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DE BEERS
A DIAMOND IS FOREVER

PALAEONTOLOGICAL MITIGATION REPORT
DEVELOPMENT ON VELDDRIF FOSSIL SHELL BAR

NOORDHOEK PHASE 2
VELDDRIF HOUSING
BERG RIVER MUNICIPALITY
OCTOBER 2003

NOT CAPTURED!

Prepared for Ninham Shand
by
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SUMMARY

A site investigation was carried out (10/10/2003) to examine the fossils exposed in trenches made into the so-called Velddrif fossil shell bar for the installation of housing infrastructure. The purpose is to mitigate the potential loss of heritage palaeontological material and also to take advantage of the opportunity for additional scientific observations provided by the excavations.

The exposures are typical of the Velddrif Formation. Samples of the sediments and the shells were taken. Their geological context is elaborated below. The samples are to be deposited in the South African Museum.

No vertebrate fossils (bones) were found.

The shell fossils present are mainly fragmentary, with scattered occurrence of better-preserved specimens. The assemblage is of low diversity. With one exception all are extant taxa. The extinct taxon is the subspecies of *Crepidula capensis viz*. *C. C. praerugulosa* which is abundantly represented at many Velddrif Formation outcrops. No extra-limital (exotic) taxa were found.

From the exposures available at 10/10/2003, it appears that lateral variation is not marked. However, it would be prudent to inspect future exposures made more distant from the spot examined. Should the unearthing of fossil bone material occur it must be immediately protected and reported.

LOCATION

The location of the site examined is indicated in Maps 1 and 2.

As shown in Figure 2, the site of detailed observations is the trench at the intersection of the future Suring and Nemesia streets.

GPS position acquired in trench:

WGS 84: S 32° 45.734'; E 18° 10.456'.

SA Grid, LO19, WGS 84: +77 373 Y, +3 626 680 X.

SA Grid, LO19, CAPE: +77 316 Y, +3 626 390 X.

Instrument: GARMIN GPSmap 76S.

GEOLOGICAL CONTEXT

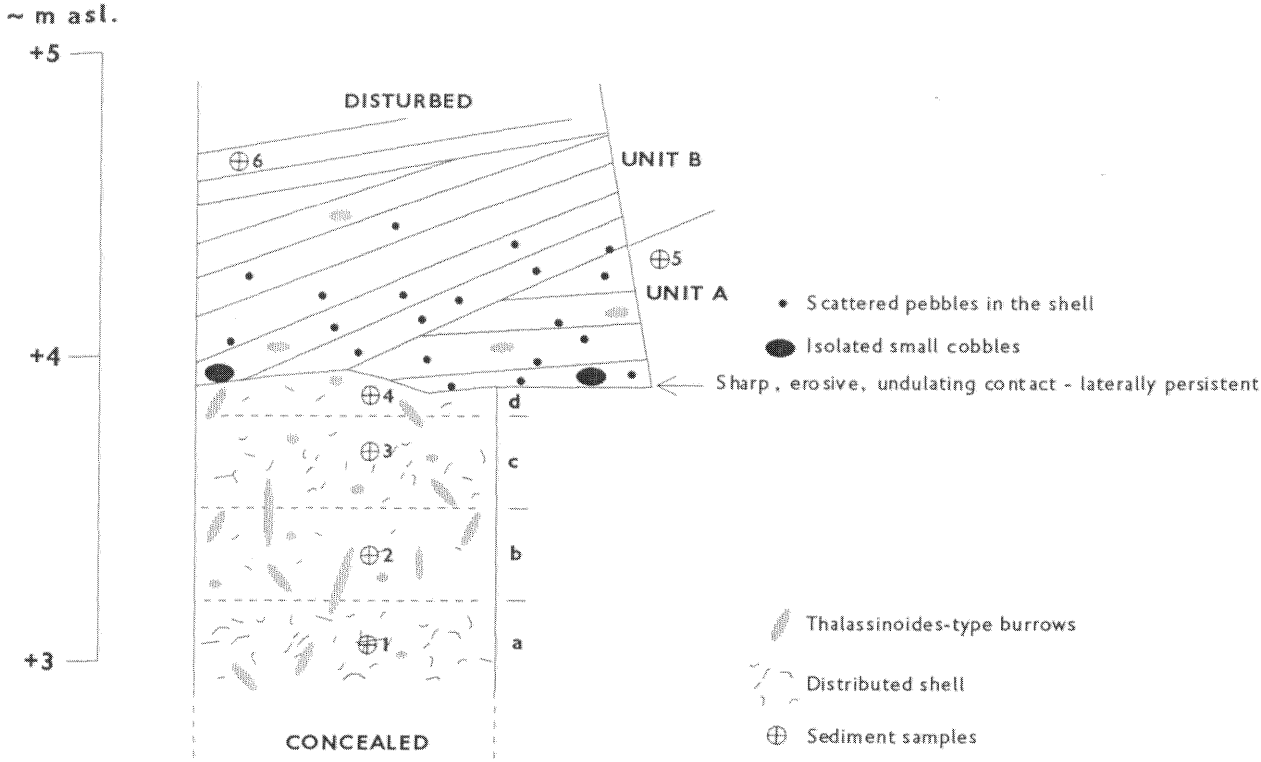
The site is on the "fossil shell bar" which is one of several such linear features in the area. These deposits are assigned to the Velddrif Fomation (Rogers, 1980, 1982), a succint summary of which has been provided by Roberts in Pether *et al.* (2000). The type section of the Velddrif Fomation is nearby, being ~2 km to the southwest of the site on the north bank of the Berg River. There Tankard (1976) documented a ~5 m section of "barrier-beach" between 2-7 m asl. consisting of ~ 3 m of shelly fine sands sharply overlain by ~2 m of cross-bedded shell-coquina. The latter was interpreted to have been deposited at intertidal (foreshore) palaeodepth.

The faunal content of the Velddrif Formation is famous for "thermally anomalous" mollusca as described by Tankard (1975) and Kensley (1974, 1985a & b), with taxonomy dealt with in Kilburn & Tankard (1975). Warm-water West African taxa populated the South African coast during the Last Interglacial (LIG) ~125 kyr B.P. and are found in Last Interglacial "raised beach" deposits all the way round to the Port Elizabeth area. They were able to pass the biological barrier imposed by the cold, upwelling Benguela System, probably under conditions like "Benguela *Niños*" when the Angolan Current pushes southwards and suppresses upwelling. The LIG may well have been a "super-interglacial" for a time, warmer than present and with changed climate/oceanography.

GEOLOGY OF THE SITE

The trench that was sampled and is described herein was the most complete exposure available, revealing a section of ~2 m vertical extent. Two distinct marine units are evident: a lower sandy unit and an upper shell unit. These are referred to below as the Lower Facies and the Upper Facies. To the east where the ridge is at lower elevation and with lesser slope there were other shallow trenches. These confirmed the lateral continuity of the units as the sharp contact between them was exposed. However, most of the upper shell unit was missing due to natural erosion in the past.

The following description is accompanied by a graphic log of the site and a labelled series of images.



GRAPHIC SECTION AT SPOT VELDDRIF 1 10/10/2003
WGS 84: S 32° 45.734'; E 18° 10.456'

DEVELOPMENT ON VELDDRIF FOSSIL SHELL BAR
NOORDHOEK PHASE 2. VELDDRIF HOUSING. BERG RIVER MUNICIPALITY
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The Lower Facies – medium-bedded, bioturbated, fine sand facies.

Only the upper metre is exposed. The lithology is mainly very fine quartzose sand with varying amounts of whole shells, shell fragments and comminuted shell sand.

Horizontal bedding on the scale of 15-30 cm thickness is defined by the concentration of shell. The boundaries between these subunits are ill-defined. Four subunits are present, labelled a-d. The lowermost subunit a contains more whole shells and larger fragments scattered within it and some of these are in convex-up orientation. Some isolated pebbles also occur in the shellier intervals.

The entire facies is highly bioturbated, with burrows 1-2 cm diameter defined by denser clots of shell fragments in the burrow-fills and by wind-etching of the less compact fills. The burrows are simple and unlined. They are best assigned to the *Thalassinoides* ichnogenus. The main architects of *Thalassinoides* systems are

anomuran Crustacea, particularly the fossorial thalassinidean shrimps, e.g. *Callianassa* and *Upogebia*.

In the shell-poor subunits b and d some relict lamination can be discerned in places. These laminae consist of mud pellets and elsewhere scattered mud pellets are present.

In subunit d an articulated *Venerupis* bivalve was present. However, this was not in life position, but it may have been rotated by bioturbation.

The upper contact of the facies is sharp and erosive. It has a smoothly undulating relief of up to about 10 cm on a horizontal scale of ~2 m.

Pedogenetic processes affecting the unit are diffuse mottles of pinkish hue associated with decayed rootlets.

The Upper Facies – crossbedded shell and shell-hash facies.

Bedding is defined by variation in average shell fragment size of the individual cross-strata and by sandier intercalations. Some cross-strata are relatively thin at 1-2 cm thickness, others are 4-6 cm thick.

In the coarser-shell cross-strata are scattered quartz pebbles, up to large pebble (~3 cm) in size. Above the sharp lower contact in the lower part of the unit are isolated small cobbles. In the south part of the trench the bedding is subhorizontal to gently dipping to the WNW (UNIT A). This earlier deposition was laterally eroded and this dipping surface was conformably overlain by more steeply-dipping cross-strata with migration direction to the NNW (UNIT B).

In places are simple sand-filled horizontal burrows of elliptical section 4x2 cm.

Pedogenetic alteration is more extensive and concentrated along crossbedding.

PALAEONTOLOGY

The trenches were examined for vertebrate bones and none were noticed.

The described section was sampled as indicated on the images. Sand samples were taken for sedimentological and microfossil analyses. A bulk sample of coarse shell from the Upper Facies was taken, as well as a sample of the finer shell hash.

The shells in the exposure were examined in order to obtain the diversity of taxa present. It was found that the diversity was low. Most of the shell present appears

to be that of the slipper limpet *Crepidula capensis praerugulosa* and the bivalve *Venerupis corrugata*. Mussel shell is also represented, but whole shells are not common and are *Choromytilus*.

Less common taxa present are *Lutraria* and a scattering of worn examples of *Patella* spp., *Bullia laevissima*, *Nucella squamosa* and *Burnupena* sp., curiously all small specimens.

List of species

GASTROPODA

Patella spp.

**Crepidula capensis praerugulosa* Kilburn & Tankard, 1975

Nucella squamosa (Lamarck, 1816)

Burnupena sp.

Bullia laevissima (Gmelin, 1791)

BIVALVIA

Choromytilus meridionalis (Krauss, 1848)

Lutraria lutraria (Linnaeus, 1758)

Venerupis corrugata (Gmelin, 1791)

* extinct subspecies

There are no striking contrasts in the taxa represented in the Lower and Upper facies. Significantly, there is no obvious presence of estuarine taxa. Extralimital "thermally anomalous" taxa are not present.

INTERPRETATION

The species represented and low diversity of shell fauna indicate an open-coast setting with both hard and sandy substrata present.

The facies character is that of coastal progradation in a relatively low wave-energy and sediment-starved setting. The highly bioturbated Lower Facies is interpreted to be the upper part of the lower shoreface. The sharp contact on the latter was

produced by the lateral migration of bars and channels in the upper shoreface (breaker and surf zone). This sharp contact is the most highly laterally-persistent surface produced in regressive shallow-marine sections. The undulatory nature of this contact basal to the crossbedded units indicates that the latter are not tabular units. Similarly the north end of the trench reveals shallow troughsets are present. Although this facies has been interpreted to be intertidal in the past, it is difficult to explain away the then apparent absence of an upper shoreface facies. The features typical of intertidal deposition on the foreshore are absent. As often is the case on the coastal plain, this uppermost (shallowest) part of the section has been removed.

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SAMPLE LABELLING

All labelled Velddrif 1 C 10/10/03

1 Lower Facies - subunit a

2 Lower Facies - subunit b

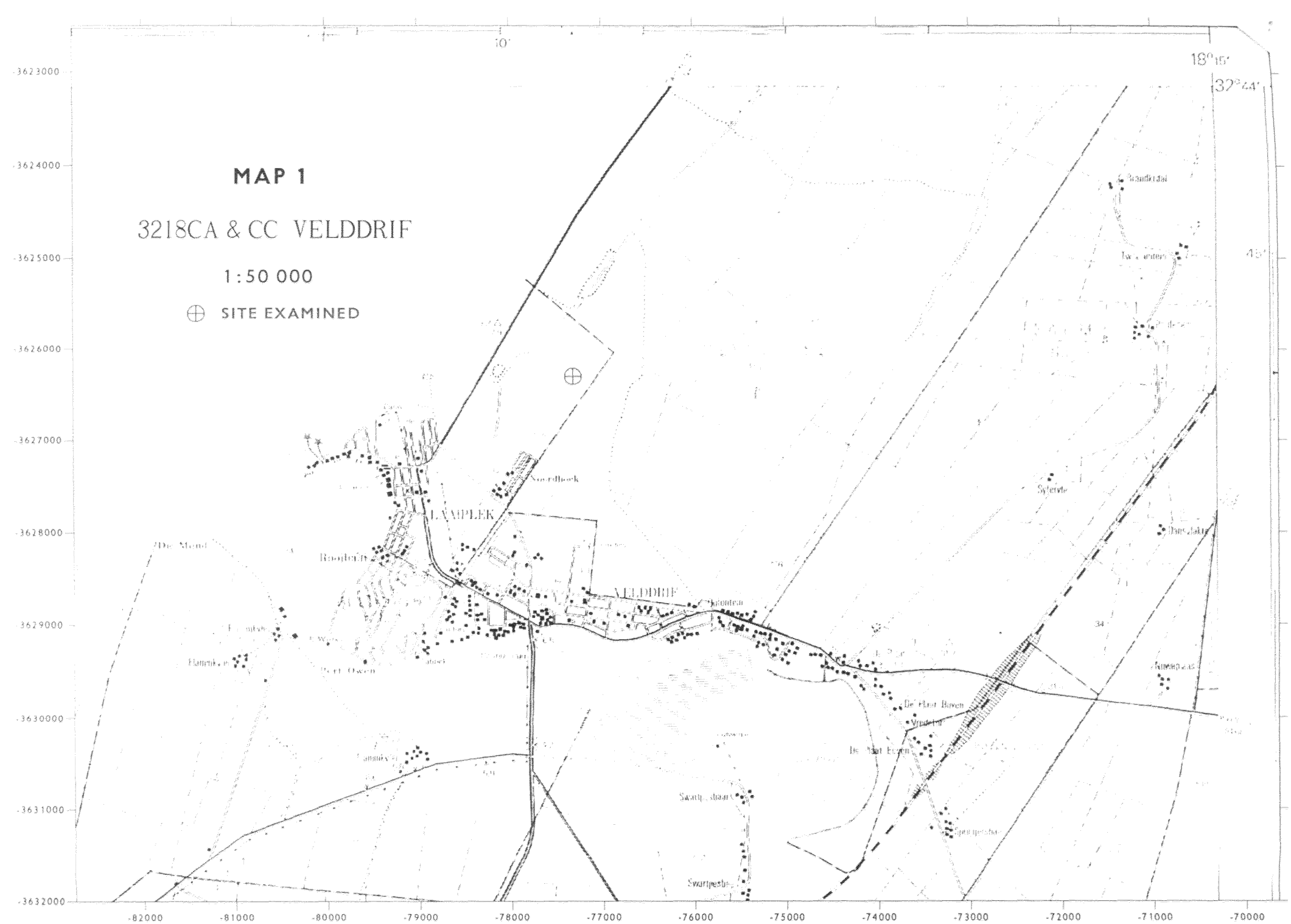
3 Lower Facies - subunit c

4 Lower Facies - subunit d

5 Upper Facies C UNIT A - Sandy intercal.

6 Upper Facies C UNIT B C Shell hash

BULK SHELL SAMPLE C UPPER FACIES C UNIT A.


MAP 1
3218CA & CC VELDDRIF
1:50 000
SITE EXAMINED
LAMPLEK
VELDDRIF
Port Owen
18°15'
32°24'
-3623000
-3624000
-3625000
-3626000
-3627000
-3628000
-3629000
-3630000
-3631000
-3632000
-82000
-81000
-80000
-79000
-78000
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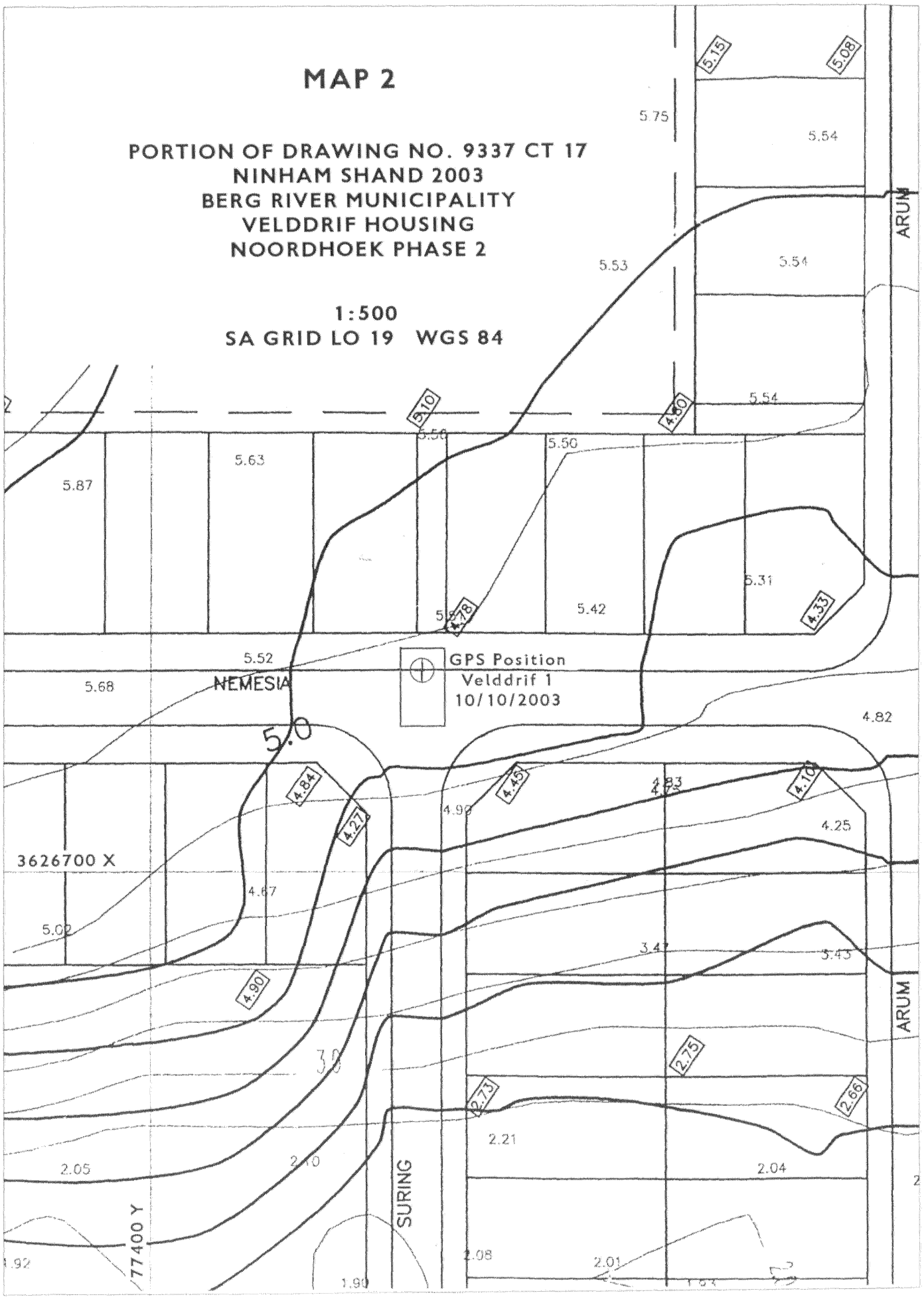
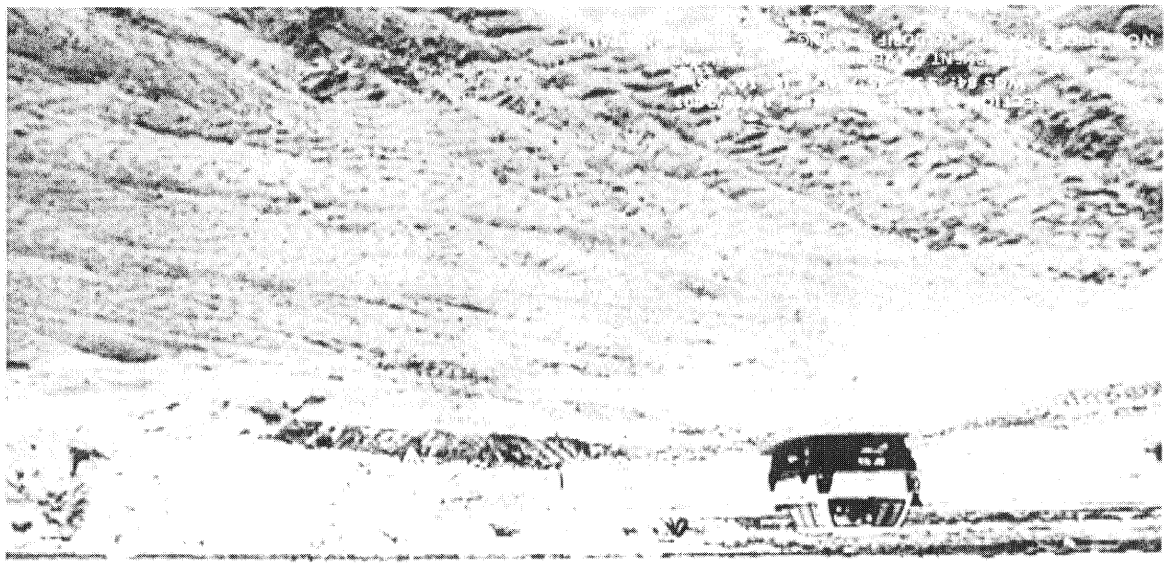
-76000
-75000
-74000
-73000
-72000
-71000
-70000

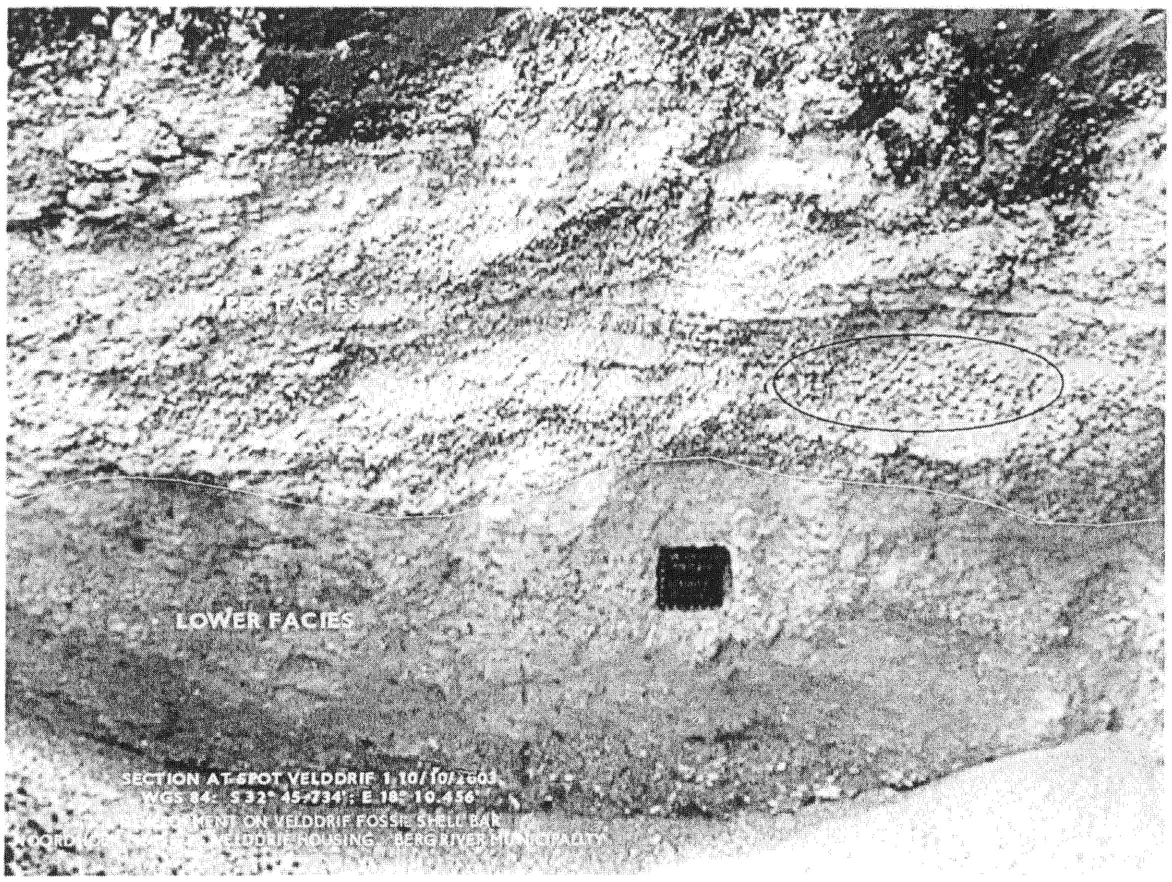
MAP 2

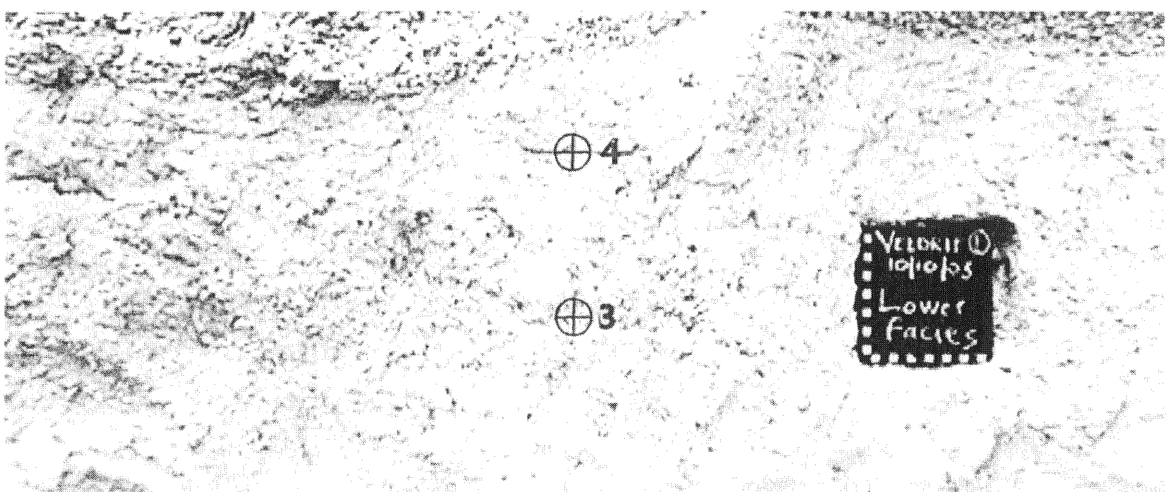
PORTION OF DRAWING NO. 9337 CT 17
NINHAM SHAND 2003
BERG RIVER MUNICIPALITY
VELDDRIF HOUSING
NOORDHOEK PHASE 2

1:500
SA GRID LO 19 WGS 84






LOWER FACIES
SECTION AT SPOT VELDDRIF 1 10/10/2003
WGS 84: S 32° 45.734'; E 18° 10.456"


4
3
2
1
Veldrif ①
10/10/05
Lower
Facies

SECTION AT SPOT VELDDRIF 1 10/10/2003
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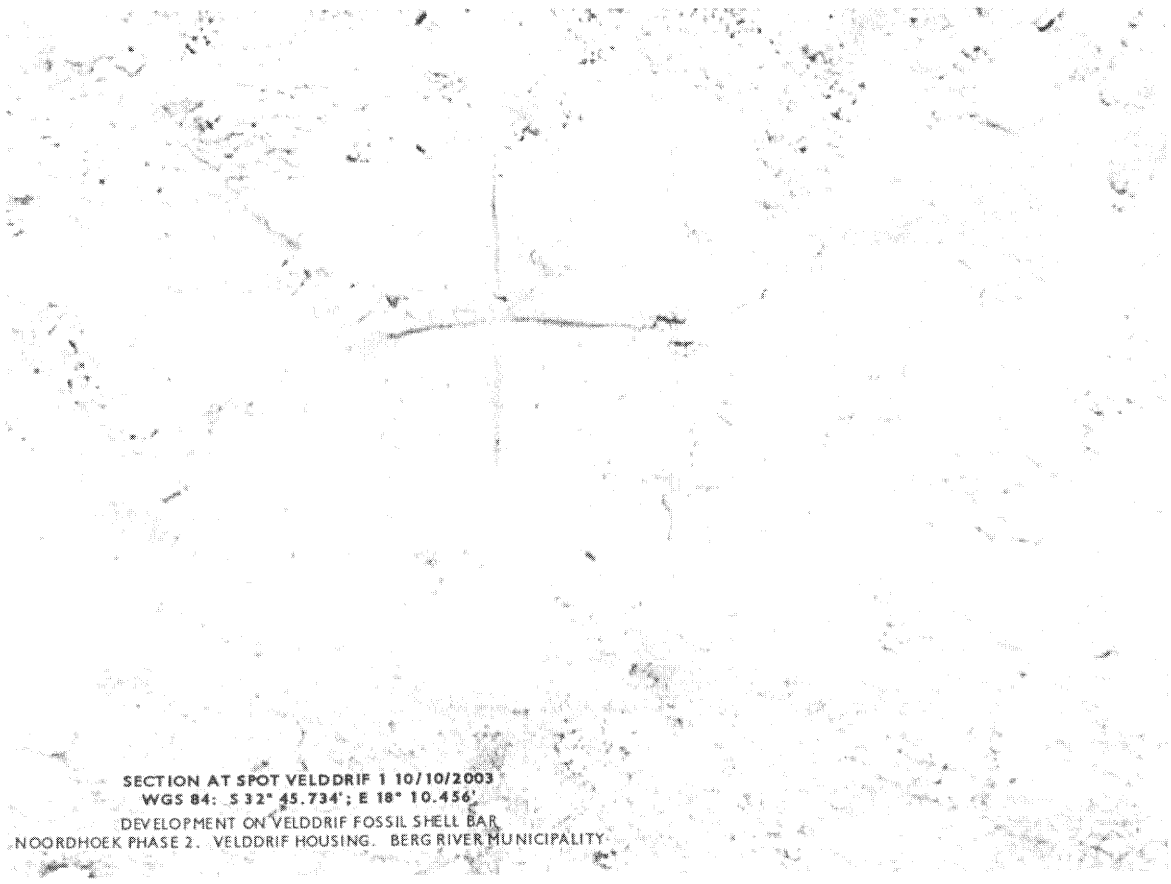

SECTION AT SPOT VELDDRIF 1 10/10/2003
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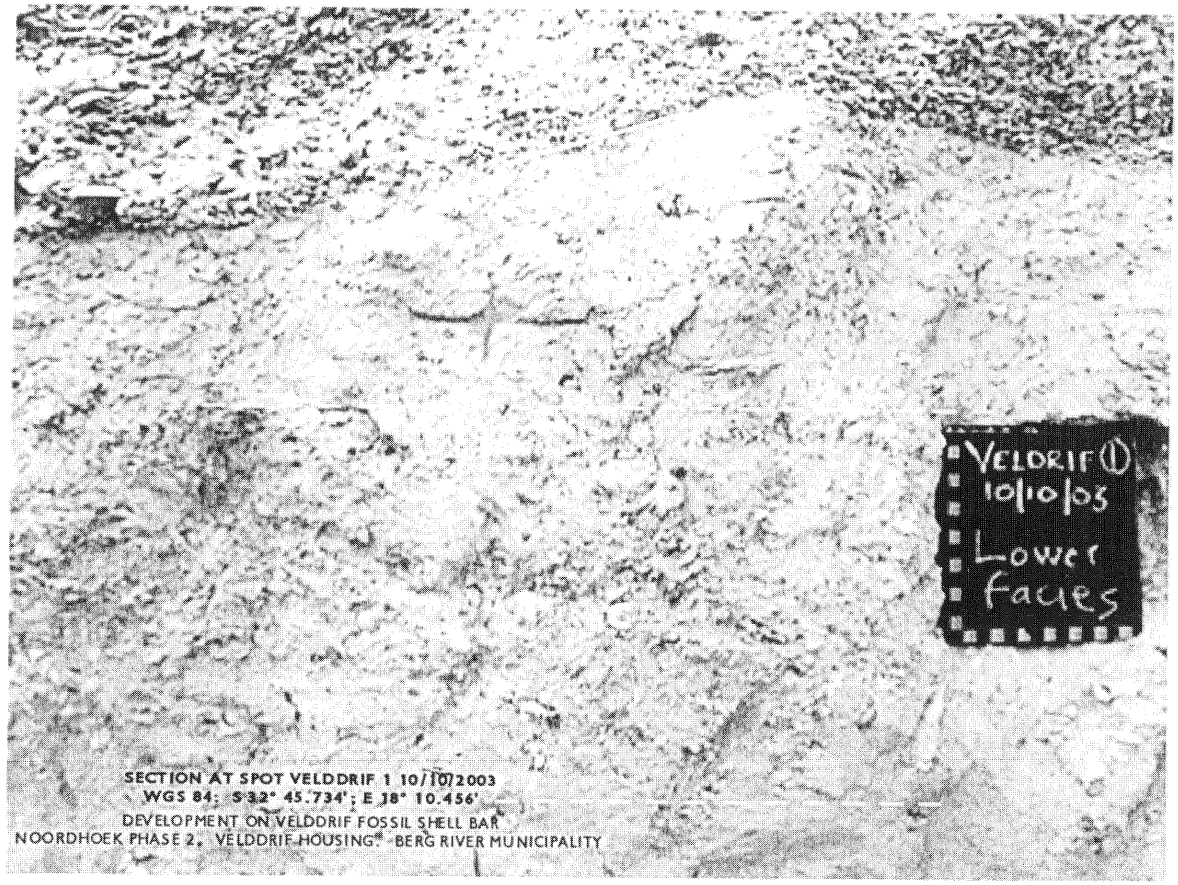
VELDRIF ①
10/10/03
Lower
Facies
SECTION AT SPOT VELDDRIF 1 10/10/2003
WGS 84; S 32° 45.734'; E 18° 10.456'
DEVELOPMENT ON VELDDRIF FOSSIL SHELL BAR
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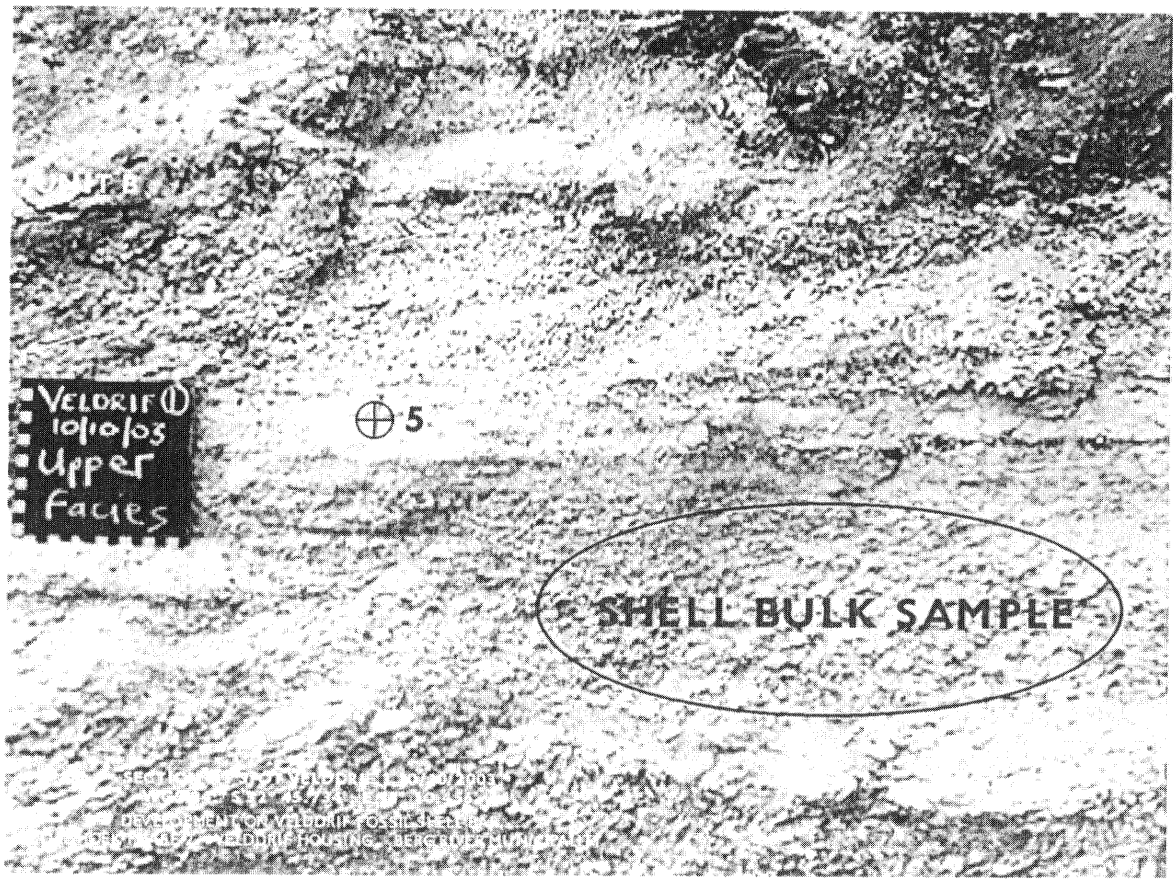
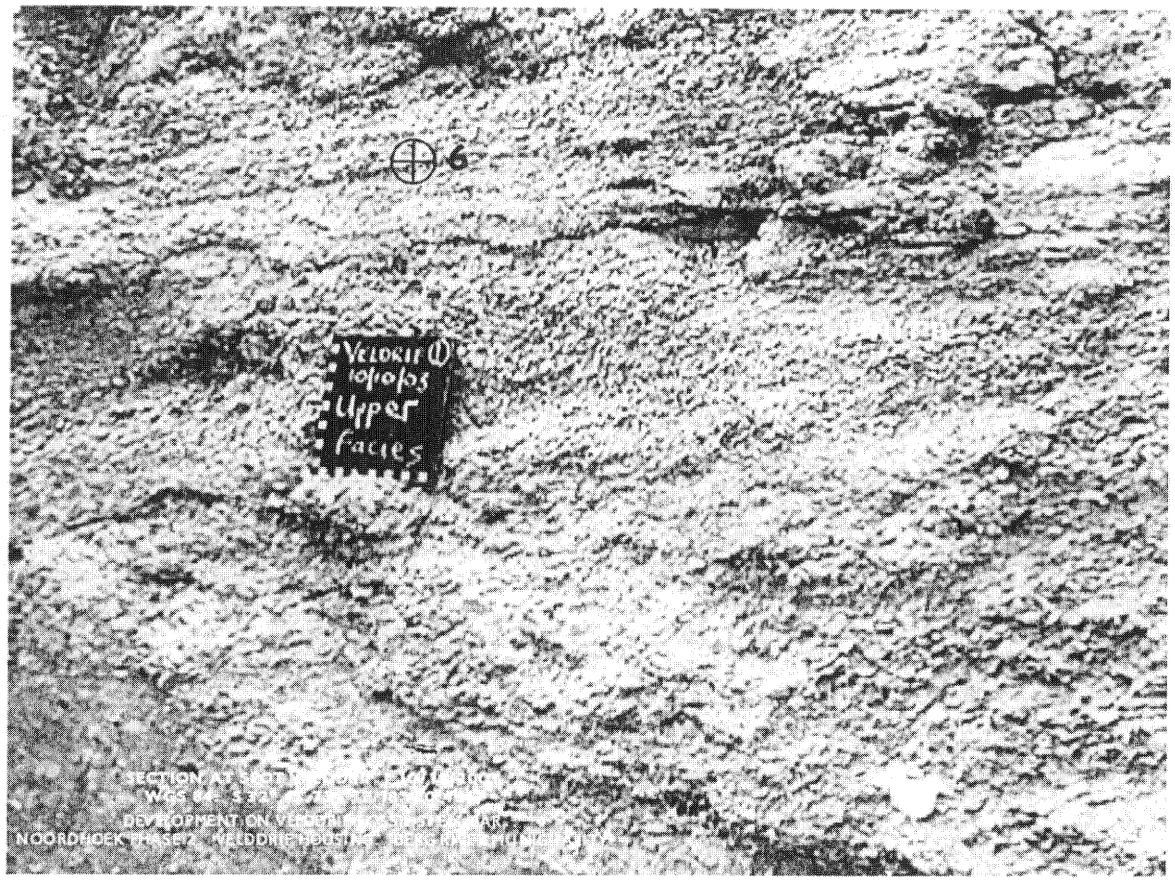

VELDRIF ①
10/10/03
Upper
Facies
5
SHELL BULK SAMPLE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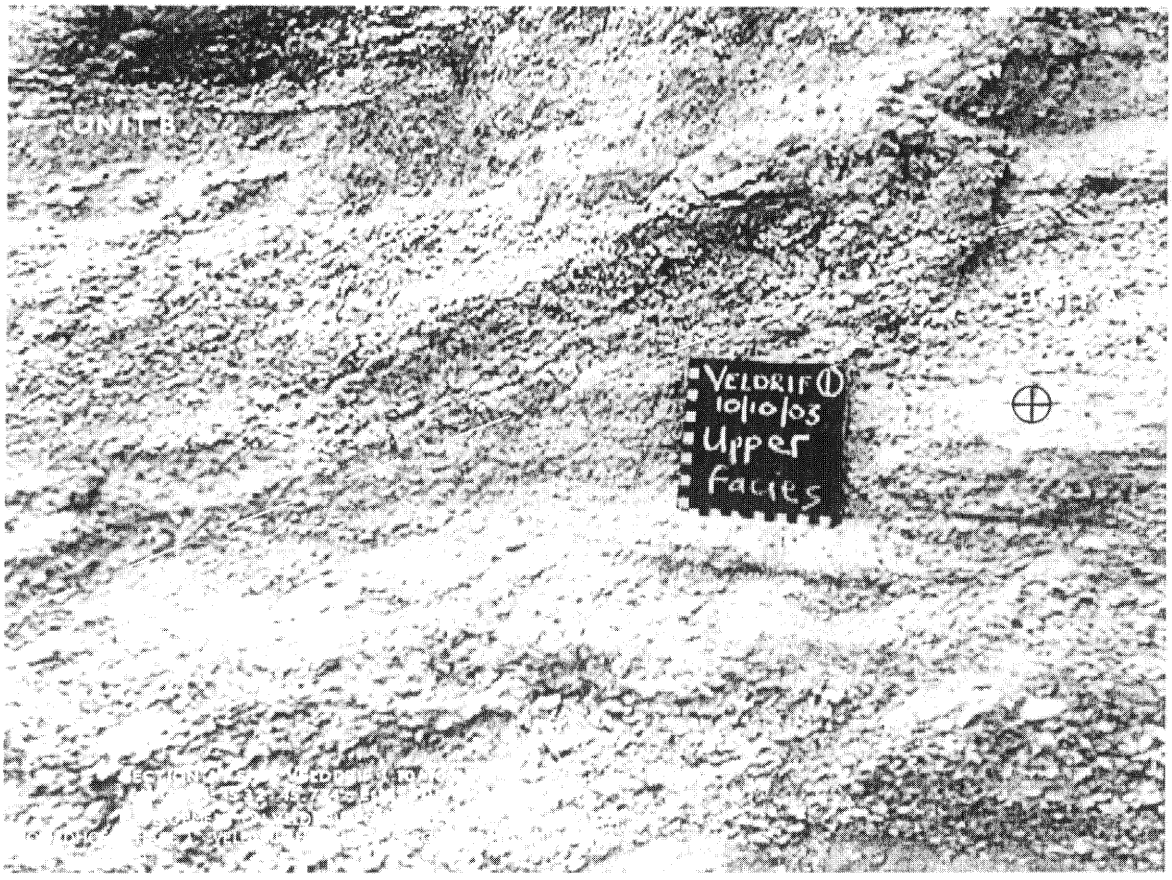
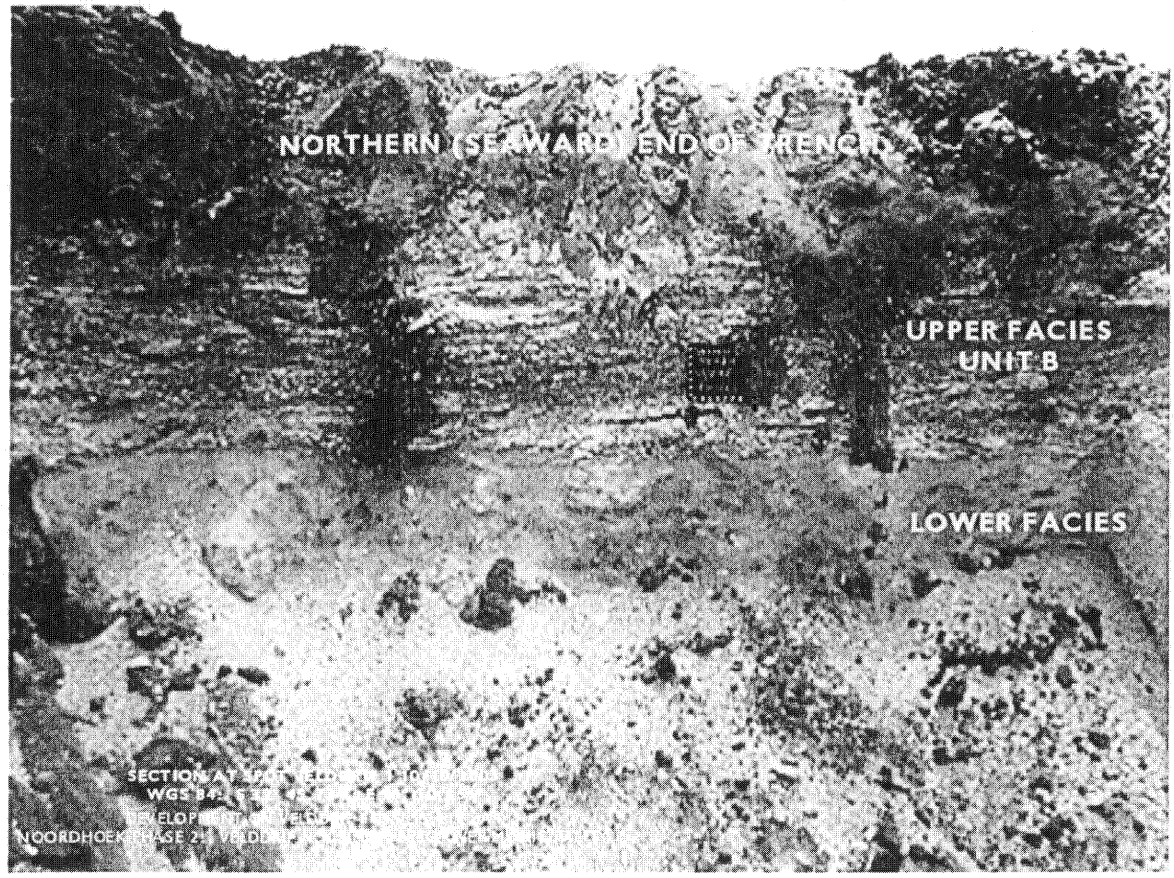
VELDRIF (1)
10/10/03
Upper
facies


VELDRIF (1)
10/10/03
Upper
facies


NORTHERN (SEAWARD) END OF TRENCH
UPPER FACIES
UNIT B
LOWER FACIES