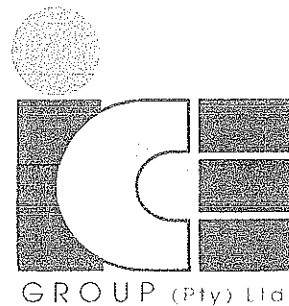




**ENGINEERING SERVICES REPORT FOR:  
PORTION 2 OF THE FARM STRANDFONTEIN No.  
712, DE KELDERS, GANSBAAI**

**AUGUST 2011**



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## 1. INTRODUCTION

Ice Group Consulting Engineers were appointed by messers Spronk & Associates for the compilation of an engineering services report for the development of Portion 2 of the Farm Strandfontein No. 712, De Kelders in the Overstrand Municipal area. Portion 2 of the Farm Strandfontein No. 712, De Kelders will therefore; for the purpose of this report hereinafter be referred to as "the site".

The site is proposed to be subdivided as follows:

TYPE OF DEVELOPMENT	ERVEN	NUMBER	ZONING	AVE ERF SIZE
Single Residential	1-84 & 87-120	118	Single Residential	532
	121	1	Road Zone	
	122 - 127	6	Public Open Space	
	128	1	Institutional Zone	
	129	1	Local Business Zone	
Town House & Group House Cluster A	A1 - A79	79	Group House Zone	410
	A80 - A113	34	Town House Zone	314
	A114 - A123	10	Private Open Space Zone	
	A124	1	Road Zone	
Town House & Group House Cluster B	B1 - B64	64	Group House Zone	397
	B65 - B84	20	Town House Zone	266
	B85 - B94	10	Private Open Space Zone	
	B95	1	Club House	
	B96	1	Road Zone	
Town House & Group House Cluster C	C1 - C89	89	Town House Zone	296
	C90 - C125	36	Group House Zone	417
	C126 - C139	14	Private Open Space Zone	
	C140 - C141	2	Road Zone	
Town House & Group House Cluster D	D1 - D32	32	Town House Zone	289
	D33 - D36	4	Private Open Space Zone	
	D37	1	Road Zone	

The proposed subdivision of the site is indicated on the plan attached as Annexure A.



## 2. SITE DESCRIPTION

The site is situated East of the existing De Kelders development and North of the R43 in Gansbaai.

A detail topographical survey was done by messers Spronk and Associates land surveyors which were used for the preliminary design purposes.

The entire site is approximately 110ha in extent of which 56ha is within the urban edge for development an approximately 38ha is earmarked for development.

The contour plan indicate that a large number of individual dunes exist in the existing surface of the site. These dunes cause various depressed low areas which will, in turn provide a large number of depressed low points in the vertical alignment of roads, should the existing surface be followed. It is therefore proposed that these dunes be leveled by means of a cut-to-fill operation over the proposed site for development in order to create a general gradient according to the existing boundaries of the site. This will result in a general gradient into a north-westerly direction. Note that a number of additional localized earthwork operations will be required on the proposed surface to ensure optimum stormwater drainage.

## 3. GEOTECHNICAL INFORMATION

The site is underlain by quartzite sandstone of the Peninsula Formation of the Table Mountain Group. A variable of wind-blown sand and residual soil consisting of quartz sand overlies the solid rock. No trial holes were dug but the depth of the sand is of such a nature that no rock should be encountered.

## 4. SERVICES

The position of existing services was obtained from Overstrand Municipality, the topographical survey of messers Spronk and Associates and various site investigations.

The design of services will be in accordance with the "Guidelines for the provision of Engineering Services for Residential Townships" (Blue book), the UTG7 publication "Geometric Design of Urban Local Residential Streets", the TRH4 and the specific standards of the Local Authority and the NRS 034 Specifications for electrification of residential areas..

### 4.1 Sewerage

The existing De Kelders area is not serviced with a sewerage reticulation system. Sewage is transported to the treatment works from conservancy tanks with trucks.

The proposed internal sewerage reticulation system will consist of the following:

Internal system	: Gravity full bore	: 160 mm diameter Class 34 uPVC
		: 200 mm diameter Class 34 uPVC
		: 225 mm diameter Class 34 uPVC
		: 250 mm diameter Class 34 uPVC
House connections	: Gravity full bore	: 110 mm diameter Class 34 uPVC



The following average daily flow values will be used for the calculations with regard to the design of the internal sewerage reticulation system:

Description	No. of Units/Size	ADF	ADF (l/day)
Res I	118	850 l/day/unit	100 300
Res II	179	750 l/day/unit	134 250
Res III	175	600 l/day/unit	105 000
Local Business	5 783m <sup>2</sup>	10kl/ha/day	5 783
Institutional	2 417m <sup>2</sup>	10kl/ha/day	2 417
Recreational	4 562m <sup>2</sup>	10kl/ha/day	4 562
TOTAL ADF (l/day)			352 312
Peak Factor			2.5
PDWF (l/day)			880 780
Extraneous flow			15%
PWWF (l/day)			1 012 897
PWWF (l/s)			11.723
PWWF (m <sup>3</sup> /s)			0.012

To ensure that a minimum full bore velocity of 0.7 m/s is maintained, the following gradients will be accepted as the minimum:

Diameter	No. of Dwellings	Minimum Gradient
100	1 House connection	1 : 60
	Other	1 : 90
150	1 to 10	1 : 90
	11 to 80	1 : 120
	81 to 110	1 : 150
	111 to 130	1 : 180
	More than 131	1 : 200
200		1 : 300
225		1 : 350
250		1 : 400
300		1 : 500

Further to the above, a peak flow factor of 2.5 for less than 1 500 erven and an allowance of 15% for infiltration will be used.

The position of the internal sewerage reticulation system will be according to the following guideline:

General position in road reserves	:	1.5m from erf boundaries
Midblock sewers	:	1.2m from erf boundaries
Erf connections	:	1.0m from erf boundary 1.5m from side boundary

The site will be graded in order to ensure that the internal sewerage reticulation system can be collected at two positions within the proposed development. The sewage from the proposed development will be transported to the existing sewage treatment plant via an underground piped system. The proposed external sewage pipe system will be designed to ensure that the existing De Kelders area can be connected to the proposed system.



According to Overstrand Municipality, the existing sewage treatment works was recently upgraded from 300kl/day capacity to 2 000kl/day capacity. On a peak day the sewage treatment plant currently requires approximately 1 200kl. It is estimated that this development will generate approximately 1 013kl effluent on a peak day, including infiltration and a peak flow factor and approximately 352kl without taking infiltration and the peak flow factor into consideration.

#### 4.2 Water

According to the water master plan of Overstrand Municipality, which was compiled by CES consulting engineers, the water distribution system in De Kelders is operated as a single pressure zone supplied directly from the Klippgat system as well as an existing 0.75Ml reservoir, a 2Ml proposed De Kelders reservoir and two boreholes south-west of De Kelders, namely Grotte and Stanfordsbaai. The two reservoirs are supplied by means of a 250mm diameter pumping main with a flow meter from the Klippgat Pump station. Outflow meters were provided on the gravity pipeline from the reservoirs as well as on the pipelines from the two boreholes. A 75mm diameter link with a flow meter between the De Kelders zone and the Gansbaai zone were provided for emergency requirements. This link is closed under normal operating conditions and opened under emergency condition only.

The report by CES consulting engineers indicates that the entire northern part of De Kelders show residual pressures below the required 24m during peak hour demand conditions due to high flow velocities (in excess of 1.5 m/s) and insufficient pipe capacities resulting in high head losses.

The following bulk water reticulation items are required to proceed with the development of the site and to improve residual pressures in areas where problems are currently experienced during peak demand conditions:

- 2.2Ml reservoir
- 300mm diameter parallel pipe reinforcement (560m) – From the proposed reservoir to the branch of the existing De Kelders development and the proposed site
- 300mm diameter future main (300m) – From the branch as mentioned above and the proposed ring-main for the site
- 200mm diameter future main pipe (4 465m) – Proposed ring-main for the site along the boundaries of the site and in the proposed roads (Road 2, R43).

According to the water master plan of CES consulting engineers, the top and bottom water level of the proposed 2.2Ml reservoir is 97.5m MSL and 91.5m MSL respectively. To ensure residual pressure above the minimum of 24m, the demand area should be lower than approximately 70m. The proposed site for development is situated at levels between 45m MSL and 68m MSL.

It is however our proposal that a variable speed booster pump be provided directly on the reticulation system as part of the bulk supply to ensure that the required residual pressure is maintained.



The following average daily water demand for residential developments will be used as a guide for this development:

Description	No. of Units/Size	ADF	ADF (l/day)
Res I	118	850 l/day/unit	100 300
Res II	179	750 l/day/unit	134 250
Res III	175	600 l/day/unit	105 000
Local Business	5 783m <sup>2</sup>	10kl/ha/day	5 783
Institutional	2 417m <sup>2</sup>	10kl/ha/day	2 417
Recreational	4 562m <sup>2</sup>	10kl/ha/day	4 562
TOTAL ADF (l/day)			352 312
Equivalent Units			353
Peak Factor			14
IPF (l/day)			4 942 000
IPF (l/s)			57.200

The internal network will be designed on a ring-main principle and will connect to the proposed bulk reticulation ring-main system at various positions around the boundaries of the site to complete the internal ring-mains.

The minimum pipe size will be 110mm diameter uPVC Class 12 pipes. Each individual erf will be provided with a water meter as required by the Local Authority. Isolating valves shall be provided to ensure that no more than 3 valves need to be closed to isolate any section and will be positioned opposite splays.

The minimum fire hydrant flow will be 900 l/min at a minimum residual head of 7m and will be positioned at a general radius of 240m.

House connections will be 28mm inside diameter for single connections and 35mm for double connections, if required. The connections will be positioned 0.5m from both front and side erf boundaries.

The impact of the proposed development on the existing water reticulation system, including the reservoir capacity will be determined by the Local Authority's consulting engineers, if required.

#### 4.3 Stormwater

Due to the topography of the site as discussed above under paragraph 2 (site description), the site is sub-divided into three main drainage areas. These drainage areas will therefore be the basis on which the drainage patterns will be determined. The three drainage areas are as follows:

Drainage Area	Existing system	Size of pipe required	Storm event
1	No system	No System Required	1:2
2	No System	900mm diameter	1:2
3	No System	450mm diameter	1:2

The position of the drainage area outfalls areas are as follows:

Drainage area 1 : Northern end of the site  
 Drainage area 2 : Normandie road  
 Drainage area 3 : Main road



Approximately 15% of the site drains directly from the erven into the ocean, nature reserve or existing roads.

Due to the lack of a sufficient stormwater reticulation system in the adjacent section of the existing De Kelders development, it is our proposal that the 1:2 year recurrence interval storm event runoff, generated in the sub-catchment areas of the site be conveyed through the existing De Kelders development in a piped reticulation systems to discharge at two main positions. The runoff from the existing De Kelders development will be accommodated in the proposed reticulation system and the cost of the additional capacity required, deducted from the bulk service contributions. It should however be noted that the roads in the existing De Kelders development does not have any kerbs or channels.

The discharge positions will then be continued through the existing development as follows:

Drainage area 1	:	None Required
Drainage area 2	:	Along Normandie road, down Eden road and discharge at the Eden/Smuts road intersection
Drainage area 3	:	Along Main road and discharge into the existing channel

Other smaller reticulation systems should also be provided through the existing De Kelders development. These systems will also accommodate the existing De Kelders development and follow routes along Storm, Reitz, de Villiers and Crescent Roads.

Various local depressed low points exist in the roads in the existing De Kelders development but are of such a nature that it should not cause problems with the proposed underground reticulation system's alignment, as the overall gradient of roads seems to be sufficient.

The minor stormwater system will consist of catchpits and underground concrete spigot and socket pipes, which will discharge as described above. The minimum pipe size will be 375mm diameter and a self cleaning velocity during 75% of the 1:2 year recurrence interval storm event of 0.9 m/s will be maintained. The maximum distance between manholes and catchpits will be 90m.

The major stormwater system will be conveyed via the roads. Due to the proposed earthworks, all erven will discharge onto roads and all roads will be graded without low points. Overland escape routes for the major storm event will be provided where required.

Due to the localized low points of roads in the existing De Kelders development, as mentioned above, the major storm event might experience difficulty to discharge through the existing roads without causing flooding of the adjacent properties. The main drainage area should however be conveyed *without difficulty*.



#### 4.4 Roads

The proposed development will gain access from the R43, where additional lanes will be provided and from Main road in the existing De Keiders development.

All internal roads will be provided with an asphalt surface, mountable kerbs on both sides (CK5 and MK10), at a minimum crossfall of 2.0% and sufficient substructure, according to the TRH4.

The proposed roads in the development were classified as follows:

Class	Function	Dwelling units served	Road width
4	Local distributor	400 to 1 500	7.4m
4	Local distributor	400 to 1 500	7.4m
5a	Residential access collector	Up to 200	5.5m
5b	Residential access loop	Up to 120	5.0m
5b	Residential access collector	Up to 120	5.0m

The roads will be designed according to the following minimum standard:

Road	Design speed	CI Radius	Min Gradient	K-value	Min Vertical curve length
1	50 km/h	150m	0.4%	11	80m
2	50 km/h	40m	0.4%	11	80m
3	40km/h	15m	0.4%	6	30m
4	30km/h	10m	0.4%	4	20m
All other	20km/h	10m	0.4%	2	20m

The substructure of roads was designed according to the following road categories:

Road	Class	Category	Traffic class	Design period
1	UB	B	E2	20 years
2	UB	B	E2	20 years
3	UC	C	E0	20 years
4	UC	D	ER	20 years
All other	UC	D	ER	20 years

Bellmouth radii on the roads will generally be 6m, except at intersections with Class 5a and Class 4 roads, where the radii will be 8m and 10m respectively.

It is proposed that traffic circles be provided at intersections with major roads for traffic flow and traffic calming measures.

#### 4.5 Telkom

Telkom uPVC service ducts will be installed with regular inspection chamber/draw boxes, according to the required specifications and connected to the existing network.



## 4.6 Electricity

### 4.6.1 Bulk Electricity Supply

The inclusion of this development area into the Overstrand Municipal area of supply was approved by the National Energy Regulator of South Africa (NERSA) and the supply authority therefore will be Overstrand Municipality.

The maximum electricity demand for the planned 472 residential units is estimated at 2 000 kVA, with the average demand 1 200 kVA.

The electrical networks in the De Kelders area currently does not have adequate capacity for this additional load, and a new bulk supply will therefore have to be installed.

The proposed bulk supply will consist of a new medium voltage cable from the Gansbaai Main switching station some 4,6km away, via this development, linking up the Klipgat supply point and ending in De Kelders where it will be incorporated into the existing networks in Vyfer Street. The connection to De Kelders will ensure a secondary supply should the new primary cable fail.

In addition to the installation of this new bulk supply, an application will also be lodged with Eskom for an increase of 2 000kVA in the Municipal supply point. This aspect will be done in liaison with the electricity department of Overstrand Municipality.

### 4.6.2 Internal Electricity Services

The internal services will consist of medium and low voltage underground cables, miniature substations, consumer distribution kiosks and single phase erf connections.

Design of all new infrastructure will be done as per NRS 034 Specification and the latest design guidelines of Overstrand Municipality.

Streetlighting will be installed as per the architectural guidelines of the development and the design guidelines of Overstrand Municipality.

All services will be handed over to Overstrand Municipality after completion and commissioning.

## 5. CONCLUSION

The layout is practical and cost effective from a civil engineering point of view. It is however critical that the mass earthworks be done as it could affect the layout at certain points where the provision of major stormwater systems becomes more expensive.

The proposed external sewage reticulation system between the proposed development and the existing sewage treatment plant is required for the development to proceed. Sufficient capacity is available in the existing sewage treatment plant but upgrading will be required prior to the entire development being fully developed.

It is critical that the 2.2Ml reservoir and the bulk water reticulation system be provided to the development in order to ensure that the required peak demand at the minimum residual pressure be maintained.



The paragraphs under electricity (4.6) was obtained from Worley Parsons previously known as Kwezi V3 Consulting engineers and Mr. Theo Potgieter can be contacted in this regard should additional information be required at (021) 912 3000.

We trust that the report will be to your satisfaction and will gladly provide any further information required on request.

A handwritten signature in black ink, appearing to read 'Pieter Engelbrecht', written over a horizontal line.

Pieter Engelbrecht  
iCE Group

**PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT  
PROPOSED HOUSING DEVELOPMENT  
KHOISAN BAY  
DE KELDERS  
GANSBAAI**

Prepared for

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By

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**MARCH  
2006**

### Executive Summary

EFG Engineers (Pty) Ltd requested that the Agency for Cultural Resource Management conduct a Phase 1 Archaeological Impact Assessment of a proposed township housing development on the Remainder of Portion 2 of the Farm Strandfontein No. 712 in De Kelders, near Gansbaai, in the Bredasdorp District, Western Cape Province.

To be called Khoisan Bay, the proposed rezoning (from Agriculture) and subdivision of the affected property provides for the development of between 1500 and 1800 residential units, including associated infrastructure such as roads and services. Some public open space is also envisaged. In effect, the development comprises an extension of the existing De Kelders Township.

The extent of the proposed development (about 113 ha) falls within the requirements for an archaeological impact assessment as required by Section 38 of the South African Heritage Resources Act (No. 25 of 1999).

The aim of the study is to locate and map archaeological heritage remains that may be negatively impacted by the planning, construction and implementation of the proposed project, to assess the significance of the potential impacts and to propose measures to mitigate against the impacts.

The subject property is located immediately alongside the R43, on the right hand side as one enters De Kelders from Stanford. The western boundary of the site runs alongside the Walker Bay Nature Reserve. Currently, the affected property is vacant, but the western half of the site has been severely burnt as a result of the recent fires in the Overberg. The remainder of the property (i.e. the eastern portion) is infested with a mix of alien and indigenous vegetation, resulting in low archaeological visibility. Some basic infrastructure is already in place on the site, comprising a gravel service road with underground bulk water supply pipeline that services De Kelders Township.

Archaeological heritage remains are highly visible in the (burnt) western portion of the affected property. Most of the remains comprise very thin, sometimes fairly extensive, surface scatters of mainly fragmented shellfish, with a few stone tools, and occasional pieces of pottery and ostrich eggshell. Several scatters, however, appear to comprise thicker surface deposits of shell, suggesting that more substantial archaeological deposits may occur below the wind-blown sands.

The archaeological heritage remains have been graded high-medium-low local significance, subject to shovel testing in order to determine the significance of possible below ground archaeological deposits.

With regard to the proposed housing development on Portion 2 of the Farm Strandfontein No. 712 in De Kelders, the following recommendations are made.

- Shovel testing of archaeological heritage remains in order to determine the significance of below ground deposits. If some of the surface scatters are found to have depth and undisturbed deposits, they will have to be sampled by way of controlled archaeological excavation.
- Vegetation clearing operations in the eastern portion of the proposed site must be monitored by a professional archaeologist. Subject to training, these activities could also be undertaken by an Environmental Control Officer. Should any archaeological remains be uncovered during these operations, shovel testing (and possibly) systematic archaeological sampling may be required.
- Bulk earthworks and excavations must also be monitored by a professional archaeologist. Subject to training, these activities could also be undertaken by an Environmental Control Officer. Should any archaeological remains be uncovered during these operations, shovel testing (and possibly) systematic archaeological sampling may be required.
- Should any human remains be disturbed, exposed or uncovered during excavations and earthworks for the proposed project, these should immediately be reported to the South African Heritage Resources Agency (Mrs Mary Leslie @ 021 462 4502). Burial remains should not be disturbed or removed until inspected by the archaeologist.
- The above recommendations must be included in the Construction Environment Management Plan for the proposed project, to be developed by Johan Neethling Environmental Services.

## 1. INTRODUCTION

### 1.1 Background and brief

EFG Engineers (Pty) Ltd requested that the Agency for Cultural Resource Management conduct a Phase 1 Archaeological Impact Assessment of a proposed township housing development on the Remainder of Portion 2 of the Farm Strandfontein No. 712 in De Kelders (Gansbaai), in the Bredasdorp District, Western Cape Province.

To be called Khoisan Bay, the proposed rezoning (from Agriculture) and subdivision of the affected property provides for the development of between 1500 and 1800 residential units, including associated infrastructure such as roads and services. Some public open space is also envisaged. In effect, the development comprises an extension of the existing De Kelders Township.

The extent of the proposed development (about 25 ha) falls within the requirements for an archaeological impact assessment as required by Section 38 of the South African Heritage Resources Act (No. 25 of 1999).

The aim of the study is to locate and map archaeological heritage remains that may be negatively impacted by the planning, construction and implementation of the proposed project, to assess the significance of the potential impacts and to propose measures to mitigate against the impacts.

## 2. TERMS OF REFERENCE

The terms of reference for the baseline study were:

- to determine whether there are likely to be any archaeological sites of significance within the proposed site;
- to identify and map any sites of archaeological significance within the proposed site;
- to indicate the sensitivity and conservation significance of archaeological sites potentially affected by the proposed development;
- to assess the status and significance of any impacts resulting from the proposed development, and
- to identify mitigatory measures to protect and maintain any valuable archaeological sites that may exist within the proposed site.

### 3. THE STUDY SITE AND DESCRIPTION OF THE AFFECTED ENVIRONMENT

A locality map is illustrated in Figure 1.

An aerial photograph of the site indicating the study area is illustrated in Figure 2.

The subject property is located immediately alongside the R43, on the right hand side as one enters De Kelders from Stanford. The western boundary of the site runs alongside the Walker Bay Nature Reserve. Currently, the affected property is vacant. The western half of the site has been severely burnt as a result of the recent fires in the Overberg (Figures 3-7). The remainder of the property (i.e. the eastern portion) is infested with a mix of alien and indigenous vegetation, resulting in low archaeological visibility (Figures 8-11). Fire-breaks have been cut alongside the southern boundary (i.e. the current urban edge) and along a portion of the north eastern boundary. Some basic infrastructure is already in place. This comprises a service road with underground bulk water supply pipeline that services De Kelders Township. A number of smaller informal tracks and footpaths cut across the site from north to south. No buildings or structures occur on the property, other than a small pump station near a gate alongside the south eastern boundary.

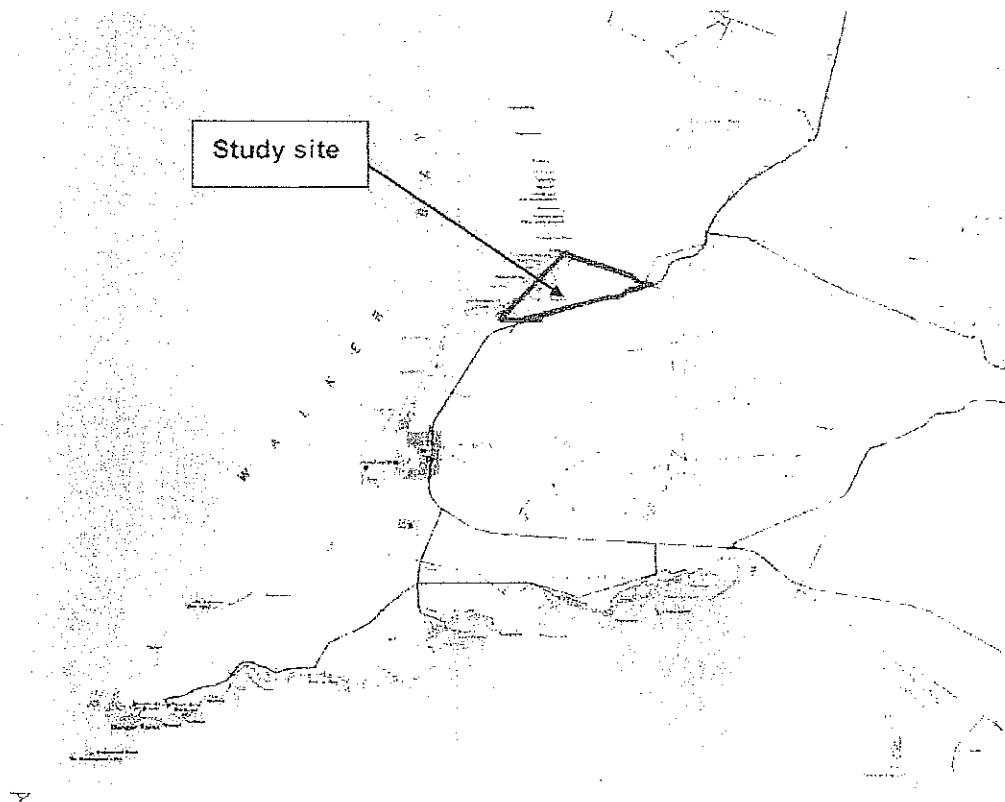


Figure 1. Locality Map. (3419 CB Gansbaai)

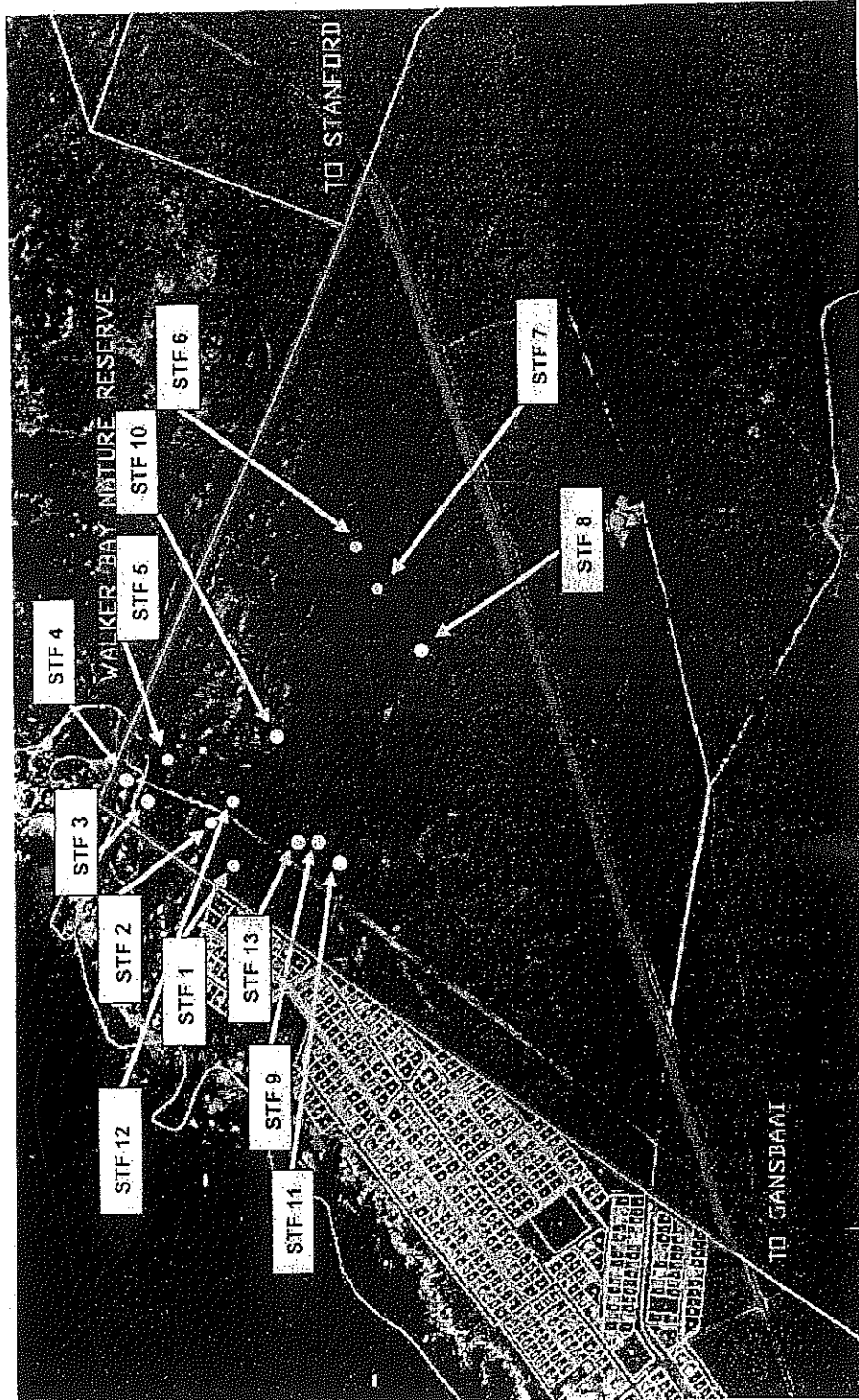


Figure 2. Aerial photograph of the study area.

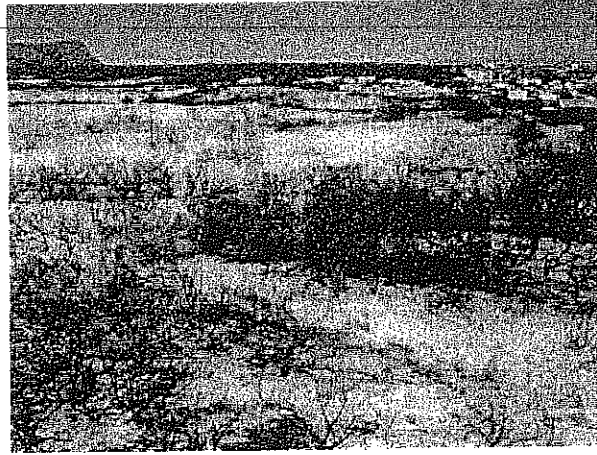


Figure 3. View of the western portion of the site facing east. The southern boundary (i.e. the current urban edge) of the subject property is located alongside the tar road to the right of the plate

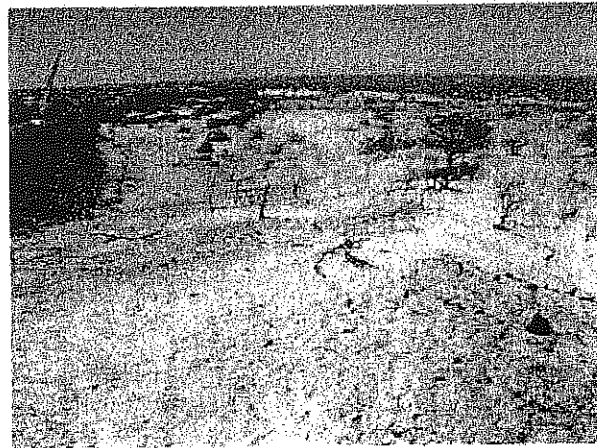


Figure 4. View of the site facing south east. Arrow indicates the R43.

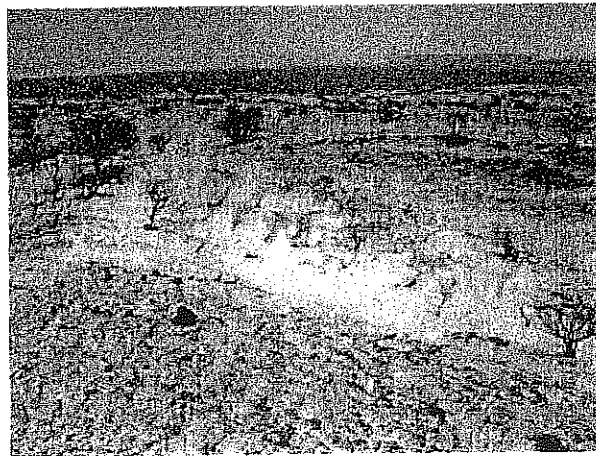


Figure 5. The site facing directly south. The photograph was taken from the R43.



Figure 6. View of the site facing west. Walker Bay Nature Reserve sand dunes can be seen in the top left hand corner of the plate.



Figure 7. View of the site facing south west.

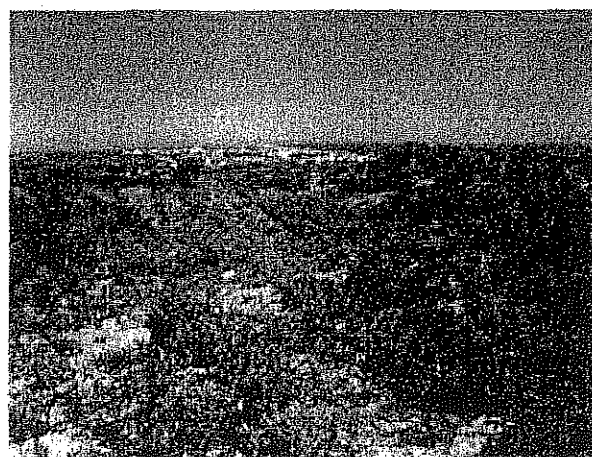


Figure 8. View of the site facing south east. The photograph was taken from the R43. Die Kelders Township is in the distance

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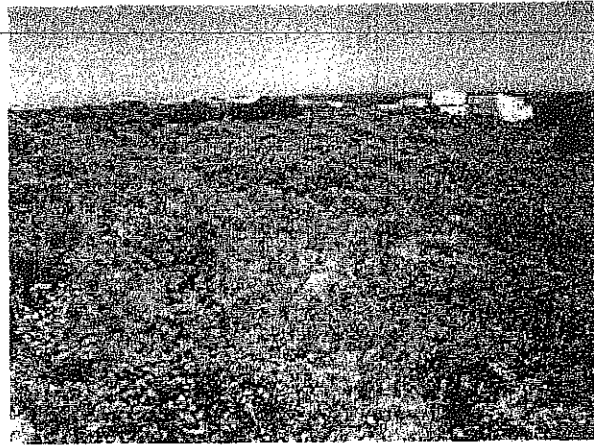


Figure 9. View of the site facing south east. Die Kelders Township is in the distance



Figure 10. View of the site facing west. Die Kelders Township is in the distance.



Figure 11. View of the site facing west. The heavily burnt, western portion of the property can be seen in the distance

#### 4. STUDY APPROACH AND DOCUMENTATION OF ARCHAEOLOGICAL SITES

##### 4.1 Assumptions

Since the receiving environment is located within a known archaeologically sensitive area (see for example Hart 2003; Kaplan 2005, 1993), the assessment assumes that:

- Damage to heritage resources potentially will occur in the proposed development.

##### 4.2 Limitations

The eastern portion of the subject property is infested with a mix of both alien and indigenous vegetation, resulting in extremely poor archaeological visibility.

##### 4.3 Method

The approach used in the archaeological study entailed a foot survey of the proposed site.

The archaeological assessment took place over two days, on the 13<sup>th</sup> and 14<sup>th</sup> March 2006.

Archaeological occurrences were recorded and given a co-ordinate using a Garmin Gecko 201 GPS set on map datum WGS 84.

A desktop study was also undertaken.

##### 4.4 Results of the desk-top study

Large numbers of coastal archaeological sites occur in the Gansbaai/De Kelders region (Kaplan 1993), the most famous probably being the well-known De Kelders Cave (Schweitzer 1979) located in the Walker Bay Nature Reserve, close to the affected property. With its rocky shoreline, the region acted as foci that attracted Later Stone Age<sup>1</sup> (LSA) people as it offered greater opportunities for the exploitation of marine foods, particularly shellfish.

Shell middens (ancient rubbish dumps), ancient tidal fishtraps (*visvywers*) and burials (both indigenous and colonial) have been recorded along the regions shoreline, at Pearly Beach (Avery 1974; Kaplan 2000, Rudner 1968), Buffelsjachtbaai (Hart & Halkett 1991), Quoin Point, Die Dam, Duinbaai, Soetfontein, Sandy Point, Kleinbaai, Danger Point (Kaplan 1993, 1996, Rudner 1968) and Gansbaai (Hart 2003; Kaplan 2005). The archaeological sensitivity of the region has also been highlighted in the Gansbaai Spatial Development Plan (Steyn Larsen 2003).

Archaeological excavations and shovel testing of deposits in Gansbaai and Danger Point have also been undertaken (Kaplan 2000b, 2006 in prep.; Nilssen 2004). Unfortunately, no radiocarbon dates have been obtained for these sites, but excavations of Perlemoen-rich shell middens deposits at Danger Point suggest dates older than 2000 years ago (Kaplan 2006 in prep.).

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<sup>1</sup> A term referring to the last 20 000 of pre-colonial history in southern Africa.

## 5. LEGISLATIVE REQUIREMENTS

### 5.1 The National Heritage Resources Act (Act No. 25 of 1999)

... any development or other activity which will change the character of a site exceeding 5 000m<sup>2</sup>, or the rezoning or change of land use of a site exceeding 10 000 m<sup>2</sup>, requires an archaeological impact assessment in terms of the National Heritage Resources Act (No. 25 of 1999).

#### 5.1.1 Structures (Section 34 (1))

No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by Heritage Western Cape (HWC), the responsible provincial resources authority.

#### 5.1.2 Archaeology (Section 35 (4))

No person may, without a permit issued by HWC, destroy, damage, excavate, alter or remove from its original position, or collect, any archaeological material or object.

#### 5.1.3 Burial grounds and graves (Section 36 (3))

No person may, without a permit issued by the South African Heritage Resources Agency (SAHRA), destroy, damage, alter, exhume or remove from its original position or otherwise disturb any grave or burial ground older than 60 years, which is situated outside a formal cemetery administered by a local authority.

## 6. IDENTIFICATION OF RISK SOURCES

The following project actions may impact negatively on archaeological sites. The actions are most likely to occur during the Construction Phase of the proposed project.

- Vegetation clearing operations in the eastern sector of the property may expose hidden shell middens and hunter-gatherer camp sites.
- Bulk earthworks and excavations may expose or uncover buried shell middens and human burials.

## 7. LIMITATIONS

The western sector of the study site has recently been badly burnt, resulting in high visibility. However, the eastern sector of the property is infested with a mix of alien and indigenous vegetation, resulting in very low archaeological visibility.

## 8. FINDINGS

Thirteen archaeological occurrences were recorded during the baseline study (refer to Figure 2).

### STF 1 (GPS reading S° 34 33 025 E° 19 22 529)

A thin, yet fairly extensive, surface scatter of fragmented shellfish occurs on a low, fairly-flat, south-facing dune slope, less than 100m from the southern boundary of the subject property (Figure 12). The shellfish remains are dominated by Black Mussel (*Choromytilus meridionalis*), with a few *Turbo samartica* and fragments of *Cymbula oculus* occurring. One large quartz chunk, one quartzite flake, and three pieces of Cape coastal pottery were also found. The site and surrounding area has been fairly heavily trampled. A modern dump of white sand mussel, glass, rusted metal and plastic, is located on a dune alongside the scattered pre-colonial shellfish remains.

The archaeological heritage remains have been rated medium local significance.



Figure 12. STF 1. View of the site facing south.

### STF 2 (GPS reading S° 34 32 941 E° 19 22 649)

A relatively well-contained, fairly substantial, scatter of highly fragmented shellfish remains occurs alongside the service road that cuts across the subject property, about 100 m north of the southern boundary. The archaeological occurrence is set among burnt out tree stumps, on a flat dune surface, either side of several raised outcroppings of calcrete at the base of a high sand dune (Figures 13 & 14). Several thicker patches (or clusters) of slightly raised, (burnt) shellfish deposits, suggests that some below ground archaeological deposits possibly occur over this site. Shellfish remains have also spilled into the service road, and occur as a thin scatter north of the road as well. At least 10 small charred pieces of pottery (possibly from one vessel) were found clustered around a blackened mound of shell, while at least eight more pieces of pottery were found scattered over the site, including one thick body sherd about 4 cm thick. Six quartzite stone flakes were also found. A lower grindstone was also found on a slightly raised outcropping of calcrete and sand about 25 m south of the main shellfish concentration, and about 75 m west of STF 1.

The shellfish in STF 2 is dominated by Black Mussel, with much smaller counts of Turbo samarica, Scutellastra argenvillei, S. granularis, some Sand Mussel (Donax Serra) and whelk occurring.

The archaeological heritage remains have been rated high local significance.

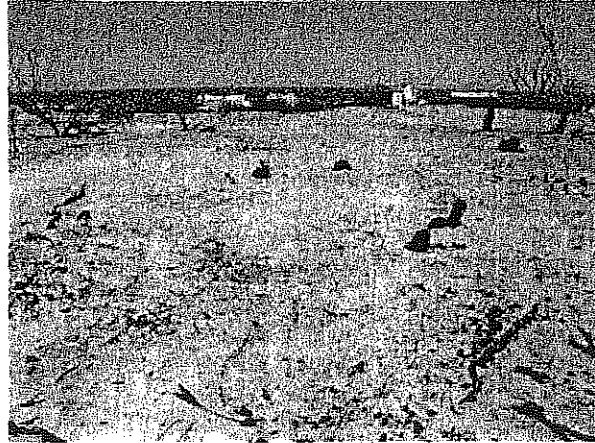


Figure 13. STF 2. View of the site facing south.



Figure 14. Arrows indicates location of STF 1 and STF 2

#### STF 3 (GPS reading S° 34 32 852 E° 19 22 654)

A thin, very small scatter of fragmented shellfish remains, dominated by Black Mussel, occurs on a low dune immediately alongside the tar road near the south-western boundary of the affected property. A thin scatter of shell (Black Mussel) occurs in a narrow deflated basin about 15 m north of the road. No cultural remains were located.

The archaeological heritage remains have been graded low local significance.

**STF 4 (GPS reading S° 34 32 838 E° 19 22 717)**

A very thin (small) scatter of fragmented shellfish, dominated by Black Mussel, was found on an artificially raised sand bank, set back behind some burnt tree stumps, alongside the tar road near the entrance to the Walker Bay Nature Reserve. No cultural remains were located.

The archaeological heritage remains have been graded low local significance.

**STF 5 (GPS reading S° 34 32 890 E° 19 22 727)**

A thin scatter of fragmented shellfish and five large quartzite flakes, occur among a fairly large, flat outcropping of calccrete, about 20 m north of the main service road at the bottom of a high sand dune, and about 150 m north-east of the entrance to the Walker Bay Nature Reserve. Relatively large numbers of heat spall flakes are scattered about. The shellfish is dominated by Black Mussel, with some Turbo samartica and S. argenvillei also present.

The archaeological heritage remains have been graded low local significance.

**STF 6 (GPS reading S° 34 33 060 E° 19 22 934)**

A thin surface scatter of fragmented shellfish, measuring about 20 m in extent, was found in the north western (central) portion of the affected property, on a high, flat dune top. The shellfish is dominated by Black Mussel, while a few fragments of Turbo samartica and C. oculus were also noted. Three very small pieces of burnt pottery were found.

The archaeological heritage remains have been graded low local significance.

**STF 7 (GPS reading S° 34 33 124 E° 19 22 879)**

A very thin surface scatter, or strip, of fragmented shellfish, dominated by Black Mussel with some C. oculus and S. argenvillei, occurs among some burnt out trees on a north-west facing dune slope, about 100 m east of STF 6. No cultural items were located.

The archaeological heritage remains have been graded low local significance.

**STF 8 (GPS reading S° 34 33 090 E° 19 22 722)**

The site comprises a relatively large, but thin, surface scatter of fragmented shellfish remains on a west-facing dune slope, about 120 m east of STF 7. The site looks onto an extensive deflated dune basin (or dune slack) extending southwards. The shellfish is dominated by Black Mussel, with some larger fragments and pieces of Turbo samartica and C. oculus and S. argenvillei occurring. Several limestone and quartzite flakes and chunks were also counted.

The archaeological heritage remains have been graded medium local significance.

**STF 9 (GPS reading S° 34 33 044 E° 19 22 662)**

A thin, fairly extensive, surface scatter of fragmented shellfish remains occurs on a flat dune top about 50-60 m north of the service road running across the property, almost directly in line with a thatch roofed building on the southern boundary of the subject property. The shellfish remains are dominated by Black Mussel, with fragments and several larger pieces of C. oculus and Turbo samartica occurring. A few whole (larger) S. argenvillei and Turbo samartica were also counted. Three pieces of weathered (or burnt) ostrich eggshell, and two larger quartzite flakes were also counted.

**The archaeological heritage remains have been graded medium local significance.**

**STF 10 (GPS reading S° 34 33 028 E° 19 22 799)**

A fairly extensive, but very thin, surface scatter of fragmented shellfish remains occurs on a east-facing dune slope overlooking a wind deflated basin, about 200 m north of STF 2. The shellfish is dominated by Black Mussel, with some C. oculus, S. argenvillei, and Turbo samartica occurring. One limestone flake, one quartzite flake, one quartzite chunk, one small piece of blackened pottery and one very small piece of burnt ostrich eggshell were also counted.

**The archaeological heritage remains have been graded medium local significance.**

**STF 11 (GPS reading S° 34 33 083 E° 19 22 624)**

The site, comprising a thin surface scatter of fragmented shellfish, about 15 m in extent, is located about 40 m east of STF 9, and about 45 m north of the existing service road that cuts across the site. The shellfish is dominated by Black Mussel, with some C. oculus, whelk and Turbo samartica occurring. No cultural remains were found on the site.

**The archaeological heritage remains have been graded low local significance.**

**STF 12 (GPS reading S° 34 33 001 E° 19 22 648)**

The site comprises a very thin, small, surface scatter of Black Mussel, about 20-30 m north of STF 2. No cultural remains were found. The site may well represent the northernmost edge of STF 2, where shellfish remains were also found in the service road.

**The archaeological heritage remains have been graded low local significance.**

**STF 13 (GPS reading S° 34 33 001 E° 19 22 648)**

A small, thin, surface scatter of fragmented shellfish, dominated by Black Mussel, occurs about 15 m north of the gravel access road and about 30 m west of STF 9. No cultural remains were located.

**The archaeological heritage remains have been graded low local significance.**

### 8.1 Other finds

About a dozen Early Stone Age<sup>2</sup> (ESA) and Middle Stone Age<sup>3</sup> (MSA) tools were found in the main access road that cuts across the subject property (refer to Figure 2), as well as several smaller minor roads, in the heavily vegetated eastern sector of the proposed site. The tools, in coarse-grained (ESA) and finer-grained (MSA) quartzite's, comprise mainly large chunks and flakes. One larger core was also counted. No formal tools such as handaxes, points, or scrapers were found. A few fragments and pieces of shellfish were also noted in the sandy road reserve, but these comprise mainly scattered and isolated bits.

The archaeological heritage remains have been graded low local significance.



Figure 15. Collection of ESA and smaller MSA stones tools from the site.  
Scale is in cm.

<sup>2</sup> A term referring to the period between 2 million and 200 000 years ago.

<sup>3</sup> A term referring to the period between 200 000 and 20 000 years ago.

## 9. IMPACT STATEMENT

Shell midden remains with pottery, stone tools and ostrich eggshell will be negatively impacted by the proposed housing development and associated activities.

Vegetation clearing operations (in the eastern sector of the property) and bulk earthworks and excavations may also impact negatively on hidden or buried shell middens and human burials.

## 10. RECOMMENDATIONS

With regard to the proposed housing development on Portion 2 of the Farm Strandfontein No. 712 in De Kelders, the following recommendations are made.

- Shovel testing of archaeological heritage remains in **STF 1, 2, 8, 9 & 10** are required in order to determine the significance of below ground deposits. If some of the surface scatters are found to have depth and undisturbed deposits, they will have to be sampled by way of controlled archaeological excavation.
- Vegetation clearing operations in the eastern sector of the site must be monitored by a professional archaeologist. Subject to training, these activities could also be undertaken by an Environmental Control Officer. Should any archaeological remains be uncovered during these operations, shovel testing (and possibly) systematic archaeological sampling may be required.
- Bulk earthworks and excavations must also be monitored by a professional archaeologist. Subject to training, these activities could also be undertaken by an Environmental Control Officer. Should any archaeological remains be uncovered during these operations, shovel testing (and possibly) systematic archaeological sampling may be required.
- Should any human remains be disturbed, exposed or uncovered during excavations and earthworks for the proposed project, these should immediately be reported to the South African Heritage Resources Agency (Mrs Mary Leslie @ 021 462 4502). Burial remains should not be disturbed or removed until inspected by the archaeologist.
- The above recommendations must be included in the Construction Environment Management Plan for the proposed project, to be developed by Johan Neethling Environmental Services.

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