

# HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED EXTENSION AND UPGRADE TO THE POTSDAM AND MELKBOSSTRAND WASTE WATER TREATMENT WORKS AND ASSOCIATED INFRASTRUCTURE, CAPE TOWN MAGISTERIAL DISTRICT, WESTERN CAPE

(Assessment conducted under Section 38 (8) of the  
National Heritage Resources Act as part of an EIA.)

Prepared for

**Ninham Shand Consulting Services**  
P.O. Box 1347, Cape Town, 8000

And

**CCA Environmental**  
P.O. Box 10145, Caledon Square, 7905

First draft : 14 June 2007  
Revised and updated : 13 August 2007  
Final revision : 07 December 2007



Prepared by

**Jayson Orton & Tim Hart**

**Archaeology Contracts Office**  
Department of Archaeology  
University of Cape Town  
Private Bag  
Rondebosch  
7701

Phone (021) 650 2357  
Fax (021) 650 2352  
Email [jayson.orton@uct.ac.za](mailto:jayson.orton@uct.ac.za); [timothy.hart@uct.ac.za](mailto:timothy.hart@uct.ac.za)

## EXECUTIVE SUMMARY

The Archaeology Contracts Office (ACO) was appointed by Ninham Shand Consulting Services to undertake an Archaeological Impact Assessment for the extension and upgrading of both the Potsdam and Melkbosstrand Wastewater Treatment Works (WWTW) and the installation of a new pump station and pipeline in the Blouberg to Melkbos area. Three alternative pipeline routes, running along the R27, the Eskom servitude east of Blouberg Hill and along the railway line further to the east, were indicated for assessment. Other alternatives for the project had already been ruled out at the scoping stage of the project.

Part of the study area was covered by vehicle as the degree of disturbance precluded any surface archaeological traces. All other areas were covered on foot. Although some areas were blanketed with impenetrable exotic vegetation, others had very good visibility but almost exclusively due to disturbance in the form of ploughing and quad bike tracks. Various people representing a variety of local organisations were consulted to ensure that no heritage issues were overlooked during the study. The background study indicated that little research had been conducted in the area, although many pre-colonial burials have been collected from construction sites near the coast and records of other archaeological material do exist from a number of farms in the area. Fossil material is known to occur in the area and has already been reported from the current upgrade work at the Potsdam WWTW. The Battle of Blouberg which was fought between the British and Dutch in 1806 is the most significant heritage issue to exist in the study area. It occurred just southeast of Blouberg Hill.

The fossils at Potsdam are whale bones and it is not known whether other items may be associated. Several scatters of Early and/or Middle Stone Age (E/MSA) artefacts were recorded. All were in disturbed contexts and no decent diagnostic artefacts were seen. Later Stone Age (LSA) scatters were also found with two of them incorporating some shell fragments. In general these were quite small and ephemeral but at least two appeared to be more extensive occurrences of perhaps 15 m to 20 m diameter. Two quarry sites were recorded, one of which was already disturbed and has little value. The E/MSA material was most frequently associated with ferruginous material or degraded fragments of silcrete suggesting that it is usually associated with subsurface landforms covered by aeolian dunes in other areas.

A 20<sup>th</sup> century ruin near the Battle site and a recent memorial cross on the R27 are not protected by the legislation. The historic tree alignments of the old Mamre Road form a significant element in the local cultural landscape.

It is strongly recommended that pipeline Option 3 be avoided completely and that Option 1, along the R27 be favoured instead, preferably within the road reserve. Option 4 could be used but rerouting of the pipeline as far south of the Battle site as possible would need to be done. Monitoring of excavations for both the WWTW as well as the pump station is recommended in case of finding significant and possibly extensive fossil beds. This could be limited to a few visits to establish the fossil potential, mainly during the initial excavations. Further study of the E/MSA scatters is very unlikely to lend additional knowledge to the regional picture and is not recommended. Although not significant in and of themselves, the LSA artefact scatters carry some significance when considered in their regional context. The possibility of obtaining a radiocarbon date from one is also significant given how little is known of the local archaeology. Given the poor quality of the site though, the date should not be conducted as mitigation – collection of the material will suffice. Sampling of this and one

other LSA scatter is recommended, while monitoring of the pipeline excavations will be required in one area alongside a prehistoric silcrete quarry site.

The whole area around the Battle of Blaauwberg is seen as highly significant since human burials pertaining to the Battle could be found anywhere. All pipeline excavations in the vicinity of the Battle site would also need to be monitored for human remains and possibly historical artefacts. The Battle site falls within a declared Conservation Area known as the 'Blaauwberg Conservation Area'.

The possibility of finding prehistoric burials should also be borne in mind as their distribution is unpredictable although they are far more common in the immediate coastal areas with deeper sand cover.

Destruction/disturbance and mitigation permits would need to be obtained for the Stone Age sites and the Battle site as appropriate should pipeline Options 3 or 4 be chosen. Mitigation permits would also need to be obtained should palaeontological mitigation be required.

# Contents

<b>1. INTRODUCTION</b> .....	<b>5</b>
<b>2. TERMS OF REFERENCE</b> .....	<b>5</b>
<b>3. HERITAGE LEGISLATION</b> .....	<b>7</b>
<b>4. PROJECT DESCRIPTION</b> .....	<b>8</b>
<b>5. METHODS</b> .....	<b>8</b>
5.1. Limitations.....	9
<b>6. DESCRIPTION OF THE AFFECTED ENVIRONMENT</b> .....	<b>11</b>
<b>7. BACKGROUND TO LOCAL HERITAGE</b> .....	<b>16</b>
7.1. Palaeontology .....	16
7.2. Archaeology .....	16
7.3. History.....	17
<b>8. FINDINGS</b> .....	<b>18</b>
8.1. Palaeontology .....	20
8.1.1. Site 1 (Potsdam fossil bed) .....	20
8.2. Stone Age .....	21
8.2.1. Site 2 (LSA artefact scatter) .....	21
8.2.2. Site 3 (LSA artefact scatter) .....	21
8.2.3. Site 4 (?LSA artefact scatter) .....	22
8.2.4. Site 5 (?LSA/MSA artefact scatter).....	22
8.2.5. Site 6 (MSA artefact scatter) .....	23
8.2.6. Site 7 (Silcrete quarry).....	23
8.2.7. Site 8 (LSA shell and artefact scatter) .....	25
8.2.8. Site 9 (LSA artefact scatter) .....	25
8.2.9. Site 11 (Silcrete quarry).....	26
8.2.10. Site 13 (?ESA/MSA artefact scatter) .....	26
8.2.11. Site 14 (?ESA/MSA artefact scatter) .....	26
8.2.12. Site 15 (?ESA/MSA artefact scatter) .....	27
8.2.13. Site 16 (LSA shell and artefact scatter).....	28
8.2.14. Site 17 (MSA/?LSA artefact scatter).....	29
8.2.15. Site 18 (MSA artefact scatter) .....	30
8.3. Historical .....	30
8.3.1. Site 10 (20 <sup>th</sup> century farmstead and Battle of Blaauwberg site).....	30
8.3.2. Site 12 (Old Mamre Road) .....	32
8.4. Other .....	33
8.4.1. Site 19 (Roadside cross).....	33
<b>9. DISCUSSION AND ASSESSMENT</b> .....	<b>33</b>
9.1. Palaeontology .....	33
9.2. Stone Age .....	34
9.3. Historical .....	37
<b>10. CONCLUSIONS AND RECOMMENDATIONS</b> .....	<b>40</b>
10.1. Conclusions and recommendations for alternative pipeline routes .....	41
10.2. Conclusions and recommendation for WWTW upgrades and pump station .....	41
10.3. Specific mitigation and permit requirements for known sites .....	42
10.4. Unmarked burials.....	43
<b>11. REFERENCES</b> .....	<b>43</b>
<b>12. INVESTIGATION TEAM</b> .....	<b>46</b>
<b>APPENDIX 1</b> .....	<b>47</b>
<b>APPENDIX 2</b> .....	<b>48</b>

# 1. INTRODUCTION

In accordance with instruction from Heritage Western Cape (HWC), the Archaeology Contracts Office (ACO) was appointed by Ninham Shand Consulting Services to undertake a Heritage Impact Assessment (HIA) for the proposed upgrade and extension of two wastewater treatment works (WWTW) at Potsdam and Melkbosstrand. A new pipeline would also need to be laid as part of the extensions and three alternatives have been identified in this regard. The Potsdam WWTW lies alongside the M5 road between the eastern end of the Rietvlei Nature Area and the Chevron refinery, while the Melkbosstrand WWTW is along the R27 on the north bank of the Sout River (Figure 1). The expansion to the waste water treatment infrastructure is required to meet the needs of the fast-growing west coast suburbs in the area. This HIA is part of an Environmental Impact Assessment (EIA) which is being carried out jointly by Ninham Shand Consulting Services and CCA Environmental for the City of Cape Town.

## 2. TERMS OF REFERENCE

The following terms of reference were provided for the HIA:

- Take cognisance of the guideline for involving heritage specialists in the EIA process (Winter & Baumann 2005) in developing the approach to the heritage assessment;
- Review previous heritage investigations undertaken in the area;
- Liaise with HWC, the management of Blaauwberg Conservation Area (BCA) and local heritage organisations with regard to the heritage assessment.
- Compile a report including:
  - An overview of the local and regional heritage context of the area in terms of archaeological, palaeontological and cultural landscapes;
  - The sites/aspects/artefacts of heritage/cultural significance identified at the sites and along the outfall route options. In identifying heritage resources, consideration must be given to living resources and heritage landscapes;
  - An overview of any unique or significant sites/aspects/artefacts encountered;
  - A description and assessment of the significance of the impacts of the composite alternatives, including outfall routes, on the heritage resources (on a nominal scale of neutral, very low, low, medium, high and very high);
  - A detailed description of appropriate and practicable mitigation measures required to limit the significance of the construction and operational phase impacts and/or enhance potential benefits, and an assessment of their likely effectiveness. These guidelines should include appropriate recommendations for the final design and layout of the composite alternatives and outfall route options.
- Delineate any site/aspects/artefacts of heritage/cultural significance on the maps provided.

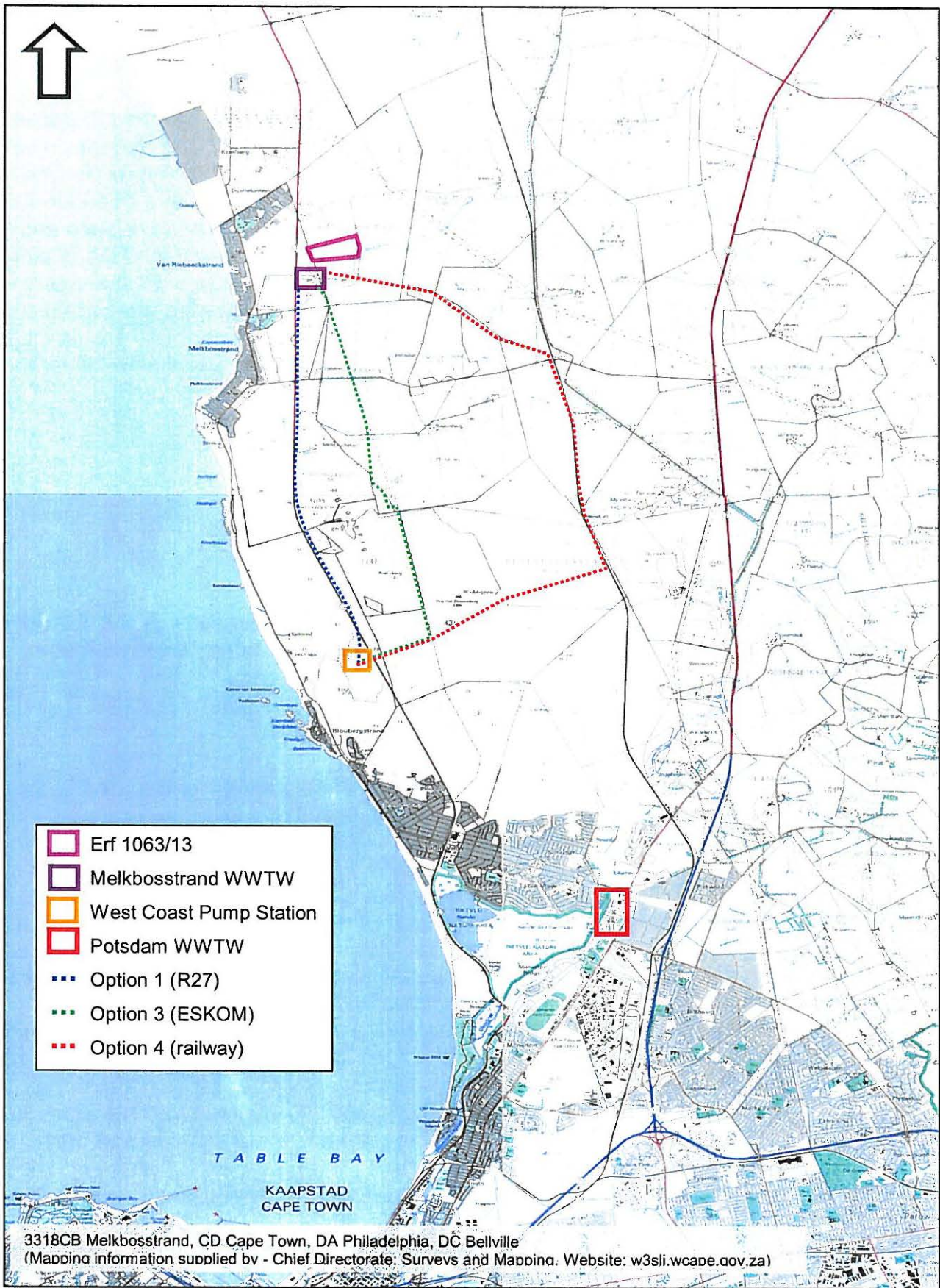


Figure 1: Location of the study areas.

### 3. HERITAGE LEGISLATION

The National Heritage Resources Act (NHRA) (No. 25 of 1999) protects a variety of heritage resources including all palaeontological or prehistoric material, historical artefacts and structures and human remains. Section 38 of the Act states that Heritage Impacts Assessments (HIAs) are required for certain kinds of development including:

- the construction of a road, wall, powerline, pipeline, canal or other similar linear development or barrier exceeding 300 m in length;
- the construction of a bridge or similar structure greater than 50 m in length;
- any development or other activity which will change the character of a site –
  - exceeding 5 000 m<sup>2</sup> in extent;
  - involving three or more existing erven or subdivisions thereof;
  - involving three or more erven or divisions thereof which have been consolidated within the past five years; or
- the re-zoning of a site exceeding 10 000 m<sup>2</sup> in extent.

The current project incorporates a pipeline longer than 300 m and the proposed pump station and WWTW expansions would change the character of sites exceeding 5000 m<sup>2</sup>.

Stand alone HIAs are not required where an EIA is carried out as long as the EIA contains an adequate HIA component that fulfils the provisions of Section 38. In such cases only those components not addressed by the EIA should be covered by the heritage component. The South African Heritage Resources Agency (SAHRA) is responsible for the protection of National Heritage Sites (grade 1 sites) as well as all historic graves and human remains. HWC is responsible for the management and protection of all Provincial Heritage Sites (grade 2 sites), generally protected heritage and structures (grade 3a – 3c sites) and prehistoric human remains. Disturbance or destruction of any protected heritage material will require a permit issued by the relevant authority.

In terms of the NHRA, the definitions of protected heritage material covered by the various sections are as follows:

- In Section 34, "**Structure**" means any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith. All such structures greater than 60 years of age are protected. Note that in terms of the legislation all renovations, alterations or changes to any protected structure will also require a permit.
- In Section 35, "**Archaeological**" refers to any material remains resulting from human activity which are older than 100 years of age, in a state of disuse and are in or on land. It includes artefacts, human and hominid remains and artificial features and structures. This means that an archaeological site is any area where there are artefacts (objects made by human hand) and/or ruins that are over 100 years of age. In terms of rock art it includes all area within 10 m of the art.
- In Section 35, "**Palaeontological**" includes any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace. The term fossil means mineralised bones of animals, shellfish, plants or marine animals and a trace fossil is the track, footprint or cast of a fossil organism that is preserved in stone or consolidated sediment.

- In Section 36, “**Burial Grounds and Graves**” means any place of interment and includes the contents, headstone or other marker of such a place, and any other structure on or associated with such place. Note that although isolated **human remains** are not included here, they are protected by other legislation such as the Exhumations Ordinances (12 of 1980) and the Human Tissues Act (No. 65 of 1983).
- “*Cultural landscapes*” are also protected by the Act. Any “**Place**” (site, area, region, structure or group of structures or open space) with “**Cultural significance**” (aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance) can be regarded as a cultural landscape. The compliance authority is permitted to intervene and comment on the design and aesthetic qualities of any development that forms part of, or is within sight of, a heritage place or site.

## 4. PROJECT DESCRIPTION

The project proposal involves the extension and upgrading of either one or both of the Potsdam and Melkbosstrand WWTW, installation of a new pump station and the laying of new pipelines for the distribution of wastewater. The pipeline would run between the new pump station and the Melkbosstrand WWTW. The project is now at the EIA stage with other alternatives already having been ruled out during the scoping study. In summary then, three alternative pipeline routes remain and are identified as follows (Figure 1):

- Option one: along the R27 within existing road reserve or outside the reserve but within 5 m of it;
- Option three: along the Eskom servitude over Blaauwberg Hill; or
- Option four: along the Atlantis Railway Line and veering westwards near Melkbosstrand.

In terms of development footprints, two possible options exist for each of the WWTW depending on the type of system chosen (Membrane Bioreactor or Activated Sludge). At Potsdam the extension and upgrade would either take place completely within the existing WWTW footprint with old facilities being replaced by new ones with higher capacity or would include a small portion of land immediately to the south of the existing works (Erf 9379). The majority of the existing works lie on Erf 1943 but Erven 10781, 23046, 1945 (part only) are also in use. If the Activated Sludge system is employed in the Melkbosstrand extension and upgrade then new land to the northeast of the existing site would be required, since the current footprint on Erf 1474 is too small to accommodate the required facilities. The proposed new location is on Erf 1063/13. The pump station is on completely undeveloped land (Erf 268) and the proposed footprint would be approximately 1 ha.

## 5. METHODS

Field surveys were conducted on 30<sup>th</sup> and 31<sup>st</sup> May, 1<sup>st</sup> June and 8<sup>th</sup> August 2007. These were done in two ways depending on the nature and degree of disturbance of the terrain. Due to the great amount of variation, the search area was broken up into various smaller areas to aid their description as shown in Table 1 and Figure 2.

The entire R27 route (Area 2) is heavily disturbed and was not searched in detail. Spot searches were made at various points along the route to confirm observations made from the



vehicle. The railway servitude (Area 8) is similarly disturbed and was searched in the same way. The very dense bush and the heavily disturbed nature of Areas 10 and 11b meant that only certain areas could be searched on foot. The remaining areas were all examined via detailed foot survey.

**Table 1:** Breakdown and description of the various areas under study.

Area	Description
1	Proposed West Coast Pump Station site and area east to R27
2	Option 1: R27 route
3	Option 2: R27 to Eskom servitude
4	Option 2: Eskom servitude south of Blaauwberg Hill
5	Option 2: west of Eskom servitude on Blaauwberg Hill
6	Option 2: Eskom servitude north of Blaauwberg Hill
7	Option 3: Eskom to Railway line
8	Option 3: Railway servitude
9	Option 3: Groot Oliphantskop and Vaatjie
10	Option 3: Between Vaatjie and Melkbos WWTW
11a	Melkbosstrand WWTW
11b	Melkbosstrand alternative site
12a	Potsdam WWTW
12b	Potsdam extension

Findings were photographed and described and their positions were recorded by means of a hand-held GPS receiver on the WGS84 datum.

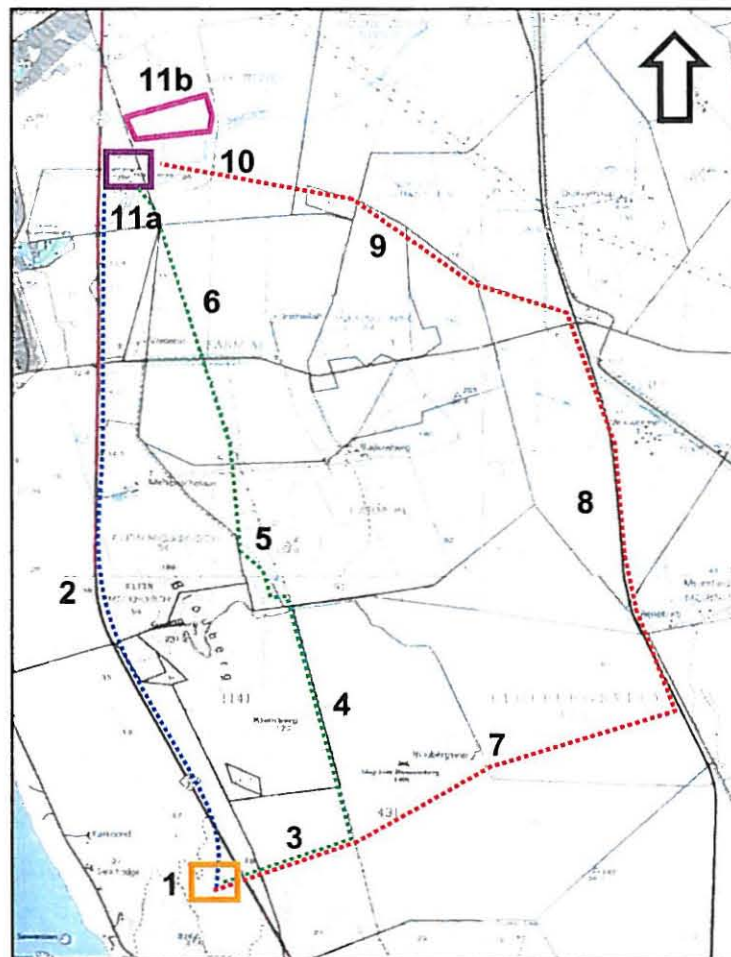
Various bodies and individuals were consulted in order to gain additional input to the project. This input relates primarily to the Battle of Blaauwberg. These are shown in Table 2.

The assessment of impacts is based on the archaeological or historical significance of sites within their local or regional context rather than on the criteria commonly employed by environmental practitioners. Consideration is given to the value of the information that can be obtained from the sites based on knowledge gained from previous work in the area as well as to their quality/integrity and the degree to which they will be disturbed or destroyed.

### 5.1. Limitations

Thick bush was encountered in some areas, specifically Areas 5, 7, 8, 10 and 11b, although within the latter some open, sandy areas and footpaths were found to exist. The majority of area 12b has been artificially levelled and is covered by grass. The sandy substrate along the southern part of the Eskom servitude (Area 4) is heavily disturbed by the actions of quad bikes, although it is felt that on the whole the disturbance in fact aided the location of archaeological material, since vegetation growth was retarded. The areas alongside the R27 road (Area 2) and the railway line (Area 8) are heavily disturbed both as a result of cut and fill activities related to their construction and maintenance work on the respective routes. Existing services already exist along the R27 resulting in further disturbance of the road servitude. Immediately adjacent to the R27, outside the road reserve, large parts are covered by thick vegetation while others, especially to the south and west of Blaauwberg Hill, have shifting dunes that have been stabilised by Port Jackson Willow trees. These shifting dunes would have resulted in the deflation and/or covering of archaeological material present in the area.

Despite these limitations, it is felt that the conclusions reached are sufficient to allow a decision to be made on whether the proposed developments should be allowed to proceed.



**Figure 2:** Map showing the breakdown of the study area into small areas. Area 12 (not shown) is the Potsdam WWTW further to the south.

**Table 2:** People consulted for heritage input during compilation of this report.

Name	Position/Affiliation/Interest
Adele Pretorius	Acting Area Manager for the North (includes Blaauwberg Conservation Area)
Major Tony Gordon	Blaauwberg Conservation Area SA Military History Society Family member on British side in the Battle Highly knowledgeable on the history of the Battle
Commander W. M. Bisset.	SA Military History Society Past curator of the Simons Town Naval Museum
Dr Dan Sleight	Historian
Gerry de Vries	Battle of Blouberg Heritage Society Canon Association
Willem Steenkamp	Military/historical writer Aelianus cc. (military/historical tourism)

## 6. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The study area is quite large although the development footprints are small. Aside from Blaauwberg Hill and its immediate surrounds, the area is quite highly developed, particularly to the south and along the coastal stretch. The area around the Melkbosstrand WWTW is less developed although a facility for off-road vehicles exists to the east.

The terrain is generally fairly flat although Blaauwberg Hill, in the central part of the study area, provides a significant feature at 231 metres above sea level. Prior to the heavy development that has occurred there, most of the area, primarily to the west of Blaauwberg Hill, would have been covered by shifting sand dunes. A large area inland from Melkbosstrand is still undeveloped with the vegetation there being a variable mix of exotic acacias and indigenous fynbos and renosterveld. A part of the area around the Blaauwberg Hill is protected within the Blaauwberg Conservation Area (BCA).

Two waterways traverse the area. To the north the short Sout River rises among farmlands to the east and debouches in the Atlantic Ocean at Melkbosstrand. The Diep River is more significant and flows from the Riebeek-Kasteel Mountains north of Malmesbury across the farmlands and into its large estuary which includes Rietvlei, a declared Protected Natural Environment, and the Milnerton Lagoon.

Specific physical characteristics of the search areas are outlined in Table 3 and Figures 3 to 18 record the primary physical features in each area.

**Table 3:** Physical characteristics of the search areas.

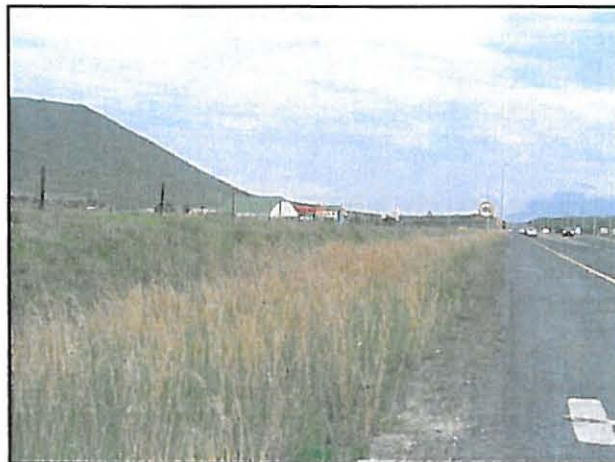
Area	Physical characteristics
1	Sand dunes heavily infested with exotic acacias and disturbed by road construction activities close to the R27.
2	Sand dunes with indigenous fynbos in some areas and long grass in others, heavily disturbed by road construction activities and laying of other services.
3	Sand dunes infested with exotic acacias and disturbed by earth moving, dumping and other sundry activities.
4	Sandy area with occasional dunes and indigenous fynbos, disturbed by quad bikes with severe erosion in places. Dense exotic acacias occur on either side of the servitude in this latter area.
5	Sandy area with fynbos present in the servitude but otherwise very dense exotic acacia infestation.
6	Most is flat, ploughed farmland with minimal vegetation cover. Far northern part is river floodplain flanked on either side by sand dunes with fynbos. Dense exotic acacias occur on either side of the servitude in this latter area.
7	Dense exotic acacias in the western and eastern parts but large open grassy area in the centre.
8	Dense exotic acacias flank the railway line but with open grassy areas in places near the northern end.
9	Flat, ploughed farmland but with a stand of exotic acacias near the south-eastern end. Crossed by the old Mamre Road avenue of blue gum trees.

Area	Physical characteristics
10	Sand dunes predominantly covered by dense exotic acacias, although the western portion is heavily disturbed through the presence of a 4x4 circuit. Dumping has also occurred on this latter area.
11a	The area around the Melkbos WWTW is flat, sandy and predominantly infested with exotic acacias, although much fynbos also exists.
11b	This area is flat, sandy and infested with exotic acacias. Open areas are present in places and sporadic fynbos plants are present in places.
12a	The area of the Potsdam WWTW is already fully developed.
12b	This small, flat area is under sports fields and thick grass.



**Figure 3 (left):** Area 1: location of the proposed West Coast Pump Station. Blaauwberg Hill is visible in the background.

**Figure 4 (right):** Area 2: southern part of the R27 route showing disturbed verge. Blaauwberg Hill is visible in the background.



**Figure 5 (left):** Area 2: northern part of the R27 route showing grassy verge. Blaauwberg Hill is visible on the left.

**Figure 6 (right):** Area 3: The gravel road between the R27 and the Eskom servitude.



**Figure 7 (left):** Area 4: looking south down the servitude, Kleinberg is visible on the right.  
**Figure 8 (right):** Area 4: quad bike tracks in the servitude.



**Figure 9:** Area 5: looking west over the Eskom servitude at Blouberg Hill. The proposed route runs through the thick bush in the foreground.



**Figure 10 (left):** Area 6: ploughed farmland.  
**Figure 11 (right):** Area 6: sand dune area south of the Sout River.



**Figure 12:** Area 7: Fields with bush to the west. Kleinberg is visible in the distance to the right.



**Figure 13 (left):** Area 8: field near the northern part of the railway route. Railway line is visible in background.  
**Figure 14 (right):** Area 8: heavily disturbed areas in the railway servitude.



**Figure 15 (left):** Area 9: Ploughed farmland and the patch of exotic acacias in the eastern part.  
**Figure 16 (right):** Area 10: Bushy area east of the 4x4 circuit.



**Figure 17 (left):** Area 11b: Bush and sand in the southern part of the site.  
**Figure 18 (right):** Area 11b: the western boundary fence and thick bush.



**Figure 19 (left):** Area 11b: The eastern part of the site with modern structures.  
**Figure 20 (right):** Area 12a: The part of the existing Potsdam WWTW for which the extension and upgrade is proposed



**Figure 21 (left):** Area 12b: The northern end of Theo Marais Park (sports fields) next to the Potsdam WWTW.  
**Figure 22 (right):** Area 12b: Overgrown part of Theo Marais Park.

## 7. BACKGROUND TO LOCAL HERITAGE

### 7.1. Palaeontology

The mineralised bones of ancient fauna are often found in this region of the Cape west coast. Fossils are regularly encountered between Woodstock beach, near Cape Town, and Saldanha Bay to the north of Yzerfontein. These include the material excavated from sites such as Elandsfontein (Singer & Wymer 1968), Duinefontein 2 (Klein *et al.* 1999) and Langebaanweg (Halkett & Hart 1999; Hendey 1969; Singer 1961). Fossil bones were also seen at Bakoond (Orton 2007) and Tygerfontein (Halkett & Hart 1995), both to the south of Yzerfontein, and a large collection has been made from an occurrence at Melkbosstrand (Hendey 1968). Material from the Milnerton beach area has also been recorded (Avery 1995; Broom 1909). Fossil material at Milnerton includes terrestrial and marine fauna, as well as shell deposits (Avery 1995). Many of these occurrences occur near the surface with the Melkbosstrand material having been exposed by wind deflation on an old marine terrace some 5 to 6 m above sea level (Hendey 1968: fig. 2). The Duinefontein 2 material occurs buried within red Pleistocene sands immediately north of the Koeberg power station within about 0.5 m of the surface (Klein *et al.* 1999).

Of direct relevance to this project is the fact that fossil whale bones have recently been discovered on the Potsdam site during the course of the current upgrade project there (Avery 2007; S. Killick, pers. comm. 2007). These were about two to three metres below current ground level.

### 7.2. Archaeology

Due to the rapid urban expansion of greater Cape Town, little archaeological work has been carried out in the general vicinity of the study area. Although southern Africa has been occupied by hominids for more than one million years, little evidence of the earliest occupation is preserved within the local region. The fossil site of Duinefontein 2 does, however, contain Early Stone Age (ESA, >200 thousand years ago (kya)) artefacts and similar isolated items are routinely found in ploughed fields across the south-western Cape. Kaplan (1996, 2000b) reports ESA artefacts from farmlands near the study area.

Middle Stone Age (MSA, 200kya – 20kya) artefacts were found in association with the Melkbosstrand fossils (Hendey 1968) indicating at least some MSA presence in the area. MSA artefacts of the Stillbay type have also been collected in the region of Maitland just south of the study area (Goodwin 1926, 1928) and at a site described as being between Milnerton and Maitland (Goodwin & Van Riet Lowe 1929). Artefacts thought to date to the MSA were observed at Groot Oliphantskop to the east of the Melkbosstrand WWTW (Orton & Hart 2004) and in the region of Vissershok (Kaplan 2002a).

In general, Later Stone Age (LSA, <20kya) sites are far more commonly encountered than earlier material. This may be largely due to burial of older sites beneath recent sand. The only formal excavations to have taken place at an LSA site are those in the near coastal dunes of the Atlantic Beach Golf Estate, just northwest of Blaauwberg Hill and at Melkbosstrand. At the Atlantic Beach sites late Holocene LSA occupation probably pertaining to the Khoekhoen people was found. The sites were located in the high sand dunes and consisted of shell middens and associated artefacts. The lowest shell layers were dated to about AD 700 to AD 750 at AB1 and about AD 1050 at AB3 (Sealy *et al.* 2005). Kaplan (2000a) and Gray (2000) conducted excavations in a shell midden with material probably



dating back to the mid-Holocene but this has never been studied further. Hendey (1968) and Avery (1995) also mention the existence of LSA shell middens among the coastal dunes and photographs of Bloubergstrand from the early 1900s in Duminy (1979) show the kind of dunes that would undoubtedly have housed LSA middens. The Atlantic Beach sites are approximately 1.3 km from the sea so the chance of finding further sites within the study area does exist.

LSA artefacts have also been noted from the vicinity of Maitland (Goodwin & Van Riet Lowe 1929), the farm Groot Oliphantskop (Kaplan 1996; Orton & Hart 2004) as well as other farms in the area (Kaplan 2004).

Two burials were reportedly excavated from the Groot Oliphantskop farm in the mid-20<sup>th</sup> century (Kaplan 1996). Morris (1992) has catalogued human burials from South Africa and records numerous burials from the Milnerton (13 listed), Blaauwberg (20 listed) and Melkbosstrand (22 listed) areas. Others have also been recorded in recent years (e.g. Avery 1995; Deacon & Goosen 1997; Kaplan 2000a, 2002b; Yates 2001) and continue to be found at new development sites.

### **7.3. History**

During the early years of the Cape Colony the Dutch settlers made use of the area for grazing but they are unlikely to have left any trace of this use. Early land grants resulted in the construction of farm buildings but not many remain intact today. Those at Groot Oliphantskop are, however, excellent and well preserved examples (Orton & Hart 2004) and, although now modified, the farmstead immediately north of the Blaauwberg Hill also relates to historical occupation of the area.

The most significant historical event to take place in the area was the Battle of Blaauwberg which occurred in early January 1806. This battle signalled the end of the Dutch occupation of the Cape when the British forces landed at Melkbosstrand, marched over the saddle at the north-eastern edge of Blouberg Hill and defeated the Dutch in a battle among the sand dunes to the east of Kleinberg.

The events unfolded as follows (modified from the Battle of Blaauwberg Bicentenary website [http://battle.blaauwberg.net/btb\\_brochure.php](http://battle.blaauwberg.net/btb_brochure.php)):

In 1806 England and France were at war over the trade route to the East. The Cape was governed by the Netherlands (then known as the Batavian Republic), an ally of France, and there were fears of an attack by the British due to the Cape's strategic position on the sea route between Europe and the East.

25th December 1805: After being chased by an English warship, a Privateer ran aground near Cape Point. The French captain informed the Cape Governor, Lieutenant General J. W. Janssens, of a strong British fleet en route to the Cape.

1st January 1806: A Proclamation was issued for a general call up of all able bodied men to defend the Cape.

4th January 1806: The British fleet was sighted. 63 British ships under Commodore Sir Home Popham with some 7 000 troops commanded by Major General Sir David Baird, dropped anchor between Robben Island and Blaauwberg. Baird knew what to expect at the Cape as he had served as a Brigadier General during the first British occupation of the Cape (1795 - 1803). He planned to land in Table Bay but this was not possible as gale force winds were blowing. Janssens had begun preparations for the defense of the Cape. He was able to rally about 2 000 men, amongst which

were:

- Batavian Marines and an assortment of citizen (burgher) cavalry, gunners and dragoons;
- 5th Waldeck Battalion (German and Hungarian mercenaries);
- French sailors and marines from 2 French vessels anchored in Table Bay;
- Hottentot Regiment (KhoiSan);
- Javanese Artillery (nicknamed the Mardykens);
- Slaves from Angola and Mozambique.

5th January 1806: Janssens moved his troops northwards to the V. O. C. (Dutch East India Company) outpost Rietvlei (Rietvallei). Two of the British warships and some transport ships sailed to Saldanha Bay to occupy the port.

6th January 1806: The British troops landed at Losperd's Bay (now known as Melkbosstrand). An old transport ship was beached to act as a breakwater. One of the landing boats capsized in the surf, drowning 36 Highlanders. Janssens did not oppose the landing.

7th January 1806: The remainder of the British troops, armaments, horses and necessary provisions were landed and preparations made for the advance to Cape Town. Janssens moved his troops out of their camp at Rietvlei and by afternoon had taken up position at Bloubergsvlei Farm on the plains east of Blouberg Hill. His forces straddled the wagon trail to Cape Town which the advancing British troops would have to use. British warships started bombardment of the camp at Rietvlei, not knowing that the enemy had already moved out.

8th January 1806: At 03H00 the British forces, formed in brigades, made their way towards the wagon trail. Soon after 05H00 the British troops were on the saddle of Blaauwberg Hill, looking down on the battlefield. The battle commenced on Kleinberg where the 24th regiment drove the mounted citizens off the hill. Captain Foster was killed and 15 men were either killed or wounded. By now the armies were within firing range of each other. The Highland Brigade was ordered to fix bayonets and charge, supported by cannon fire. On the Batavian front, confusion reigned. The regiments began to break rank and retreat, ignoring Janssens's pleas to stand their ground. Janssens, sensing defeat, ordered a retreat. The British, already exhausted, did not pursue. The Batavian troops regrouped at Rietvlei. 347 soldiers were reported missing. The British troops were exhausted after their march across hot sand under a scorching sun and without water. Many fainted and collapsed. When they arrived at the freshwater spring on Bloubergsvlei Farm, Baird had to personally supervise the distribution of water. The farm house was converted into a temporary hospital. British casualties were 204 dead and injured. Baird and the remainder of his troops pressed on and arrived at the deserted Rietvlei camp in the evening, encamping for the night.

9th January 1806: Baird and his troops advanced on Cape Town. Colonel von Prophalow, acting Commandant of Cape Town, offered no resistance. Janssens had withdrawn to the Hottentots Holland mountains, intending to offer further resistance.

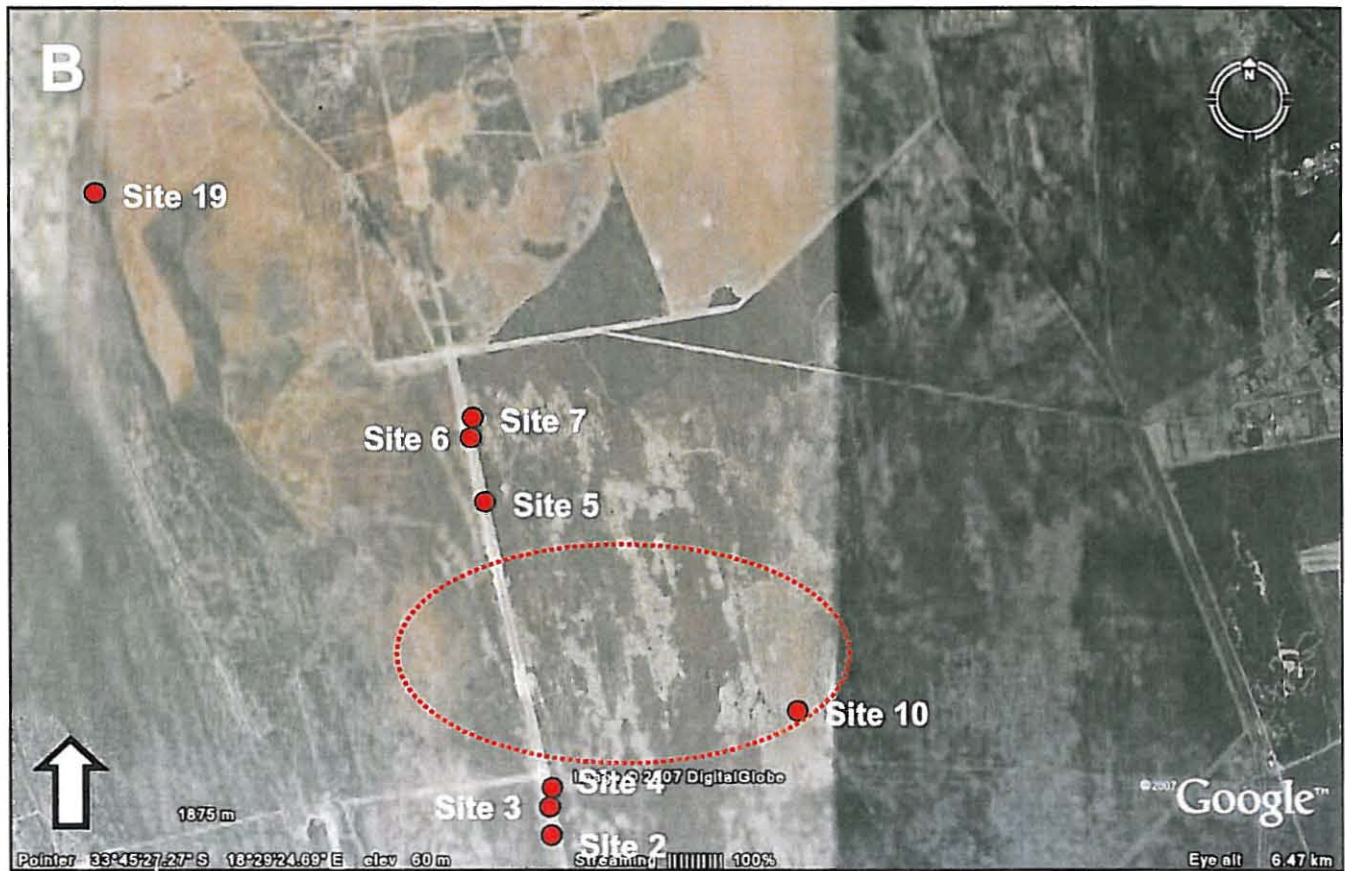
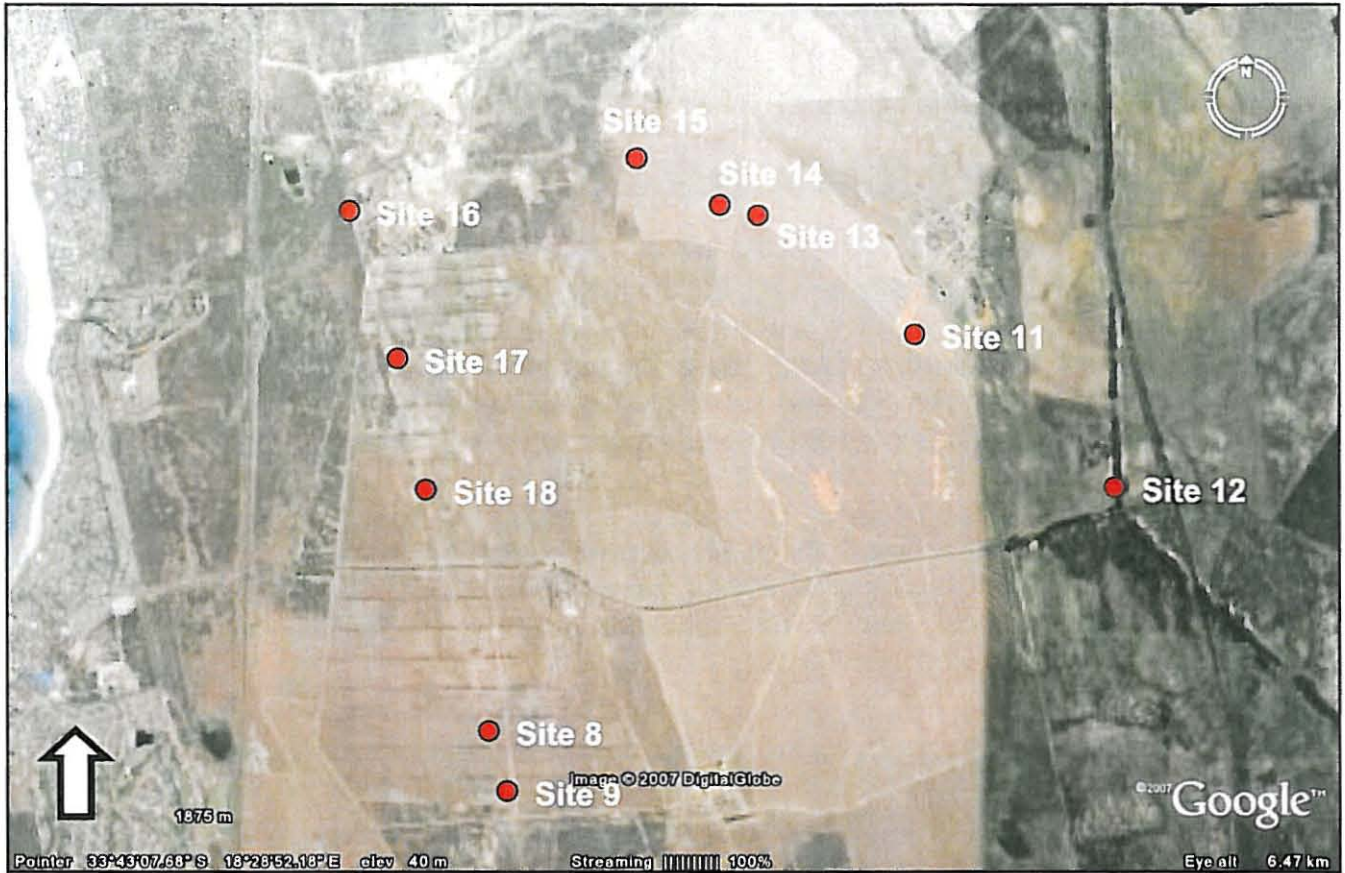
10th January 1806: The provisional Articles of Capitulation were signed at Papendorp, now Woodstock.

18th January 1806: Janssens surrenders under favourable terms for his troops, the citizens of the Cape and himself, with all existing rights and privileges being retained.

6th March 1806: Janssens, his officers and 573 men left Table Bay in 7 ships bound for the Batavian Republic.

## 8. FINDINGS

A number of heritage sites were located during the survey. These were mostly LSA but both older and more recent material is also present. These finds are addressed according to age and mapped in Figure 23.



**Figure 23:** Aerial photographs showing the location of sites 2 to 19. Site 1 is at the Potsdam WWTW further south (See Figure 1) and the approximate site of the Battle of Blouberg (listed with site 10) is shown by the red circle.

## 8.1. Palaeontology

### 8.1.1. Site 1 (Potsdam fossil bed)

Location: 33° 50' 31.0" S 18° 31' 20.0" E  
Erf 1943

Although not seen during this survey, fossil bones were recovered from the southern end of the Potsdam WWTW during the current extension and upgrade project. They were some 3m below the current ground surface. These bones were reported to the ACO by Mr Steve Killick, an engineer on the site, and subsequently examined by Dr Graham Avery of the Iziko SA Museum. The finds are whale bones similar to those frequently exposed on the beach near the Diep River estuary (Avery 2007; Figure 24) and are no doubt part of the extensive fossil bed that stretches between Woodstock beach in the south and Langebaanweg in the north as described in Section 6. Since the current works have probably only penetrated about 1 m below the ground surface (S. Killick, pers. comm. 2007), the fossil bed is likely to be intact below the existing ponds. Similarly, the fossil bed quite likely extends southwards beneath Theo Marais Park (Erf 9379).



**Figure 24:** Fossil whale bones from the Potsdam WWTW.  
(Photograph provided by Dr Graham Avery of Iziko SA Museum).

## 8.2. Stone Age

We have grouped all the Stone Age sites together, since, although material of different age is present, it is frequently difficult to tell them apart in the absence of diagnostic artefacts. Those from Area 4 were revealed primarily in the quad bike track with few artefacts being found outside the track. As such these sites are likely to be more extensive than was evident at the time of recording.

### 8.2.1. Site 2 (LSA artefact scatter)

Location: 33° 46' 34.5" S 18° 28' 59.8" E  
Farm name: Bloubergsvley 431

This site lies in Area 4 and consists of a fairly extensive scatter of stone artefacts in quartz and silcrete (Figure 25). Two of the silcrete flakes are retouched or utilised and might actually be scraper fragments.

### 8.2.2. Site 3 (LSA artefact scatter)

Location: 33° 46' 31.3" S 18° 28' 59.0" E  
Farm name: Bloubergsvley 431

This site consists of a scatter of quartz artefacts with no diagnostic items present (Figure 26). Based on the artefact size they are most likely LSA in age.



Figure 25: Stone artefacts from Site 2. Scale bar is 10 cm long.



**Figure 26:** Stone artefacts from Site 3. Scale bar is 5 cm long.

#### 8.2.3. Site 4 (?LSA artefact scatter)

Location: 33° 46' 29.5" S 18° 28' 58.5" E

Farm name: Bloubergsvley 431

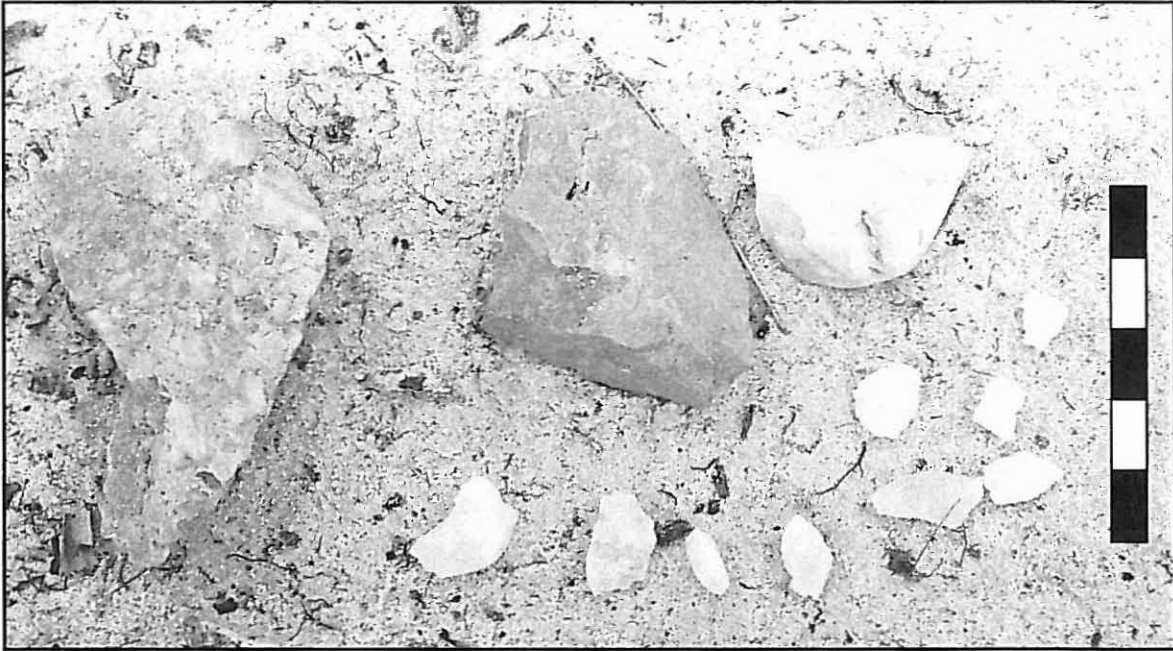
This site consists only of a very light scatter of some six or seven artefacts in quartz and silcrete and is probably LSA in age.

#### 8.2.4. Site 5 (?LSA/MSA artefact scatter)

Location: 33° 45' 41.3" S 18° 28' 46.2" E

Farm name: Bloubergsvley 431

This scatter of artefacts is in quartz and silcrete and may be a mix of MSA and LSA elements. It does not appear to be very extensive with only about 12 artefacts visible (Figure 27).



**Figure 27:** Stone artefacts from Site 5. Scale bar is 5 cm long.

#### 8.2.5. Site 6 (MSA artefact scatter)

Location: 33° 45' 26.3" S 18° 28' 42.3" E

Farm name: Bloubergsvley 431

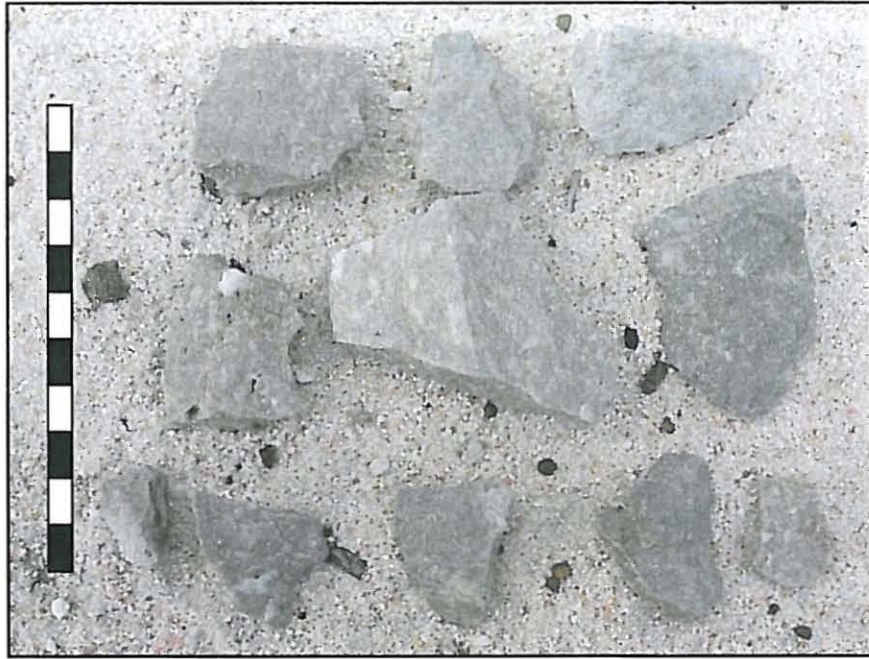
This artefact scatter is exclusively in silcrete (Figure 28) and lies in a deflated area with ferricrete nodules exposed at the surface. It appears as though some of the silcrete is non-artefactual. These artefacts are almost certainly MSA in origin and were probably quite deeply buried prior to disturbance and deflation in the quad bike track.

#### 8.2.6. Site 7 (Silcrete quarry)

Location: 33° 45' 23.4" S 18° 28' 41.2" E

Farm name: Bloubergsvley 431

This is not a real "site" but rather a collection of silcrete rafts that have been excavated out and piled to one side during construction of the powerlines (Figure 29). Some show marks indicative of their having been struck to remove flakes (Figure 30). These rafts would probably have been exposed in the drift sand from time to time during prehistory resulting in their periodic use as a source of raw material.



**Figure 28:** Stone artefacts from Site 6. Scale bar is 10 cm long.



**Figure 29 (left):** Silcrete rafts piled up at Site 7.

**Figure 30 (below):** Detail of a flaked edge where flakes have been removed from the silcrete raft. Ruler in cm.





### 8.2.7. Site 8 (LSA shell and artefact scatter)

Location: 33° 44' 01.0" S 18° 28' 14.4" E

Farm name: Farm 88

The presence of marine shell fragments indicates this scatter to date to the LSA. The site is in a ploughed field and has thus been smeared around the area. Its diameter is probably in the region of 20 to 25 m. It has artefacts in quartz and silcrete, a few pieces of ochre, a few fragments of unmodified shale and just two shell fragments (Figure 31). One of the latter is a limpet fragment and the other could not be identified. Being in a ploughed field there is a good chance that many more artefacts lie buried beneath the surface. The presence of organic material (marine shell) could allow for the production of a radiocarbon date for the site.



**Figure 31:** Artefacts, unmodified stone fragments and marine shell fragments from Site 8.  
Scale bar is 5 cm long.

### 8.2.8. Site 9 (LSA artefact scatter)

Location: 33° 44' 12.4" S 18° 28' 18.0" E

Farm name: Farm 88

This site is similar to Site 8 but consists only of flaked artefacts in quartz and silcrete (Figure 32). It too lies in a ploughed area and is smeared across the surface. The scatter is quite extensive perhaps covering an area of approximately 30 to 35 m in diameter.



**Figure 32:** Artefacts from Site 9. Scale bar is 5 cm long.

#### 8.2.9. Site 11 (Silcrete quarry)

Location: 33° 42' 49.8" S 18° 29' 42.9" E

Farm name: Groot Oliphants Kop 81

This site is a very impressive Stone Age quarry that has been recorded before during other assessments (Kaplan 1996; Orton & Hart 2004). It consists of a large silcrete outcrop that, through weathering of the surrounding landscape, stands proud of the surface (Figure 33). It is surrounded by many millions of flaked artefacts and broken fragments of silcrete as well as a fair number in quartz. The total diameter of the artefact scatter surrounding this site is some 200 m.

#### 8.2.10. Site 13 (?ESA/MSA artefact scatter)

Location: 33° 42' 28.5" S 18° 29' 09.7" E

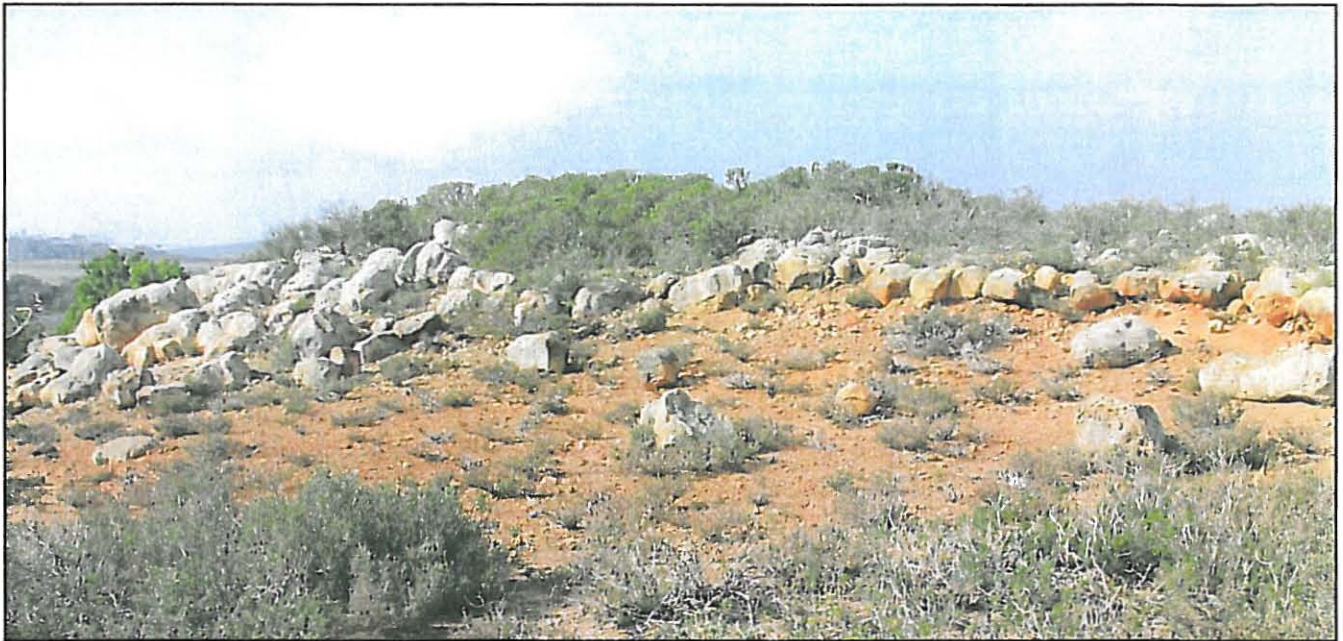
This light scatter consists of very crude and quite well weathered artefacts in silcrete. The site is in a ploughed field with a few artefacts spread over the surface.

#### 8.2.11. Site 14 (?ESA/MSA artefact scatter)

Location: 33° 42' 25.0" S 18° 29' 02.8" E

Farm name: Kleine Zoute Rivier 84

This scatter is not dissimilar to Site 13. It is also quite an ephemeral occurrence but with the ploughing of the field it is spread over an area of at least some 50 to 60 m diameter. The artefacts are also very crude and are accompanied by a variety of other cobbles and rough lumps of silcrete (Figure 34). It seems possible that an old silcrete source has eroded and weathered with time and upon exposure at the surface has become rather diffuse.



**Figure 33:** The quarried silcrete outcrop at Site 11.



**Figure 34:** Some of the material from Site 14. Scale bar is 10 cm long.

#### 8.2.12. Site 15 (?ESA/MSA artefact scatter)

Location: 33° 42' 17.5" S 18° 28' 46.5" E

Farm name: Kleine Zoute Rivier 84

This site is also similar in nature to Sites 13 and 14 but a single crude biface was also located (Figure 35). No cobbles are present on this scatter.



Figure 35: The crude biface from Site 15.

#### 8.2.13. Site 16 (LSA shell and artefact scatter)

Location: 33° 42' 26.6" S 18° 27' 42.3" E

Farm name: 1474

This small shell and artefact scatter (Figure 36) lies on the highest crest of the Holocene dune system flanking the southern margin of the Sout River floodplain. The Eskom servitude in this region has quite dense fynbos so only items exposed in the pathway could be located. The artefacts were mostly of quartz but one larger flake of argillaceous sandstone was also found. The shell species included *Scutellastra argenvillei*, *Cymbula granatina*, *C. granularis* and *Burnupena* sp. An isolated silcrete flake was also noted some 30 m to the south and might be related to the same site.



Figure 36: Stone artefacts and shell fragments from Site 16. Scale bar is 5 cm long.

#### 8.2.14. Site 17 (MSA/?LSA artefact scatter)

Location: 33° 42' 53.9" S 18° 27' 52.1" E  
Farm name: Farm 88

This scatter of artefacts lies in a deflated area which was probably originally artificially excavated (Figure 37). Although the overlying sand is white Holocene sand, the lowest material is yellow and has many small ferricrete nodules exposed. The artefacts are in quartz and silcrete (Figure 38) with the latter tending to be larger. One silcrete flake has ferricrete formed on its surface indicating that it dates back at least into the MSA. It is, however, also possible that the site contains a deflated admixture of LSA and MSA artefacts. A silcrete hammer stone was also seen.



**Figure 37 (left):** The deflated surface of Site 17.

**Figure 38 (below):** A selection of artefacts from Site 17. Scale bar is 5 cm long



### 8.2.15. Site 18 (MSA artefact scatter)

Location: 33° 43' 17.6" S 18° 27' 59.6" E

Farm name: Farm 88

This is an ephemeral but fairly widespread occurrence of silcrete artefacts in a ploughed field. The scatter is probably some 30 m in diameter. Although no diagnostic artefacts were found, there are many ferricrete nodules in the sand which often indicates that associated artefacts are MSA in age.

## 8.3. Historical

### 8.3.1. Site 10 (20<sup>th</sup> century farmstead and Battle of Blaauwberg site)

Location: 33° 46' 15.5" S 18° 29' 52.2" E

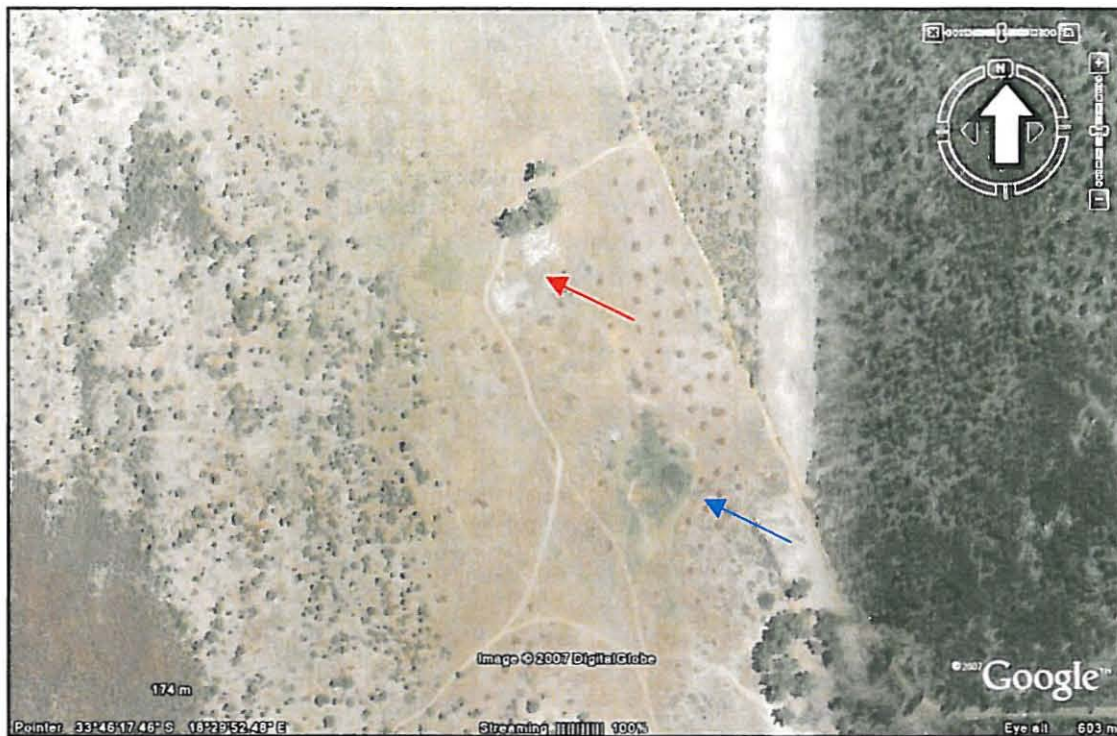
Farm name: Bloubergsvley 431

This farmstead consists of just two ruined structures (Figure 39) in the middle of a large open grassed area (Figure 12). It appears as though they have been recently collapsed, perhaps to prevent illegal occupation. Both are fairly square in plan and, judging by their fabric, appear to be quite recent, possibly dating to the early to mid-20<sup>th</sup> century (Figure 40). As ruins they fall within the archaeological section of the heritage legislation and, being less than 100 years of age, are thus not protected. However, this area is significant in that there was an earlier farmhouse nearby which was used during the Battle of Blaauwberg. Apparently very little remains of this now and no sign of its ruin was seen during the survey. A spring was reportedly located near this old farmhouse and was used by the soldiers after the battle. There is a spring just southeast of Site 10 (Figure 41) but we do not think that this is the same spring as that recorded near the old farmhouse. Figure 42 shows an old map of the Battle of Blaauwberg. The site of the Battle is protected within the BCA which was declared a protected area in 1996 (See Appendix 1 for declaration text).

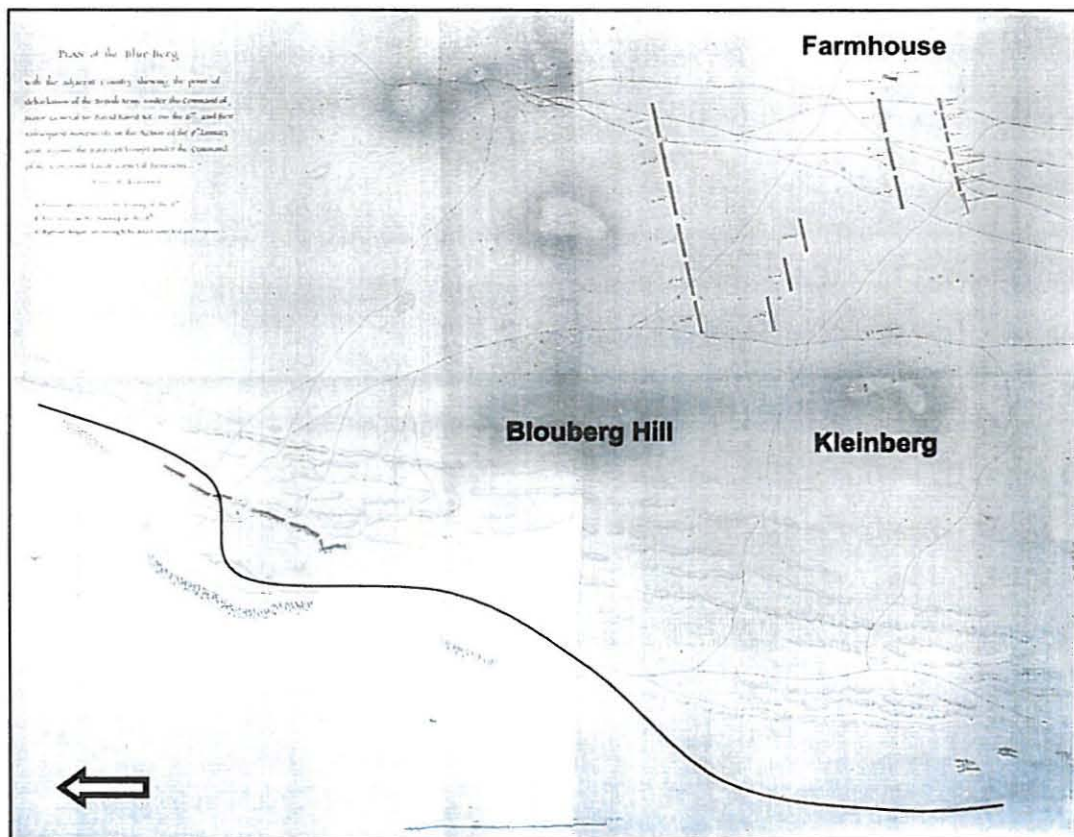
It should be noted that the exact line of the proposed pipeline route could not be ascertained at the time of survey but probably runs quite close to this ruin.



**Figure 39 (left):** The site of the 20<sup>th</sup> century ruin. **Figure 40 (right):** The collapsed rubble.



**Figure 41:** Aerial view of Site 10 showing the ruins (red arrow) and spring (blue arrow).



**Figure 42:** Old map of the Battle site at Blaauwberg Hill. The dashes above (east of) Blouberg Hill indicate the British positions on the morning of the 8<sup>th</sup> of January 1806. Immediately below (west of) the farmhouse the position of the Highland Brigade can be seen ready for attack. They are faced by the Dutch forces in the top right-hand corner of the map. Source: Cape Archives, SAL.KCA.CPA.c1806.

### 8.3.2. Site 12 (Old Mamre Road)

Location: 33° 43' 10.4" S 18° 30' 25.5" E  
Farm name: Groot Oliphants Kop 81

The old Mamre Road crosses the proposed pipeline route at this point. The road alignment consists of a significant avenue of blue gum trees (Figure 43 & 44) although the road has been rerouted in this area due to the addition of the railway. The alignment is already slightly damaged in this area due to the loss of at least one tree.



**Figure 43:** View down the gum tree avenue on Groot Oliphants Kop.



**Figure 44:** Aerial view of the old Mamre Road gum tree avenue (green dots). The proposed pipeline route is shown by the white dots.



## 8.4. Other

### 8.4.1. Site 19 (Roadside cross)

Location: 33° 44' 37.3" S 18° 27' 19.5" E

Farm name: Klein Melkbosch 94 (R27 road reserve)

Although not protected by the heritage legislation, this cross (Figure 45) was erected in memory of someone and should be given due consideration.



Figure 45: The roadside cross on the R27.

## 9. DISCUSSION AND ASSESSMENT

This report has considered extensions and upgrades to two wastewater treatment facilities at Potsdam and Melkbosstrand, construction of a new pump station and three alternative routes for pipelines linking the pump station with the Melkbosstrand WWTW. Table 4 lists the findings, providing an estimation of their archaeological significance, the significance of the impacts with and without mitigation and suggested mitigation measures. Tables 5 to 7 summarise the overall impacts to each of the scenarios, alternatives and pipeline routes in terms of the ratings commonly applied by environmental practitioners. Note that these are limited to the construction phase since no impacts would occur during operation. Any new excavations for maintenance, assuming they are within the same areas originally assessed and mitigated (if appropriate), would not result in any new impacts.

### 9.1. Palaeontology

Just one palaeontological site was recorded. This occurrence was discovered during the current extension and upgrade work at the Potsdam WWTW. It is part of a far wider occurrence that stretches along much of the south-western Western Cape coast. The occurrence is assigned medium significance based on its as yet unknown potential. If a larger variety of animal species was found during the proposed extension and upgrade then this would raise the significance of the site. It is likely that more whale bones would be found in the sediments immediately overlying bedrock and also possible that other species could be located in higher levels (G. Avery. pers. comm. 2007). While it is not possible to reliably assess the scale of the impact, monitoring and mitigation as appropriate would allow for the rescue of data from the fossil bed in this area.

Along the road in the vicinity of the proposed West Coast Pump Station numerous root casts were observed on the surface. These clearly relate to a trench that had been excavated and refilled along the edge of the road. Despite careful examination, no fossil material was noted. Important fossils are occasionally found in the white aeolian sands of the Witzand Formation and this possibility should not be overlooked during excavation in any areas where the Witzand Formation is present. An information document containing advice with regards to such finds is included here as Appendix 2.

## 9.2. Stone Age

Fifteen Stone Age sites of varying age were recorded during the survey. All were deflated and disturbed and are thus of relatively limited value. The older sites dating to the ESA and MSA are undoubtedly part of far larger occurrences and, since none of them contained any artefacts that could improve our understanding of those periods in the area, these sites are all ascribed very low significance.

LSA archaeological sites generally have greater potential to inform on the lives of prehistoric communities that once lived in the area. A number of sites with LSA artefacts were located. Only two were found to contain organic material, in the form of marine shell, which could be used to obtain a radiocarbon date. One of these, however, contained only a very ephemeral trace of shell.

Although these sites are small and quite ephemeral, their value lies not so much in their individual contents, but in the fact that they may represent another component of the archaeological record for the area, possibly left behind by different people, at different times or during different periods of prehistory. Such scatters can be quite diverse and have various origins (as summarised by Sullivan 1995). Archaeological research generally focuses on richer and better preserved sites that produce more data. This tends to result in a biased record and a generally very limited understanding of artefact scatters. In order to properly understand a particular place or area it is important to record all the types of archaeological occurrences that are present there, even those in ploughed fields. It should also be noted that on average only some 2% to 5% of artefacts will be exposed on the surface of ploughed land (Shott 1995 and references therein) which means that a site appearing insignificant on the surface may not actually be so. It has also been found that a surface assemblage in a ploughed field will change with each successive ploughing episode such that the true character of a site may not be known without several visits (Shott 1995).

Very little archaeological work has been carried out in the Blouberg area and is essentially limited to the excavations reported by Sealy *et al.* 2004 and the many burials that have been collected from the dunes of Melkbosstrand and Bloubergstrand over the years. The small sites found during this survey would thus be able to help build the picture of local prehistory and do need to be given due consideration. The importance of considering small sites has recently been demonstrated in Namaqualand (Orton 2007) and the value of assemblages found in ploughed fields has also been acknowledged internationally (Dunnell & Simek 1995; Shott 1995).

Since they have the potential to yield greater amounts of information, these LSA sites have been assigned variable significance, those with organic material or a greater variety of artefacts tending towards low-medium and those very ephemeral sites being very low. No sites of high significance were noted.

**Table 4:** General assessment of significance of heritage, impacts thereon and mitigation requirements.

Heritage concern	Project area	Significance of heritage within local or regional context <sup>1</sup>	Status of impact	Significance of impacts without mitigation <sup>2</sup>	Significance of impacts with mitigation (when applicable)	Suggested mitigation
Site 1 (Potsdam fossil bed)	Potsdam WWTW	medium	negative	low-medium	very low	palaeontological/archaeological monitoring and sampling during construction as necessary
Site 2 (LSA artefact scatter)	Pipeline Option 3	low	negative	low	very low	collect sieved sample
Site 3 (LSA artefact scatter)	Pipeline Option 3	very low	negative	very low	-	
Site 4 (?LSA artefact scatter)	Pipeline Option 3	very low	negative	very low	-	
Site 5 (?LSA/MSA artefact scatter)	Pipeline Option 3	very low	negative	very low	-	
Site 6 (MSA artefact scatter)	Pipeline Option 3	very low	negative	very low	-	
Site 7 (Silcrete quarry)	Pipeline Option 3	very low	neutral	very low	-	
Site 8 (LSA shell and artefact scatter)	Pipeline Option 3	low-medium	negative	low-medium	very low	collect sieved sample, large grid
Site 9 (LSA artefact scatter)	Pipeline Option 3	low-medium	negative	low-medium	very low	collect sieved sample, large grid
Site 10 (20th century farmstead)	Pipeline Option 4	-	-	-	-	
Site 10 (Battle of Blaauwberg site)	Pipeline Options 3 & 4	very high	negative	variable: medium to very high <sup>3</sup>	variable: low to high <sup>3</sup>	archaeological monitoring

Heritage concern	Project area	Significance of heritage within local or regional context <sup>1</sup>	Status of impact	Significance of impacts without mitigation <sup>2</sup>	Significance of impacts with mitigation (when applicable)	Suggested mitigation
Site 11 (Silcrete quarry)	Pipeline Option 4	high	negative	low	very low	archaeological monitoring and sampling if necessary
Site 12 (Old Mamre Road)	Pipeline Option 4	high	negative	very low	very low	minimise damage to trees, preferably work between them
Site 13 (?ESA/MSA artefact scatter)	Pipeline Option 4	very low	negative	very low	-	
Site 14 (?ESA/MSA artefact scatter)	Pipeline Option 4	very low	negative	very low	-	
Site 15 (?ESA/MSA artefact scatter)	Pipeline Option 4	very low	negative	very low	-	
Site 16 (LSA shell and artefact scatter)	Pipeline Option 3	low-medium	negative	low-medium	very low	collect sieved sample
Site 17 (MSA/?LSA artefact scatter)	Pipeline Option 3	very low	negative	very low	-	
Site 18 (MSA artefact scatter)	Pipeline Option 3	very low	negative	very low	-	
Site 19 (Roadside cross)	Pipeline Option 1	-	-	-	-	if necessary, cross should be moved then replaced as close as possible to original location

<sup>1</sup> This is an estimation of the importance or value of the site in terms of current knowledge of local heritage. Items not protected by the NHRA are not rated.

<sup>2</sup> This column considers the general impacts on heritage should the particular site not be mitigated. This relates largely to the value of the information that would be lost and the degree to which the site would be disturbed.

<sup>3</sup> It is unknown what material relating to the Battle might be uncovered during trenching so the intensity of impacts cannot be easily assessed. Impacts on human remains would be of higher intensity while those on artefactual material would be lower.

**Table 5:** Summary of assessment of potential impacts of sewer outfall options on the receiving heritage environment (construction phase).

	Option 1: along R27		Option 3: along Eskom servitude		Option 4: along Atlantis Railway line	
	Without mitigation	With mitigation	Without mitigation	With mitigation	Without mitigation	With mitigation
Extent	-	-	International	International	International	International
Duration	-	-	Permanent	Permanent	Permanent	Permanent
Intensity	-	-	High	Medium	High	Low
Status	-	-	Negative	Negative	Negative	Negative
Probability	-	-	Definite	Definite	Definite	Definite
Significance	n/a	n/a	High	Medium	High	Low
Confidence	High	High	High	High	High	High

### 9.3. Historical

While no historical sites were found and recorded during the survey, there is one very important aspect that needs consideration. This is the site of the Battle of Blaauwberg which at the moment is mostly covered by dense exotic alien vegetation and which would be traversed by pipeline Options 3 and 4. The Battle Site is also a declared Provincial Heritage Site.

This battle was a very significant event in the history of South Africa since it resulted in the final end of Dutch colonial rule and the start of British rule. Many people died during the battle and, due to the difficulties associated with the terrain, all are likely to have been buried more or less where they fell. This means that graves could be scattered randomly across a large area, possibly about 1 km<sup>2</sup> in extent, and could easily be intersected during excavations.

The ruins of the farmhouse that played a role as a field hospital will also be present somewhere in the vicinity. Various artefacts relating to the battle have been recovered over the years with most having been quite close to the surface (Major T. Gordon, pers. comm. 2007). It is quite likely that many more artefacts are still present in the area and any subsurface excavations could intersect them.

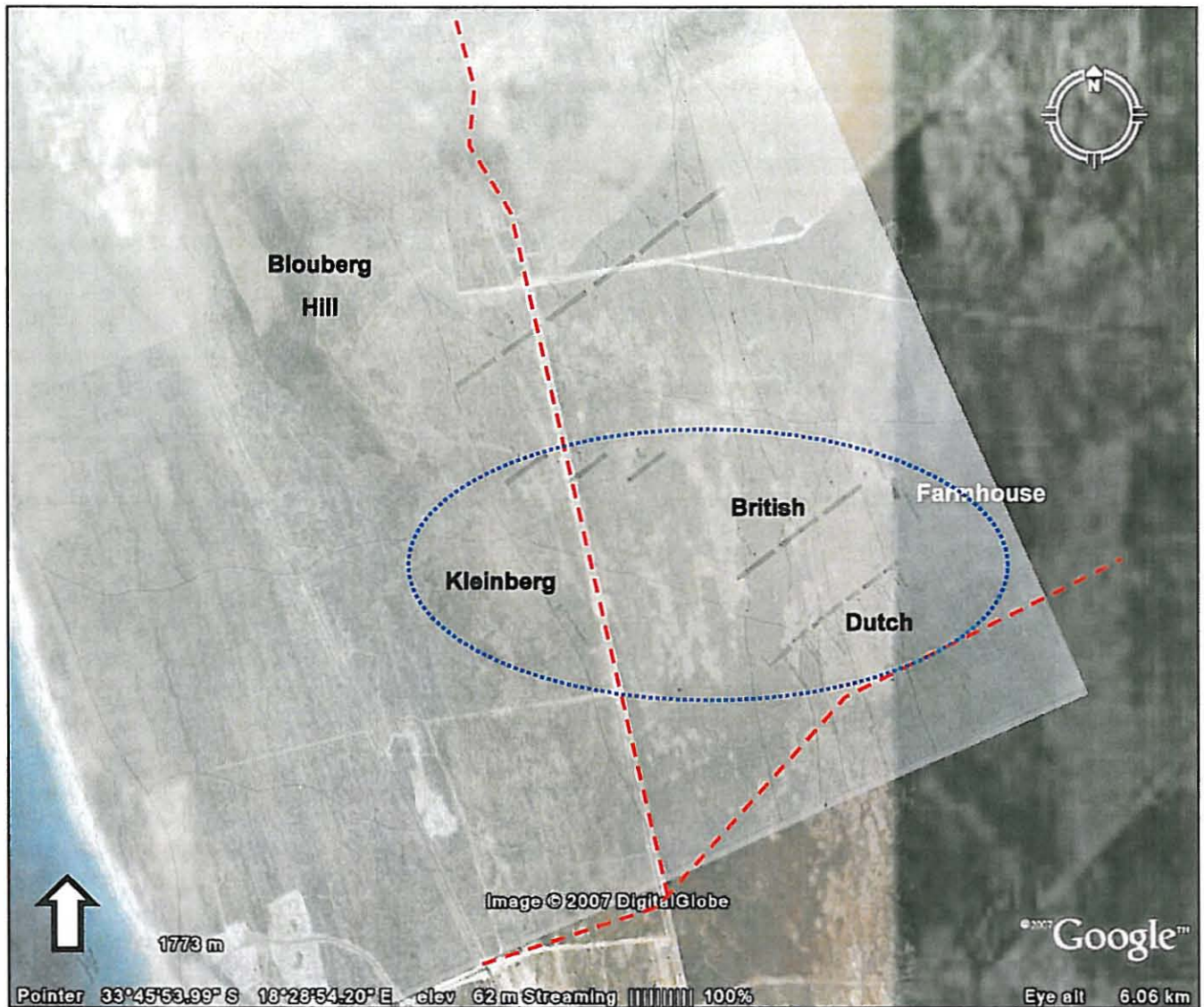
Modern technology can help to pin-point the positions of features relating to the Battle. Using the map shown in Figure 42 and overlaying it on Google Earth allows one to speculate where the farmhouse and spring may have been (Figure 45).

**Table 6:** Summary of assessment of potential impacts of Scenarios 1, 2 and 3 (activated sludge alternative) on the heritage environment associated with the Potsdam and Melkbosstrand WWTW (construction phase).

	Scenario 1: Potsdam WWTW capped at 47 MI/d and balance of flows to Melkbosstrand WWTW (latter extended and upgraded to 59 MI/d)		Scenario 2: Potsdam WWTW extended and upgraded to 75 MI/d and balance of flows to Melkbosstrand WWTW (latter extended and upgraded to 31 MI/d)		Scenario 3: Potsdam extended and upgraded to 100 MI/d	
	Without mitigation	With mitigation	Without mitigation	With mitigation	Without mitigation	With mitigation
<b>POTSDAM WWTW</b>						
Extent	-	-	Local	Local	Local	Local
Duration	-	-	Permanent	Permanent	Permanent	Permanent
Intensity	-	-	Medium	Low	Medium	Low
Status	-	-	Negative	Negative	Negative	Negative
Probability	-	-	Definite	Definite	Definite	Definite
Significance	-	-	Low-medium	Very low	Low-medium	Very low
Confidence	-	-	High	High	High	High
<b>MELKBOSSTRAND WWTW</b>						
Extent	Local	Local	Local	Local	-	-
Duration	Permanent	Permanent	Permanent	Permanent	-	-
Intensity	Low	Low	Low	Low	-	-
Status	Negative	Negative	Negative	Negative	-	-
Probability	Probable	Probable	Probable	Probable	-	-
Significance	Low	Very low	Low	Very low	-	-
Confidence	High	High	High	High	-	-

**Table 7:** Summary of assessment of potential impacts of Scenarios 1, 2 and 3 (MBR alternative) on the heritage environment associated with the Potsdam and Melkbosstrand WWTW (construction phase).

	Scenario 1: Potsdam WWTW capped at 47 MI/d and balance of flows to Melkbosstrand WWTW (latter extended and upgraded to 59 MI/d)		Scenario 2: Potsdam WWTW extended and upgraded to 75 MI/d and balance of flows to Melkbosstrand WWTW (latter extended and upgraded to 31 MI/d)		Scenario 3: Potsdam extended and upgraded to 100 MI/d	
	Without mitigation	With mitigation	Without mitigation	With mitigation	Without mitigation	With mitigation
<b>POTSDAM WWTW</b>						
Extent	-	-	Local	Local	Local	Local
Duration	-	-	Permanent	Permanent	Permanent	Permanent
Intensity	-	-	Low-medium	Low	Low-medium	Low
Status	-	-	Negative	Negative	Negative	Negative
Probability	-	-	Definite	Definite	Definite	Definite
Significance	n/a	n/a	Low-medium	Very low	Low-medium	Very low
Confidence	High	High	High	High	High	High
<b>MELKBOSSTRAND WWTW</b>						
Extent	Local	Local	Local	Local	-	-
Duration	Permanent	Permanent	Permanent	Permanent	-	-
Intensity	Low	Low	Low	Low	-	-
Status	Negative	Negative	Negative	Negative	-	-
Probability	Probable	Probable	Probable	Probable	-	-
Significance	Low	Very low	Low	Very low	n/a	n/a
Confidence	High	High	High	High	High	High



**Figure 45:** Overlay of the old Battle of Blaauwberg map on Google Earth. Battle features are noted and the red lines indicate approximately where the proposed pipeline routes lie. Most of the fighting took place within the eastern part of the dotted blue oval but a small skirmish which resulted in at least 15 deaths also took place on Kleinberg.

Due to its importance in South African history and the possibility that graves of foreign soldiers might be found in the area, the Battle Site has been accorded very high significance. Given how little we currently know of the area, it is difficult to assess the potential impacts that might occur. If any human remains were encountered, and given that Dutch and British soldiers, amongst others, were killed during the battle, this would be an impact of very high significance on an international scale. Discovery of any artefacts relating to the Battle would be of medium to high significance.

## 10. CONCLUSIONS AND RECOMMENDATIONS

General conclusions and recommendations pertaining to each of the project areas are provided in Sections 10.1 and 10.2, while specific mitigation and permit requirements for each of the known sites are provided in Section 10.3.



## **10.1. Conclusions and recommendations for alternative pipeline routes**

### Option 1: R27 road reserve or adjacent line within 5 m of reserve

This is the strongly preferred alternative. No known heritage resources would be impacted and the servitude is already in very poor condition due to road construction and maintenance activities. The roadside memorial cross should be carefully placed to one side during construction and then replaced as close as possible to the original location after completion of work. Should the pipeline be placed immediately adjacent to the reserve, no impacts would be felt.

### Option 3: Eskom servitude

This is the least preferred alternative. The proposed line runs directly through the area in which the Battle of Blaauwberg was fought in 1806 and the possibility of encountering unmarked burials relating to the Battle exists. Furthermore, the Battle Site is a declared Provincial Heritage Site which affords it a high degree of protection. Several Stone Age artefact scatters exist in this area, two of which would require mitigation. It is strongly recommended that this alternative receive no further consideration.

### Option 4: Railway line

This alternative could be considered but it is recommended that one section be rerouted. There is a possibility of encountering material related to the Battle of Blaauwberg along the southern part of this route and it is recommended that the route be moved further south. This would also keep it outside of the BCA. Several Stone Age artefact scatters are also present along the northern part of the proposed route. No mitigation is necessary for any of these scatters although archaeological monitoring of trenching activities immediately adjacent to the silcrete quarry (Site 11) should be conducted during the construction phase.

## **10.2. Conclusions and recommendation for WWTW upgrades and pump station**

### Potsdam WWTW

The extension and upgrade at Potsdam should be allowed to go ahead but monitoring of the excavations should be carried out by an archaeologist or preferably a palaeontologist to determine the extent and significance of the buried fossil horizon located during the current work at the site (see Section 10.3 for further detail). This applies both to the existing site (Erf 1943) and the identified expansion site on part of Theo Marais Park (Erf 9379) to the south.

### Melkbosstrand WWTW

The proposed extension and upgrade to the Melkbosstrand WWTW should be allowed to go ahead but monitoring of the excavations should be undertaken by an archaeologist or preferably a palaeontologist to check for buried fossils. This could take the form of one or two visits during the early stages of excavation to establish whether any fossils are present with further visits scheduled only if required. This applies to both the existing site as well as to the proposed new location on Erf 1063/13. Given the greater distance from the coast there is only a small chance of intersecting buried fossils here.

### West Coast Pump Station

The proposed pump station of Erf 268 should be allowed to go ahead but monitoring of the excavations should be undertaken by an archaeologist or preferably a palaeontologist to

check for buried fossils. This could take the form of one or two visits during the early stages of excavation to establish whether any fossils are present with further visits scheduled only if required.

### **10.3. Specific mitigation and permit requirements for known sites**

#### Site 1 (Potsdam fossil bed)

Palaeontological monitoring of earthworks during the extension and upgrade should take place. The appointed specialist would need to check for the presence of further fossil material and assess the extent and significance of such material if found. At least one visit should be conducted soon after the commencement of earthworks with further visits scheduled if required. If necessary, sampling of the material would need to be conducted. Based on observations made, the specialist would need to decide whether immediate collection is sufficient or whether more formal excavations should be carried out. Formal excavations would require an excavation permit from HWC. Given the type and frequency of material already reported it is most likely that immediate collection and recording would suffice.

#### Site 2 (LSA artefact scatter)

An archaeologist should be appointed to collect a sample of the material present at this site. Given the relatively poor context of this site, the sampling can be done by means of sieving a quantity of sand from the site to recover a sample of whatever artefacts are present. An excavation permit from HWC would be required for the mitigation.

#### Sites 8 and 9 (LSA artefact scatters)

An archaeologist should be appointed to collect a sample of the material present at these sites. It is likely that only stone artefacts are present but there is a chance that other classes of finds might also be recovered. Given the ploughed context of the site, it might be appropriate to work within a grid of 2m by 2m rather than the conventional 1 m<sup>2</sup> grid. A 1.5 mm sieve is preferable to avoid loss of small items but should this prove impractical due to soil conditions and content then a 3 mm sieve could be used instead. An excavation permit from HWC would be required for the mitigation.

#### Site 10 (Battle of Blaauwberg site)

This site can be regarded as an informal burial ground. While Option 3 should be avoided, the use of Option 4 should incorporate rerouting of the southern part of the line as far south as possible so as to minimise chances of intersecting any material related to the Battle Site. Should any work be carried out in this area then archaeological monitoring of the trenches in the vicinity of the Battle site should be carried out. All workers should be instructed to keep a watchful eye on the soil during excavations and report any bones or artefacts seen to the appointed archaeologist immediately. A permit from HWC would be required to excavate trenches within the BCA.

#### Site 11 (Silcrete quarry)

Judging by the elevated position of this silcrete outcrop, the site may have been quarried for a very long time. Archaeological monitoring of excavations through the surrounding scatter should aim to check whether any buried artefact horizons pertaining to earlier periods might

be preserved beneath the surface. It is recommended that the archaeologist be informed of when trenching in this area will occur so that the site visit can be planned for the right time. A permit from Heritage Western Cape would be required for any trenching in the immediate vicinity of the site.

#### Site 12 (Old Mamre Road)

Care should be taken to avoid removing any of the trees of this alignment. It should be possible to work between the trees only removing individual roots as necessary. No permit is necessary to trench between the trees.

#### Site 16 (LSA shell and artefact scatter)

Given the state of preservation and the quantity of material present on this site it is recommended only that sand from the site be sieved to recover a sample of material. This would serve primarily for the collection of shell that would allow a radiocarbon date to be produced in the future should this be desirable in a research context. A 1.5 mm sieve should be suitable here given the nature of the dune sand. An excavation permit from HWC would be required for the mitigation.

### **10.4. Unmarked burials**

The possibility of encountering unmarked prehistoric human burials at any stage of the proposed project and in any area should be borne in mind. These are usually far more common in relatively deep coastal dunes and are less likely in the farmlands where ferricrete nodules indicating a hard substrate are sometimes visible at the surface. As such they would probably be more likely to occur along the R27 (pipeline Option 1) or in the vicinity of the proposed pump station, although overall this probability is very low.

Historical burials connected to the Battle of Blaauwberg might also be encountered on pipeline Options 3 and 4. These have been considered in Section 10.3.

If any bones are found during the course of excavation work then they should be reported to an archaeologist and work in the immediate vicinity should cease until the appropriate actions have been carried out by the archaeologist. If the bones are found upon examination to be part of a burial then they would need to be exhumed. Depending on their age, this would need to be done under a permit from either HWC (for pre-colonial burials) or SAHRA (Burials later than about AD 1500).

## **11. REFERENCES**

- Avery, G. 1995. Archaeological and palaeontological survey: Milnerton Lagoon mouth (3318CD). Unpublished report prepared for Knight Hall Hendry & Associates. South African Museum, Cape Town.
- Avery, G. 2007. Fossil Whale Bones exposed during work at the Potsdam Treatment Works. Site report held at Iziko SA Museum, Cape Town.

- Broom, R. 1909. On the evidence of a large horse recently extinct in South Africa. *Annals of the South African Museum* 7: 281-282.
- Deacon, H.J. & Goosen, R.J. 1997. Phase 2 archaeological assessment. Milkwood Place Development, Melkbosstrand. Unpublished report prepared for Investment Facility Company Five Zero Two (Pty) Ltd. Department of Archaeology, University of Stellenbosch.
- Dunnell, R.C. & Simek, J.F. 1995. Artifact size and plowzone processes, *Journal of Field Archaeology* 22: 305-319.
- Duminy, J.P. 1979. Twilight over the Tygerberg. *Kommetjie*: Dr. J.F. Midgley.
- Goodwin, A.J.H. 1926. The Hardy collection of stone implements. *South African Journal of Science* 33:826-832.
- Goodwin, A.J.H. 1928. Sir Langham Dale's collection of stone implements. *South African Journal of Science* 25:419-426.
- Goodwin, A.J.H. & Van Riet Lowe, C. 1929. The Stone Age cultures of South Africa. *Annals of the South African Museum* 27: 1-289.
- Gray, J. 2000. Report for SAHRA on the excavation at Melkbosstrand (Erf 609) Site CBD 14 (2). Unpublished report, Cape Town.
- Halkett, D. & Hart, T. 1995. Phase 1 archaeological investigation: Tygerfontein. Unpublished report prepared for Mr. B. Hack. Archaeology Contracts Office: University of Cape Town.
- Halkett, D. & Hart, T. 1999. West coast Report on pilot excavations at "E" quarry, Langebaanweg Fossil Park, Langebaanweg. Unpublished report prepared for Earth Sciences Division, South African Museum. Archaeology Contracts Office: University of Cape Town.
- Hendey, Q.B. 1968. The Melkbos site: an upper Pleistocene fossil occurrence in the south-western Cape Province. *Annals of the South African Museum* 52: 89-119.
- Hendey, Q.B. 1969. Quaternary vertebrate fossil sites in the south-western Cape Province. *South African Archaeological Bulletin* 24: 96-105.
- Kaplan, J. 1996. Archaeological and cultural impact assessment: Omega Substation. Unpublished report prepared for Ninham Shand Consulting Engineers. Agency for Cultural Resource Management, Riebeek West.
- Kaplan, J. 2000a. Archaeological excavations, Melkbos Shopping Centre, Melkbosstrand. Unpublished report prepared for Colliers RMS. Agency for Cultural Resource Management, Riebeek West.
- Kaplan, J. 2000b. Archaeological and historical study: Sopot River Catchment Management Plan. Unpublished report prepared for SRK Consulting Engineers and Scientists. Riebeek West: Agency for Cultural Resource Management.

- Kaplan, J. 2000c. Archaeological Study, Blaauwberg City – M12 extension. Unpublished report prepared for Ninham Shand Environmental Section. Riebeek West: Agency for Cultural Resource Management.
- Kaplan, J. 2002a. Phase 1 Archaeological Impact Assessment proposed Vissershok Landfill Extension Cape Town. Unpublished report prepared for SRK Consulting Engineers and Scientists. Riebeek West: Agency for Cultural Resource Management.
- Kaplan, J. 2002b. Phase 1 Heritage Impact Assessment, erven 1694, 2529 and 2530, Melkbosstrand. Unpublished report prepared for COASTEC. Riebeek West: Agency for Cultural Resource Management.
- Kaplan, J. 2004. Scoping study on the proposed extension and upgrading of the Melkbosstrand Wastewater Treatment Works. Unpublished report prepared for CCA Environmental. Riebeek West: Agency for Cultural Resource Management.
- Klein, R. G., Avery, G., Cruz-Uribe, K., Halkett, D., Hart, T. & Volman, T.P. 1999. Duinefontein 2: an Acheulean site in the Western Cape Province of South Africa. *Journal of Human Evolution* 37: 153-190.
- Morris, A.G. 1992. A master catalogue: Holocene human skeletons from South Africa. Johannesburg: Witwatersrand University Press.
- Orton, J. 2007. Preliminary report on excavations at Erf 1626 (Bakoond), Yzerfontein, Malmesbury magisterial district, Western Cape Province. Unpublished report prepared for Yzerfontein Seaside Estates (Pty) Ltd. University of Cape Town: Archaeology Contracts Office.
- Orton, J. & Hart, T. 2004. Heritage scoping study of the farm Groot Oliphantskop (Farm 81) for the proposed Omega substation, Western Cape. Unpublished report prepared for Eyethu Engineers. University of Cape Town: Archaeology Contracts Office.
- Sealy, J., Maggs, T., Jerardino, A. & Kaplan, J. 2004. Excavations at Melkbosstrand: variability among herder sites on Table Bay. *South African Archaeological Bulletin* 59: 17-28.
- Shott, M.J. 1995. Reliability of archaeological records on cultivated surfaces: a Michigan case study. *Journal of Field Archaeology* 22: 475-490.
- Singer, R. 1961. The new fossil sites at Langebaanweg, South Africa. *Current Anthropology* 2: 385-387.
- Singer, R. & Wymer, J. 1968. Archaeological investigations at the Saldanha skull site in South Africa. *South African Archaeological Bulletin* 23: 63-74.
- Sullivan, A.J. 1995. Artifact scatters and subsistence organization. *Journal of Field Archaeology* 22: 49-64.

Winter, S. & Baumann, N. 2005. Guideline for involving heritage specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 E. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

Yates, R. 2001. The recovery of three human skeletons during the preparation of the Birkenhead Shopping Centre building site, Melkbosstrand. Unpublished report prepared for Colliers RMS International Property Consultants. Cape Town: Henshilwood, Yates and Winter Heritage Resource Specialists.

Cape Archives: SAL.KCA.CPA.c1806

## **12. INVESTIGATION TEAM**

Fieldwork:	J. Orton
Report:	J. Orton T. Hart
Archival:	L. Schietecatte

# APPENDIX 1

## DECLARATION OF BLAAUWBERG CONSERVATION AREA

NATIONAL MONUMENTS ACT, No. 28 OF 1969

26 January 1996

### DESIGNATION OF A CONSERVATION AREA: THE SITE DESCRIBED AS THE BLAAUWBERG CONSERVATION AREA, IN THE CAPE TOWN AND MALMESBURY DISTRICTS

In terms of section 5 (9) of the National Monuments Act, 1969 (Act No. 28 of 1969), the National Monuments Council hereby designates the site of the Blaauwberg Battlefield and adjacent land, consisting of two sub-sections as a conservation area. The two areas are described as portions A and B,

#### DESCRIPTION

Portion A is defined as an area enclosed by a line starting where the northern boundary of Erf 418, Bloubergstrand, extended in a north-westerly direction, intersects with the high-water mark of the Atlantic Ocean; thence south-eastwards along the northern boundary of Erf 418, Bloubergstrand, to the most northerly beacon (Beacon A) of Erf 288, Bloubergstrand; thence south-eastwards along the northern boundary of Erf 288, Bloubergstrand, to the western beacon of Erf 2507, Melkbosstrand; thence south-eastward along the southern boundaries of Erven 2507, 2506, 2555, 2556, 2557 and 2558, Melkbosstrand, so as to exclude these erven from the area, to the most easterly beacon of Erf 2558, Melkbosstrand; thence south-south-eastwards along the eastern boundary of Erf 268, Bloubergstrand, so as to include the said erf in the area for a distance of 907,5 metres; thence in an eastern direction to Beacon L of Erf 1694, Melkbosstrand; thence in a southerly direction along the eastern boundary of Erf 1694, Melkbosstrand, to Beacon T of the said erf; thence in a east-north-easterly direction to Beacon Y of Erf 268, Bloubergstrand; thence in a south-easterly direction along the eastern boundary of Erf 268, Bloubergstrand, to Beacon Z of the said erf; thence in a south-easterly direction to Beacon A of Erf 268, Bloubergstrand, thence in a south-south-easterly direction along the eastern boundary of Erf 268, Bloubergstrand, to Beacon F of Cape Farm 1141; thence south-westwards to the most northerly beacon (Beacon A) of Erf 307, Bloubergstrand; thence south-south-westwards along the northern boundary of the latter erf to Beacon D of this erf; thence south-south-eastwards along the western boundary of the same erf to Beacon B of En 644, Bloubergstrand; thence west-south-westwards along the northern boundary of Erf 644, Bloubergstrand, to Beacon A of the said erf; thence along an extension of this line to a point where it meets the high-water mark of the Atlantic Ocean; thence in a northerly direction along the high-water mark of the Atlantic Ocean to the starting-point, including a portion of Erf 385, Bloubergstrand, and Erf 418, Bloubergstrand, all situated in the Bloubergstrand and Melkbosstrand Local Areas, in the Cape Town and Malmesbury Districts, as indicated on the map "Proposed Blouberg Conservation Area" dated 24 November 1995, and filed in the office of the Cape Metropolitan Council and on file 9/2/018/28 in the office of the National Monuments Council, in Cape Town.

Portion B is defined as an area enclosed by a line starting at Beacon E of Cape Farm 1141; thence in a northerly direction along the eastern boundary of the said farm for a distance of 1268 metres; thence east-north-eastwards for a distance of 1350,9 metres; thence south-south-eastwards for a distance of 1103,2 metres to where the extension of this line meets the southern boundary of Cape Farm 431/2; thence west-south-westwards for a distance of 85,7 metres to Beacon F of the said farm; thence south-westwards along the southern boundary of the latter farm to the starting point, all situated in the Local Area of Bloubergstrand, in the District of Cape Town, as indicated on the map "Proposed Blouberg Conservation Area" dated 24 November 1995, and filed in the office of the Cape Metropolitan Council and on file 9/2/018/28 in the office of the National Monuments Council, in Cape Town.

G. S. HOFMEYR

Director: National Monuments Council

## APPENDIX 2

### FOSSILS IN DUNES

#### Palaeontology in the Witzand Formation

#### A GENERAL INFORMATION DOCUMENT

John Pether, for Heritage Western Cape

#### Introduction

The intent of this document to inform about the potential of finding fossils in the younger, generally uncemented dune sands around the Cape Coast. These loose dune sands currently forming much of the coastal surface have been called the "Witzand Formation".

In the Cape Town area, the thicker "Witzand" dunes on the False Bay coast between Strandfontein and Macassar are mined to supply sand for construction purposes. The "clean" sands are generally regarded as unfossiliferous. Indeed, for the most part they are, but occasionally alert personnel have noticed fossils in places in the old dunes and have saved them from destruction. Some of this valuable material has been passed on to museums where they are kept for scientific study, but as importantly, where they add to the collection of rare heritage objects from the area. As heritage objects that inform us of the history of a place, they are public property which the State undertakes to acquire and conserve on our behalf (the National Heritage Resources Act No. 25 of 1999).

By providing information about the fossils that occur in dunes, it is hoped to spark the interest and participation of citizens involved in mining dunes, to help in the spotting and saving of the fossils. The few finds rescued in the past from dunes have been the skulls and bones of large animals which are more easily seen, such as rhino, large bushpigs, elephant and hippo. Below I hope to convince that there are more fossils in dunes than generally meets the eye.

#### What are Fossils

Fossils are the remains of past life that are found buried within sediments (sands, muds and gravels) that have accumulated in the past. Generally they are skeletons, the durable, harder parts of organisms e.g. bones and teeth of animals being the most well-known. Shells are skeletons of clams and snails. The most common fossils found in dune sands are the shells of land snails (terrestrial gastropods) that lived on them. The remains of plants are fossils, for instance, charcoal layers from veld fires occur in dunes. Remains of decayed plant roots are very common, sometimes partially calcified.

Importantly, fossils occur on all size scales, down to the microscopic. Tiny bits of worn down shell form part of the dune sand, but a lot of these are in fact entire skeletons of pin-head size marine animals, called foraminifera, which have blown from the beaches. Freshwater ponds and vleis occur in places between dunes and these form local organic-rich layers. Apart from preserved plant fragments, these "mucky" waste layers contain the microscopic pollen and spores from plants in the wider area, deposited as dust in the standing water - a record of the vegetation of past times.

A special category of fossils are called "trace fossils" or "spoorfossiele". As evident in the name, these are not remains of the organism, but traces of its activity. The most famous examples would be dinosaur spoor in old rocks, but a recent example that hit the headlines worldwide was the discovery of human footprints in older cemented dunes at Langebaan, dated at about 120 ka BP. In the softer sands of the young dunes, trace fossils are seen in



section on the vertical faces. Most of these are the large burrows made by moles and the traces made by burrowing insects (ants, wasps, dung-beetles etc.). Footprints are quite often seen in section, manifesting as sharply contorted dune laminations.

### **What is the “Witzand Formation”**

Loose pale sands have been piled up into dunes practically everywhere around the southern Africa coastline. In places, often called “Die Witzand”, these are easily-recognized “dune fields” of actively blowing sands, sculpted into various dune forms by the wind. Over large areas the pale sands have been overgrown to various degrees by vegetation and stabilized. The original dune forms have been softened and various plant communities occur, from pioneer plants colonizing new dunes, to mature Strandveld and dune thicket covering older dunes and, of course, out-of-control, invasive alien species that were originally introduced to South Africa to “tame” the coastal tracts of loose, blowing sand.

We see the sand blowing off sandy beaches into adjacent dune fields today. Close to the coastline, the younger sand dunes are thought to have blown off sandy beaches mainly during the last 12 000 years (12 kilo-anni, ka), during the duration of time called the “Recent” or the Holocene Epoch. Large tracts of windblown sand, as dune plumes up to several km in length, can be readily distinguished on aerial photographs of the coastal plains. These relate to the lower sea-levels associated with the Last Ice Age, geologically not so long ago, 12-40 ka Before Present (BP), when sea-level dropped to levels -70 to -130 m below present and vast areas of the coast that is now offshore, were exposed as dry land. During these times, when our present-day coastline was “high and dry in the hills”, dune plumes marched inland from distant sandy beaches that are now submerged on the inner continental shelf.

### **FOSSILS IN THE WITZAND SANDS**

Speaking broadly, the history of dunes in the Cape has not so much been influenced by aridity, but by inter-related factors of changing sea-level, changes in sand supply and climate changes. Dunes have accumulated quite rapidly in shifting localities, but their surfaces were also rapidly colonized by vegetation and animals when, for some reason, the rate of sand delivery diminished. Thus, some fossils of animals are expected – these are not the dunes of a vast, sparsely-inhabited sand-sea like the arid Namib Desert. Although fossils will be very scarce within the main bulk of the dune sands, they will be found in greater numbers in association with the surfaces that represent pauses in sand accumulation. These old buried surfaces, called palaeosurfaces, are usually marked by various degrees of soil formation. This can vary from very immature soil layers, grey-coloured with more organic content (from plants) than the main dune sand, to more developed soils with additional “fines” content from the weathering-breakdown of sand mineral grains (often pinkish and with powdery lime content). These are sure to be noticed as they degrade the quality of the building sand and it is undesirable to include them in the “product”.

Not unexpectedly, the most common fossils in the dunes are land snail shells, tortoise shells/bones and the bones of moles. These occur anywhere in the dune sand, but as mentioned, are more common in and below a palaeosurface “soil”. This is particularly noticeable for the more common snail shells. Although these fossils are relatively common, a representative collection should be made where they occur - they may not be the same species that are now (or were historically) in the area.

The fossil bones of larger animals are scarce, but a careful search along a palaeosurface layer often produces results. In many cases these appear to be isolated finds, but often what appears to be a single bone leads to further finds at the spot, such as a scatter of bones

accumulated by hyaenas, which may include quite a variety of animals.

A particular kind of palaeosurface is formed where the wind scours away previously-deposited dune sand, producing a scoop-shaped palaeosurface called a "blowout". The fossils that were sporadically distributed within the dune are then concentrated on the bottom of the blowout. Typically, such concentrations appear mainly as a litter of land snail shells, but a careful look usually reveals fossils of the other animals that lived on the dunes: tortoises, lizards, moles, rabbits, rodents, birds, etc. and sometimes the bones of larger animals like antelopes, zebra and ostriches (and their eggshells).

More dramatically, and better evidence of climate change, is when a blowout subsequently becomes a pond of standing water, due to increased rainfall, lack of a drainage outlet between surrounding dunes and rising local water table. This occurs on a variety of scales, from a mere small boggy area, to ponds, to vleis. As one can imagine, the original wind concentration of dune-biota fossils is then overlain by muddy, organic-rich deposits. These are the real fossil bonanzas of the Cape Flats, for they preserve a great variety of stuff. Firstly, as sources of water, they attract the larger herbivores from the surrounding area, their predators and, in turn, the scavengers. Larger vleis are mysteriously detected by hippos, which plod over the dunes to take up residence. Then there is the fossil record of the pond/vlei life itself, a lot of which also turns up rather mysteriously, like the frogs, aquatic snails and small fish. The best bet is for their eggs being inadvertently brought in by birds, a sample of which are also entombed. Microfossils include the ostracods (microscopic crustaceans with often very specific requirements) and the diatoms (minute plants with glass shells). More locally, reeds, leaves, fruiting bodies and root masses are preserved in the muds. Ancient ponds and vleis, as natural traps of windborne material, also provide a glimpse of the greater, surrounding vegetation, in the form of pollen capsules from near and far, and windborne charcoal fragments from fires, usually of fairly close origin.

A further palaeosurface should be mentioned. This is the main or bottom surface underlying the dunes and on which they formed. In the False Bay area near the coast, this is usually the surface formed on the calcrete-limestone capping on top of even older dunes, called the Wolfgat Member of the Langebaan Limestone Formation. This is a long-lived, hard surface and may have been covered by dune and uncovered again several times, before finally being overlain by the current dune sand. This surface is an absolute must as a target for fossil hunting and rescue.

Ancestral South Africans were around during the time of the Witzand-type dunes; hunting, foraging for veldkos and camping on them. Thus it is perfectly possible that some of the fossils found in the dunes may be associated with past human activities. Man-made (anthropogenic) fossil accumulations are a special heritage category called the archaeological record. The occurrence of stone tools, charcoal from cooking hearths and perhaps bits of pottery, gives away the fact that these are records of the way of life of ancient people that periodically lived along the coast. In most cases these archaeological occurrences are visible on or shallowly buried in the loose windblown sands, are of "Late Stone Age" or early historical age, and should be identified during the archaeological impact assessment. More scattered material dating from earlier times could be concentrated at depth in the aforementioned blowouts, mixed with non-archaeological material.

### **Rescuing the Fossils**

Although fossils are scarce in dune sands, they nevertheless do occur, particularly in palaeosurface contexts and in interdune deposits that are locally present. Unfortunately,

much of the fossil material is obscure to a casual inspection. Hitherto, the rescue of some conspicuous fossils has been almost entirely dependent on the involvement and interest of dune-mining personnel, to spot and recover them. Although this is praiseworthy, the *ad hoc* collection of fossils is not desirable, as the contextual information is inadequate or altogether lacking. Recovery of fossils noticed should be carried out by a qualified person, to ensure acquisition of the mandatory attendant information on its context.

Thus, on mine personnel noticing a fossils, a designated contact person should be informed. The recovery of the fossils should then be done promptly, to ensure minimal disruption of mining schedules/production.

Concerns that fossil finds will disrupt production are real. However, in the majority of cases the exposed, sparse fossil material can be rescued or sampled quickly. If need be, usually it is possible to shift the sand-loading spot temporarily to another position along the mining face. If the mining plan cannot accommodate a temporary (4-8 hours) "no go" at the fossil spot, or a delay in having the fossils professionally excavated is unavoidable, then the position of the material should be noted and photographed. The fossils and enclosing sand should then be carefully removed in bulk and "stockpiled" in a safe area, where it can be dealt with later.

A periodic inspection of mine faces (e.g. at least quarterly) should be carried out by a qualified person. Any screened-off coarser fractions and "waste" material should also be inspected, the latter "dirty" or soil-sand layers being of greater fossil potential.

The prime motivation is to rescue the uncovered fossils, so that they are not lost and their heritage and scientific value can be realized for the broader community, which is the purpose of the heritage legislation. Ideally, the arrangements for dealing with fossil finds should be formally included in the Environmental Management Plan (EMP) of the mine, with designated persons, agreed action protocols and agreed costing estimates. Such a "palaeontological mitigation" arrangement must be simple and straightforward and cost-effective. Its success hinges on the mutual co-operation and involvement of mine management, the guys at the mining face, the appointed heritage professional and the heritage authorities. At present, understandings and agreements with mine owners/management that personnel are allowed to look out for fossils and report them, and periodic inspection arrangements, are not in place.

The palaeontology of the dune mines, with report-backs on the significance of fossils and other features found in the mine, may be regarded as an enhancement of the mining environment. Feedback is also just courtesy, but vital for maintaining interest and involvement.

Certainly, the successful finding of fossils should receive publicity that would enhance the company's image, demonstrating social responsibility and respect for the national heritage. From just nearby along the Swartklip-Wolfgat cliffs, a valuable fossil fauna and archaeological material of "Middle Stone Age" context have been recovered and reported internationally\*. An environmental and heritage educational centre with "ecotrails" past dune mines is planned for the Macassar area. Fossil finds from the dune sand mines will enrich this initiative, by communicating the discoveries with displays and attendant information. After all, that is the real purpose of rescuing the fossils - to find out and tell people of the land's history, hidden right under their feet. Some of the wonder will never rub off, which makes earth scientists.

**Contact for reporting fossils: Derek Ohland, Iziko SA Museum, 021-481 3851.**

**\*See [www.iziko.org.za/sam/resource/](http://www.iziko.org.za/sam/resource/)**

John Pether, 9 February 2007