

Erf 15387 and a portion of Erf 2001, Farm Boplaas, Pinnacle Point, Mossel Bay,
Western Cape Province

EXPLORATORY INVESTIGATION OF SHELL MIDDENS

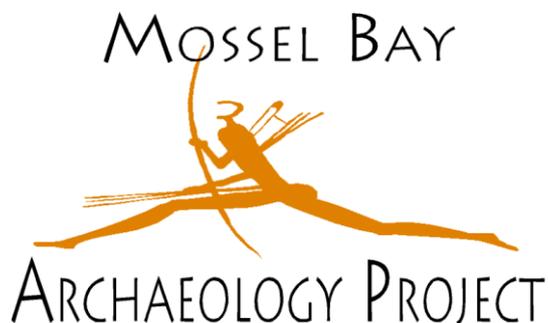
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FINAL REPORT

Prepared For:

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Executive Summary

A complex of shell middens identified during the Archaeological Impact Assessment for developments at Pinnacle Point (Kaplan 1997) were illegally damaged by construction activities and are further threatened by planned construction activities for roads, services and residential structures. The aim of the study presented here was to evaluate the middens in order to make provision for their mitigation and/or conservation prior to finalizing layout plans and commencement of construction activities.

To this end, the Mossel Bay Archaeology Project: Cultural Resources Management CC (MAPCRM Cc) was appointed to conduct exploratory excavations to investigate and determine the nature, depth and extent of the shell middens. This information is essential to make adequate plans for archaeological mitigation and/or conservation.

A total of 52 shovel tests were excavated with spades and shovels and where necessary, finer excavations - column sampling using small tools – were performed to extract samples that would allow characterization of archaeological deposits. Care was taken to excavate in roughly equal sized units of depth and where possible, archaeological and/or natural strata were located and excavated in isolation. Sufficient excavated sediments were sieved through a tiered system of 10, 3 and 1.5mm mesh-sized screens to identify and evaluate archaeological contents and relative densities. Excavated materials were sorted and quantified in our laboratory at the Dias Museum in Mossel Bay.

Exploratory excavations revealed that five areas – excluding the shell midden (PP 19) earmarked for conservation - within the affected area contain high quality (shell midden) archaeological resources that require mitigation. PP 19 will be protected and conserved in perpetuity - as recently required by Heritage Western Cape - and this study confirms that PP 19 is unique to the area under development with respect to its depth, density and variety in content. The proposed layout of roads, services and residential Erven indicate that construction activities associated with implementing this layout will have a permanent and negative impact on archaeological resources.

Recommendations are made for remedial and rescue mitigation of archaeological deposits already damaged by construction activities and those that are threatened by such activities. Options are also given for certain areas in the event that developers choose to change layout plans and the location of residential Erven. Recommendations are presented for the mitigation, protection and conservation of PP 19 and a newly discovered pottery period site (PP 31). The latter two sites must be incorporated in the archaeological conservation management plan (ACMP) for the entire property. Areas requiring archaeological mitigation, management and conservation measures must be demarcated and proclaimed as no go zones until dealt with to the satisfaction of Heritage Western Cape.

Archaeological mitigation must be conducted prior to the commencement of construction activities and a permit for this work must be obtained from Heritage Western Cape. After mitigation, protection and conservation measures are complete and in place to the satisfaction of Heritage Western Cape – based on a submitted report reflecting the details and results pertaining to this work – the developer must apply to Heritage Western Cape for a destruction permit in order for construction activities to be resumed in areas deemed appropriate by the heritage authorities.

1. Introduction

1.1 Background

Archaeological heritage resources differ in a fundamental and crucial way from most other environmental resources; they are entirely irreplaceable and not renewable. Rapid and widespread development is a serious threat to such resources. Unless long-term conservation, mitigation and management plans are put in place, the archaeological heritage resources of the affected environment are in grave danger of being lost forever.

Numerous archaeological sites were identified during the initial Archaeological Impact Assessment for developments at Pinnacle Point (Kaplan 1997, also see Marean *et al* 2004). These include a series of shell middens comprised of PP 18, PP19, and PP20 as well as recently exposed and identified shell midden deposits. Some time in 2004 Nilssen pointed out to a representative of the developers that residential erven at the western extent of the property under development encroached on midden deposits and that those erven should be moved so as to avoid the middens. The erven were not moved sufficiently to avoid the middens. During a site visit and meeting at the shell middens in June 2005 – attended by representatives of the developers and engineers - Nilssen informed those present that no construction activities could proceed in the area since the archaeological sites are protected by the NHRA. Nilssen requested that layout plans for development in the affected area be submitted to him so as to assess the potential impact on archaeological resources. The aim was to establish how the layout could be changed to avoid archaeological sites and/or to make plans to assess the middens for potential mitigation and/or conservation prior to construction activities in the affected area. Layout plans were not issued to Nilssen before certain shell middens were illegally damaged by construction activities late in 2005.

Heritage Western Cape (HWC) instructed the developers to stop all construction work in the affected area so that mitigation and/or conservation measures could be put in place. While the presence of archaeological remains suggests that mitigation is required, the details of such mitigation could not be established without exploratory shovel test excavations. The Mossel Bay Archaeology Project: Cultural Resources Management CC (MAPCRM Cc) was appointed to undertake exploratory excavations to determine the nature, depth and extent of the midden deposits.

1.2. Purpose and Scope of the Study

The objectives of shovel test excavations include the following:

- To assess the spatial extent, depth, nature and content of shell middens identified by Kaplan (1997) and those exposed and identified more recently.
- To identify mitigatory and/or conservation measures to avoid or minimize potential negative impacts; and
- To make recommendations for archaeological mitigation and/or conservation.

Terms of reference (TOR) for shovel test excavations:

- a) Conduct controlled shovel test excavations at area known to contain shell midden deposits and elsewhere as deemed necessary.
- b) Where appropriate, sieve excavated material through a three tiered screen system with mesh sizes 10, 3.3 and 1.5mm to ascertain eco- and artefactual contents and their relative densities.
- c) Assess the impact of the proposed development on archaeological materials.

d) Recommend remedial and rescue mitigation measures to be implemented prior to and during the construction phase of development. Recommend protective and conservation measures for sites to be conserved in perpetuity. The latter – PP19 and PP 31) must be included in the archaeological conservation management plan (ACMP) for the entire property (Nilssen *et al* 2006).

e) Prepare and submit a report that meets standards required by HWC in terms of the National Heritage Resources Act, No. 25 of 1999.

1.3 Study Area

Nilssen *et al* (2006) and Berry (2006) give general descriptions of the property under development. Figure 1 shows the location of Pinnacle Point relative to the coastal town of Mossel Bay while Plate 1 shows the location of the current study area within the property under development (also see Figures 2 & 3). The present study area does not include the entire area indicated by the yellow rectangle in plate 1, but focuses on damaged and known sites (Figures 2 and 3). Due to the discovered presence of buried shell middens and other archaeological resources, further archaeological investigation is necessary for areas not targeted during this study and this work should be detailed in the ACMP.

The area incorporating sites reported on here lies near the western boundary of the property under development (Plate 1). The coastal cliffs running the length of the property to the east peter out about 500 m west of the small beach at the mouth of a small perennial stream at the southern extent of the Grootkloof area. Where they stop, the cliffs are replaced by a series of vegetated, interconnected and undulating dunes that rise steeply away from the coast. A few vehicle tracks run down these dunes and have truncated shell middens at certain locations. PP 19 is most severely damaged by vehicular traffic, but MAPCRM crew sandbagged the exposed and eroding deposit until the site can be secured by permanent measures after mitigation is complete (Plate 2).

Since the study area comprises dunes, the dominant surface sediments are wind blown sands. While some shell middens are “flagged” by the presence of marine shell on the surface, the bulk of sites and certainly the best deposits are covered by variable depths of aeolian sands.

Part of development included eradication of alien vegetation and therefore, the bulk of the study area is presently vegetated by coastal Fynbos. Profiles of exploratory excavations suggest, however, that the area was not continuously vegetated in the past and that a mobile dune system was operative for a large part of the area during the past few thousand years.

1.4 Approach to the Study

Prior to implementing exploratory excavations, the area was inspected on foot to establish shell midden bearing areas where shovel tests should be excavated. For areas where middens were previously damaged and/or known to exist, the focus was on placing tests in such a way as to reveal the extents and depths of deposits. In other words, shovel tests were placed to transect shell middens. Where no marine shell was evident at the surface, shovel tests were placed where we predicted deposits were likely to exist.

The excavation of shovel tests was carried out over a three-week period (Plates 3 & 4). Each hole was approximately one meter square and excavated to a depth of between 1 and 1.65m unless bedrock intervened. Any layers containing significant amounts of shell, faunal material or stone artefacts were sieved using a 10mm mesh (see Table 1 and Appendix A). The resulting samples were collected for sorting and analysis (Appendix A).

The recording method consisted of a written description and digital photographs of each hole. Section drawings were undertaken for all of the holes that had significant shell deposits or complex stratigraphy. The holes were backfilled on completion with their position marked by numbered stakes for subsequent survey. All excavated holes were surveyed and survey data were locked into the SA National Grid system (Table 1 and Figure 3).

Column samples were taken from selected holes containing significant deposits from which a more detailed analysis could benefit (Appendix A). The method consisted of excavating a 25 x 25cm or 50 x 50cm column from a previously prepared section (Plate 5). Each stratigraphic layer was excavated separately and sieved using a triple screen system of 10, 3 and 1.5mm meshes. The volume of each sample was recorded. The resulting samples were labeled and retained for further analysis. Digital photographs were taken and section drawings recorded for each column sample. All records and data are available on request.

2. Results of shovel test excavations

A total of 52 test holes were excavated at Pinnacle Point spread over 5 areas (Figure 3). The location and some details of shovel test holes are given in Table 1, but see Appendix A for further details.

2.1 AREA 1 (Holes 1 to 13)

2.1.1 HOLE 1 – (Column Sample taken)

Hole 1 utilised an existing trench previously excavated for pipe-laying operations. The east face was cut back to expose a pristine section. Hole 1 contained two shell lenses. The top 30cm was composed of organic, brown sandy soil with a few marine shells. Between 30 and 65cm there was a layer of light yellow sand with just the occasional shell.

The first shell lens occurred at a depth of 65cm. It was fairly thin with a depth varying from 5 to 7cm and contained mainly brown mussel with a few limpets. Beneath this was a layer of sterile white sand. The second shell lens was encountered at a depth of 125cm. This was more ephemeral than the first and contained mainly brown mussel. The excavation of Hole 1 was terminated at a depth of 140cm.

2.1.2 HOLE 2

This hole was excavated down slope from Hole 1, next to a disturbed area where a pipe had been previously been laid at a depth of approximately 1.5m. Surface shell and lumps of white calcrete from the trench suggested possible sub-surface material but Hole 2 was in fact completely sterile yellow sand.

2.1.3 HOLE 3

This hole was excavated down slope from Hole 2, along the same pipe line encountered in Holes 1 & 2. Hole 3 was also sterile

2.1.4 HOLE 4

Excavated to a depth of 140cm in soft yellow sand. The sand body was undifferentiated in profile except that the sand was a darker shade of yellow towards the base of the hole. The hole was sterile apart from a single beach cobble near the surface and occasional isolated marine shells.

2.1.5 HOLE 5 – (Column Sample taken)

Hole 5 was positioned approximately 3m east of Hole 1. It was important as it demonstrated the continuation of the two shell lenses exposed in Hole 1.

The top 43cm consisted of organic sandy soil with roots. The upper shell lens occurred at a depth of between 43 and 53cm. It was reasonably dense and compacted with many broken shells. Brown mussel predominated along with smaller amounts of *Turbo sarmaticus* white mussel, *Haliotis sp.* and limpets.

Below this was sterile yellow sand to a depth of 98cm at which point the second shell lens was encountered. This was smaller than the upper lens (less than 10cm thick) and less compacted. There were many large, whole brown mussel shells along with smaller amounts of *Haliotis sp.*, whelks and limpets. Below this was sterile yellow sand to a depth of 140cm at which point the excavation of Hole 5 was terminated.

2.1.6 HOLE 6

Located to the south of Holes 1 & 5 at a slightly higher elevation.

The top 50cm consisted of a soil horizon with roots merging into sterile brown sand. Between about 55 and 90 cm there was a layer of whitish sand. The white shading was caused by incipient calcification, almost invisible during the excavation but clearly visible in the section. There was no evidence of hard calcrete nodules, only minute white specks in the sand body. A thin shell lens was present near the top of the whitish sand. The shell included brown mussel, *Turbo sarmaticus*, *Oxystele sp.* and *Patella longicosta*.

A second shell was present at a depth of about 110cm encased in yellow sand. This was also a fairly thin layer of shell but denser and more compacted than the first lens. Below the shell lens there was sterile yellow sand. The excavation of Hole 6 was terminated at a depth of about 150cm.

2.1.7 HOLE 7

Located to the south of Hole 6 at a similar elevation.

The top 45-50cm (variable depth across the square) consisted of a surface organic layer with roots merging into dark yellow sand. Below this was a layer, approximately 20cm thick, of whitish sand. This was identical to the incipient calcification described for Hole 6. There was a thin shell lens present near the top of the whitish sand. The lens was persistent but small in terms of shell density – 12 buckets from the whitish sand produced one small bag of shell. This shell lens marks a continuation of the upper shell lens of Hole 6.

The rest of the material from Hole 6 consisted of virtually sterile yellow sand. There were, however, patches of white flecks with the occasional shell visible in the profile at a depth of ± 95 cm that may be a faint trace of the second, lower shell lens visible in Hole 6.

2.1.8 HOLE 8 – (Column Sample taken)

Located ± 4 m east of Hole 7 at a higher elevation.

Hole 8 produced a thick concentration of shell at a depth of between 50 to 60cm below the surface. This was the densest shell band from this local group of holes (6 buckets put through the 10mm sieve produced 2 large bags of shell – brown mussel, limpets, *Turbo sarmaticus*, *Haliotis sp.* and a few whelks). This probably marks the centre of a large midden of which the more ephemeral upper shell lenses of Holes 6 & 7 form the edge.

2.1.9 HOLE 9

Located ± 7 m upslope from Hole 8 in an easterly direction.

The surface layers were composed of dark organic sand with roots merging into dark yellow sand, which were sterile apart from one very small patch of shell at a depth of ± 70 cm below the surface. Below, sterile yellow sand excavated to a depth 1.5m.

The small patch of shell probably represents the final expression of the large shell band encountered in Hole 8.

2.1.10 HOLE 10

Located ±8m down slope from Hole 1 in NW direction.

Hole 10 was excavated to determine the northward extent of the shell lenses present in Holes 1 & 5. In the event, Hole 10 proved to be sterile showing that the subsurface shell did not extend this far.

Hole 10 is characterized by an upper, organic horizon with roots, a main body of dark yellow sand and a lower body of yellow sand. No shell was recovered. Excavation terminated at a depth of 140cm.

2.1.11 HOLE 11

Located ±10m south of Hole 7 at roughly the same elevation.

Hole 11 was excavated to a depth of 130cm and was completely sterile. The top 30cm was brown, organic, sandy soil with roots. Brown sand was present between 30 and 50cm. The lower levels were yellow sand with faint patches of white visible in the section.

This shows that the midden complex present in Holes 7 to 9 did not extend this far south.

2.1.12 HOLE 12 – (Column Sample taken)

Located several metres down slope from Holes 10 & 13 in a northerly direction. Hole 12 was separated from the other holes by a thick screen of bushes. The reason for excavation at this spot was the presence of a thick patch of surface shell.

The top 15cm was dark organic sand with roots. Below this was a dense concentration of shells (±20cm thick) contained in a dark brown organic matrix. There was sterile yellow sand below the shell lens to a depth of 120cm at which point the excavation of Hole 12 was terminated.

2.1.13 HOLE 13

Located in the thick bushy area to the NE of Hole 10 and above the slope leading down to Hole 12. Hole 13 was excavated with the hope of finding a northern extension of the double shell lenses recorded in Holes 1 & 5. In the event, this proved to be negative as there was no shell at the expected levels. There was, however, a much deeper shell lens.

The surface layers were the usual organic horizon with roots overlaying dark brown sandy soil. Beneath this lay a deep body of yellow sand. At a depth of between 120 and 150cm a layer of light grey soil was encountered. This contained shell with a maximum concentration at about 140cm. The basal unit was bright yellow sterile sand. The excavation of Hole 13 was terminated at a depth of 165cm.

The deep shell lens in Hole 13 is most probably related to the thick shell concentration near the surface of Hole 12 and they would appear to be part of the same midden. Hole 12 is at a lower elevation than Hole 13 which would account for the shell being much nearer the surface in the excavated hole.

2.1.14 SUMMARY & CONCLUSIONS for AREA 1

The results from the excavations suggest that we are dealing with at least three discrete shell middens deposited at different periods in time and physically separated by wind blown sands.

The double shell lenses recorded in Holes 1, 5 & 6 represent the first and second middens. Whether the thick shell concentration in Hole 8 and the thinner shell lens in Hole 7 are part of this system, or represent a separate phenomenon, can be determined by further field excavation.

The third, and presumably older, midden occurs in Holes 12 & 13.

A more extensive and more controlled excavation programme, in association with radiocarbon dating, is needed to clarify these findings.

2.2 AREA 2 (Holes 14 to 21)

2.2.1 HOLE 14

Hole 14 was the most easterly hole in Area 2.

The surface layers consisted of dark organic sand with roots overlying yellow sand. There was an ephemeral shell lens at 35 cm with sterile yellow sand below.

The shell lens is probably an extension of the more prominent shell concentration registered in Hole 15. The small shell sample came from two buckets.

2.2.2 HOLE 15

Much of Area 2 has been disturbed by road building and pipe laying operations. Hole 15 was located next to the rough track (running north-south parallel with the stream) where a shell exposure was visible in the west bank.

A thick shell lens was encountered just below the surface. The thickness of the lens varied considerably across the 1m square. The lens had a maximum thickness of 10cm in the northern section and diminished to 4cm in the western section. The shell was thinning out in the eastern section and was completely absent from the southern section. The shell sample came from six buckets put through the 10mm sieve.

Below the shell lens there was sterile yellow sand excavated to a depth of 110cm.

It would seem that Hole 15 intersected the edge of a fairly extensive midden that extends in a northerly direction away from the sea. The shallow shell lens intercepted in Hole 14 would seem to be a western expression of the midden.

2.2.3 HOLE 16

Located close to the west bank of the rough track, on the opposite side of the track from Hole 15. The purpose of the hole was to see if the midden encountered in Hole 15 extended westward.

There was an upper horizon of brown organic sand with roots overlying yellow sand excavated to a depth of 110cm.

Hole 16 was virtually sterile with only an occasional isolated shell. This demonstrated that the midden exposed in Hole 15 did not extend this far westward.

2.2.4 HOLE 17

Located down slope from Hole 16 close to the exposed pipe trench. Hole 17 proved to be a rich investment as it revealed a stratigraphy with three lenses containing considerable volumes of shell.

The first shell lens was encountered just below the surface, a dense shell horizon in a matrix of brown soil. Unlike the middens in Area 1, which were dominated by brown mussel, this lens contained a wide variety of species including *Haliotis sp.*, *Turbo sarmaticus*, *Perna perna*, *Donax serra* as well as a variety of whelks and limpets (*Patella argenvillei*, *P.miniata*, *P.cochlear*, *P.longicosta* & *P.tabularis*). Also collected from the lens were mammal bone, fish bone, quartzite chunks, beach cobbles and ochre. A total of 10 buckets were put through the 10mm sieve which produced 4 large bags of shell.

The second shell lens was at a depth of 60cm. This was fairly dense (± 10 cm thick) but not on the scale of the first lens. The shell mix was similar to the first lens but less in quantity. A total of 13 buckets produced one large bag of shell.

The third shell lens was located at a depth of almost 100cm. This lens was remarkable for the large numbers of *Turbo sarmaticus*, many of large size. Also present were the usual brown mussel and limpet species. A total of 11 buckets produced one large bag of shell. There was sterile yellow sand below the final shell lens to a depth of 120cm when the excavation was concluded.

2.2.5 HOLE 18

Located down slope from Hole 17 on the opposite side of the pipe trench. This was the most westerly of the holes in Area 2 and the one nearest the stream. The reason for excavating Hole 18 was to see if the midden encountered in Hole 17 extended this far.

There was some shell visible in the side of the pipe trench but Hole 18 turned out to be completely sterile.

The hole was very shallow. It consisted of a vegetation layer overlying yellow sand with solid rock at a depth of between 20 and 25 cm. This marks the bedrock containing the stream.

2.2.6 HOLE 19

Located on the northern edge of the residential plot.

Hole 19 was completely sterile. There was a vegetation layer on the surface overlying sterile yellow sand.

2.2.7 HOLE 20

Located ± 5 m south of Hole 17 towards the sea. Adjacent to the old road that crosses the stream. The purpose of the hole was to see if the thick shell concentration in Hole 17 extended towards the sea.

The surface layer consisted of dark yellow sand with roots. At a depth of between 30 to 35 cm (varying across the square) was a fairly substantial shell lens (± 10 cm thick). The shell was contained in a very dark sandy soil matrix. A total of 10 buckets produced one large bag of shell. Below the shell horizon, dark yellow sand giving way to sterile yellow sand. The excavation was terminated at a depth of 120cm.

The most likely scenario is that the shell lens in Hole 20 is a continuation of first shell lens in Hole 17 but further excavations would be needed to confirm this.

2.2.8 HOLE 21

Located ± 13 m south of Hole 20 towards the sea. Placed between the "old road" that crosses the stream and the "new road" that is under construction.

The top layer was light yellow sand with a thin grass covering. This contained grit and land snails and is probably very recent aeolian sand (maximum thickness 25cm). Below this was nearly a metre of dark yellow sand.

Finally, at a depth of 110cm there was a fairly thin (less than 10cm) but dense, compacted shell. It consisted of the usual mix of brown mussel, turbo and limpets. Beneath this was sterile yellow sand.

The shell lens in Hole 21 seems to be quite separate from the material in Hole 20 and probably represents a distinct, and presumably older, midden.

2.2.9 SUMMARY & CONCLUSIONS for AREA 2

The situation in Area 2 is somewhat confusing due to the amount of disturbance from successive episodes of historic period tracks and occupation and recent road building and pipe laying operations.

The results from the test excavations suggest there are at least three major shell middens and at least two (or possibly four) minor middens or shell scatters. There is also a distinct possibility that more exist but have yet to be uncovered.

There is a fairly substantial midden located in Hole 15 which may or may not be connected with the more ephemeral shell revealed in Hole 14.

There were three distinct and quite separate shell deposits identified in Hole 17, each at a different stratigraphic level. The uppermost shell layer is particularly noteworthy as it has a dense and varied shell component as well as faunal remains and artefactual material. The two deeper (and presumably older) lenses were also fairly rich in terms of shell.

The single thin shell lens uncovered in Hole 20 seems likely to be connected to the upper, major shell midden in Hole 17 but could equally be a separate occurrence.

The other significant shell concentration was at the base of Hole 21. Considerably more field work needs to be undertaken to unravel the complexities of Area 2.

2.3 AREA 3 (Holes 22 to 29)

2.3.1 HOLE 22

Located on the edge of the grassy courtyard area. Rocks on three sides shelter the courtyard; it has a fairly level grassy surface and is an obvious occupation focus.

The top 30cm was yellow surface sand with roots. The next 10cm was dark organic soil with some shell. Between about 40 & 50cm below the surface there was a major lens containing dense compacted shell in an ashy matrix. This was a charcoal rich layer; a single piece of pottery was recovered.

Below the shell lens there was dark sand and soil with occasional shell to a depth of just over 80cm. Large stones and rocks terminated the excavation at this point.

2.3.2 HOLE 23 – (Column Sample taken)

Located in the centre of the grassy courtyard area. Approximately 10m to the south of Hole 22 towards the sea.

The top 10cm was sterile sand. Between 10 and 65 cm there were multiple lens of crushed compacted shell, mainly brown mussel but some Turbo. Much of the shell was embedded in dark ashy sand and soil with pockets of charcoal. Several pieces of black pottery were present towards the base of the sequence. There was brown sand below the shell deposits and sterile yellow sand from 80cm.

Holes 22 and 23 demonstrated that the grassy courtyard area was an important occupation focus and living area. There was evidence of multiple fires with much of the shell crushed and fragmented.

2.3.3 HOLE 24

Located on the south bank of the road cutting that extends from the new road towards the stream. Hole 24 was more of a cut than a hole as it was sliced back from the road into the sand body. The cut revealed two reasonably thick shell lenses.

The top 15 to 20cm was surface sand and dark organic sand with roots. The first shell lens (10 to 12cm thick) was the usual mixture of brown mussel, white mussel with some turbo, whelks and limpets all embedded in dark sandy soil.

The second shell lens (at a depth of 50cm) was thinner but more compacted than the first lens. Predominantly brown mussel but with the other usual species represented. Below was yellow sand, almost sterile apart from an occasional shell. The excavation was terminated at a depth of 110cm.

2.3.4 HOLE 25

Located on the northern side of the road cutting opposite Hole 24. Hole 25 contained one definite shell lens and one slight shell occurrence that may be the edge of a true lens.

The surface deposits (0 to 45cm) consisted of a body of deep yellow sand capped by a thin covering of dune grass. Between 45 and 55cm there was a dark organic sandy soil layer with just a few shells. There was just enough shell to provide a suspicion of a shell lens.

There was a definite shell lens at a depth of about 80cm. It was a thin (less than 10cm) but fairly concentrated and embedded in dark yellow sand. Bedrock was encountered only 10cm beneath the second shell lens.

Hole 25 was about 3.5m from Hole 24 across the road cutting. It seems likely that the same shell horizons are present in both of the holes. The lower shell lenses, in particular,

seemed to match, as they were both in a similar dark yellow sand medium. Unfortunately this cannot be tested as the intervening ground has been removed by the road cutting.

2.3.5 HOLE 26

Located on the same side of the road cutting as Hole 24, approximately 7m southwards, towards the stream. Hole 26 contained a single shell lens.

The surface deposits (0 to 55cm) consisted of a body of deep yellow sand capped by a thin covering of dune grass. Beneath this was dark organic sand layer merging into light yellow sand. A single thin (± 5 cm) shell lens in dark yellow sand was present at a depth of 125cm. The rest of the hole was sterile yellow sand to a depth of 160cm at which point the excavation was terminated.

The single shell lens of Hole 26 may well be an extension of the second (lower) shell lens in Hole 24. Further excavations along the bank of the road trench could test this

2.3.6 HOLE 27

Located on the southern side of the road trench ± 6 m east of Hole 24. Hole 27 contained a single shell lens.

The surface deposits (0 to 55cm) consisted of a body of deep yellow sand capped by a thin covering of dune grass. Beneath this was dark organic sandy soil layer (between 55 and 75cm below the surface) with a dense, compacted shell lens at the base. The shell lens is at least 10cm thick. The rest of the hole was sterile yellow sand to a depth of 120cm at which point the excavation was terminated.

The question here is whether the single shell lens in Hole 27 is a continuation of the second (lower) shell lens in Hole 24?

2.3.7 HOLE 28

Located ± 3 m south of Hole 26 on the other side of the same mound of sand. Hole 28 contained a single shell lens.

The hole was cut into the side of the sand bank and had sterile yellow sand down to 80cm at which point there was a thin shell lens. This is almost certainly an extension of the shell lens exposed in Hole 26. The lens in Hole 28 was thinner indicating the shell deposits are running out towards the rocks.

2.3.8 HOLE 29

Located on the southern side of the road trench some 15m up the road from Hole 27.

The hole was sterile apart from an occasional isolated shell. The only feature in the section was a dark organic sandy soil layer at about 55cm below surface.

2.3.9 SUMMARY & CONCLUSIONS for AREA 3

Area 2 may be divided into two sections as demarcated by the local topography.

The first section is the grassy courtyard area where the Test Holes 22 and 23 were positioned. Both these holes demonstrated the existence of rich archaeological deposits documenting an important occupation phase. This site is now referred to as PP 31 in accordance with the archaeological naming system employed for the area centered on Pinnacle Point.

The second section concentrated around the sand bodies that have been severely impacted by the road cutting. There are definitely two time periods involved as shown by the upper and lower shell lenses exposed in Hole 24. The upper lens seems to record a midden of fairly limited extent as it does not register in any of the other holes except perhaps as a faint trace in Hole 25.

The situation with the lower lens is more complex as it bears a distinct similarity to the single, but fairly deeply placed lenses, registered in Holes 25 to 28. It seems unlikely that these are all isolated shell scatters and more plausible that we have the remains of an extensive midden, possibly centered on the area destroyed by the road cutting.

2.4 AREA 4 (Holes 30 to 36)

2.4.1 HOLE 30

Located close to the southern bank of the “old road” which crosses the stream. The test hole was excavated in what appeared to be undisturbed sand. Hole 30 contained a single thin shell lens.

The surface was covered by scrub vegetation. Just below the surface (at a depth of between 3 and 10cm across the square) there was a very thin, intermittent shell scatter. It consisted of mainly brown mussel with the occasional whelk.

Below the shell was fairly coarse, sterile yellow/brown sand that continued all the way to the bottom of the hole. Rocks were encountered at 60cm on the western side of the square and slightly deeper on the eastern side.

Hole 30 was situated only ± 5 m SW of the very substantial “protected” midden on the other side of the road. If this area is indeed undisturbed, it means the large midden did not extend this far.

2.4.2 HOLE 31 – (Column Sample taken)

Located ± 8 m south of the very large “sand-bagged” midden (PP 19) on the other side of the road. The area is covered with bushes and scrub vegetation. Hole 31 contained multiple shell lenses in a virtually continuous sequence.

The top 25cm were yellow sand with roots. Beneath the sand there were successive shell deposits, thick on the northern side of the square and running out towards the south.

The north section of Hole 31 (nearest to the large midden) has a series of lenses from 25cm to the base of the hole at 70cm. There was a thin upper black layer and a much more substantial lower black layer. These consisted of fire-associated compacted shell with charcoal and burnt shell. The lower black layer rests directly on large stones. This appears to be an ancient cobble beach sloping south toward the sea.

The black layers extend along the western side of the hole but run out before reaching the south section. The east section has a shell lens but only traces of the lower black layer. The south section is almost sterile with just remaining traces of the shell lens but no black deposits.

Hole 31 is obviously crucial as it was the only test hole with similar dark, very hard deposits as the large midden on the opposite side of the road. Hole 31 was a lucky choice as it intercepted the southernmost extent of the large midden, much of which must have been destroyed by road building and other activities.

2.4.3 HOLE 32

Located ± 10 m to the south of Hole 31 close to the beach. Hole 32 contained a single very thin shell lens.

The surface deposits (0 to 15cm) consisted of yellow sand with organic traces and roots capped by scrub vegetation. Between 15 and 95cm there was yellow sand with roots entering the upper part. This was a very consistent sand body with very little change with increasing depth.

At 95cm there was a very thin (2 to 3cm thick) shell lens. Although thin it was very persistent, appearing on all sides of the square at the same depth. Mainly brown mussel with some fragments of turbo. Cobbles were encountered just beneath the shell lens.

2.4.4 HOLE 33

Located on the large shell midden towards the back (north) away from the road. This was actually a re-excavation of a previous test pit excavated by the developer to establish the edge of the large midden (PP 19). Hole 33 revealed one thin shell lens/scatter and a trace of what was probably a dense shell lens.

The top ±25cm was sterile yellow sand. Below this was a slightly organic layer (±10cm thick) sloping down towards the sea (south). There was a thin scatter of shell dispersed throughout the layer.

On the eastern side of the hole (visible in the section) there was a patch of thick shell in dark matrix immediately below the previous shell scatter. This appears to be the remnant of a much thicker shell deposit truncated by the previous excavation. Below was sterile yellow sand to a depth of 100cm.

The most interesting aspect of Hole 33 was the paucity of shell deposits considering the proximity of the major deposits of the large midden.

2.4.5 HOLE 34

Located towards the back (north) of the large midden in a similar position to Hole 33 but further to the west. Like Hole 33, this was a re-excavation of a previous hole. Hole 34 contained a single, thin shell midden.

The single shell lens was only visible in the north section of the hole at a depth of between 54 and 62cm below the present surface of the midden. It was very slight (less than 5cm thick), more of a shell scatter that had been truncated by the previous excavation.

The rest of the deposits, above and below the shell lens, were sterile yellow sand. The excavation was terminated at a depth of 100cm.

2.4.6 HOLE 35

Located to the west of the large midden. This was in the midst of disturbed area but the hole was positioned in the lee of a large rock where shell was present on the surface.

Apart from the shell lying on the surface, presumably run off from the large midden, Hole 35 was completely sterile.

The top 35cm was yellow sand. The only interesting aspect of the hole was the bright red granular sand present from below the yellow sand to the base of the hole at a depth of just over 1m. The red sand is part of a much older land surface and probably underlies the large midden.

2.4.7 HOLE 36

Located on the southern side of the old road slightly down slope from the large midden towards the stream. This was more of a cut than a hole as it was placed against the bank of the road close to the bushes.

The top ±20cm was sterile yellow sand with roots. At the base of the sand there was a very thin scatter of shell.

From 20 to 80cm there was sterile sand until rocks started appearing. There was a very ephemeral presence of shell lying on or just above the rocks. This was more of a loose shell scatter than a compacted lens.

2.4.8 SUMMARY & CONCLUSIONS for AREA 4

Area 4 is dominated by the presence of the very large shell midden, the importance of which is already known.

The excavation of Hole 31 was a very useful exercise as it showed that the deep, black, cemented deposits of the large midden formerly spread across the area now destroyed by the road. The area around Hole 31, and in particular the area between the hole and the road, are obviously of crucial importance.

There were three other very thin shell lenses/scatters in Holes 30, 32 & 36 that appear to represent isolated archaeological occurrences unrelated to the large midden and therefore of interest in understanding the sequence of events of the region.

2.5 AREA 5 (Holes 37 to 52)

2.5.1 HOLE 37

Located slightly down slope from the level "platform area" at the top of the hill, ± 4 m east of the road.

The top ± 25 cm was dark brown sandy soil with roots. The layer included occasional shell as well as a few quartzite lumps.

Between 25cm and the base of the hole at 110cm there was yellow sand with roots in the upper section. There was a minor concentration of shell visible in the western section, not enough to warrant being called a shell lens but certainly an event.

2.5.2 HOLE 38

Located opposite Hole 37 on the other side of the road.

There was an upper organic soil layer (± 30 cm in depth) whilst the rest of the hole, down to 125cm, was yellow sand. There were no shell concentrations, only isolated shells in the upper 50cm of the hole. The lower part of the sand had white flecks of incipient calcification.

2.5.3 HOLE 39

Located down slope from Hole 37 on the eastern bank of the road. This was a cut made into the side bank of the road where shell was present on the surface.

The top 30cm was brownish organic sand with roots. There was a slight suggestion of a shell lens at a depth of 30cm. From 30cm to the base of the hole, at 100cm, there was undifferentiated sterile yellow sand.

2.5.4 HOLE 40

Located at the top of the road in the centre of the level platform area. This is the highest point of the hill at which shell is present on the surface. A trench has been cut to the north of the platform that acted as a useful window into the subsurface deposits. There was absolutely no shell visible in the trench although there was a layer of hard calcrete at a depth of 40cm below the current surface.

Hole 40 consisted of yellow sand to a depth of 120cm. There was just an occasional isolated shell with a suspicion of a shell lens at a depth of 50cm.

2.5.5 HOLE 41

Located ± 5 m south of Hole 40 on the eastern bank of the road. Shell was present on the surface.

The top 30cm consisted of dark brown, organic sandy soil. This contained a fairly rich shell concentration, mainly brown mussel with some turbo and white mussel. Five buckets put through the 10mm sieve produced a three quarter full large bag of shell.

There was a faint suspicion of a second shell lens at a depth of 78cm below surface. This could well be a continuation of the ephemeral shell horizon revealed in Hole 40. The lower section of the hole was sterile yellow sand to an excavated depth of 110cm.

2.5.6 HOLE 42

Located ± 10 m down slope from Hole 41 on the other side of the road. Shell was present on the surface.

The hole contained the usual pattern of organic soil near the surface and yellow sand below. The hole was virtually sterile with only occasional isolated shells in the upper 50cm. The excavation was terminated at a depth of 140cm.

2.5.7 HOLE 43

Located ± 8 m down slope from Hole 39 on the eastern bank of the road. Shell was present on the surface.

The top 15cm was composed of vegetated brown sand with the occasional isolated shell. At 35cm there was a faint trace of slightly harder old horizon with a few shells. The lower section of the hole was sterile yellow sand to an excavated depth of 110cm.

2.5.8 HOLE 44

Located ± 3 m down slope from Hole 43 on the eastern bank of the road. Shell was present on the surface.

The top 15cm was composed of vegetated brown sand with the occasional isolated shell. Between 15cm and the base of the hole at a depth of 110cm there was yellow sand with an occasional shell in the upper portion. At a depth of 90cm there was evidence of incipient calcification in the south section

2.5.9 HOLE 45

Located ± 4 m down slope from Hole 44 on the eastern bank of the road. Shell was present on the surface.

The top 20cm was composed of vegetated brown sand. There was just a suggestion of an old horizon with a few shells at a depth of 40cm. The remainder of the hole was sterile yellow sand excavated to a depth of 140cm.

2.5.10 HOLE 46

Located in the veld ± 6 m east of Hole 44. There was no shell on the surface but the hole was dug to test for the presence of sub-surface shell away from the road.

There was the usual pattern of organic sand near the surface and continuous yellow sand to a depth of 100cm.

At a depth of between 30 to 40cm across the square there was a faint suggestion of an old horizon with the odd shell.

2.5.11 HOLE 47

Located on the side of the steep path that leads from the level platform area down to the stream. There was a thin scatter of shell on the surface, mainly brown mussel with some white mussel, turbo and limpet.

Apart from the shell on the surface, Hole 47 consisted of completely sterile yellow sand to a depth of 100cm.

2.5.12 HOLE 48

Located in the veld ± 5 m west of the level platform area. There was just a trace of shell on the surface.

Hole 48 consisted of completely sterile yellow sand to a depth of 140cm. The only point of interest was the presence of a number of calcrete nodules at the base of the hole.

2.5.13 HOLE 49

Located in the centre of the road close to Hole 44. There was a regular scatter of shell, as well as occasional pieces of ostrich eggshell and quartzite, all the way down the sloping road. Hole 49 was dug to make sure there was no sub-surface component.

In the event, there was only sterile yellow sand to a depth of 120cm.

2.5.14 HOLE 50

Located down slope from Hole 45 on the other side of the road. There was very little shell on the surface.

Hole 50 consisted of completely sterile sand to depth of 110cm.

2.5.15 HOLE 51

Located down slope from Hole 50 on the eastern side of the road. There was very little shell on the surface.

The top 25cm was composed of dark sand with roots. Between 25 and 55cm there was a dark organic soil layer with a few large shells (*Turbo sarmaticus*, whelk and *Patella miniata*) at the base of the layer.

The rest of the hole was sterile yellow sand to depth of 140cm.

2.5.16 HOLE 52

Located down slope from Hole 51 on the eastern side of the road. There was very little shell on the surface, mainly fragments.

The top 20cm was composed of dark sand with roots. The rest of the hole was completely sterile yellow sand to depth of 120cm.

2.5.17 SUMMARY & CONCLUSIONS for AREA 5

Despite the fact of widespread surface shell over the hill slope there was very little evidence of significant concentrations of sub-surface shell. Out of a total of 16 test holes excavated in Area 5, the only hole with a reasonably thick shell lens was Hole 41 at the top of the hill. There were, however, at least six shell lenses which, although thin in depth, appeared to be quite spatially extensive. Shovel tests on Erven 17877 and 17876 were limited due to dense and protected coastal Fynbos. Nevertheless, the presence of surface scatters of marine shell and manuports clearly indicate the presence of shell middens with cultural material in the area.

Table 1. Summary of shovel tests with coordinates (SA Grid WGS84), depth of excavation and presence or absence of archaeological deposits. See Appendix A for further detail. ST = shovel tests, which are indicated with ts in Figures 2 & 3.

ST No. / Name	X or Northing 37 to go before value given	Y or Easting True value	Excavated Depth in cm	Archaeological Layers
1	86845.53	84957.88	140	Couple
2	86844.67	84968.45	150	None
3	86843.43	84979.03	150	None
4	86842.36	84948.41	140	None & Sparse
5	86843.39	84956.04	140	Couple
6	86851.17	84954.94	150	Couple
7	86855.94	84951.55	140	Couple
8	86853.57	84949.09	100	Single & Dense
9	86850.80	84942.78	150	Single & Sparse
10	86840.45	84962.85	140	None
11	86867.22	84944.67	130	None
12	86829.48	84971.50	120	Single & Dense
13	86836.51	84961.15	165	Single & Dense
14 / PP 20	86918.16	85079.20	100	Single & Sparse
15 / PP 20	86921.63	85085.25	110	Single & Dense
16 / PP 20	86920.82	85092.91	110	None & Sparse
17 / PP 20	86921.92	85102.80	120	Multiple & Dense
18 / PP 20	86919.83	85107.62	25 (bedrock)	None
19 / PP 20	86906.91	85084.74	100	None
20 / PP 20	86928.44	85104.07	120	Single & Dense
21 / PP 20	86941.72	85108.36	130	Single & Dense
22 / PP 31	86971.04	85125.51	90 (rock)	Multiple & Dense
23 / PP 31	86976.86	85129.61	100	Multiple & Dense
24	86958.28	85126.17	110	Couple & Dense
25	86954.52	85126.46	90 (bedrock)	Single & Dense

ST No. / Name	X or Northing 37 to go before value given	Y or Easting True value	Excavated Depth in cm	Archaeological Layers
26	86957.05	85132.95	160	Single & Thin
27	86958.94	85119.54	120	Single & Dense
28	86960.00	85134.63	100	Single & Thin
29	86956.32	85103.28	100	None & Sparse
30 / PP 19	86929.56	85158.73	60 (rocks)	Single & Thin
31 / PP 19	86940.09	85150.72	70 (rocks)	Multiple & Dense
32 / PP 19	86948.52	85151.34	100 (cobbles)	Single & Thin
33 / PP 19	86926.28	85145.10	100	Couple & Dense
34 / PP 19	86923.45	85149.99	100	Single & Thin
35 / PP 19	86923.30	85160.20	100	None
36 / PP 19	86935.70	85141.84	100 (rocks)	Couple & Sparse
37 / PP 18	86856.35	85153.15	110	Single & Sparse
38 / PP 18	86851.35	85159.87	125	None & Sparse
39 / PP 18	86856.47	85157.13	100	Single & Sparse
40 / PP 18	86848.91	85151.00	120	Single & Sparse
41 / PP 18	86852.34	85153.56	110	Couple & Dense
42 / PP 18	86858.14	85163.94	140	None & Sparse
43 / PP 18	86859.92	85159.70	110	None & Sparse
44 / PP 18	86863.31	85161.52	110	None & Sparse
45 / PP 18	86866.44	85162.20	140	None & Sparse
46 / PP 18	86865.32	85154.42	100	None & Sparse
47 / PP 18	86857.10	85142.90	100	Surface & Thin
48 / PP 18	86840.55	85156.49	140	Surface & Sparse
49 / PP 18	86861.47	85161.95	120	Surface & Thin
50 / PP 18	86873.42	85167.01	110	Surface & Sparse
51 / PP 18	86893.40	85163.07	140	Single & Sparse
52 / PP 18	86904.30	85171.54	120	Surface & Sparse
Shell lense in dune	86913.74	85169.82	Erosion	Single & Thin
Shell scatter	86888.86	85148.62	Surface	Surface & Thin

2.6 Cultural affinities of archaeological material

The bulk of the shell middens investigated in this study are of Later Stone Age origin with the exception of PP 31, which dates to the herder/pottery period (last 2000 years). Informal stone tool assemblages suggest that most shell middens date to the last few thousand years of the Stone Age, but predating around 2000 years ago.

3. Sources of Risk, Impact Identification and Assessment

The proposed layout of roads, services and residential stands will include construction activities that will severely, negatively and permanently impact archaeological resources. The study area contains substantial archaeological materials that are protected by the National Heritage Resources Act, No. 25 of 1999.

At least two sites must be conserved in perpetuity and remedial mitigation is required in four areas. If layout plans are not changed, excluding PP 19 and PP 31, then large excavations in mitigation are required before construction activities can continue. If the

layouts are changed, mitigation can be minimized, but adequate measures must be implemented to ensure that remaining shell middens are protected and conserved in perpetuity.

An additional source of risk is the presence of unmarked human burials. These may occur anywhere in the landscape and are often exposed during earthmoving activities along the coast, particularly in dune settings. Human remains are also protected by law and dealt with by the State Archaeologist at the South African Heritage Resources Agency (Mrs. Mary Leslie who can be reached at 021 462 4502).

Table 2 summarizes the impacts of the proposed development on archaeological heritage resources.

Table 2. Impact on and Loss of Archaeological Heritage Resources

	Without Mitigation	Assuming Mitigation
Extent	Local & National	Local
Duration	Permanent	Permanent
Intensity	High	Low
Probability	High	Low
Significance	High to medium	Low
Status	Negative	negative & positive
Confidence	High	High

4. Recommended Mitigation Measures

South African museum samples of artefactual stone, fauna, charcoal and other cultural remains from shell middens, particularly with origins on the Cape south coast, are few and relatively small. For conservation, management and research purposes it is critical, therefore, that additional and larger samples are rescued from shell middens threatened by development or that will be destroyed by development after archaeological mitigation. Recommended mitigation measures presented below hold this fact fundamental to our considerations. Radiocarbon dates must be obtained for all middens and midden layers.

As their name suggests, shell midden deposits are overwhelmingly dominated by the remains of marine shellfish and therefore their densities are not the key guiding factor for establishing mitigation requirements. Retaining adequate samples of shellfish is therefore a given.

In addition to general field observations, recommendations for mitigation are based on quantified densities of various eco- and artefact categories per volume of excavated midden deposit and thicknesses of various midden layers as presented in Appendix A. Please refer to Appendix A - and where appropriate Figure 3 - to evaluate the basis of our recommended mitigation measures.

Due to the potential presence of unmarked human graves, particularly in dune settings along the coast, we recommend that all earthmoving activities be monitored by a professional archaeologist even after archaeological excavations in mitigation are complete (see section 3 above).

Implementation of recommended mitigation measures must adopt procedures and protocols – for shellfish sampling, excavation and documentation - that are of currently acceptable standards to generate research-worthy assemblages.

Because the actual nature of archaeological materials can only be assessed when unearthed, the scope of adequate mitigation measures can only be established during mitigation. While shovel tests provide windows on sub-surface materials we know that deposits can vary significantly across space. Given this, it is possible that the scope of mitigation recommended here is either over or underestimated. The archaeologist(s) conducting mitigation may be required to alter the scope of mitigation to remedy inaccurate recommendations.

4.1 Area 1

Shell deposits unearthed during trenching operations were first detected by a MAPCRM monitor as part of our archaeological monitoring of all earthmoving activities related to developments at Pinnacle Point (Nilssen 2005).

Holes 6, 7 and 8 do not contain sufficient densities of artefactual stone or fauna to justify archaeological excavation in mitigation because extensive excavations are not likely to yield sufficient stone or bone for meaningful quantification. High densities of marine shell, however, warrant shellfish sampling for radiocarbon dating and quantification to determine shellfish exploitation strategies and species composition. Sufficient column sampling must be implemented to yield around 3.5 to 4kg of shellfish remains from a 10mm screen and the shellfish fraction from the 3mm screen must also be retained for future analyses. Shellfish specimens must be submitted for radiocarbon dating.

Holes 1, 5, 12 and 13 contain notable densities of artefactual stone, fauna and charcoal. The fauna includes micro fauna, small bovid, medium bovid, fish, tortoise, small mammal, dune mole rat and bird. With these categories as the focus and based on calculated densities per volume of deposit, we recommend that an excavated volume of 5m³ or an area of about 50m² will yield representative collections.

If Erven 17888 and 17887 are moved so as to avoid the middens, then remedial mitigation should include shellfish sampling around holes 6, 7 and 8 as detailed above and a volume of about 1m³ or an area of 10m² should be excavated centered on holes 1, 5, 12 and 13. If this option is chosen, then adequate measures must be put in place to ensure that the middens are conserved in perpetuity. The latter must then become part of the ACMP for the entire property.

4.2 Area 2 (PP 20)

Holes 15, 17, 20 and 21 contain stone artefacts, fauna and charcoal in addition to high densities of marine shell. Hole 17 was particularly rich and varied in fauna and with the other holes includes small bovid, medium bovid, large bovid, very large terrestrial mammal, small mammal, micro fauna, tortoise, seal, fish - of which some are large specimens - and bird – including some large marine bird. Densities of stone artefacts are particularly high, making this series of midden deposits important.

In the area centered on hole 15, we recommend that some 10m³ or an area of around 100m² must be excavated to yield representative samples of cultural materials, with particular focus on stone artefacts. For the area including holes 17, 20 and 21 we estimate

that excavating 10m³ or an area of some 70m² will provide an adequate assemblage of cultural materials.

In the event that developers choose to move Erven 17870 and 17871 so that they do not encroach on the midden deposits, then we recommend that 20% of the above recommendations are implemented. If the above-named Erven are moved, then adequate measures must be implemented to ensure that PP 20 is conserved in perpetuity.

4.3 Area 3 (including PP 31)

Holes 22 and 23 revealed the presence of a deep, stratified shell midden deposit (PP 31) with Cape Coastal pottery present to bedrock. Stone artefacts are present in reasonable quantities and fauna and charcoal occur in moderate quantities. Fauna include medium to large bovid, seal, tortoise, small bovid, small mammal, micro fauna and fish. PP 31 is of great importance and must be conserved in perpetuity. Adequate materials were likely produced by shovel testing to characterize and date this site, but if not, then at least 2m³ should be excavated for this purpose. Protective, conservation and management measures for this site must be included in the ACMP for the property.

The bulk of the midden described in section 2.3 above was destroyed by bulldozer activity associated with a road cutting. All excavations bar hole 29 revealed substantial midden deposits in this area and contents are similar to those seen in holes around PP 20 (section 4.2) which include relatively high densities and variety of faunal remains. With respect to remedial mitigation in lieu of damage, we recommend that the remainder of this midden be rescued through excavation. The estimated area requiring excavation is about 50m².

Once mitigation is completed to the satisfaction of HWC and once conservation measures are in place for the conservation of PP 31, the developer can complete this portion of the road up to, but not across, the small stream. At the same time a pump station can be installed where indicated on the early 2006 layout plan presented to us by one of the engineers. This pump station must be well clear of PP 31.

4.4 Area 4 (including PP 19)

PP 19 is to be conserved in perpetuity and several measures are required to ensure its protection and conservation. The midden must be formally surveyed by a registered surveyor in conjunction with a professional archaeologist. The survey data – and probably a buffer zone as may be required by HWC - must be appended to the appropriate title deeds to ensure legal protection of PP 31. Also, the survey data - with buffer – can be used to register PP 19 as a regional or national heritage site. The latter must be proposed to HWC.

To characterize and date the midden and its layers we recommend that at least 1m³ be excavated. This excavation can dovetail with cleaning the eroded profile prior to stabilization. A retaining wall should be built around the midden allowing a space between the wall and the exposed profile. The space should then be filled and hand-compacted with white builders' sand. The entire site must be covered with a membrane of geotextile (bidum) before covering the latter with a layer of white builders' sand of around 20 to 30cm thick. A second membrane of geotextile (bidum) must cover the last layer of sand after which a layer of appropriately seeded (coastal Fynbos) topsoil of at least 50cm thick should finally cover the second membrane. The surveyed site – including buffer zone – should then be "camped" with an appropriate balustrade and at least two information boards must be installed. The latter should indicate the site's status, meaning and value in preferably 3 of the official languages. PP 19 and details concerning measures for its conservation and management must be included in the ACMP for the property.

With reference to PP 19, if the road crosses to the west of the small stream it cannot turn north as currently planned (Figure 4).

Hole 31 contains substantial quantities of stone artefacts, while fauna is poorly represented and includes small mammal, bird, fish – including a very large mussel cracker tooth -, small bovid, small mammal and micro fauna. Charcoal is present but in low densities. The focus of mitigation is on retrieving a large stone artefact assemblage. If the road crosses to the west of the stream and based on content and densities, then around 3m³ or an area of 30m² must be excavated in the vicinity of holes 31 and 32 in order to generate a representative assemblage. If the road does not cross the stream, then the midden deposits exposed in holes 31 and 32 can be dated and characterized by excavating some 5m². These middens can then be included in the area encompassing PP 19 for conservation in perpetuity.

If Erf 17877 is not moved, then an area of some 20m² must be excavated at the shell lens in Area 4. If this plot is moved, then no mitigation of the shell lens is required.

4.5 Area 5 (PP 18)

To avoid further damage to shell midden deposits and to minimize remedial mitigation, the current alignment of the sewer trench must be moved to the north and east of ts 40 (Figure 3) and engineers suggest that it can be rerouted along the old, eroded St Blaize Trail. Because of damage to the shell middens as a result of sewer trenching in this area, remedial mitigation is required. We recommend that an excavated area of 15m² will yield representative midden deposits. Included among the faunal remains are medium to large bovid and fish.

If developers choose to move Erven 17877 and 17876, then no mitigation is required in the short term. Nevertheless, measures for conservation and management of PP 18 must be included in the ACMP for the entire property. If developers choose that the above-named plots stay, then mitigation is required. Complicating the implementation of archaeological excavation and sampling concerns issues around protected vegetation in this area. Around the shell scatter adjacent to and on Erf 17876 we recommend an excavation of some 30m². Concerning the shell layer on an older surface (palaeosol) in the vicinity of hole 51 a further excavation of 30m² is recommended.

Table 3. Age, significance and summary of recommended mitigation. Please see text in section 4 for details and options.

TS No. / Site Name	Period/Age	Potential Significance	Recommended Mitigation
6, 7 & 8	Later Stone Age without pottery	Provincial	Shellfish sampling and dates - obtain permit from Heritage Western Cape
1, 5, 12, 13, 15,	Later Stone Age without pottery	Provincial/National	Excavation & dates - obtain permit from Heritage Western Cape
17, 20, 21, 24, 25, 26, 27, 28, 37, 39, 40, 41, 43, 45, 46	Later Stone Age without pottery	Provincial/National	Excavation and dates in remedial mitigation - obtain permit from Heritage Western Cape

TS No. / Site Name	Period/Age	Potential Significance	Recommended Mitigation
22, 23 / PP 31	Later Stone Age with pottery	National	Excavate & date to characterize and conserve in perpetuity - obtain permit from Heritage Western Cape
30, 33, 34 / PP 19	Later Stone Age without pottery	National	Excavate & date to characterize and conserve in perpetuity - obtain permit from Heritage Western Cape
31, 32, 51, shell lens, shell scatter	Later Stone Age without pottery	Provincial/National	Excavate/sample & date or conserve - obtain permit from Heritage Western Cape

Acknowledgements

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Figures and Plates

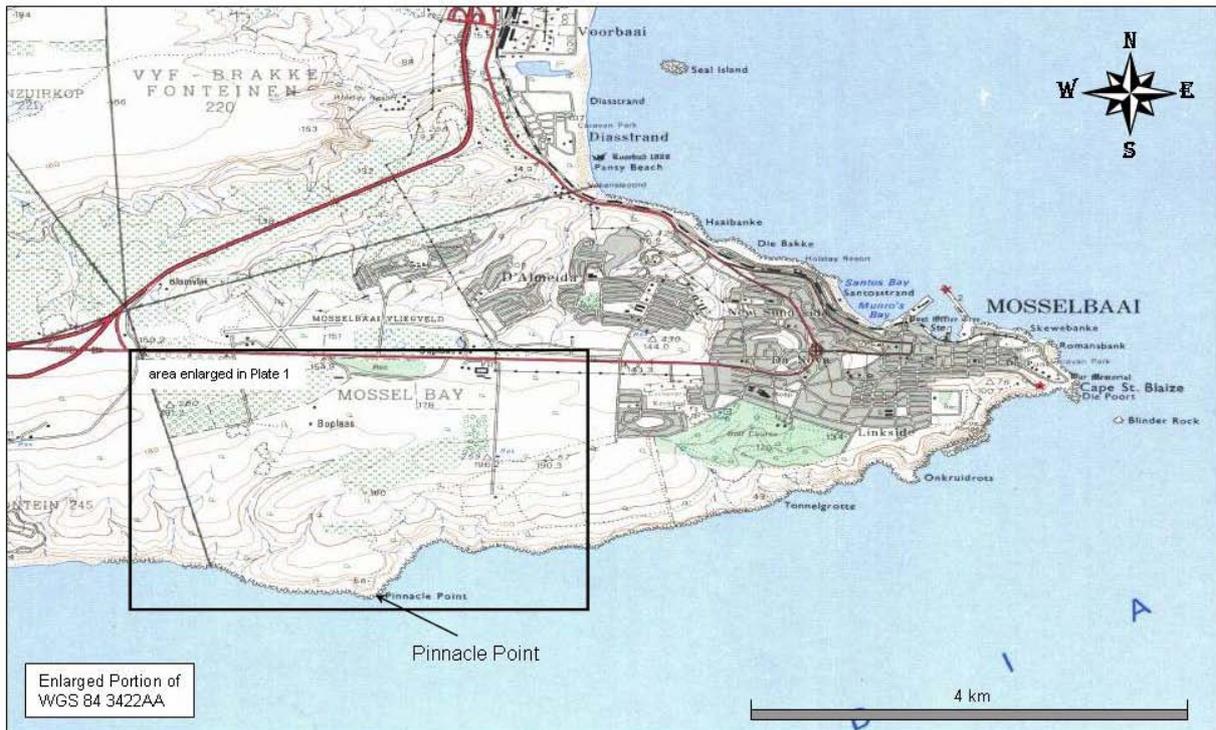


Figure 1. General location of Pinnacle Point relative to the coastal town of Mossel Bay, Western Cape Province.



Plate 1. Enlarged area as indicated in Figure 1. The white line depicts the boundary of the property under development at Pinnacle Point. Shell middens – PP 18, PP 19 and PP 20 - are indicated with red dots (approximate locations). Yellow frame indicates approximate area framed in Figure 2 and enlarged in Figure 3.

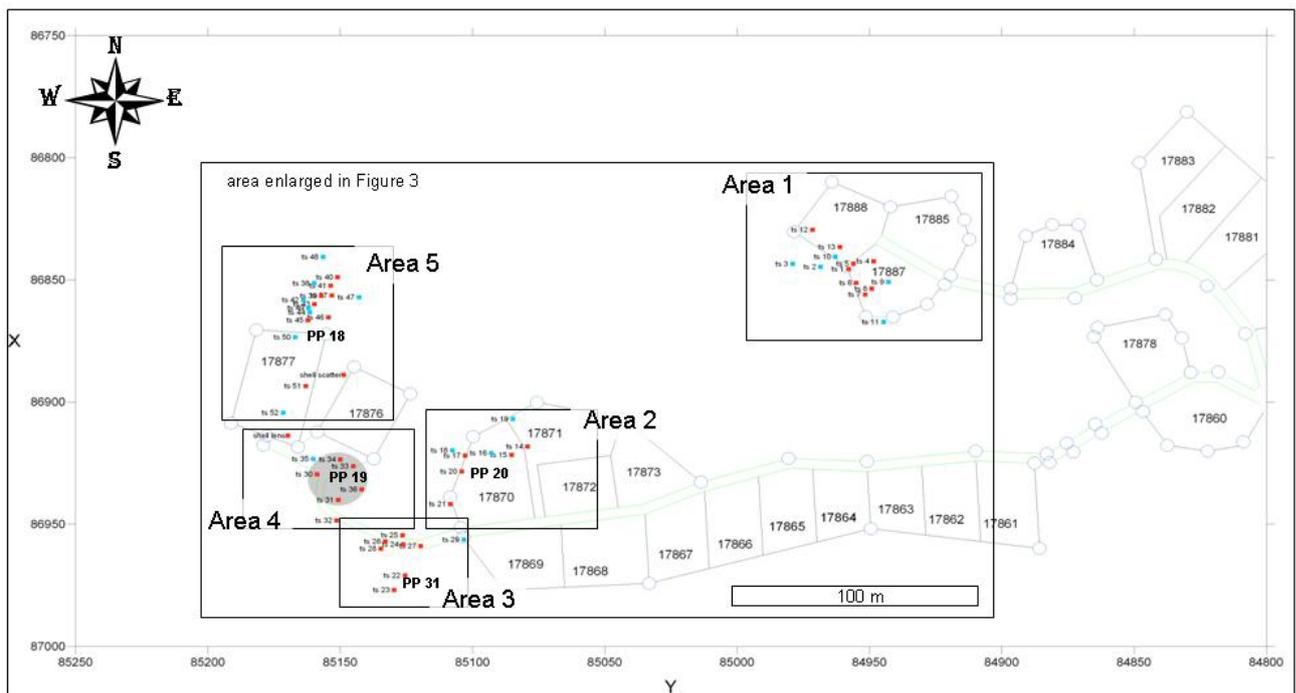


Figure 2. Layout plan of roads and residential erven at the western extent of development at Pinnacle Point. Locations of study Areas are shown relative to sites PP 18, PP 19 and PP 20 (see Plate 1). 37 must go before values on the X axis that represent northing while the values on the Y axis are true and represent easting. Survey data – also see Table 1 - are locked into the SA National Grid system (WGS 84). The 100m scale bar is taken from the X axis.

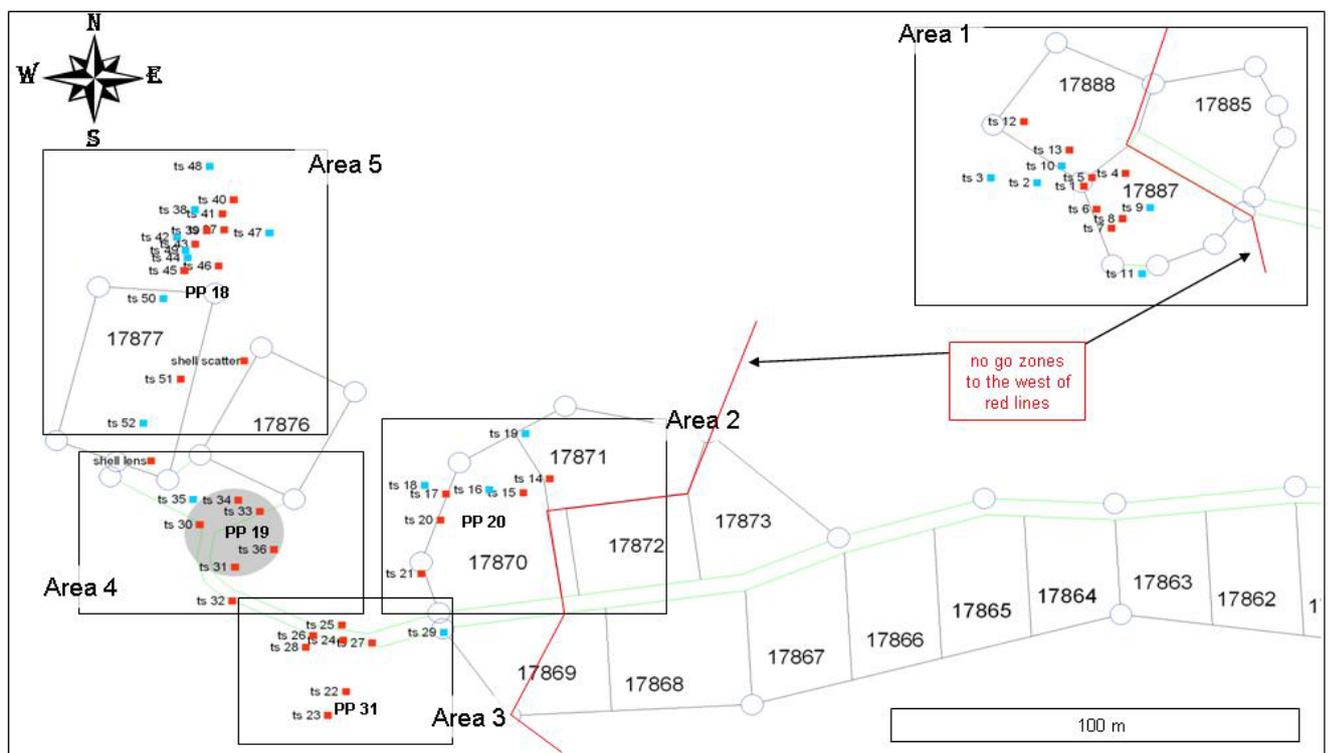


Figure 3. Enlarged area as indicated in Figure 2 and Plate 1 (yellow rectangle). Locations of shovel test – exploratory - excavations are indicated by blue and red squares and named by ts and a number (e.g., ts 12 in Area 1) that are referred to as hole number in the text (e.g., hole 12). Blue squares represent holes with surface or sparse archaeological materials or sterile sediment and shell midden bearing holes are indicated with red squares. Red lines indicate the eastern boundaries for proposed no go zones.



Plate 2. The southern, damaged and eroding portion of PP 19 was sandbagged to stabilize the site before permanent protective and conservation measures are implemented.



Plate 3. Work in progress at PP 31 (holes 22 & 23).



Plate 4 Column sampling at hole 5. The white portions of the scale rods are 25cm long.



Plate 5. Profile of column sample at hole 5. The white portions of the scale rods are 25cm long.

Appendix A

Summary table of selected shovel test holes.

test hole	layer	vol (cm3)	stone		charcoal (g)	fauna (g)	shell (g)	stone		charcoal (g/m ³)	fauna (g/m ³)	shell (g/m ³)
			n=	g				n/m ³	g/m ³			
5	1 st level	nk	1	825.1	0.6	17.5	2826.6					
	2 nd level	38793	1	3.8		1.9	1087	26	98.0		49.0	28020.5
	dark brown soil surface	12931	3	279.4			168.9	232	21607.0			13061.6
		25862				1.5	134.7				58.0	5208.4
6		142241					849.9					5975.1
7		155172					809.9					5219.4
8		77586			2	7.9	7340.4			25.8	101.8	94609.9
12		nk			0.5	22.9	3123.1					
13		nk			0.3	0.3	1500					
14		25862			0.1		638.9			3.9	0.0	24704.2
15		77586	43	2142.8	0.01	31.5	5901.7	554	27618.4	0.1	406.0	76066.6
16		nk					188.3					
17		439654	54	1567.7	0.63	144	39386.5	123	3566	1	328	89585
20		129310	21	659.6		77.8	2922.9	162	5100.9		601.7	22603.8
21		77586	22	991.9		15.6	5205.2	284	12784.5		201.1	67089.4
22		nk	49	3045	7.5	5.8	290.7					
23		nk	17	1566	17.7	9.9	2604.1					
24		nk	3	51	0.4	1.4	614.7					
26		nk	1	814.4	0.2	0.1	1045.6					
27		nk	2	587.5	2.8		2600					
31	2 nd layer of shell	nk	3	89.4		4.1	1068.2					
		nk	12	506.4			563.7					
32		nk	1	24	0.2		388.5					
37		nk	2	138.3		5.4	1194.5					
41		77586	1	387.1	0.6	0.01	2300	13	4989.3	7.7	0.1	29644.5

Appendix A cont ...

Summary table of column sampled shovel test holes.

column sample	layer	vol (cm3)	stone		charcoal (g)	fauna (g)	shell (g)	stone		charcoal (g/m ³)	fauna (g/m ³)	shell (g/m ³)
			n=	g				n/m ³	g/m ³			
1	brown soil	7964				9.31	90.2				1169.0	11326.0
	col #2 1 st shell lense	10884			0.3	3.2	737			27.6	294.0	67714.1
	col #2 2 nd lense	5575			1.5	0	501.1			269.1	0.0	89883.4
	col#1 2nd lense	5575			1.7	0	456.1			304.9	0.0	81811.7
	shell lense	10884			0.2	12.4	675.9			18.4	1139.3	62100.3
	white sand layer	30983			0.12	5.6	200.3			3.9	180.7	6464.8
5	1	5840			5	25.3	209			856.2	4332.2	35787.7
	2	4247	1	16	3.4	0.1	610.8	235	3767.4	800.6	23.5	143819.2
	3	18771			1.01	1	72.6			53.8	53.3	3867.7
	4	3982			0.1	10.8	409			25.1	2712.2	102712.2
	5	7433				0.1	5.9				13.5	793.8
8	1	12931					1.3					100.5
	4	8760			1	0.21	646			114.2	24.0	73744.3
	5	2124			1.2	0.01	400.5			565.0	4.7	188559.3
	6	3186			0.4		57.5			125.5		18047.7
	7	25862			0.1		35.8			3.9		1384.3
	5	2124					49.8					23446.3
12	1	3716			1.8	4.9	702.2			484.4	1318.6	188966.6
	2	4247			1.4	3.2	449.9			329.6	753.5	105933.6
	3	3186			1.2	17.7	665.5			376.6	5555.6	208882.6
	4	3716			0.4	6.7	781.4			107.6	1803.0	210279.9
17	1	20364	1	2.5	0.3		819.5	49	122.8	14.7		40242.6
	2	12931	1	36			1836.9	77	2784.0			142054.0
	4	6371			0.4		1551.5			62.8		243525.3
	6	2124			0.2	0.01	607.9			94.2	4.7	286205.3
23	1	2655	4	8.7	0.5		105.6	1507	3276.8	188.3		39774.0
	2	2124			0.1		380.9			47.1		179331.5
	3	12931	17	55.7	7.6	1.4	6100	1315	4307.5	587.7	108.3	471734.6
	4	4247	4	18.7	5.8	0.1	1679.9	942	4403.1	1365.7	23.5	395549.8
	5	11149	11	285.7	3	0.11	3500	987	25625.6	269.1	9.9	313929.5
	6	4247	2	20.9	2		1331.9	471	4921.1	470.9		313609.6
	7	5840			0.7		1951.4			119.9		334143.8
31	1	2124			0.02	0.02	425.8			9.4	9.4	200470.8
	2	9557			0.1		51.5			10.5		5388.7
	3	1593			0.2	0.01	321			125.5	6.3	201506.6
	4	3716			0.2	0.2	157.4			53.8	53.8	42357.4
	5	2124	2	490.2	0.1	0.01	46.4	942	230791.0	47.1	4.7	21845.6
	6	2655	5	1556.7	0.5	0.01	191	1883	586327.7	188.3	3.8	71939.7