obtain as accurate a reading as possible, and then to correlate it with reference to the physical environment before plotting it on the map.

4.3 Limitations

In some area the vegetation was very high and dense, limiting the archaeological visibility

5. DESCRIPTION OF THE AFFECTED ENVIRONMENT

5.1 Site location

The development consists of Portion of erf 155, Portion of portion 1 of erf 155, Portion of erf 1267, Portion of erf 1268, Portion of erf 1266, Portion of erf 1355 and Portion of erf 454 of the farm Olifantshoek Allotment Area, all located on the eastern side of the town of Olifantshoek (Fig. 1 & 2). For more detail, please see the Technical Summary above.

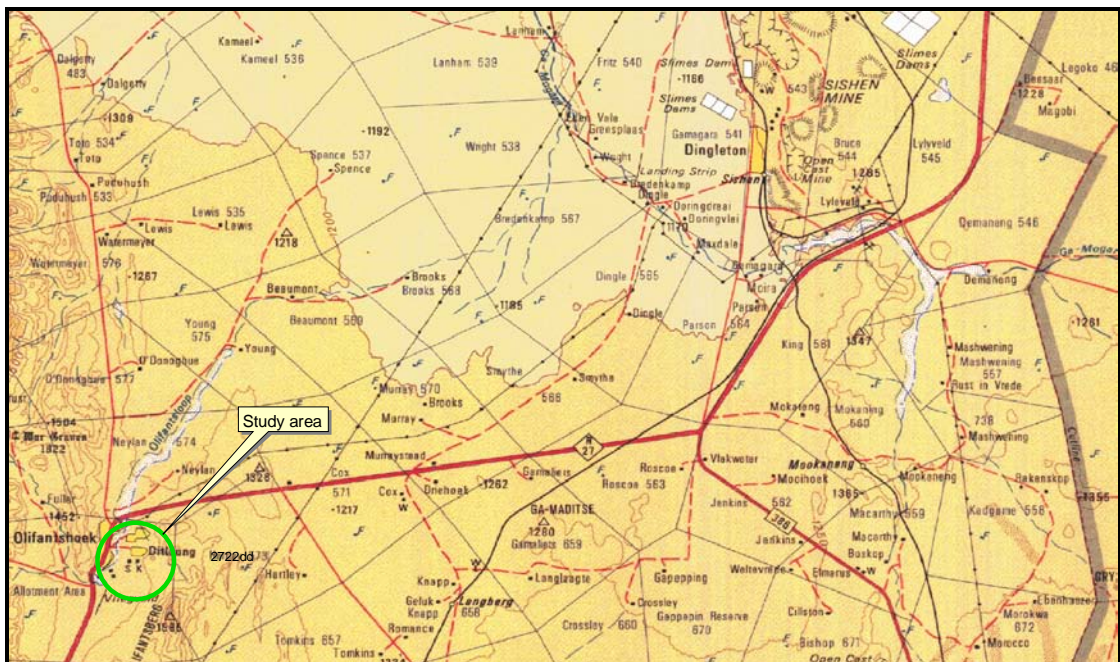


Fig. 1. Location of the study area (green circle) in regional context.

5.2 Site description

The geology of the area is complex, being made up from west to east by arenite, sand and andesite. The original vegetation is classified as Kalahari Mountain Bushveld, but has been impacted on by overgrazing, informal settlements and agricultural fields.

5.2 Overview of the region

Most sources indicate an area of low human occupation. This is largely as a result of the lack of open water. It was only with the arrival of drilling rigs and wind-mills that population density increased.

Stone Age

Occupation of the region took place during the Stone Age. Most of this, however, seems to date to the Early Stone Age and centres in the areas where there are hills, e.g. to the east and south. For example, in the vicinity of Kathu, Beaumont & Morris (1990) and Dreyer (2007) identified to occurrence of extensive Early Stone Age occupation.

Less obvious in its presence are the Later Stone Age sites, some of which are indicated by Beaumont & Vogel (1984). They equate these sites, some which occur in the larger region, with Cape Coastal pottery associated with amorphous LSA (herders) or Wilton (hunter-gatherers) in the period 100 BC to AD 1900.

Iron Age

Early Iron Age occupation did not take place in the region and seems as if the earliest people to live settled lives here were those of Tswana-speaking origin (Tlhaping and Tlharo) that settled mostly to the north and a bit to the west of Kuruman. However, they continued spreading westward and by the late 18th century some groups occupied the Langeberg region. With the annexation of the Tswana areas by the British in 1885, the area became known as British Betchuana Land. A number of reserves were set up for these people to stay in. In 1895 the Tswana-speakers rose up in resistance to the British authority as represented by the government of the Cape Colony. They were quickly subjected and their land was taken away, divided up into farms and given out to white farmers to settle on (Snyman 1986).

Historic period

Many early explorers, hunters, traders and missionaries travelled through the area on their way to Kuruman on what was to become known as the "missionary road". Anderson, Burchell, Harris, Holub, Lichtenstein and Moffat are but a few of the better-known names to pass through here.

In 1902 Olifantshoek got its first permanent inhabitant, Edward Finnis and in 1903 Michael Colley opened a shop. The slow growth of Olifantshoek can be attributed to the fact that for many years Deben (Dibeng) was the main seat of the church in the region and local people preferred to go there.

Although prospecting for minerals, especially diamonds occurred in the area and some knowledge was available on the iron deposits, it was only during the 1940s that the extent of the iron and manganese deposits were established. This was followed by the establishment of towns such as Sishen (1952) and Kathu in 1972.

5.4 Identified sites

5.4.1 *Stone Age*

- A few stone tools and flakes were noticed in various places, especially in the south-eastern and north-eastern sections of the study area. These date to the Middle Stone Age, although a few might date to the Early Stone Age. All these are surface finds,

implying that they not in their original context any more and probably have been moved around a lot due to agricultural, road making and other activities in the region.

5.4.2 Iron Age

- No sites, features or objects of cultural significance dating to the Iron Age were identified in the study area.

5.4.3 Historic period

- Two large cemeteries were identified. As both are still in use and seem to expand rapidly, they are well marked and will not be impacted on by the proposed developments.

6. SITE SIGNIFICANCE AND ASSESSMENT

6.1 Heritage assessment criteria and grading

According to the NHRA, No. 25 of 1999, Section 2(vi), the *significance* of heritage sites and artefacts is determined by its aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technical value in relation to the uniqueness, condition of preservation and research potential.

A matrix was developed whereby the above criteria, as set out in Sections 3(3) and 7 of the NHRA, No. 25 of 1999, were applied for each identified site (see Appendix 1). This allowed some form of control over the application of similar values for similar sites.

The NHRA stipulates the assessment criteria and grading of archaeological sites. The following categories are distinguished in Section 7 of the Act:

- **Grade I:** Heritage resources with qualities so exceptional that they are of special national significance;
- **Grade II:** Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region; and
- **Grade III:** Other heritage resources worthy of conservation, on a local authority level.

The occurrence of sites with a Grade I significance will demand that the development activities be drastically altered in order to retain these sites in their original state. For Grade II and Grade III sites, the application of mitigation measures would allow the development activities to continue.

6.2 Statement of significance

In terms of Section 7 of the NHRA, all the sites currently known or which are expected to occur in the study area are evaluated to have Grade III significance with

- The cemeteries are viewed to have high significance on a local level.

6.3 Impact assessment

Impact analysis of cultural heritage resources under threat of the proposed development, are based on the present understanding of the development.

- As no heritage sites are known to occur in the study area, there would be no impact resulting from the proposed expansion of the township.

7. RECOMMENDATIONS

The aim of the survey was to locate, identify, evaluate and document sites, objects and structures of cultural significance found within the area in which it is proposed to develop two sections of township.

- As no heritage sites are known to occur in the study area, there would be no impact resulting from the proposed development.

Therefore, from a heritage point of view we recommend that the proposed development can continue. However, we request that if archaeological sites or graves are exposed during construction work, it should immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

8. REFERENCES

8.1 Data bases

Chief Surveyor General

Environmental Potential Atlas, Department of Environmental Affairs and Tourism.

Heritage Atlas Database, Pretoria.

National Archives of South Africa

8.2 Literature

Acocks, J.P.H. 1975. *Veld Types of South Africa*. Memoirs of the Botanical Survey of South Africa, No. 40. Pretoria: Botanical Research Institute.

Beaumont, P.B. & Vogel, J.C. 1984. Spatial patterning of the ceramic Later Stone Age in the Northern Cape Province, South Africa. In Hall, M., Avery, G., Avery, D.M., Wilson, M.L. and Humphreys, A.J.B. (eds.) 1984. *Frontiers: South African Archaeology Today*. Cambridge Monographs in African Archaeology 10. BAR International Series 207: 80-95.

Beaumont, P & Morris, D (eds.) 1990. *Guide to the archaeological sites in the Northern Cape*. Kimberley: McGregor Museum.

Breutz, P-L. 1963. *The Tribes of the Districts of Kuruman and Postmasburg*. Ethnological Publications No. 49. Pretoria: Government Printer.

Couzens, T. 2004. *Battles of South Africa*, Cape Town: David Philip.

Dreyer, J. 2007. First Phase archaeological and cultural heritage assessment of the proposed Garona-Mercury transmission power line, Northern Cape, North-West and Free State. Bloemfontein: Unpublished report.

Legassick, M. 1969. The Sotho-Tswana Peoples before 1800. In Thompson, L. (ed) 1969. *African Societies in southern Africa*. London: Heinemann. Pp. 86-125.

S A Manganese Amcor Ltd. 1977. *Kalahari Wealth: the story of manganese, 1926-1976*. Cape Town: Purnell.

Snyman, P.H.R. 1986. Die Langeberg-rebellie en die totstandkoming van Olifantshoek. *Contree* 20:16-26.

Snyman, P.H.R. 1987. Die rol van Sendelinge, die owerheid en ekonomiese faktore in die ontstaan van Kuruman, 1886-1913. *Contree* 22:5-14.

8.3 Maps

1: 50 000 Topocadastral maps – 2722DC, 2722DD

APPENDIX 1: CONVENTIONS USED TO ASSESS THE IMPACT OF PROJECTS ON HERITAGE RESOURCES

Significance

According to the NHRA, Section 2(vi) the **significance** of a heritage sites and artefacts is determined by it aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technical value in relation to the uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.

Matrix used for assessing the significance of each identified site/feature

1. Historic value				
Is it important in the community, or pattern of history				
Does it have strong or special association with the life or work of a person, group or organisation of importance in history				
Does it have significance relating to the history of slavery				
2. Aesthetic value				
It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group				
3. Scientific value				
Does it have potential to yield information that will contribute to an understanding of natural or cultural heritage				
Is it important in demonstrating a high degree of creative or technical achievement at a particular period				
4. Social value				
Does it have strong or special association with a particular community or cultural group for social, cultural or spiritual reasons				
5. Rarity				
Does it possess uncommon, rare or endangered aspects of natural or cultural heritage				
6. Representivity				
Is it important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects				
Importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class				
Importance in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province, region or locality.				
7. Sphere of Significance		High	Medium	Low
International				
National				
Provincial				
Regional				
Local				
Specific community				
8. Significance rating of feature				
1.	Low			
2.	Medium			
3.	High			

Significance of impact:

- low where the impact will not have an influence on or require to be significantly accommodated in the project design
- medium where the impact could have an influence which will require modification of the project design or alternative mitigation
- high where it would have a “no-go” implication on the project regardless of any mitigation

Certainty of prediction:

- Definite: More than 90% sure of a particular fact. Substantial supportive data to verify assessment
- Probable: More than 70% sure of a particular fact, or of the likelihood of that impact occurring
- Possible: Only more than 40% sure of a particular fact, or of the likelihood of an impact occurring
- Unsure: Less than 40% sure of a particular fact, or the likelihood of an impact occurring

Recommended management action:

For each impact, the recommended practically attainable mitigation actions which would result in a measurable reduction of the impact, must be identified. This is expressed according to the following:

- 1 = no further investigation/action necessary
- 2 = controlled sampling and/or mapping of the site necessary
- 3 = preserve site if possible, otherwise extensive salvage excavation and/or mapping necessary
- 4 = preserve site at all costs
- 5 = relocate/retain graves

Legal requirements:

Identify and list the specific legislation and permit requirements which potentially could be infringed upon by the proposed project, if mitigation is necessary.

APPENDIX 2. RELEVANT LEGISLATION

All archaeological and palaeontological sites, and meteorites are protected by the National Heritage Resources Act (Act no 25 of 1999) as stated in Section 35:

(1) Subject to the provisions of section 8, the protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority: Provided that the protection of any wreck in the territorial waters and the maritime cultural zone shall be the responsibility of SAHRA.

(2) Subject to the provisions of subsection (8)(a), all archaeological objects, palaeontological material and meteorites are the property of the State. The responsible heritage authority must, on behalf of the State, at its discretion ensure that such objects are lodged with a museum or other public institution that has a collection policy acceptable to the heritage resources authority and may in so doing establish such terms and conditions as it sees fit for the conservation of such objects.

(3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.

(4) No person may, without a permit issued by the responsible heritage resources authority-

(a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;

(b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;

(c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or

(d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

In terms of cemeteries and graves the following (Section 36):

(1) Where it is not the responsibility of any other authority, SAHRA must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit.

(2) SAHRA must identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with the grave referred to in subsection (1), and must maintain such memorials.

(3) No person may, without a permit issued by SAHRA or a provincial heritage resources authority-

(a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;

(b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or

(c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

(4) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.

The National Heritage Resources Act (Act no 25 of 1999) stipulates the assessment criteria and grading of archaeological sites. The following categories are distinguished in Section 7 of the Act:

- **Grade I:** Heritage resources with qualities so exceptional that they are of special national significance;
- **Grade II:** Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region; and
- **Grade III:** Other heritage resources worthy of conservation, and which prescribes heritage resources assessment criteria, consistent with the criteria set out in section 3(3), which must be used by a heritage resources authority or a local authority to assess the intrinsic, comparative and contextual significance of a heritage resource and the relative benefits and costs of its protection, so that the appropriate level of grading of the resource and the consequent responsibility for its management may be allocated in terms of section 8.

APPENDIX 3: SURVEY RESULTS

See Appendix 1 for an explanation of the conventions used in assessing the cultural remains.

Map datum used: Hartebeeshoek 94 (WGS84).

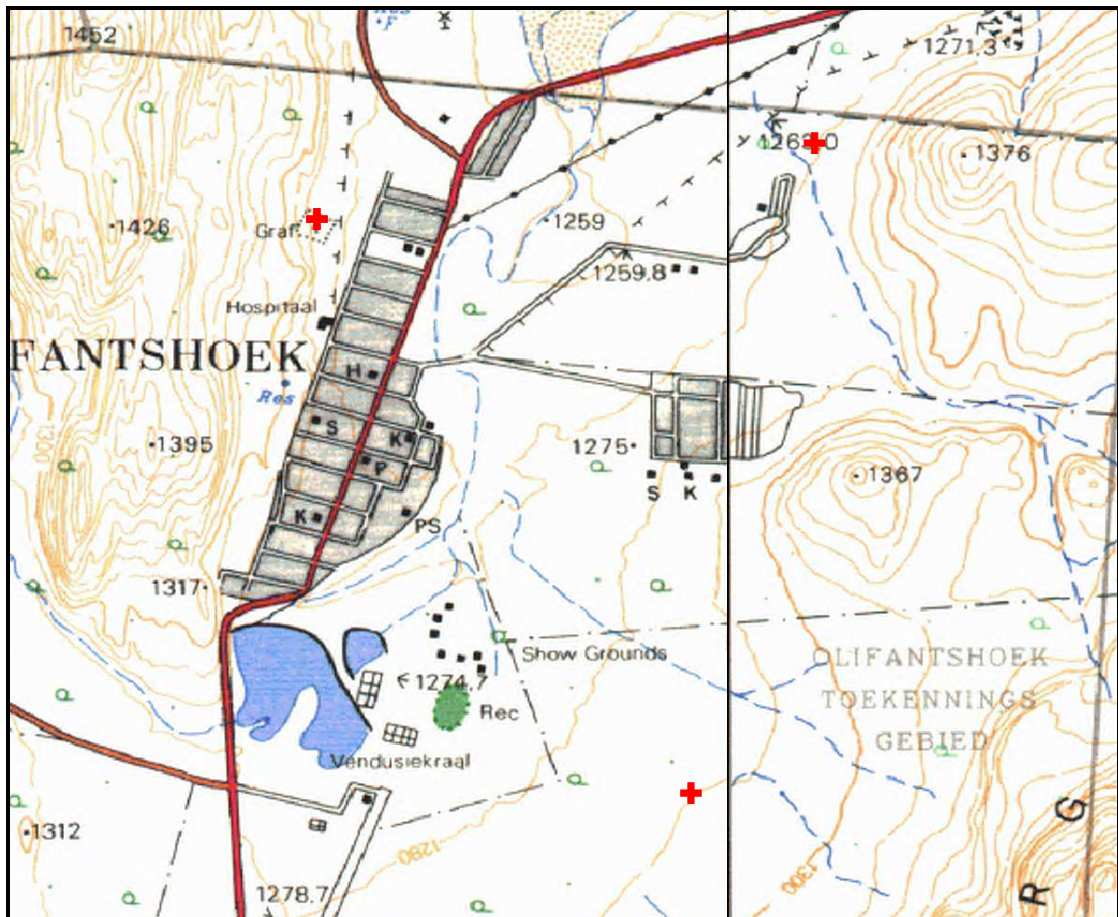


Fig. 2. The study area, showing the two identified cemeteries.
(Maps 2722DC, 2722DD: Chief Surveyor-General)

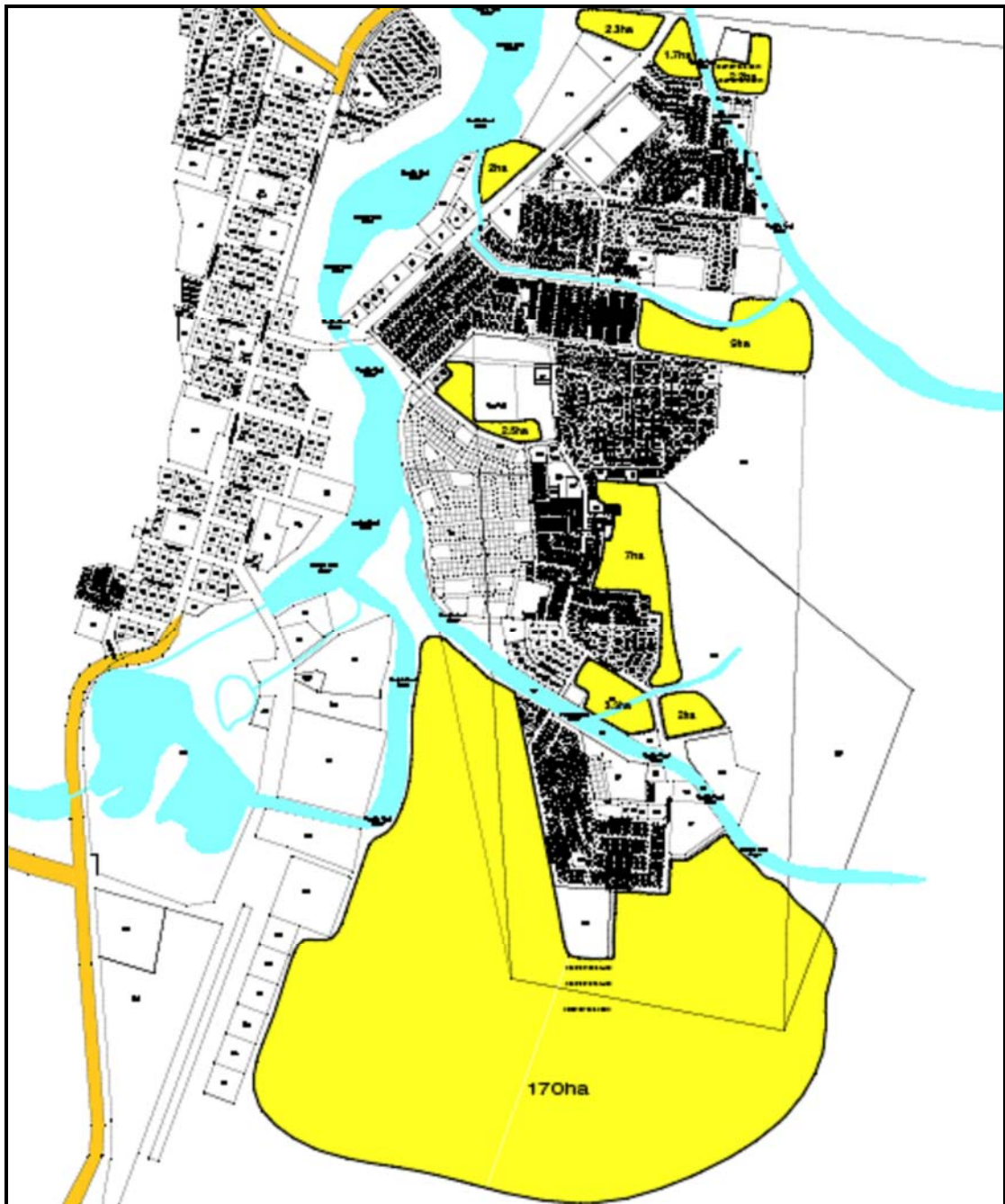


Fig. 3. Layout of the proposed development areas.

APPENDIX 4: ILLUSTRATIONS



Fig. 4. Aerial photograph of the site.
(Photo: Google Earth)



Fig. 5. The study area looking north.



Fig. 6. Different section of the study area.



Fig. 7. Northern section of the study area where agricultural fields have been made.



Fig. 8. View over the north-eastern section of study area.

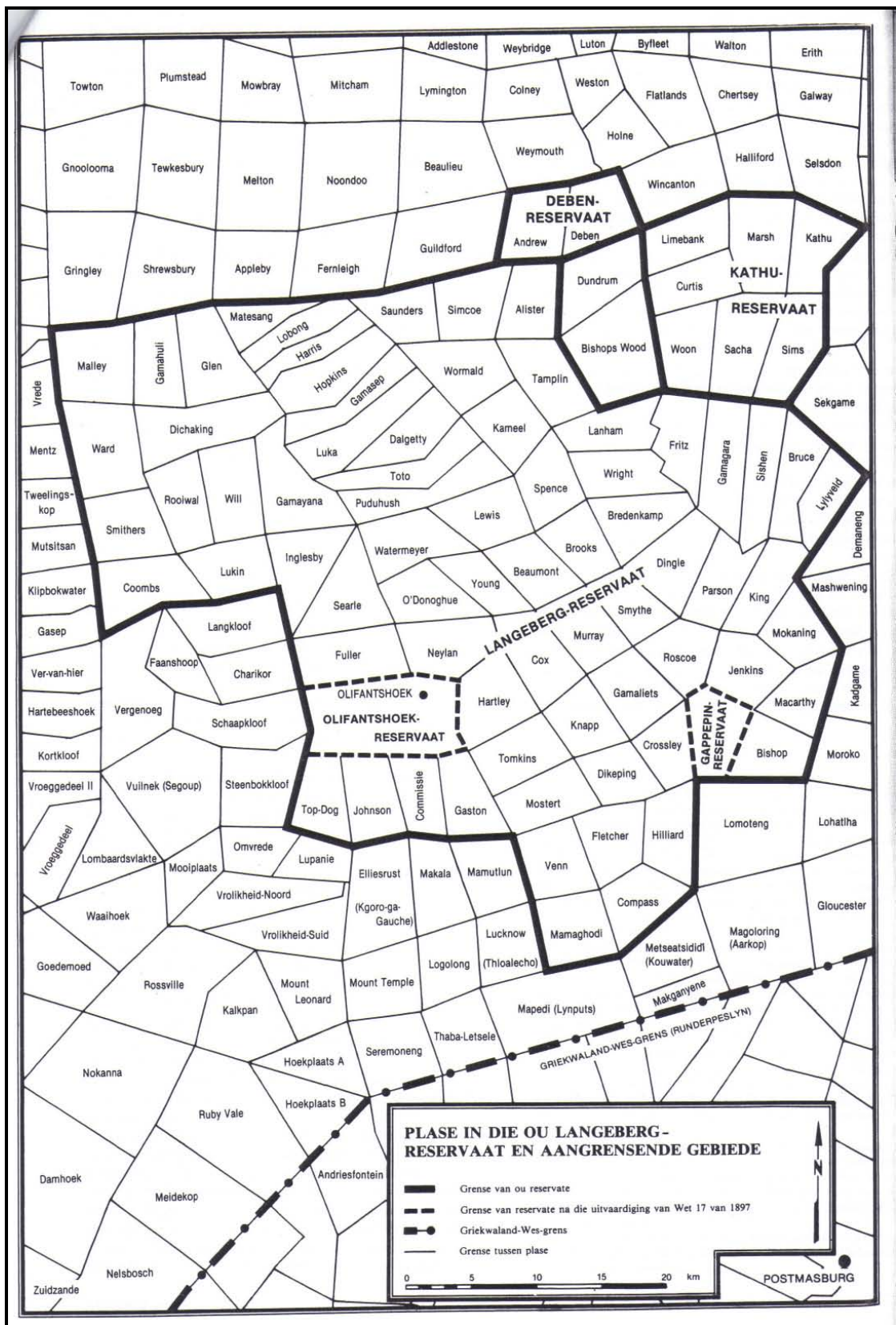


Fig. 9. Reserves in the Olifantshoek area.