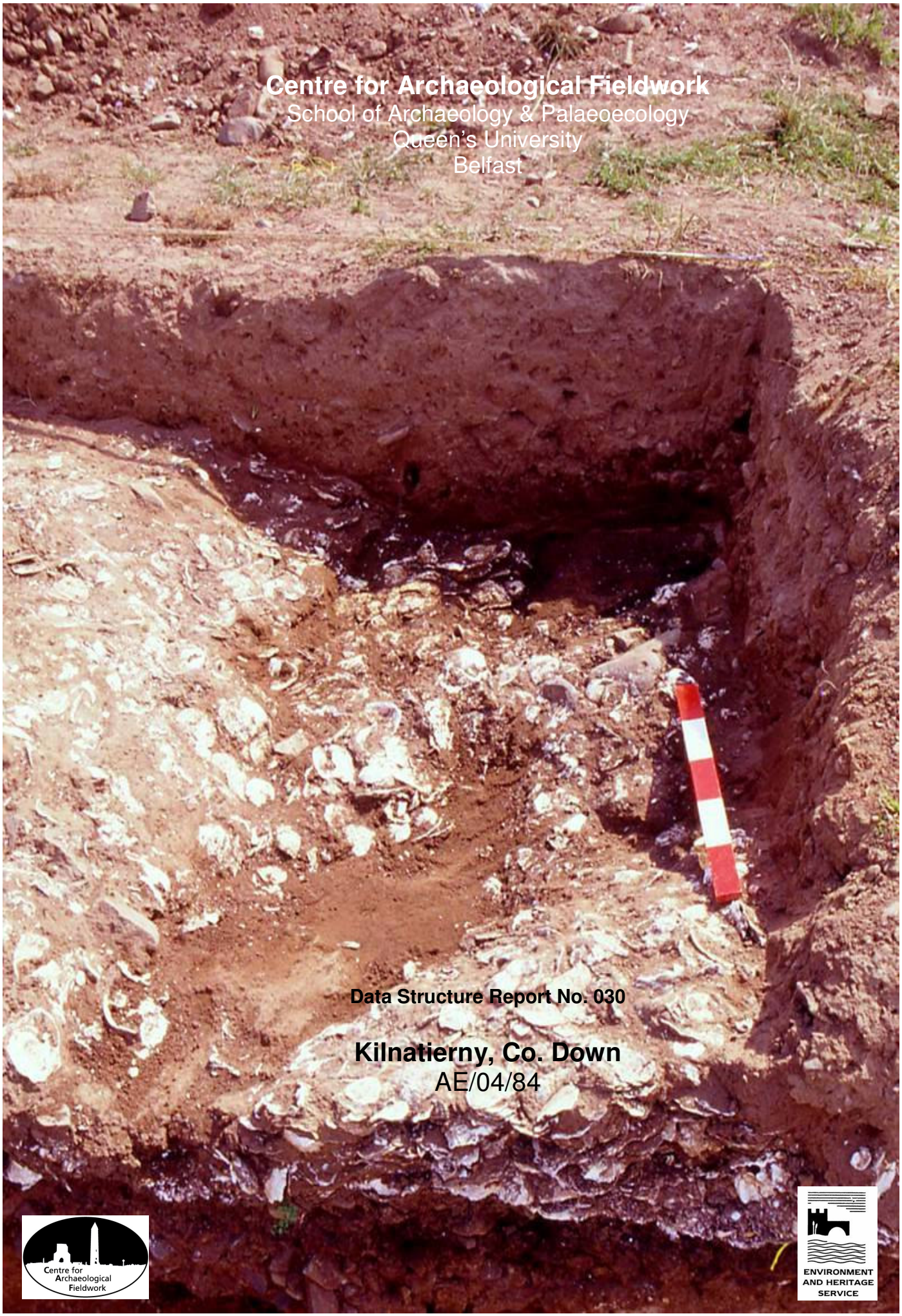
**Centre for Archaeological Fieldwork**
School of Archaeology & Palaeoecology
Queen's University
Belfast



**Data Structure Report No. 030**

# Kilnatierny, Co. Down

AE/04/84

Centre for Archaeological Fieldwork

ENVIRONMENT AND HERITAGE SERVICE

# *Data Structure Report:*
# *Kilnatierny, Greyabbey, Co. Down (KLT 04)*

Emily Murray

26th November 2004

**CAF DSR 30**

**Grid Reference: J 56686828**

**Excavation Licence: AE/04/84**

**Table of contents**

***List of Figures***

***List of Plates***

## 1 Summary

1.1 Five shallow shell midden lenses were discovered when a foundation trench was dug to the south of Hollowdene House in the townland of Kilnatierny near Greyabbey, Co. Down in October 2003 (Figure 1). The trenches also cut through relict raised beach gravels. The Environment and Heritage Service: Built Heritage (EHS) was alerted to their discovery and the site was subsequently visited by Tom McErlean of the Centre for Maritime Archaeology, University of Ulster (UU), and Brian Williams of Environment and Heritage Service: Built Heritage (EHS).

1.2 A rescue investigation and recording of the previously unknown midden lenses was undertaken by the Centre for Archaeological Fieldwork (CAF), Queen's University Belfast (QUB), on behalf of the Environment and Heritage Service: Built Heritage (EHS). The excavation was directed by Emily Murray of QUB and was carried out during the period May 24th – June 3rd, 2004.

1.3 The foundation trench was located on the southwest-facing slopes of a drumlin known as 'The Hill', at 6.5-7.5m OD (Figure 2; Plate 1). It comprised a continuous trench of variable depth (0.4-0.7m) and enclosed an area of approximately 100m$^2$. The trench delineated a roughly L-shaped plan and detached baulks were left standing within this area. These were labelled as 'island baulks' to differentiate between their section faces and those of the 'main baulk', i.e. the outer perimeter of the foundation trench. Midden lenses and beach gravels were exposed in both the main baulk and island baulks and were confined to the north-eastern end of the foundation trench (see Figure 3).

1.4 The primary objective of the archaeological investigation was to record the visible extent of the midden lenses and the raised beach gravels and to tie the features into the local landscape. This was undertaken by section-drawings and photography and by conducting a contour survey. The second objective was to carry out a small scale excavation of one of the better preserved midden lenses to recover stratified samples of material for radiocarbon dating and palaeoenvironmental and palaeo-dietary studies. Stray finds of flint had been found in the immediate vicinity of the foundation trench and it was also hoped that the excavation might uncover some of these artefacts in context.

1.5 Five separate midden lenses were identified and were designated Midden lenses A-E. Midden lens A was exposed at the easternmost end of the building site. It extended north-south for just over 3.5m and was approximately 0.5m thick at its deepest point. It was cut through by the foundation trench and was exposed on two faces of the central island baulk (south- and east-facing) and on the west-facing section of the main baulk (Figures 3, 4 and 10; Plates 2 and 11). Midden lens B was exposed on the north-facing section of the same island baulk and on two faces of the main baulk, on the east- and south-facing sections (Figures 11 and 12; Plates 12 and 13). It was the most extensive of the five lenses although it was relatively shallow, approximately 0.12-0.13m thick. It stretched east-west for around 6m across the south-facing section of the main baulk, and southwards for a further 4m (east-facing section of the main baulk). Midden lenses C, D and E had also each been cut through at least twice by the foundation trench and had two or more exposed sections (Figures 3, 13, 14 and 15; Plates 14, 15 and 16). Although the three lenses have been individually labelled (Midden lenses C, D and E) it is possible given their relative locations that they represent different exposures of a single midden (see Figure 3). Unlike Middens A and B, however, this was not easily demonstrated and the three were therefore treated as individual units.

1.6 The exposed profiles showed that three of the midden lenses (Midden lenses A, C and D) were located at the highest levels of the raised beach gravels. Midden lens B was sited further down the relict beach and entirely overlay the beach gravels. Midden lens E, the most westerly of the lenses, was heavily truncated but the surviving deposits suggested that it was situated upslope of the ancient shoreline.

1.7 Shells, predominantly oysters that eroded-out from the midden lenses were distributed across the site. The occasional piece of struck flint was also found and two poorly preserved pig incisors were found in the base of the foundation trench, close to Midden lens A.

1.8 All of the baulk elevations with visible midden lenses were recorded with photographs and section drawings. Bulk samples were also taken from Midden lenses B (main baulk) and E to recover material for radiocarbon dating.

1.9 Midden lens A represented one of the deepest and best preserved of the midden lenses. It was therefore investigated in more detail and a small trench (Trench 1: 3.5m x 1.5m) was opened on the main baulk and a second (Trench 2: 0.8m x

0.8m) on the adjacent island baulk. The composition of the archaeological deposits varied across the length of the trench but principally comprised a shell layer (0.12-0.26m thick) overlying a charcoal-rich layer (0.1-0.18m thick) which overlay the raised beach gravels. An informal hearth represented by a shallow depression and lenses of ash, with an associated with a lens of burnt and fragmented shells, were found in the north-eastern corner of the trench. Charcoal was present within the shell layer and underlying soil horizon, and *in situ* artefacts were limited to finds of flint including flakes and a possible core (see Appendix 6). Few bones were found and, with the exception of a single boar's tusk, these were all small calcined fragments.

1.10 No firm dating evidence was obtained. The flints found within Midden lens A are not diagnostic (E. Nelis *pers. comm.*) although flint material found from the Greyabbey Bay area is mostly Mesolithic and late Mesolithic in date. Charcoal was present in all of the archaeological deposits and this will facilitate the submission of multiple samples for radiocarbon dating. The retrieval of paired samples of material of marine (shell) and terrestrial (charcoal) origin could also contribute useful data for the refinement of marine radiocarbon calibration for the north-east of Ireland (see Reimer *et al.* 2002).

**Plate 1**: View of the foundation trench at Kilnatierny (facing north), with the forested grounds of the Mount Stewart demesne in the distance. Midden lens A is located to the extreme right of the photo, close to where the two figures are standing.

## 2 Introduction

### *2.1 General*

2.1.1 This report details the results of an archaeological investigation undertaken at Kilnatierny, Greyabbey, Co. Down, during the period May 24th – June 3rd, 2004. The work was conducted by the Centre for Archaeological Fieldwork (CAF), School of Archaeology and Palaeoecology, Queen's University Belfast (QUB), on behalf of the Environment and Heritage Service: Built Heritage (EHS).

### *2.2 Reason for Excavation and Research Objectives*

2.2.1 Five shallow midden lenses and relict raised beach gravels were discovered when a foundation trench was dug to the south of Hollowdene House in the townland of Kilnatierny near Greyabbey, Co. Down in October 2003 (Figure 2). The foundation trench was located on the southwest-facing slopes of a drumlin known as 'The Hill', at 6.5-7.5m OD (Figure 2; Plate 1).

2.2.2 The Environment and Heritage Service: Built Heritage (EHS) was alerted to the discovery of the middens and the site was visited by Brian Williams of EHS and Tom McErlean of the University of Ulster (UU). The Environment and Heritage Service: Built Heritage (EHS) then requested a small-scale rescue investigation to record the exposed archaeological deposits and beach gravels before building was due to commence in July 2004.

2.2.3 Although the Kilnatierny midden lenses were previously unknown of, they are located within the Mount Stewart-Greyabbey Bay area of Strangford Lough, which is known for its relative density of shell middens, in particular oyster middens (McErlean *et al.* 2002, fig. 7.2). None of these however, have been excavated. The midden lenses at Kilnatierny therefore presented an opportunity to investigate one of these types of site in detail.

2.2.4 The primary objective of the investigation was to record the visible extent of the midden lenses and the raised beach gravels and to tie the features into the local landscape. This was undertaken by section-drawings and photography and by conducting a contour survey. The second objective was to carry out a small scale excavation of one of the better preserved midden lenses to recover suitable well-

stratified samples of material for radiocarbon dating and palaeoenvironmental and palaeo-dietary studies. Stray finds of flint had been found in the immediate vicinity of the foundation trench and it was also hoped that the excavation might uncover some of these artefacts in context.

*2.3 Previous work on middens in the Mount Stewart-Greyabbey Bay area*

2.3.1 The most recent archaeological work conducted in the area is the survey of the coastal archaeology of Strangford Lough commissioned by the EHS and carried out between 1995 and 2000 (McErlean *et al.* 2002). The survey (abbreviated here to SLS) concentrated on the foreshore and the zone between the low and high tide marks. Coastal shell middens are typically located above this inter-tidal zone, sometimes a considerable distance inland where land reclamation has subsequently taken place. Because of this, and due to time constraints, the survey team limited their exploration of shell middens to short periods of field walking. They also targeted two specific areas around the north-western and north-eastern areas of the Lough (McErlean *et al.* 2002, 190).

2.3.2 The SLS records a number of oyster middens in the Mount Stewart-Greyabbey Bay area (Figure 1). Although all sites were visited by the SLS nothing was observed of the Temple Midden or the middens on South Island as they were under grass at the time of visiting. None of the middens have been excavated and although finds of flints, mainly Mesolithic, have been found associated with the deposits they all remain undated. A concentration of late Mesolithic flint scatters has also been recorded in the townlands of Mount Stewart, Kilnatierny and Ballyurnanellan around the, now reclaimed, intertidal bays of the vicinity (McErlean *et al.* 2002, 428 and 435). Each of these is described here briefly.

**Chapel Island** (J555677: SMR DOW 11:12); an oyster midden (0.2m thick) at the northern end of the island, located on or just above a raised beach (McErlean *et al.* 2002, 486). A small group of flints from the island was recorded by Woodman (1978, 298) but their present whereabouts is unknown (McErlean *et al.* 2002, 431).

**'Temple Midden', Mount Stewart** (J558689: SMR DOW 11:23); a large oyster midden on a low drumlin near the shore, approximately 10m across. A collection of predominantly late Mesolithic flints has also been found in the area (McErlean *et al.* 2002, 487 and 435; Woodman 1978, 302).

**Mount Stewart** (J560684); a second possible oyster midden or relict oyster bed not previously recorded, was noted by the SLS. Some worked flint has also been found at the site (McErlean *et al.* 2002, 487).

**South Island, Ballyurnanellan** (J565666); two oyster middens at opposing ends of the island were reported by a local informant. A small collection of flints indicates both early and late Mesolithic activity on the island (McErlean *et al.* 2002, 439). Mesolithic flints were also collected from an area overlying the raised beach on the adjacent island, Mid Island (*ibid.,* 435).

2.3.3 Prior to the investigations at Kilnatierny the only Strangford Lough midden to have been excavated is the shell midden on Rough Island, a drowned drumlin at the north-western end of the Lough (J495689: SMR DOW 11:14). The midden was excavated in 1936 by the Harvard expedition led by Movius (Movius 1940 and 1942) and again in 2001 by the School of Archaeology and Palaeoecology, Queen's University Belfast (QUB) in partnership with the Environment and Heritage Service: Built Heritage (EHS) (O'Neill *et al.* 2001). Movius's test trenches uncovered an oyster midden, and a number of hearths and shallow pits, all of which were assigned to the late Mesolithic period (Movius 1940). The site was re-investigated over sixty years later as part of a programme to record the archaeology of the island which was under threat from coastal erosion. The 2001 project is currently at the post-excavation stage and samples for radiocarbon dating have not yet been submitted. However, Western Neolithic pottery was found both within and below the midden indicating a date for the site after *circa* 4000 BC (O'Neill *et al.* 2001) and primary processing of the bulk samples has produced charred cereal grains (J. Mallory pers. comm.). Struck flints were recovered from the beach gravels underlying the midden and early Mesolithic flints were recovered from elsewhere on the island, but from derived contexts (O'Neill *et al.* 2001).

### *2.4 Other archaeology in the Mount Stewart-Greyabbey Bay area*

2.4.1 Kilnatierny lies within Greyabbey Bay which is the area of Strangford Lough with the highest concentration of post-glacial submerged forests (McErlean *et al.* 2002, fig. 4.1) and tidal fish traps (*ibid.,* fig. 6.1). Large numbers of tree stumps were found *in situ* in the bay in the red clays deposited by the late-glacial eustatic rise in

sea level. Radiocarbon dates of samples taken from the stumps indicate that the forests date to the post-glacial period (*ibid.,* table 4.1). The trees grew between the period of the sea level low stand, *circa* 9500 years BP, and the maximum sea level transgression (*circa* 6000 BP) when they were drowned by the rising sea levels. The few fish traps that have been dated date to the early and later Medieval periods, for which there is also much historical evidence for their use (McErlean *et al.* 2002, 132-185). The site at Kilnatierny also overlooks, to the north-west, a more recently reclaimed area of foreshore. This probably dates to the early eighteenth century when land reclamation was especially popular (*ibid.,* 120).

## *2.5 Archiving*

*2.5.1 A copy of this report has been deposited with the Environment and Heritage Service: Built Heritage (EHS). All site records and finds are temporarily archived with the Centre for Archaeological Fieldwork (CAF) within the School of Archaeology and Palaeoecology, Queen's University Belfast (QUB).*

## *2.6 Credits and Acknowledgements*

2.6.1 The landowners, Mr and Mrs Hamilton of Hollowdene House, for permission to excavate at Kilnatierny, and the Environment and Heritage Service: Built Heritage (EHS) who funded the excavation.

2.6.2 The excavation was directed by Emily Murray (QUB) and the excavation crew were Naomi Carver (CAF), Ruth Logue (CAF) and Ronan McHugh (CAF).

2.6.3 Assistance and advice during the course of the excavation and in the preparation of this report was kindly provided by: Thomas McErlean (UU), Gill Plunkett (QUB), John Ó'Néill (QUB), Phil Macdonald (QUB) and Colm Donnelly (QUB).

2.6.4 The illustrations in this report were prepared by Ruth Logue (CAF) and the location maps, contour plans and general plans of the site were prepared by Ronan McHugh (CAF). The Appendices were prepared by Naomi Carver (CAF) and Brian Sloan (CAF).

# 3 Archaeological investigation

## *3.1 Methodology*

3.1.1 Archaeological investigations at Kilnatierny, including a small-scale excavation of one of the midden lenses and a contour survey of the surrounding area, were undertaken from May 24th – June 3rd, 2004.

3.1.2 Five midden lenses and relict raised beach gravels were discovered when a foundation trench was dug to the south of Hollowdene House in the townland of Kilnatierny near Greyabbey, Co. Down in October 2003 (Figures 1 and 2). The foundation trench was located on the southwest-facing slopes of a drumlin known as 'The Hill', at 6.5-7.5m OD (Figure 2; Plate 1). It comprised a continuous trench of variable depth (0.4-0.7m) and enclosed an area of approximately 100m$^2$. The trench delineated a roughly L-shaped plan and detached baulks were left standing within this area. These were labelled as 'island baulks' to differentiate between their section faces and those of the 'main baulk', i.e. the outer perimeter of the foundation trench. Midden lenses and beach gravels were exposed in both the main baulk and island baulks and were confined to the north-eastern end of the foundation trench (see Figure 3).

3.1.3 Five midden lenses were identified and were designated Midden lenses A-E. Only two of the lenses, Midden lens E and part of Midden lens A, were exposed in plan where the topsoil, as well as some of the archaeological deposits, had been removed by the mechanical diggers.

3.1.4 Five separate midden lenses were identified and were designated Midden lenses A-E. Midden lens A was exposed at the easternmost end of the building site. It extended north-south for just over 3.5m and was approximately 0.5m thick at its deepest point. It was cut through by the foundation trench and was exposed on two faces of the central island baulk (south- and east-facing) and on the west-facing section of the main baulk (Figures 3, 4 and 10; Plates 2 and 11). Midden lens B was exposed on the north-facing section of the same island baulk and on two faces of the main baulk, on the east- and south-facing sections (Figures 11 and 12; Plates 12 and 13). It was the most extensive of the five lenses although it was relatively shallow, approximately 0.12-0.13m thick. It stretched east-west for around 6m across the south-facing section of the main baulk, and southwards for a

further 4m (east-facing section of the main baulk). Midden lenses C, D and E had also each been cut through at least twice by the foundation trench and had two or more exposed sections (Figures 3, 13, 14 and 15; Plates 14, 15 and 16). Although the three lenses have been individually labelled (Midden lenses C, D and E) it is possible given their relative locations that they represent different exposures of a single midden (see Figure 3). Unlike Middens A and B, however, this was not easily demonstrated and the three were therefore treated as individual units.

3.1.6 The exposed sections showed that three of the midden lenses (Midden lenses A, C and D) were situated on the highest levels of the raised beach gravels. Midden lens B was sited further down the relict beach and entirely overlay the beach gravels. Midden lens E, the most westerly of the lenses, was heavily truncated but the surviving deposits suggested that it was situated upslope of the ancient shoreline.

3.1.7 Shells, predominantly oysters that had eroded-out from the midden lenses were distributed across the site. The occasional piece of struck flint was also found and two poorly preserved pig incisors were found in the base of the foundation trench, close to Midden lens A.

3.1.8 The five midden lenses were investigated by cleaning-back the exposed sections and recording the visible archaeology with descriptive notes, section drawings and photography. Midden lens A represented one of the deepest and best preserved of the midden lenses. It was therefore investigated in more detail and a small trench (Trench 1: 3.5m x 1.5m) was opened on the main baulk and a second (Trench 2: 0.8m x 0.8m) on the adjacent island baulk (see Sections 3.2 and 3.3).

3.1.9 One context record incorporating the five midden lenses was created using standard context recording methods (Appendix 1). Features and deposits were photographed (Appendix 4) prior to and following their excavation and a series of sections and plans were prepared during the course of the investigations (Appendix 5). In addition to photography and illustration, the principal site records consisted of context sheets augmented by separate registers of small finds (Appendix 6) and bulk samples (Appendix 7).

3.1.10 The location and elevation of each of the midden lenses was recorded by an EDM survey. A contour survey of the site's immediate environs was also undertaken

and the elevation of the midden lenses relative to the raised beach was recorded (see Section 3.8).

### *3.2 Midden lens A: Trench 1*

3.2.1 Midden lens A was exposed both in the west-facing section of the eastern end of the foundation trench (main baulk) and also on two sides of the opposite island baulk (Figure 3 and Plate 2). In the case of the latter, the overburden and part of the shell layer had been stripped back revealing the extent of this area of the midden lens in plan. This showed that it terminated just beyond the edges of the island baulk. The stratigraphy corresponded with that visible in the main baulk so the small area was swiftly excavated and sampled. This is described further below (Section 3.3).

3.2.2 The west-facing elevation of Midden lens A indicated that there were two principal cultural layers underneath the humic topsoil (101); a dense shell layer (118) and a dark brown soil layer containing charcoal (139). The latter did not appear to be homogenous and at least one identifiable lens of darker, charcoal rich material (141) was recorded within it (Figure 4). In the dried–out and friable section visible on commencing work at the site it was, however, difficult to identify any other separate layers with any certainty. Both the shell layer (118) and charcoal rich layer (139) overlay raised beach gravels (103). The humic layer (101) physically overlay these gravels (103) further northwards, beyond the northern extent of the midden lens visible in the west-facing section (Plate 2). As with the shell (118) and charcoal (139 and 141) layers, the matrix of the beach gravel was heterogeneous. At least one definite lens of fine gravel (104) was discernible which formed a basal layer to the primary gravel deposit (103). The gravels were deposited over the 'natural' sandy substrate (102) which included patches of densely compacted sand within it.

**Plate 2**: Midden lens A before excavation; the west-facing section on the main baulk (with 0.5m scale) and the island baulk section in the foreground.

3.2.3 An excavation trench (Trench 1) measuring 3.5 m (N-S) by 1.5 m (E-W) was opened adjacent to the edge of the foundation trench. It was positioned directly above the midden lens as revealed in the main baulk section. The southern edge of the trench (one of the long axes) that ran along the edge of the foundation trench had been cut by mechanical diggers the previous autumn and it was uneven and overhung the underlying midden lens. This meant that as the excavation progressed, the total width of the trench became marginally reduced. The midden lens visible in the main baulk extended marginally further southwards beyond the edge of the excavation trench. The sides of the foundation trench were cut back (i.e. eastwards) more deeply at the southern end, and the baulk sections had also crumbled and survived less well (see Plate 2). Because of this, the southern end of the excavation trench was placed just short of the southern extent of the midden lens.

3.2.4 The grass sod in Trench 1 was removed to reveal a dark brown humic layer (101). This varied in thickness between 0.2m and 0.45m, with the deepest section at the southern end of the trench (Figure 4). This humic layer (101) extended across most of the building site and from Trench 1 it produced a few pieces of modern pottery and some flints (Find Nos. 330, 332 and 333). Other inclusions were occasional flecks of charcoal and one or two shells that were presumably derived from the underlying shell layer (118).

3.2.5 The removal of the humic layer (101) revealed the shell layer (118) and a small slightly raised area of beach gravel (103) at the north western corner of the trench. The shells extended over much of the excavation trench at a variable thickness of between 0.1m and 0.22m.

3.2.6 At the north-eastern end of the trench the shells were fragmented and were of a homogenous grey colour, suggestive of burning. The extent of this burnt shell lens (123) also coincided with an area of burning represented by a dark, charcoal rich soil at the extreme north-eastern corner of the trench (124). The extent and margins of both of these spreads of material was indefinite.

3.2.7 The surface level of the shell layer (118) was even. It undulated and rose slightly towards the centre of the trench, where the shells were tightly packed, and sloped downwards at the southern end with a slight rise again at the southwestern corner

of the trench. In between the south-western corner of the excavation trench and the main extent of the shell midden lens, there was an elongated depression devoid of shells running in a north-west to south-east direction. The fill of this depression was indistinguishable from the humic material (101) overlying it but it was separated (assigned as 122) for reasons of stratigraphic control (Plates 3 and 4). At the south-eastern corner of the trench was a second spread of sandy, light coloured soil (121), covering an area of approximately 0.2m x 0.1m, and also void of shells (Figure 5; Plates 3 and 4).

**Plate 3**: Midden lens A, Trench 1: looking north, after the humic layer (101) was removed. The extent of the two areas void of shells (122 and 121) are just visible towards the bottom of the photograph, and the burnt contexts (124 and 123), toward the top right corner.

**Plate 4**: Midden lens A, Trench 1: the southern end of the trench, facing east, shows the extent of the elongated deposit void of shells (122) and the primary shell layer (118).

3.2.8 A box section (0.75m x 0.25m) was opened to investigate the humic deposit (122) and to recover a bulk sample. The section showed that the shells (118) to the north of the humic deposit (122) were layered at an angle and slumped southwards. The shells overlay a shallow charcoal-rich soil (139) which gradually deepened towards the southern end of the trench (see Figure 4). The humic deposit (122) partially overlay these slumped shells but where they terminated, it also directly overlay the dark charcoal-rich horizon (139). The transition between the two (122 and 139) was indistinct. The humic deposit (122) became sandier and increased in charcoal content with depth. It produced little archaeological material apart from the occasional fragment of shell. At the southern end of the trench, the humic deposit (122) partially overlay more of the shell layer (118) which sloped upwards, with the shells again layered at an angle (Plates 4 and 5).

**Plate 5**: Midden lens A, Trench 1 (facing east) showing box section cut through the shell layer (118) and soil deposit (122). The underlying dark, charcoal-rich horizon (139) and beach gravels (103) are also illustrated.

3.2.9 It is unclear why there was this gap in the shell layer. The shape of the 'void' was suggestive of a plough furrow although there was no evidence that the shells, or the underlying layers, were actually cut-through. No cut was observed in the overlying humic 'topsoil' (101), nor was there much evidence of disturbed or re-deposited shells within it which one might expect if this was the case. No cuts parallel to the elongated void of shells (122) were observed, either within the trench or anywhere else along the length of the west-facing baulk section. One possibility is that there was some sort of boundary between the two areas of the shell deposit (118), represented by (122), which has since been removed or decayed. No positive evidence survived of any such hypothetical obstacle but if it was a log or tree trunk for example, as it decayed over time the overlying soil would have gradually filled-in the void. This would certainly explain what was observed; the elongated void (122) and why no real distinct change between the humic 'topsoil' (101) and the humic fill of the void (122) was observed.

3.2.10 The sandy spread (121) at the south-eastern corner of the trench (approx. 0.35m x 0.25m) was investigated with a small half-section. As with the humic fill (122) of the elongated void to the west of it, it too directly overlay a thin spread of the dark charcoal-rich layer (139). Despite its angular appearance when first exposed, there was no indication of any cuts through the surrounding shells or within the overlying humic layer (101) and it appeared to be re-deposited 'natural' (102). Plate 5 shows

the area of shells separating the two areas level with the shell layer (118) but void of shells (121 and 122). Although the composition of this clump of shells was no different from the rest of the associated upper layer of the shell deposit (118), the angle at which the shells lay, and their general looseness, suggested that they might have been disturbed and re-deposited. This observed difference is, however, difficult to quantify or illustrate. These shells may be associated with some disturbance of the area subsequent to the primary deposition of the shells.

3.2.11 At the opposite end of the trench, the excavation of the mixed charcoal, soil and shell deposit (124) showed that it was a spread associated with a concentrated area of burning and an informal hearth represented by a shallow depression and ash lenses (Plate 6). The sides of the trench cut through the hearth illustrating the ash lenses (136) within it (Plate 7). Some oyster shells were mixed-in within the hearth fill and the base of the hearth overlay a shallow layer of oysters indicating that the hearth was set 'within' the main shell layer (118). The spread of fragmented, burnt shells (123) was also concentrated towards this corner of the trench and was associated with the hearth.

**Plate 6**: Midden lens A: Area of burning ('informal hearth') at the north-eastern corner of Trench 1.

**Plate 7**: Midden lens A: close-up photo showing the ash lenses (136) and depth of the informal hearth in the west-facing section of Trench 1.

3.2.12 The main shell layer (118) was made-up predominately of oyster shells (*Ostrea edulis*) which were generally well preserved and often complete or almost complete. Valves of the great scallop (*Pecten maximus*) were also common, and cockles (*Cerastoderma edule*), mussels (*Mytilus edulis*) and periwinkles (*Littorina littorea*) were also all noted. The distributions of left and right valves of the oyster and scallop shells seemed to be random and did not indicate systemic disposal of paired specimens. The shells were tightly packed and generally lay horizontally, except towards the southern end of the trench where they slumped downwards (Plate 5).

3.2.13 Trowelling down through these shells (118), as in the normal manner with other buried soils, was not easily done. Instead it was decided to excavate the shells by 'lifting' them by hand and trowel and taking the shell layer down in arbitrary spits of approximately 0.3-0.5m in depth. Before commencing with this strategy, the excavation trench was divided into half-metre grid squares with 0:0 set at the south-eastern corner. A bulk sample of the shells (118) was taken from each of these half-metre squares and where the depth of the deposits allowed, multiple stratified samples were recovered (see Appendix 7). Flecks and larger lumps of charcoal were interspersed within the general shell matrix as well as lenses of more fragmented shell (125), or pockets of other species such as razor clams

(132). These occurred as random and ill-defined spreads. Analysis of the samples at the post-excavation stage will provide a record of the spatial distribution of these and other materials within the midden lens. There was little or no soil present between the shells in the uppermost layer but many of the oyster shells had a thin film of soil on one or more surface. This suggested that rain water, percolating down from the ground surface, had deposited soil residues on the exposed shells' surfaces. As excavation of the shell horizon (118) progressed, the ratio of soil to shell increased. The basal layer of the shell layer had a much higher content of sticky reddish-soil within it and it also contained a greater number of periwinkles especially towards the southern end (137).

3.2.14 At the southern end of the trench the buried soil underlying the shells had charcoal flecks throughout (139) with darker charcoal-rich patches within it (141 and 140 - Figure 6; Plates 8 and 9). North of this charcoal-rich spread, and west of the west-facing edge of the trench, was a sticky red sandy layer (138) which appeared to be a shallow mixed 'transitional' layer between the overlying shell layers (118 and 137) and the underlying natural sandy substrate (102). Oysters from the overlying deposit were regularly impressed into this layer (138), often at an upright angle, most notably at what proved to be the juncture between the two different underlying substrates, the sand (102) and gravel (103). Apart from a negligible line of small stones, which included a nodule of flint, there was no clear boundary between these two spreads, of reddish sandy soil (138) and the darker charcoal flecked deposit (139). These appeared to represent spreads of material with different proportions of charcoal and sand content but not distinct features. Immediately south of the hearth, the surface level rose up over a slight eminence and the layer underlying the shells (118 and 123) comprised gravel with some shell inclusions (142) which appeared to be a small dump of re-deposited gravel (Plates 8 and 9). This penultimate layer of mixed deposits (138, 139, 140, 141 and 142) was excavated, exposing the relict beach shoreline in plan. (Figures 7 and 8, Plate 10).

**Plate 8**: Trench 1 (facing east): the penultimate layer

**Plate 9**: The southern end of Trench 1 showing the charcoal rich layer (139) during excavation. The sandy deposit void of shells (121) recorded at the south-western corner can be seen in the west-facing section of the trench.

**Plate 10**: Trench 1: post excavation photo (facing east) showing the upper limit of the beach gravels (103) and the natural (102).

3.2.15 There were a small number of flints found during the excavation from both the shell layer (118) and underlying soil and charcoal layers (123, 125, 139 and 140; Figure 9). There was no obvious dump or cache of flints within the archaeological horizons although their distribution shows a general clustering in the south-eastern quadrant of the trench. This was also the area with the deepest stratigraphy suggesting that their quantity may simply be a reflection of sample size. A small quantity of mammal bone fragments were also recovered from the shell and underlying layers. As with the flint finds, these too were concentrated towards the southern end of the excavation trench. All of those noted during excavation were calcined.

3.2.16 Bulk samples were taken throughout the excavation (Appendix 7). Floatation and sieving of these samples in the laboratory will recover charcoal suitable for radiocarbon dating and also any macroscopic plant remains, fish bones and/or flint debitage. A number of 'shell-only' samples were also taken from the shell layer (118) for biometrical and seasonal analysis and will only require cursory washing.

### 3.3 Midden lens A: Trench 2

3.3.1 Midden lens A was investigated with the excavation of a second small trench opened on the island baulk section (Trench 2: 0.8m x 0.6m). The same deposits were represented in the small area of Midden lens A located on the opposing island baulk. With the exception of the humic layer (101) and the underlying non-anthropogenic deposits (102 and 103), the archaeological layers were assigned a separate set of context numbers for reasons of control.

3.3.2 The humic layer (101) and some of the shell midden lens had been removed by the mechanical excavators. The shell layer (108: equivalent to 118) survived to a depth of approximately 0.08-0.1m and included oyster, cockle, mussel, periwinkle and scallop shells (Plate 11).

**Plate 11**: Midden lens A on the island baulk (Trench 2): East-facing section. The beach gravels (103) can be seen at the lower right corner.

3.3.3 The shells (108) overlay at least three different horizons (Figure 10). The uppermost of these was a shallow brown sandy lens (133), approximately 0.01m thick, confined to the eastern edge of the island baulk section of the midden lens. It contained both charcoal and bone, including a boar's tusk. This deposit (133) was not present in Trench 1 suggesting that it was a localised lens within the midden. This overlay a charcoal-rich sandy layer (106), approximately 0.1m thick, and equivalent to the dark soil layer (139) in the main trench (Trench 1). The basal deposit was a reddish brown sandy layer with charcoal and some small stones

(107). It appeared to be a mixed layer between the charcoal rich layers above (106 and 133) and the sandy substrate (102) and gravels (103) underneath. The deposits were recorded and rapidly excavated with bulk samples taken from each of the layers.

### 3.4 Midden lens B

3.4.1 Of the five midden lenses identified, Midden lens B was the most extensive. It stretched east-west for approximately 6m across almost the full length of the northern-most baulk of the foundation trench, and southwards for another 4m or more (Figure 3). As with Midden lens A, Midden lens B also extended across the central island baulk (Plate 12). The overburden had not been stripped back at the northern end of the baulk as had been done at the southern end. The southern extent of Midden lens B was not therefore revealed in plan, but it must have terminated north of Midden lens A as the northern margins of Midden lens A were found with an area of sterile ground beyond it.

**Plate 12**: Midden lens B: section visible on the main baulk (left side of photograph) and on the island baulk (right side of photograph). The heterogeneous nature of the underlying gravel deposits is also evident from the photograph.

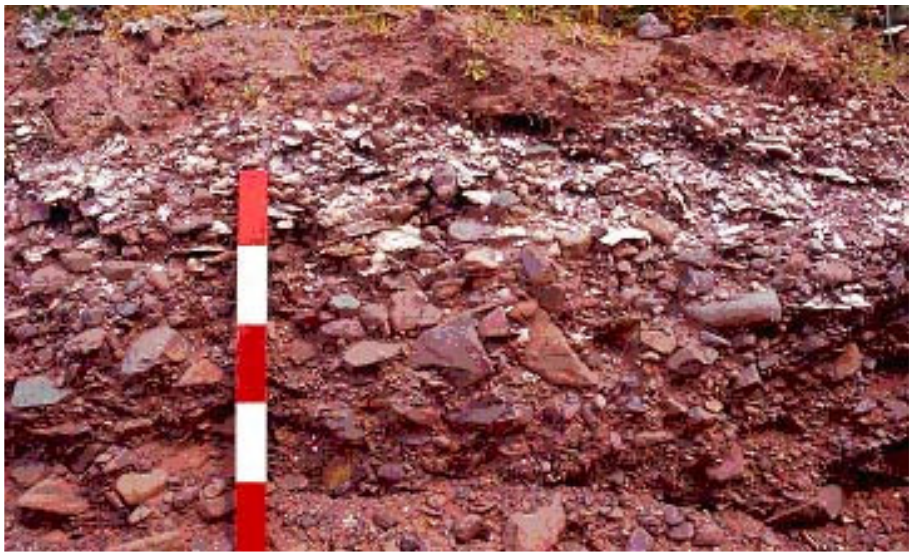


**Plate 13**: Midden lens B (main baulk): the shallow shell layer (134) stratified between the humic deposit (101), above, and the beach gravels (103), below.

3.4.2 Midden lens B was relatively shallow, approximately 0.12-0.13m thick. The shell layers (134 and 135) were sandwiched between the overlying dark humic layer (101) and the underlying raised beach gravels (103). The main shell layer (134) was at its deepest in the north-facing section of the island baulk (Figure 11), approximately 0.18m thick. It comprised principally oysters but other shells present included periwinkles, mussels and cockles. The shells were heavily fragmented and there was no obvious layering or patterns of deposition within the visible shell layers. The basal layer of shell was mixed with the underlying gravels which made it difficult to delineate a clear line between them (Figure 12).

3.4.3 The oysters were generally better preserved in the island baulk section of the midden lens and a good number of oysters were also scattered around the bottom of the foundation trench. The island baulk section of the midden lens was also the thickest suggesting that this could represent the main area of the midden lens with other deposits spreading out from it. An attempt was made by Gill Plunkett (QUB) to locate the extent of Midden lens B north of the section exposed in the main baulk. Midden lens deposits were recorded approximately one metre north of the foundation trench but the coring – a screw auger was used - proved to be time-consuming and unsatisfactory and so it was not pursued any further.

3.4.4 The raised beach gravels (103) were at their deepest (> 0.7m) and most extensive at this end of the foundation trench. The depth of the gravels was not determined as they continued deeper than the foundation trench and the base of the trench had been lined with concrete. The gravels were mixed and included many lenses of finer gravel (104).

### 3.5 Midden lens C

3.5.1 Midden lens C was exposed on two opposing section faces (east- and west-facing) of a small island baulk located south-west of Midden lens A (Figure 3). The lengths of the visible deposits on the two sides were roughly 1.8m and 1.2m respectively. As with Midden lenses A and B, the midden deposits were layered in-between the overlying dark brown humic layer (101) and the underlying beach gravels (103).

3.5.2 Only a small clump of fairly loose shells (109) was visible in the west-facing section of Midden lens C. The shell lens, mainly of oysters, was approximately 0.5m in maximum length and 0.06-0.07m in depth (Figure 13 and Plate 14). To the south of the shells was a reddish-brown sandy layer (110), 0.2m thick and overlying the sandy substrate (102).

**Plate 14**: Midden lens C, west-facing section. The small clump of shells (109) are just visible to the left of the scale (0.5m) with the gravels (103) dominating much of the make-up of the northern extent of the small island baulk.

3.5.3 In the east-facing section (Plate 15 and Figure 13) the shell layer (109) was more extensive but relatively shallow, approximately 0.04m in depth. Oysters and periwinkles were both present. The shell layer directly overlay a gritty greyish-brown soil horizon with charcoal inclusions (111) approximately 0.18m thick, which was stratified above the deeper reddish-brown soil layer (110), around 0.25m thick. This in turn overlay the natural sandy substrate (102). The deepest section of the archaeological deposits was present towards the northern end where the shells directly overlay the raised beach gravels (103). This east-facing section was also notable for the number of large boulders which were present at the uppermost levels of the sandy substrate (102). This occurrence was most marked in the east-facing section of this small island baulk (Figure 13) but was a feature also observed in the section faces below Midden lenses A and D.

**Plate 15**: Midden lens C, east-facing section: the midden lens was also visible on the opposite, west-facing side, of the small baulk (see Plate 14).

### 3.6 Midden lens D

3.6.1 Midden lens D was visible in the main baulk, opposite the west-facing section of Midden lens C. As with Midden lens C, the lens was also exposed in a second section, on a short length of a west-facing section of the main baulk (see Figure 3).

3.6.2 Three shell layers were identified in the east-facing section of Midden lens D (figure 14 and Plate 16). The three were differentiated on the level of

fragmentation of the shells present and in the quantity of gravel and stone inclusions. The southernmost extent of the shell layer (112) extended for approximately 0.8m and was between 0.1m and 0.18m thick. It was made-up predominantly of oysters, including several complete examples protruding from the section face. To the north of this lens of shells, the shell layer was notably more heavily fragmented and more compacted with a greater frequency of pebble and gravel inclusions as one moved from south to north (116). The stratification in the east-facing section indicated that the 'oyster' lens (112) succeeded the compacted shells lens (116). The greater degree of fragmentation in the earlier of the two deposits (116) may be due to disturbance or trampling during the deposition of the succeeding layer of shells (112).

3.6.3 Associated with these primary shell layers were two small pockets of mixed shell deposits; one of shell and gravel (113) 0.05m-0.1m thick, and the second of shell, dark earth and charcoal flecks (117), around 0.08m thick. Both of these were stratified above a distinct charcoal-rich layer (114) that undulated across the section face and was 0.2m thick at its deepest point (Plate 16). The distinct dip within this layer (Plate 16) could represent a hearth, like the depression and ash lenses that were uncovered during the excavation of Midden lens A, Trench 1 (see Section 3.2.11).

3.6.4 A short length of the midden lens was visible on the west-facing section although some of the shell layer (112) had been removed by earlier digging activity and erosion (Figure 14). The same basic anthropogenic deposits (112, 113 and 114) recorded in the east-facing section recurred in the west-facing section although the sandy, charcoal-flecked deposit (113) was more extensive. The coarse and fine gravel lenses were not distinguished (103/104) and differences in the sandy substrate were noted, with a darker upper layer of mixed sand and soil (115) with some large stones and boulders present.

**Plate 16**: Midden lens D, east-facing section. The burnt layer (possible hearth?) is visible just to the left of the scale (0.5m). The beach gravels can be seen on the right.

### 3.7 Midden lens E

3.7.1 Midden lens E was the most westerly of the five recorded midden lenses. The lens was exposed in the north-facing section of a long narrow island baulk (see Figure 3) and it had been damaged by the mechanical diggers. The shallow shell layer (126) was partly exposed on the surface of the baulk and dislodged shells and other midden debris were scattered around the base of the adjacent trenches.

3.7.2 The shell lens (126) extended for about 1m in length and was approximately 0.15m thick. The shells identified included oysters, mostly fragmented, and periwinkles. The western end of the midden had been removed by the diggers when the foundation trench was dug and an area of shells, that had been trampled and crushed, was left exposed on the surface of the island baulk. The surface debris was cleaned-back and a bulk sample of the shell layer (126) was taken. In the course of sampling, a large Bann-like flake (Find No. 326) was found near the exposed surface of the deposit.

3.7.3 Two small pockets of the same dark, charcoal flecked soil (129) between 0.07-0.1m thick were stratified below the shell layer (126) towards the western end of the midden lens. East of these were a number of other variable dark brown soil

lenses visible in the section face. A shallow elongated dark humic layer (approximately 0.05-0.07m thick), directly underlay the humic topsoil (101) and extended eastwards for over 1.5m. Below this, as in Midden lens D, there was a relatively deep (0.25m) charcoal rich layer (130) and an associated dark-brown lens (128) with a possible pit-like depression, 0.2m deep. The relationship between these two the deposits (128 and 130) was not clearly established (Figure 15).

### 3.8 Surveying *(Ronan McHugh)*

3.8.2 An EDM survey was carried out in conjunction with the excavation. The survey was undertaken using a TCR705 Total station and the data was processed using Leica LISCAD 6.0 software.

3.8.3 The objectives of the survey were to produce accurate plans of the archaeological deposits and to tie in the location of the excavation with the surrounding landscape. The Kilnatierny survey was tied into the Irish National Grid using an existing Ordinance Survey bench mark located near Patterson's Hill, to the north-west of the site.

3.8.4 Levels were taken on the section lines for each of the five midden lenses, so that the actual heights of the deposits recorded in section could be recorded (Figure 16**)**. The building trenches also cut through the relict raised beach gravels and the upper limits of these deposits, where they were exposed in the section baulks, were also surveyed. Nine levels were taken at arbitrary spot heights along the base of the raised beach deposit. Elevations were also taken for the majority of the small finds. The principal elevations recorded during the survey are presented in Table 1 below.

3.8.5 A number of selected points within the field boundary were also taken to create a contour survey of the immediate area. The midden lenses were located on the north-west facing slope of a small drumlin which rose to over 14m OD (Figure 2). Within the survey area the raised beach deposit broadly followed the contour of the drumlin, with the highest elevations being recorded on the upslope of the drumlin and the lowest to the north-west, around the base. The highest point of the raised beach deposit was 6.783m OD (Level RB1), while the lowest was 4.801m OD (Level RB9). Some plateauing occurred between Levels RB3 and RB7 which corresponds with a relatively broad shelf between the 6.5m OD and 7m OD contour lines in the modern topography of the drumlin.

| Point ID | Heights (metres above sea level) |
|---|---|
| Level RB1 | 6.75 |
| Level RB2 | 6.42 |
| Level RB3 | 5.99 |
| Level RB4 | 6.48 |
| Level RB5 | 6.83 |
| Level RB6 | 6.58 |
| Level RB7 | 6.43 |
| Level RB8 | 5.11 |
| Level RB9 | 4.80 |
| D 2 Midden lens A | 6.23 |
| D 4 Midden lens A | 6.55 |
| D 5 Midden lens A | 6.28 |
| D 3 Midden lens C | 6.65 |
| D 6 Midden lens C | 6.64 |
| D 7 Midden lens D | 6.58 |
| D 8 Midden lens D | 6.43 |
| D 12 Midden lens E | 6.44 |
| D 13 Midden lens B | 6.22 |
| D 14 Midden lens B | 6.13 |
| D 15 Midden lens B | 6.41 |
| D 18 Midden lens B | 6.32 |
| D 21 Midden lens A | 6.83 |
| D 22 Midden lens A | 6.86 |
| D 23 Midden lens A | 6.83 |

**Table 1** Levels taken at Kilnatierny, Co. Down. Raised beach levels are denoted "RB" (Figure 16). Levels taken for section drawings are denoted by drawing number, e.g. "D1".

## 4 Discussion and conclusion

4.1.1 The material from Midden lens A has not yet been examined but it became apparent during excavation that although one might label Midden lens A as an 'oyster' midden, it was in fact far from homogenous in its make-up. The presence of great scallop shells was fairly significant while a wide range of other shellfish were also noted. Similarly, the charcoal-rich soil layer (139) below the principal shell layer (118) proved to be more complex than as was revealed in the original section face (Figure 4). However, apart from the presence of an informal hearth, represented by a shallow depression and a build-up of ash lenses (136), no other features or obvious patterns of activity were discovered in the small area excavated, just spreads of shells and soils with different charcoal content. It is difficult therefore to make much of the different layers recorded only in section for Midden lenses B-E. Overall, however, the midden lenses all comprised the same general stratigraphy of a mixed shell layer overlying a dark soil layer with evidence of burning as represented by the consistent presence of charcoal. These deposits all post-dated the relict raised beach gravels.

4.1.2 No firm dating evidence was obtained for the midden lenses. The flints discovered at Kilnatierny, both stray finds and those found in context from the excavated layers in Midden lens A, are suggestive of prehistoric activity. No flint debitage was noted during the excavation but given the nature of the shell deposit it would have been difficult to see. If any knapping was undertaken at the site, the sieving and processing of the bulk samples should provide the positive or negative evidence for this activity. A preliminary inspection of the flints indicated that they do not form a diagnostic assemblage (E. Nelis pers. comm.) although one possible Bann-like flake was found within the disturbed shell layer of Midden lens E. Bann flakes are characteristic implements of late Mesolithic flint assemblages, circa 5500-4000 BC (Waddell 1998, 20-1) and scatters and stray finds of flints, predominately late Mesolithic, have been found in the general Greyabbey Bay area (McErlean et al. 2002, 428 and 435).

4.1.3 There were no other material finds from the excavation trenches such as metalwork, pottery or worked bone. There was also little animal bone present and the only positive identification of any of this material so far is of pig: a boar's tusk was found in Midden lens A and two pig incisors were found in the base of the foundation trench, adjacent to Midden lens A. These specimens could have come

from either wild or domestic animals. Charcoal was present in all of the archaeological deposits and this will facilitate the submission of multiple samples for radiocarbon dating. The retrieval of paired samples of material of marine (shell) and terrestrial (charcoal) origin could also contribute useful data for the refinement of marine radiocarbon calibration for the north-east of Ireland (see Reimer et al. 2002).

4.1.4 The contour survey at Kilnatierny provides accurate levels for the exposed section of raised beach within the foundation trench. The recorded data shows that the upper margins of the beach gravels are at an elevation of between +4.8m and +6.8m OD (Table 1). This elevation falls within the levels given by McErlean et al (2002, 31-2) for post-glacial deposits within the Lough.

4.1.5 Both late-glacial and post-glacial relict raised shorelines have been recorded in Northern Ireland. They have been dated to around 18000-1600BP and 7000-5000BP respectively (Carter 1982, 21) although marked differences in the timing of the post-glacial peak transgressions have been recorded at different points around the northern and eastern coastline (ibid., 18-9). Along the east coast of Northern Ireland late-glacial raised beach deposits have been recorded at elevations of up to +20m OD (ibid.) while post-glacial deposits for the same region have been recorded at elevations of between +1m and +3m OD (ibid., 7-13). There has been no systematic study of raised beach deposits within Strangford Lough but both late- and post-glacial raised beaches have been recorded (McErlean et al. 2002, 31-2). McErlean et al. (ibid.) give a raised sea-level range of between +2m and +7m for post-glacial deposits within the Lough although they acknowledge that the highest of these may derive from storm activity. Gravel beach ridges indicating post-glacial elevated sea-levels have been recorded elsewhere along the Northern Ireland coastline with height ranges of +4m to +8m OD (Carter 1982, 19). It has been suggested that these may have been as a result of 'extreme sedimentation' due to surge tides more common within the enclosed Irish Sea, rather than the open Atlantic, and within tidal estuaries and sea loughs (ibid. 20). In correlation with the limited data available, it is probable that the beach gravels recorded at Kilnatierny represent a post-glacial raised gravel beach ridge.

4.1.6 In summary, the dating evidence for the midden lenses is limited. However, the presence of flint and possibly wild pig and the location of the midden lenses on the upper margins of probable post-glacial beach gravels are not inconsistent with this

being an early prehistoric, possibly late Mesolithic, site. Verification, or otherwise, of this suggestion will have to await radiocarbon dating.

4.1.7 In conclusion, although of limited scale and duration, the survey and excavation undertaken at Kilnatierny has presented an opportunity to investigate one of the Greyabbey Bay 'oyster' middens in more detail. A range of environmental samples were collected during the course of the excavation and their analysis will provide further information on the nature of activity at the site as well as supplying material for radiocarbon dating and a seasonality study.

## 5. Recommendations for further work

5.1 Charcoal and shells offer the possibility of obtaining radiocarbon dates for the occupation of Midden lens A. The confirmation of the date of the midden lens will provide a firm basis for the interpretation of the midden and for comparative studies of middens both in the immediate area and in a wider context. It is therefore recommended that two or more samples from Midden lens A and one each from Midden lens B and E, are submitted for radiocarbon analysis.

5.2 It is recommended that a full, specialist study of the flints from the excavations at Kilnatierny be undertaken. Ideally these should be considered alongside the surface finds of flints from the Greyabbey Bay area, many of which have not been subject to formal examination. A detailed study of these finds will allow an assessment of the relationship of the sites, in terms of function and contemporaneity, to be undertaken.

5.3 Marine shells form the greater part of the site matrix so it is important to make a statement on the range and frequency of species represented in the excavated trenches. The analysis of the shells could also make a useful contribution to understanding the nature in which the site developed, especially given the systematic recovery of bulk samples by grid-square. The assemblage can be compared with material recovered from excavations at Rough Island, and in the future, with material recovered from archaeological investigations of similar sites in the area such as those proposed at Ardmillan Bay on the western shores of the Lough (S. McCartan and T. McErlean *pers. comm*.). In the long-term, the accumulation of this data (range and proportion of species, biometrical data etc.) from sites from around the Lough could present a useful data-set and 'window' into the reconstruction of past shellfish populations of the Lough. This data might also be married with the distribution of middens in the Lough to identify patterns of exploitation and movement.

5.4 Seasonality is one of the key questions presented by sites such as the midden lenses at Kilnatierny where no positive evidence of long-term occupation or settlement was found. Unless the processing of the bulk samples proves otherwise, the absence of bird and fish bones precludes the possibility of a seasonal indicator from that source. Oysters and other shellfish would have been available all year round so their presence alone is not indicative of any particular

season of activity. However, analysis of their microstructure or chemical make-up has the potential of indicating what time of year they were harvested. Identifying the season in which the shellfish were gathered and eaten would throw light on when, and possibly why, the site was visited. It is therefore recommended that seasonal analysis of samples of shellfish is undertaken. A successful technique of determining the season of death of oysters has been developed by Nicky Milner (2001), in which the analyses of incremental growth is undertaken using thin sections taken at the valve hinge. Milner has been approached with a view to analysing oysters from the Rough Island excavations. Sufficient numbers and discrete samples of oysters were specifically collected from different areas of the Kilnatierny midden lens to warrant similar analysis.

5.5 The final recommendation is that this excavation report is edited and written-up for publication in a peer-reviewed journal, or as a paper in conference proceedings, following the completion and submission of specialist reports and radiocarbon dates.

## 6 Bibliography

Carter, R.W. (1982) 'Sea-level change in Northern Ireland', *Proceedings of the Geological Association* **93(1)**, 7-23.

McErlean, T., McConkey, R and Forsythe, W. (2002) *Strangford Lough. An archaeological survey of the marine cultural landscape*, Belfast: Blackstaff Press.

Milner, N. (2002) *Incremental growth of the European oyster Ostrea edulis: seasonality information from Danish kitchen midden lenses*, Oxford: Archaeopress.

Movius, H.L. (1940) 'Report on a stone age excavation at Rough Island, Strangford Lough, County Down', *Journal of the Royal Society of Antiquaries of Ireland* **70**, 111-142.

O'Neill, L., Donnelly, C., Mallory, J. and McNeill, T. (2001) *Rough Island Research Excavation: Data Structure Report*, unpublished report, CAF (QUB).

Reimer, P.J., McCormac, F.G., Moore, J., McCormick, F. and Murray, E.V. (2002) 'Marine radiocarbon reservoir corrections for the mid- to late Holocene in the eastern subpolar North Atlantic', *Holocene* **12(2),** 129-135.

Waddell, J. (1998) *The prehistoric archaeology of Ireland*, Galway: Galway University Press.

## Appendix 1: Figures

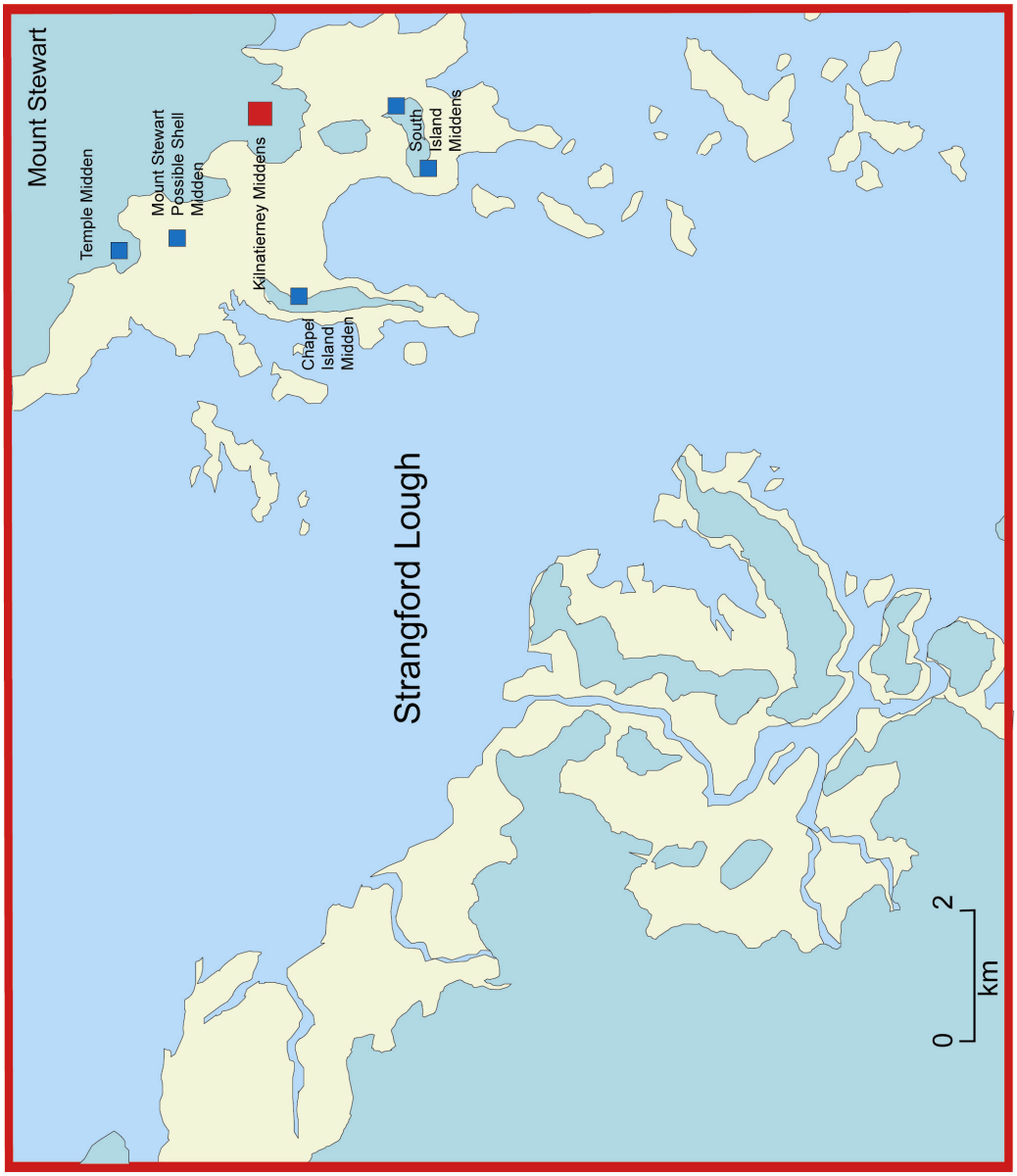



Figure 1:

Location map

Kilnatierney middens and other nearby shell middens

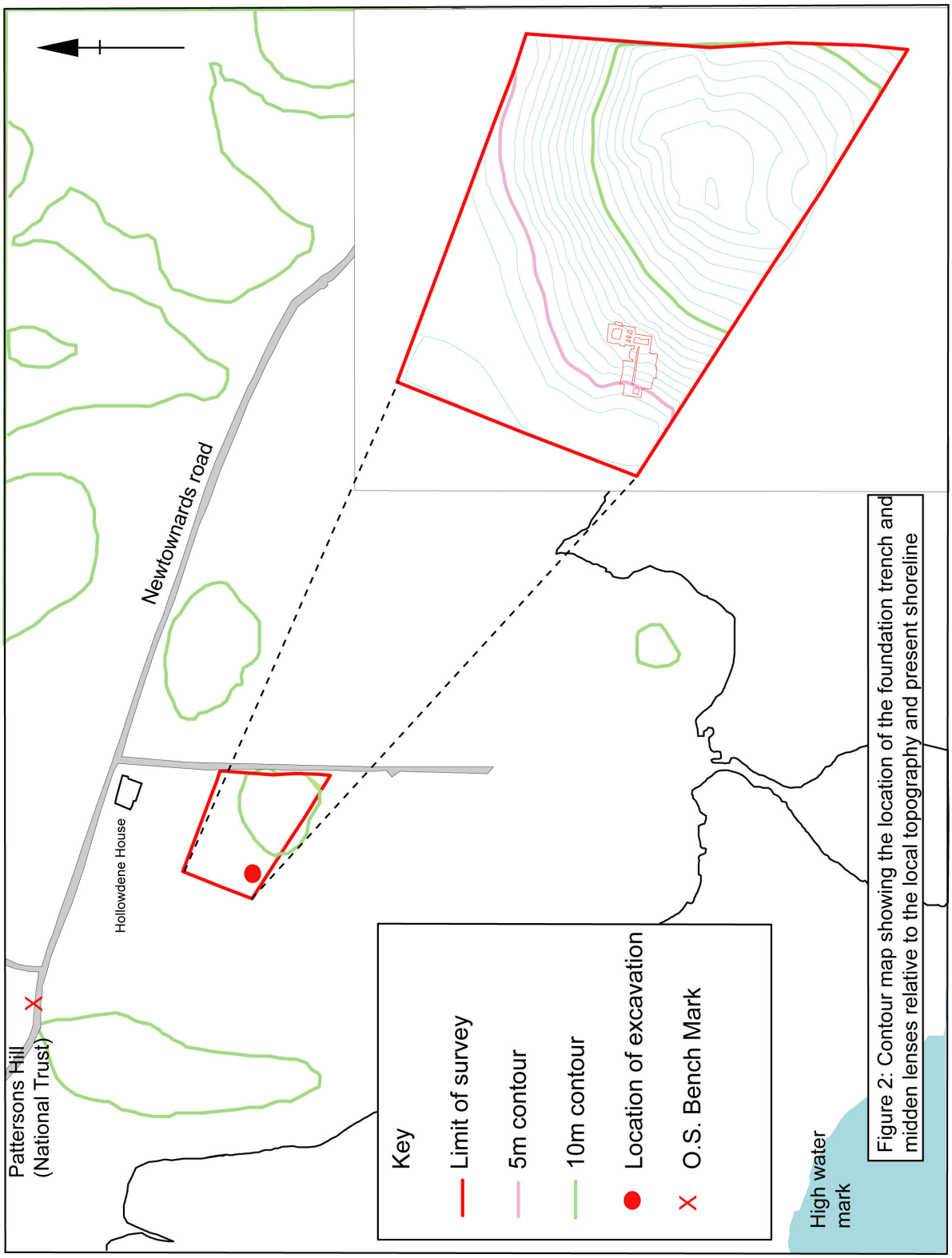



Figure 2: Contour map showing the location of the foundation trench and midden lenses relative to the local topography and present shoreline

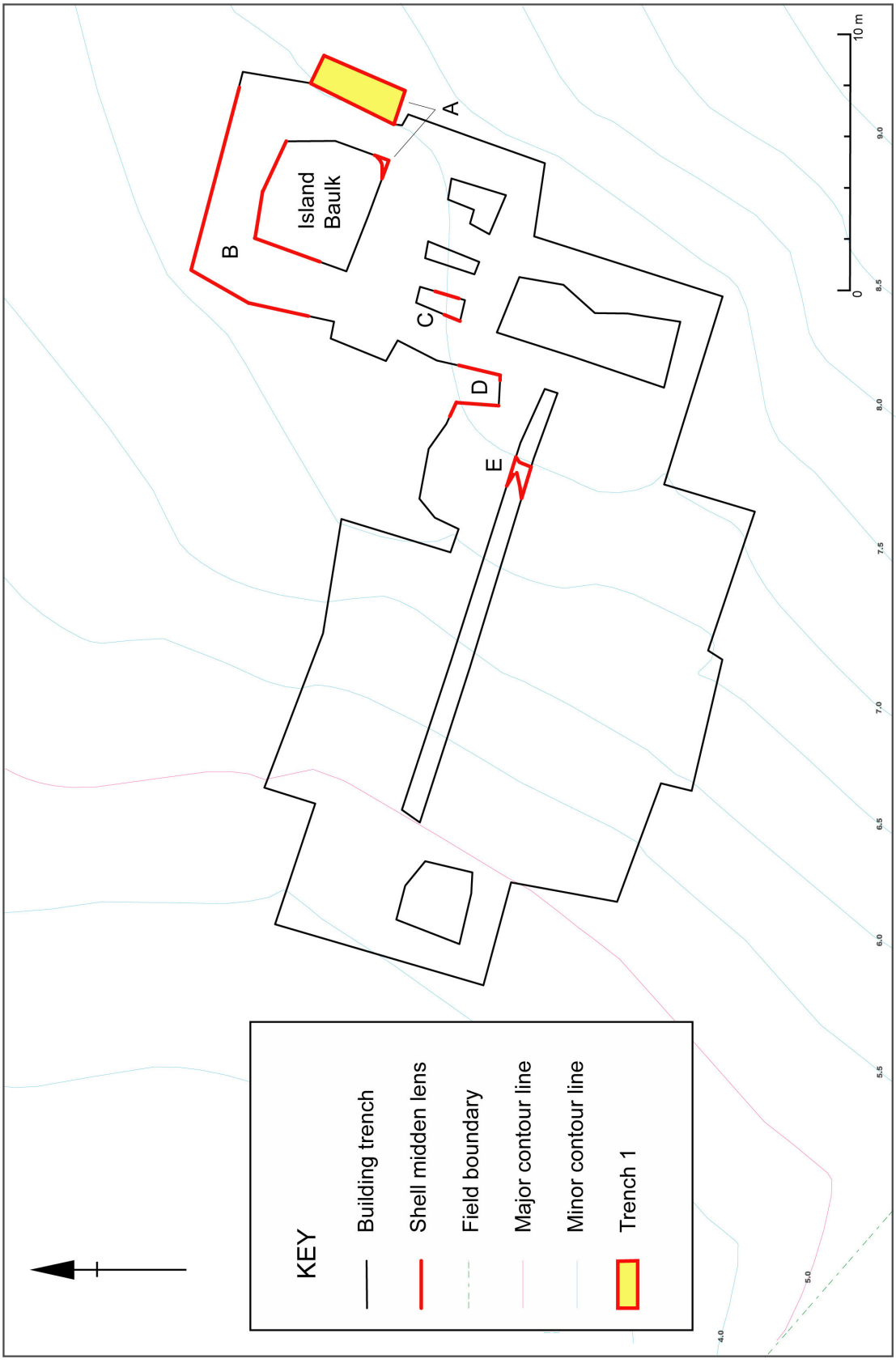



Figure 3: Contour plan showing location of building trench, midden lenses and excavation trench

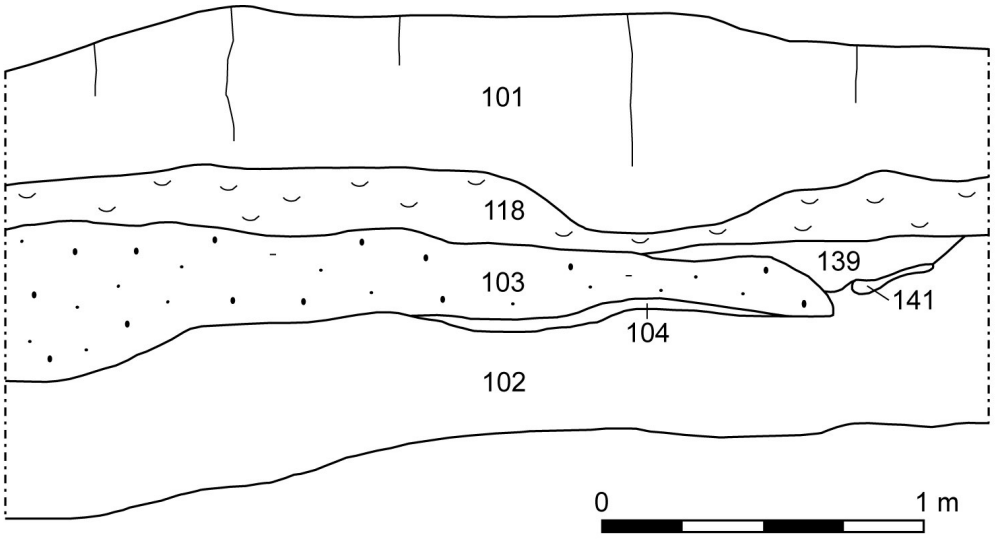



Figure 4: Midden A, main baulk; west-facing section before excavation and opening of Trench 1.

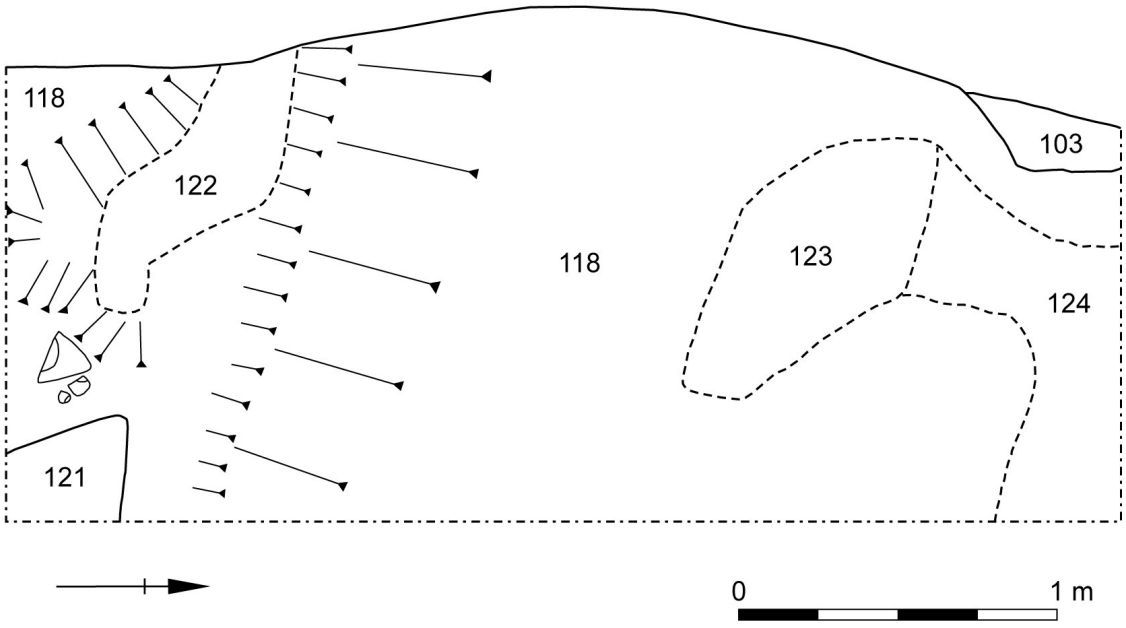



Figure 5: Midden A; Plan of Trench 1 after the removal of the uppermost humic layer (101), showing the extent of the shell layer (118).

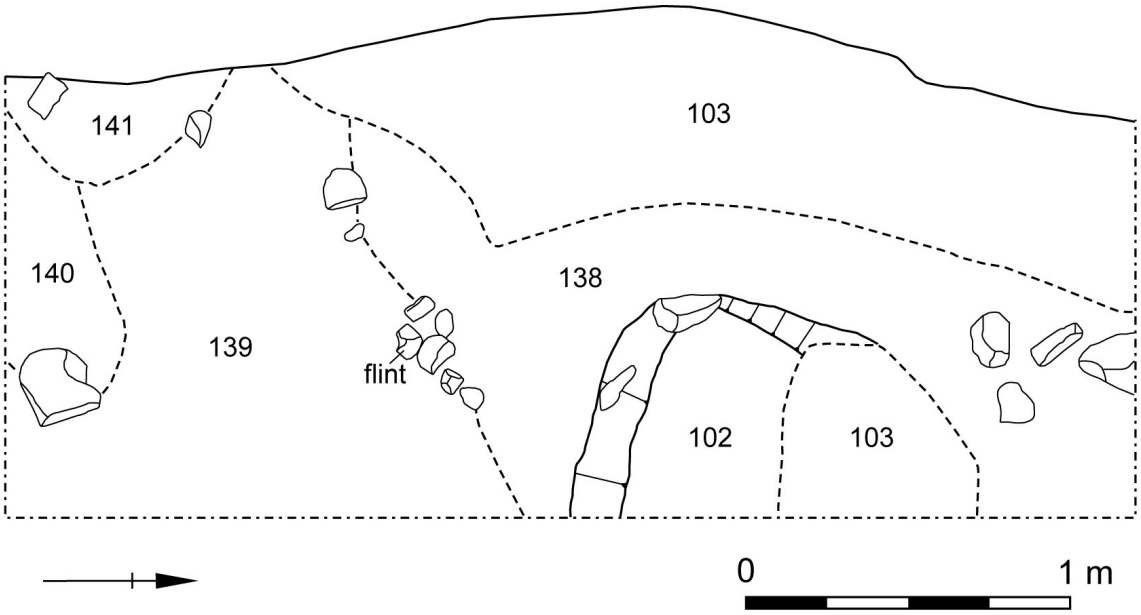



Figure 6: Midden A; plan of Trench 1 showing the penultimate layer.

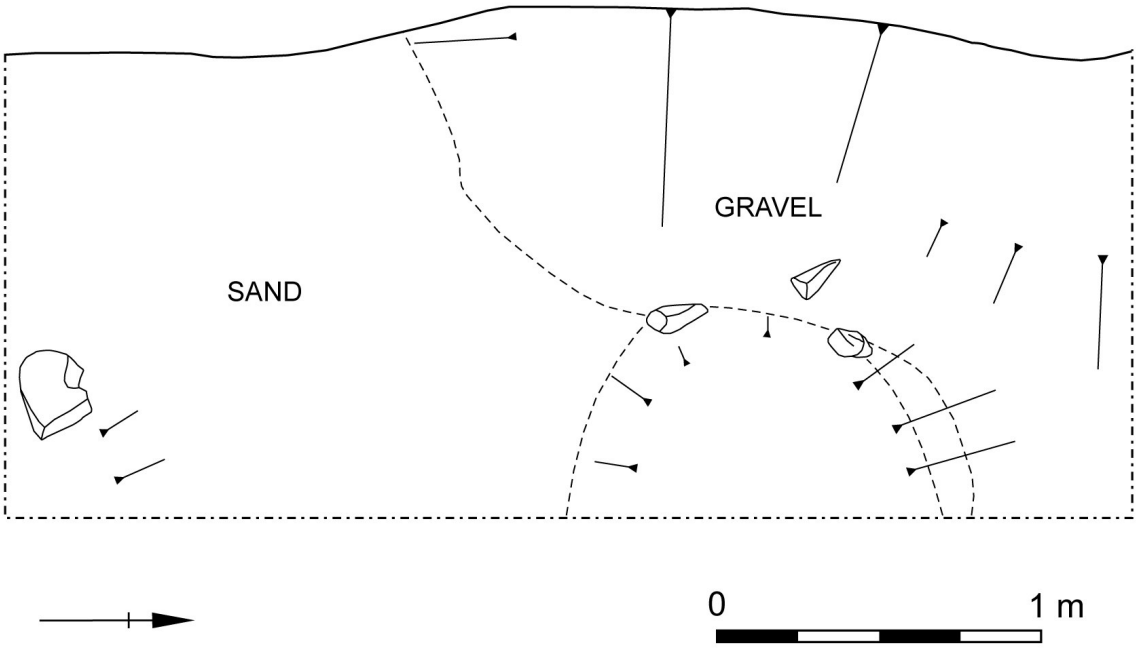



Figure 7: Midden A; final plan after the removal of the archaeological layers showing the relict raised shoreline.

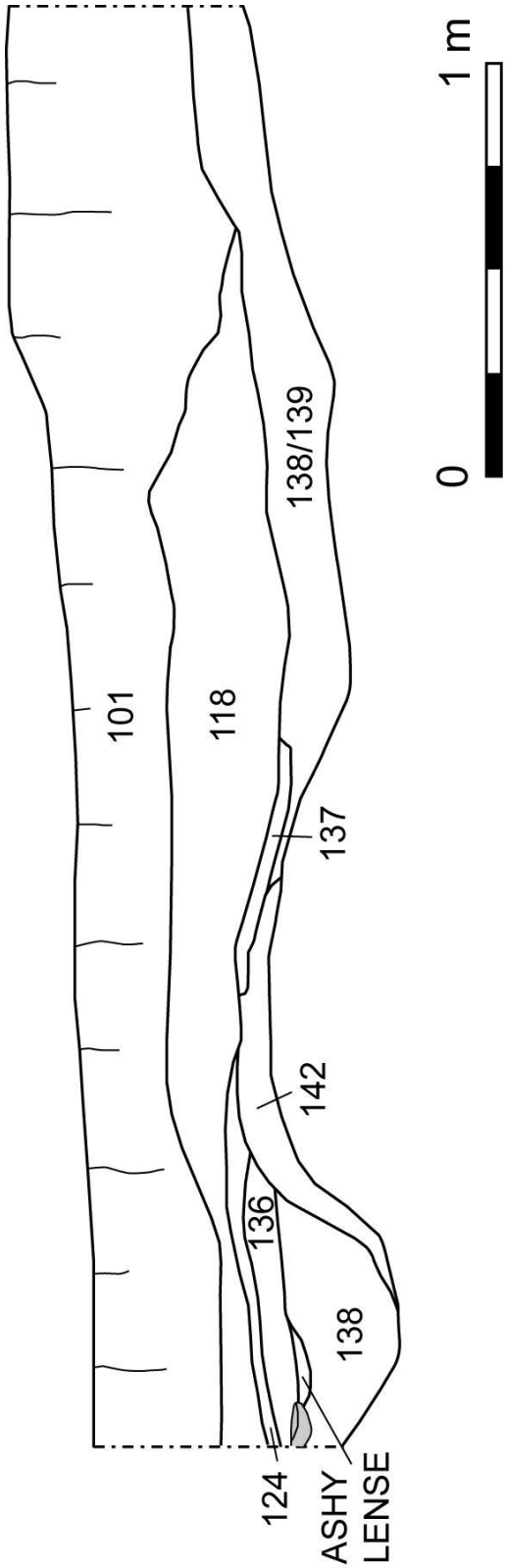



Figure 8: Midden A; west-facing section.

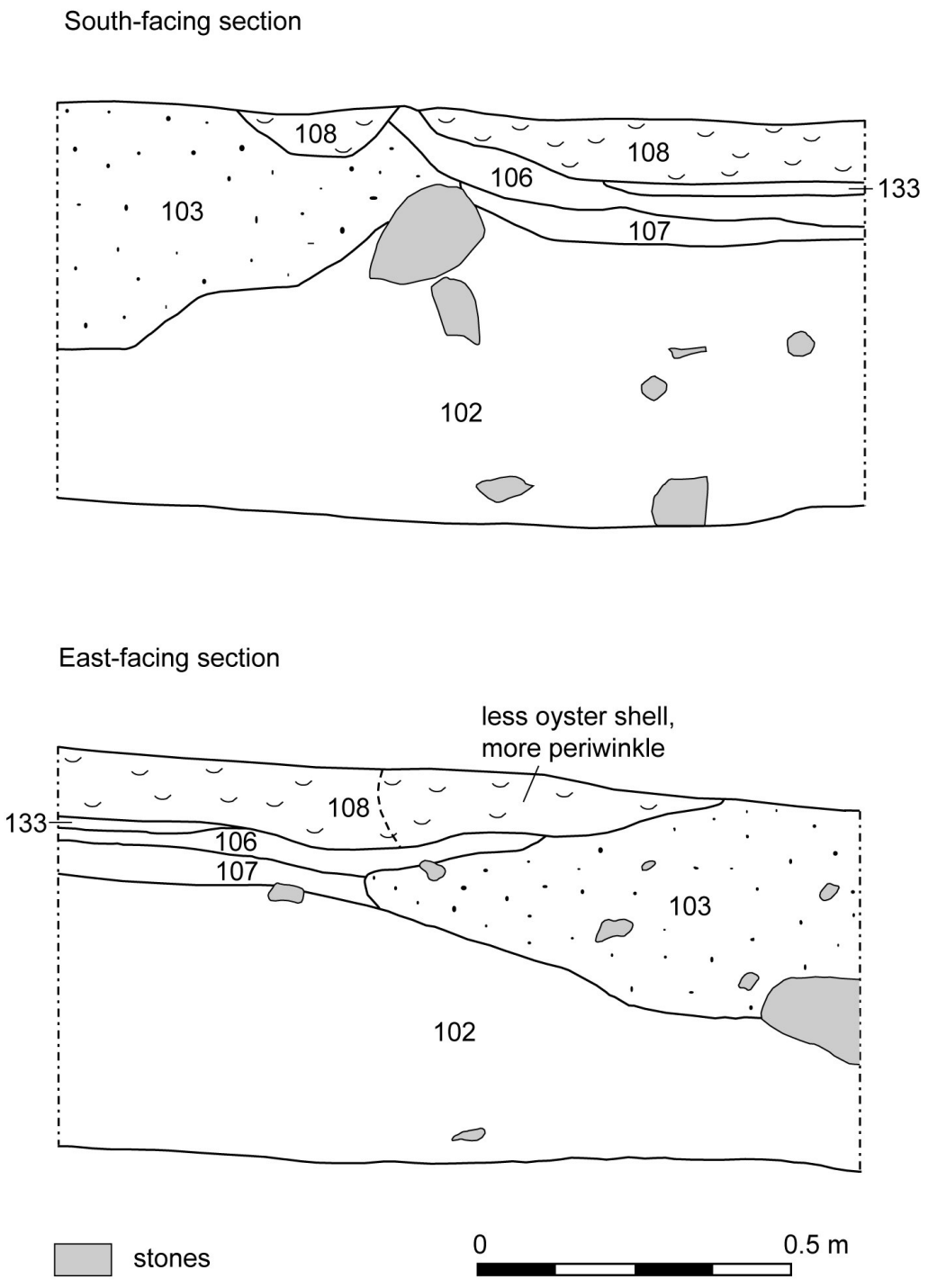



Figure 10: South and east-facing sections of Midden A on the island baulk (Trench 2).

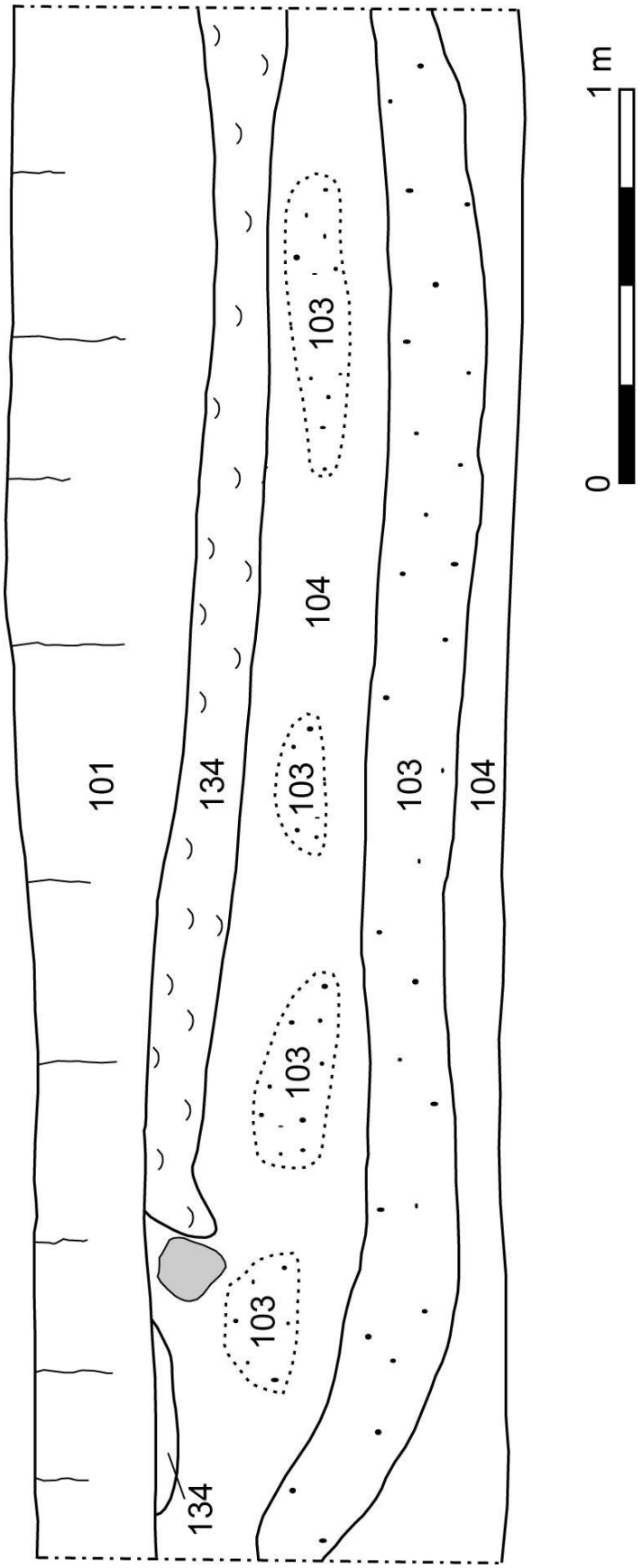



Figure 11: Midden B (island baulk); north-facing section.

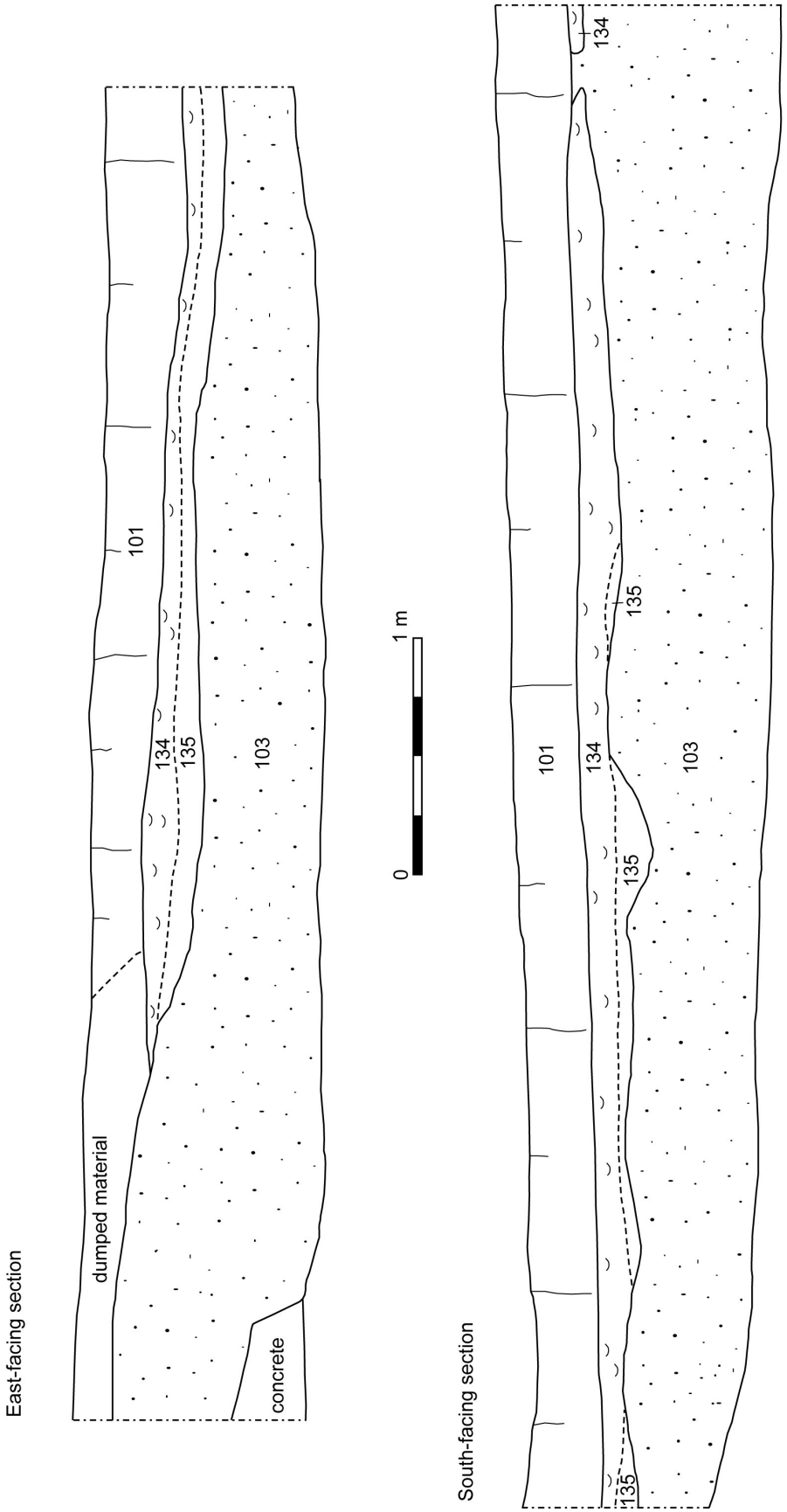



Figure 12: Midden B; east and south-facing sections.

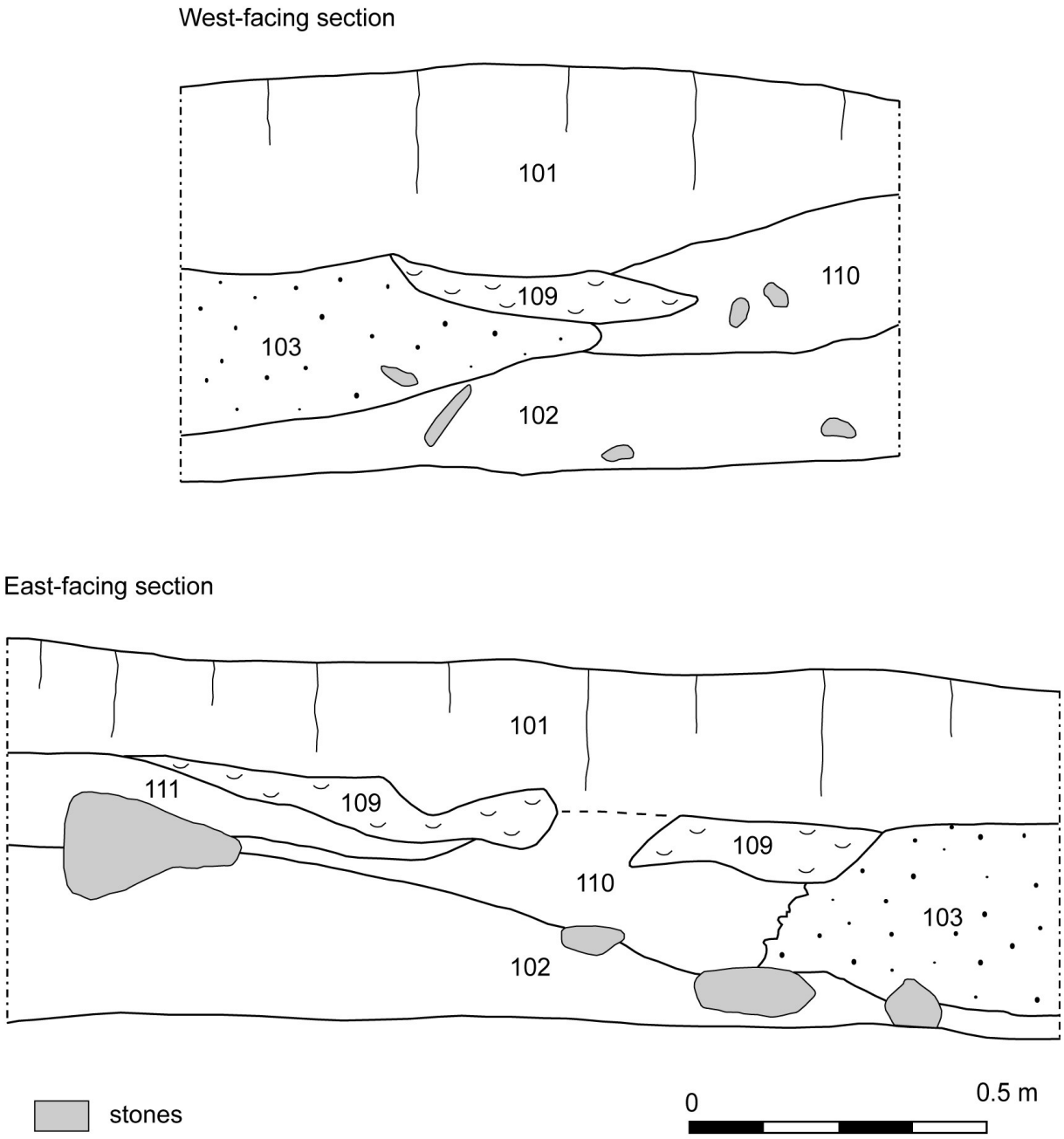



Figure 13: Midden C; west and east-facing sections.

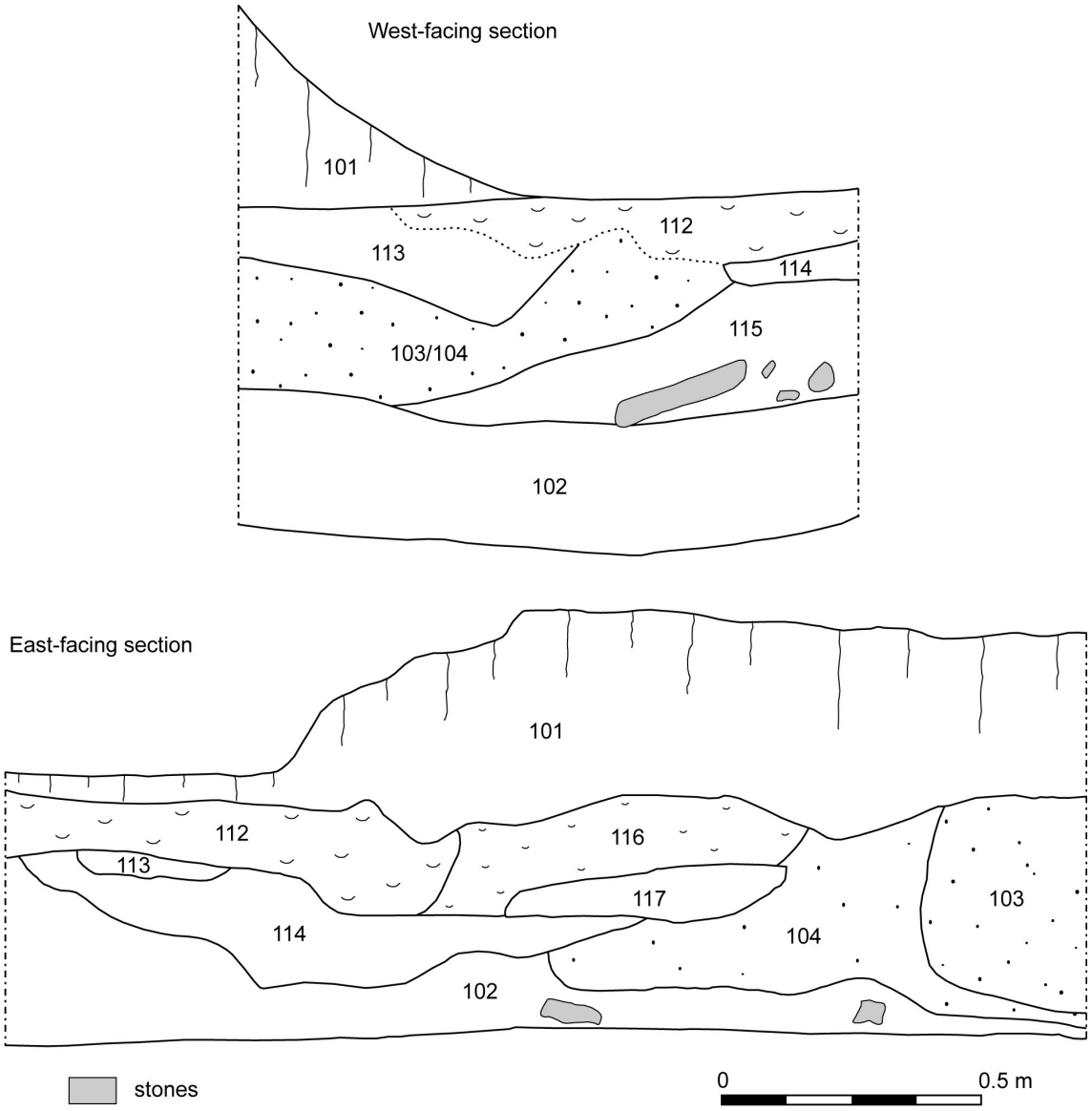



Figure 14: Midden D; west and east-facing sections.

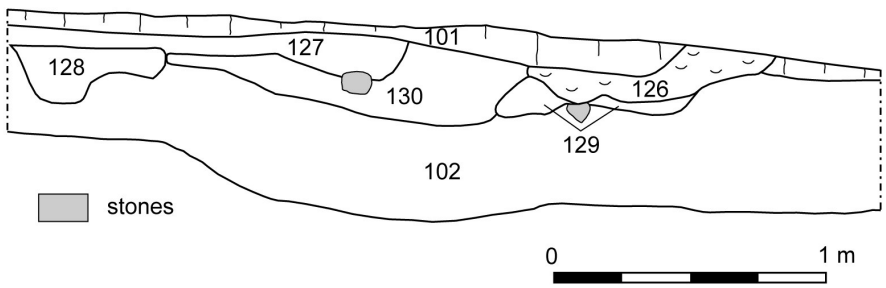



Figure 15: Midden E; north-facing section.


Figure 16: Contour plan showing raised beach levels and section points

## Appendix 2: Context list

| Context No. | Midden lens | Description |
|---|---|---|
| 101 | All | Dark brown humic layer ('topsoil') extending over most of the site. Variable depth. |
| 102 | All | Yellow sandy substrate underlying raised beach gravels, with some large stones and boulders. |
| 103 | All | Beach gravel and coarse sand, underlying several of the midden lenses and visible in the baulk sections across most of the north and north-western end of the foundation trench. |
| 104 | All | Lenses of fine gravel within main gravel (103). Finer gravels formed a basal layer to the main gravel (103) in the baulk section below Midden lens A (Trench 1) while 'pockets' occurred within the gravels under Midden lens B. |
| 105 | Midden lens A: TR 1 | *VOID [basal layer of 101, directly overlying 118]* |
| 106 | Midden lens A: TR 2 | Charcoal rich sandy layer. Equivalent to charcoal rich layer (139) in Trench 1. |
| 107 | Midden lens A: TR 2 | Shallow, reddish-brown sandy layer with charcoal and some small stones. Overlying charcoal rich deposit (106). Equivalent to 138 in Trench 1. |
| 108 | Midden lens A: TR 2 | Shell layer, approx. 0.1m thick (truncated). Equivalent to shell layer (118) in Trench 1. |
| 109 | Midden lens C | Shell midden layer approx. 0.04m-0.08m thick. Oyster, scallop, periwinkle and mussel shells present. |
| 110 | Midden lens C | Dark reddish-brown sandy layer, 0.2m thick. |
| 111 | Midden lens C | Gritty charcoal lens approx. 0.18m thick. |
| 112 | Midden lens D | Shell layer made up predominantly of oysters. 0.1m-0.18m thick |
| 113 | Midden lens D | Mixed shell and gravel lens, 0.05-1m thick |
| 114 | Midden lens D | Dark, charcoal-rich layer, 0.2m thick at deepest point |
| 115 | Midden lens D | Dark layer of mixed sand and soil with some larges stones and boulders |
| 116 | Midden lens D | Compacted and fragmented shell deposit with some gravel inclusions |
| 117 | Midden lens D | Mixed lens of shell and dark earth, approx. 0.08m thick. |
| 118 | Midden lens A: TR 1 | Shell layer of variable thickness; approx. 0.13m-0.22m. Comprising primarily oyster shells but other shells present include scallops, limpets, periwinkles and whelks. Charcoal also present as well as struck flints and some calcined mammal bone fragments. |
| 119 | Midden lens A: TR 1 | Context number assigned to the dark soil layer underlying the shell layer (118) and visible in the main baulk section of Midden lens A prior to excavation. This was superseded by context numbers 138 and 139. *Equivalent to 138/139* |

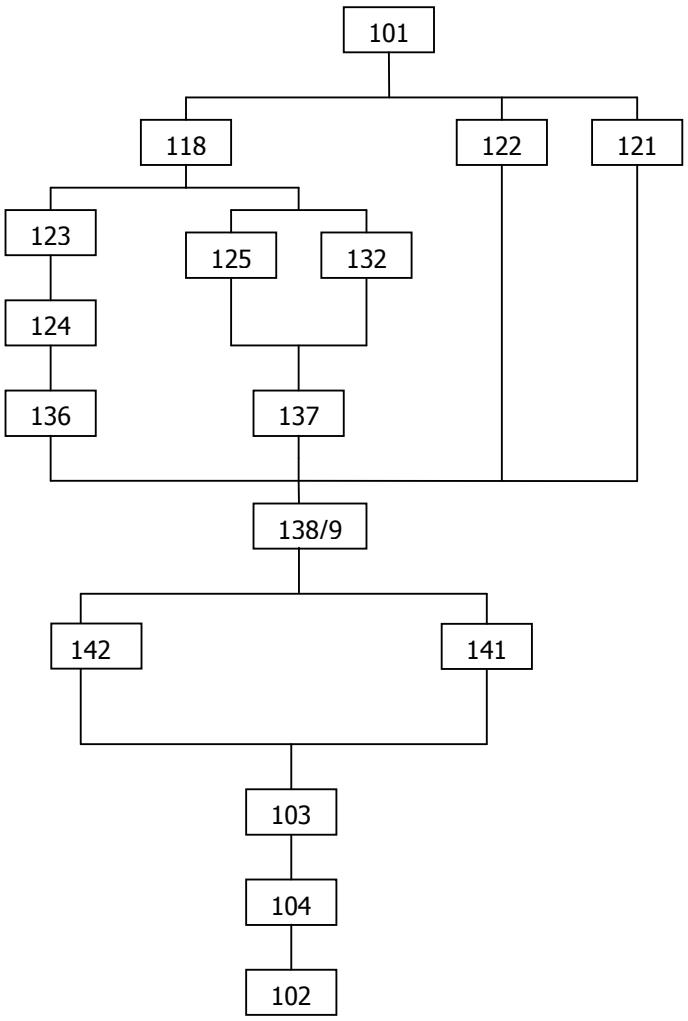
| Context No. | Midden lens | Description |
|---|---|---|
| 120 | Midden lens A: TR 1 | *VOID [Duplication: equivalent to 141]* |
| 121 | Midden lens A: TR 1 | Sterile sandy spread at south-eastern corner of Trench 1. |
| 122 | Midden lens A: TR 1 | Humic deposit largely devoid of shells and indistinguishable from the humic layer (101) overlying it but separated at an arbitrary depth for reasons of control. Overlies shallow charcoal layer (139). |
| 123 | Midden lens A: TR 1 | Spread of fragmented and burnt shells (light grey in colour) and charcoal in northern part of trench. |
| 124 | Midden lens A: TR 1 | Area of dark soil in northern part of trench overlying ash lenses (136). |
| 125 | Midden lens A: TR 1 | Lens of heavily comminuted shell within shell layer (118) towards southern end of trench. Produced a number of flints (Find Nos. 307, 308 and 310). |
| 126 | Midden lens E | Shell layer comprising fewer oysters than in most of the other midden lenses (Midden lenses A-D) but poorly preserved with lots of fragmented shell. Periwinkles present. 0.05-0.07m thick. |
| 127 | Midden lens E | Mid-brown layer approx. 0.07m thick and deepening to 0.15m at its western end. |
| 128 | Midden lens E | Dark-brown lens, 0.2m thick at deepest point – possible shallow pit? |
| 129 | Midden lens E | Small pockets of dark soil underling the shell layer. |
| 130 | Midden lens E | Dark charcoal-rich spread extending in length for 1.4m E-W, and approx. 0.25m thick. |
| 131 | Midden lens B | *VOID [shell on island baulk = 134]* |
| 132 | Midden lens A: TR 1 | Pocket of shells (razor clams and dogwhelks) located roughly within grid-square 2x0m. Deposit found towards the base of the shell layer (118) and with a higher ratio of soil to shell content than the primary shell layer (118). |
| 133 | Midden lens A: TR 2 | Shallow brown sandy lens with charcoal and bone, including a boar's tusk. The deposit was not present in Trench 1 suggesting that it is a small localised deposit within the midden. |
| 134 | Midden lens B | Shell layer below the humic layer (101) and overlying the mixed shell and gravel lenses (135). |
| 135 | Midden lens B | Mixed deposits of shell and gravel underlying the main shell lens (134). |
| 136 | Midden lens A: TR 1 | Ash lenses representing an informal hearth at the north-eastern corner of the trench. |
| 137 | Midden lens A: TR 1 | Basal lens of the shell layer (118). Periwinkles were more common than in upper layers of the midden with a higher ratio of soil to shell content. |
| 138 | Midden lens A: TR 1 | Reddish-brown layer, underlying the shell layer (118) and overlying sandy substrate (102). |
| 139 | Midden lens A: TR 1 | Dark charcoal-rich layer underlying the shell layer (118 and 137) at the southern end of the trench with spreads of more concentrated areas of charcoal (140 and 141), within it. Contemporaneous with layer 138 but with a higher concentration of charcoal and no clear boundary between the two. |

| Context No. | Midden lens | Description |
|---|---|---|
| 140 | Midden lens A: TR 1 | Charcoal-rich spread at southern end of trench. |
| 141 | Midden lens A: TR 1 | Mixed deposit, of stickier consistency, within charcoal layer (139) in north-west corner of the trench. |
| 142 | Midden lens A: TR 1 | Re-deposited gravel with some shells mixed in it. Underlying the primary shell lens (118). |

## Appendix 3: Harris matrices

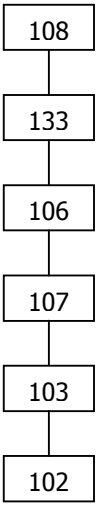
Midden A: Trench 1

Harris Matrix



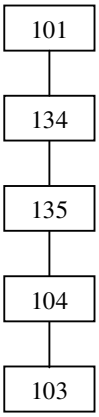
Midden A: Trench 2

Harris Matrix



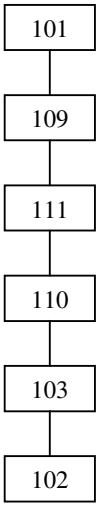

Midden B

Harris Matrix



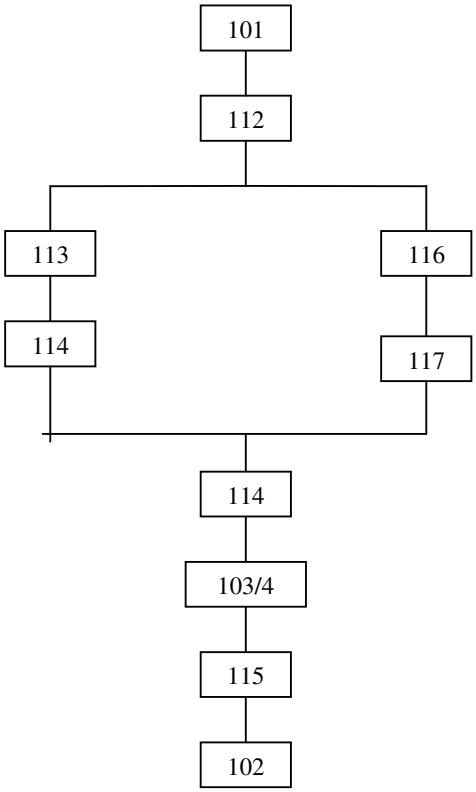
Midden C

Harris Matrix



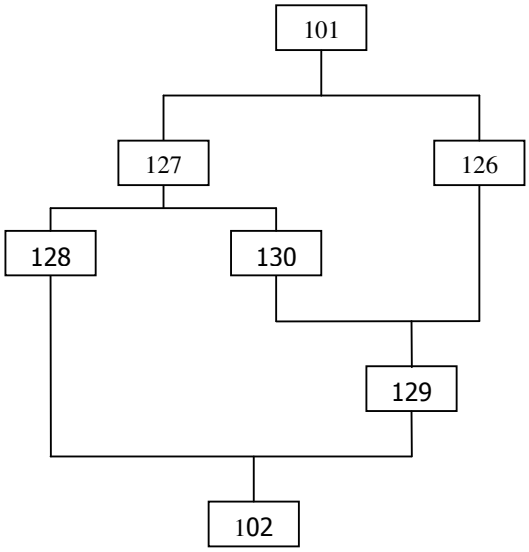
Midden D

Harris Matrix



Midden E

Harris Matrix



## Appendix 4: Photography register

**Film One** (Kodak: colour positive 35mm film)

| *No.* | *Direction* | *Description* |
|---|---|---|
| 1 | Facing north north-east | General shot of the site (landscape). |
| 2 | Facing north north-east | General shot of the site (landscape). |
| 3 | Facing north north-east | General shot of the site (profile). |
| 4 | Facing west | The south-eastern end of the building site. Midden lens B and Midden lens A on the island baulk, are both visible. |
| 5 | Facing west | Midden lens A on the island baulk: east-facing section. |
| 6 | Facing west | Midden lens A on the island baulk: east-facing section. |
| 7 | Facing east | Midden lens A on the main baulk: west-facing section. |
| 8 | Facing east | Midden lens A on the main baulk: west-facing section. |
| 9 | Facing north-west | Midden lens A on the main baulk: south-facing section. |
| 10 | Facing north | Midden lens B: south-facing section, close-up. |
| 11 | Facing east | Midden lens B: general shot of main baulk and island baulk sections. |
| 12 | Facing north | Midden lens B: general shot of main baulk and island baulk sections. |
| 13 | Facing west | Midden lens C: east-facing section. |
| 14 | Facing east | Midden lens C: west-facing section. |
| 15 | Facing west | Midden lens D: east-facing section. |
| 16 | Facing east | Midden lens D: west-facing section. |
| 17 | Facing east | Midden lens A: general shot showing Ronan and Naomi drawing the section of the main baulk before excavation. |
| 18 | Facing west | Midden lens A on the island baulk. |
| 19 | Facing south | General shot of Trench 1 after the removal of the humic layer (101). |
| 20 | Facing north | General shot of Trench 1 after the removal of the humic layer (101). |
| 21 | Facing west | The northern end of Trench 1 showing the spread of fragmented and burnt shells (124). |
| 22 | Facing west | The northern end of Trench 1 showing the area of burning. |
| 23 | Facing east | The southern end of Trench 1 showing the shell layer (118) and humic deposit (122). |
| 24 | Facing east | Record shot of box section in western part of Trench 1 showing the shell layer (118) and humic deposit (122). |
| 25 | Facing east | The main shell layer (118) during excavation. |
| 26 | Facing west | The main shell layer (118) during excavation. |
| 27 | Facing west | Midden lens A: general shot of fragmented shell lens (125) within the main shell layer (118). |
| 28 | Facing north | Midden lens A: general shot of fragmented shell lens (125) within the main shell layer (118). |
| 29 | Facing north | Midden lens A on the island baulk: Charcoal rich sandy layer (106) with protruding boar's tusk just visible in section (to right of trowel). |
| 30 | Facing south-west | General shot of building trench [testing camera] |
| 31 | Facing south-west | General shot of building trench [testing camera] |
| 32 | Facing north | Midden lens A: area of burning and lenses of ash (136) representing an informal hearth in the north-eastern corner of Trench 1. |
| *No.* | *Direction* | *Description* |

| | | |
|---|---|---|
| 33 | Facing west | Midden lens A: area of burning and lenses of ash (136) representing an informal hearth in the north-eastern corner of Trench 1. |
| 34 | Facing east | Midden lens A: area of burning and lenses of ash (136) representing an informal hearth in the north-eastern corner of Trench 1. |
| 35 | Facing south | Post-excavation shot of the area of burning (136) in the north-eastern corner of Trench 1. |
| 36 | Facing east | Post-excavation shot of the area of burning (136) in the north-eastern corner of Trench 1, showing west-facing section. |

**Film Two** (Kodak: colour positive 35mm film)

| *No.* | *Direction* | *Description* |
|---|---|---|
| 1 | Facing east | Post-excavation shot of the area of burning (informal hearth) at the north-eastern corner of Trench 1 showing the ash lenses (136) in the section profile. |
| 2 | Facing west | Post-excavation shot of the area of burning (informal hearth - plan view) at the north-eastern corner of Trench 1. |
| 3 | Facing north | General shot of Trench 1 during final stages of excavation. |
| 4 | Facing north | Midden lens A on the island baulk; area of burning (106) |
| 5 | Facing west | Midden lens A on the island baulk; area of burning (106) |
| 6 | Facing north | Midden lens A, TR1: following removal of the shell layer (118) and ashy lenses (136) |
| 7 | Facing north | Midden lens A, TR1: following removal of the shell layer (118) and ashy lenses (136) |
| 8 | Facing south | Midden lens A, TR1: following removal of the shell layer (118) and ashy lenses (136) |
| 9 | Facing east | Midden lens A, TR1: following removal of the shell layer (118) and ashy lenses (136) |
| 10 | Facing east | Midden lens A, TR1: following removal of the shell layer (118) and ashy lenses (136) |
| 11 | Facing southeast | Midden lens A, TR1: following removal of the shell layer (118) and ashy lenses (136) |
| 12 | Facing north | Midden lens A, TR1: charcoal rich horizon (139) with concentrated patches of charcoal (140). |
| 13 | Facing southeast | Midden lens A, TR1: charcoal rich horizon (139) with concentrated patches of charcoal (140). The shell layer (118) is visible in section face. |
| 14 | Facing east | Midden lens A, TR1: charcoal rich horizon (139) with concentrated patches of charcoal (140). The shell layer (118) is visible in section face. |
| 15 | Facing east | Midden lens A, TR1: close-up of charcoal spread (141) at the western end of the trench |
| 16 | Facing east | Midden lens A, TR1: general shot of the charcoal spread (141) at the western end of the trench |
| 17 | Facing north | Midden lens A, TR1: post-excavation photograph showing extent of beach gravels and the natural sandy substrate |
| 18 | Facing east | Midden lens A, TR1: post-excavation photograph, showing extent of beach gravels and the natural sandy substrate |
| 19 | Facing east | Midden lens A, TR1: post-excavation photograph, showing extent of beach gravels and the natural sandy substrate |
| 20 | Facing south | Midden lens A, TR1: post-excavation photograph, showing extent of beach gravels and the natural sandy substrate |
| 21 | Facing southeast | Midden lens A, TR1: post-excavation photograph, showing extent of beach gravels and the natural sandy substrate |
| 22 | Facing southwest | View of the Mourne mountains and the Lough from the site. |
| 23 | Facing east | Midden lens A, TR1: northern of west-facing section showing ash lenses (136) |
| 24 | Facing south | Midden lens A, TR1: east-facing section, post-excavation |

## Appendix 5: Drawing Register

| ***Drawing No.*** | ***Type*** | ***Scale*** | ***Description*** |
|---|---|---|---|
| 1 | Plan | 1:100 | Overall plan of foundation trench showing location of shell midden lenses. |
| 2 | Section | 1:10 | Midden lens A, on the island baulk: south-facing section. |
| 3 | Section | 1:10 | Midden lens C: east-facing section. |
| 4 | Section | 1:20 | Midden lens A, main baulk: west-facing section. |
| 5 | Section | 1:10 | Midden lens A on the island baulk: east-facing section of |
| 6 | Section | 1:10 | Midden lens C: west-facing section. |
| 7 | Section | 1:10 | Midden lens D: west-facing section. |
| 8 | Section | 1:10 | Midden lens D: east-facing section. |
| 9 | Section | 1:10 | Midden lens E: north-facing section. |
| 10 | Plan | 1:20 | Midden lens A: Trench 1 after the excavation of the humic layer (101) showing the extent of the shell layer (118) and associated lenses. |
| 11 | Plan | 1:20 | Plan of Trench 1 showing grid layout. |
| 12 | Section | 1:20 | Midden lens E: north-facing section. |
| 13 | Section | 1:20 | Midden lens B: north-facing section. |
| 14 | Plan | 1:20 | Outline of depression ('hearth') after the excavation of the ashy lenses (136). |
| 15 | Section | 1:20 | Midden lens B: west-facing section. |
| *16* | - | - | *Not used* |
| 17 | Section | 1:20 | Midden lens B: south-facing section. |
| 18 | Section | 1:20 | Midden lens B: east-facing section. |
| 19 | Plan | 1:20 | Plan of Trench 1 following excavation of shell layer (118) |
| 20 | Plan | 1:20 | Post-excavation plan of Trench 1. |
| 21 | Section | 1:20 | West-facing 'back-section' of Trench 1. |
| 22 | Section | 1:20 | South-facing section of Trench 1. |
| 23 | Section | 1:20 | North-facing section of Trench 1. |

## Appendix 6: Small Finds Register

*Note: The finds are listed by midden lens and context number.*

| *Find No.* | *Midden lens* | *Context No.* | *Description* |
|---|---|---|---|
| 329 | A | 101 | Two sherds of modern pottery |
| 330 | A | 101 | Flint |
| 312 | A | 103 | ?Burnt flint from top of gravel, below shell layer (118), from co-ordinates 1.2x1.1m |
| 314 | A | 103 | Flint from top of gravel, below shell layer (118) from co-ordinates 2.8x1.3m |
| 323 | A | 103 | Flint from top of gravel, below shell layer (118) from grid square 2.0x1.0m (2.45x1.25m) |
| 324 | A | 103 | Flint from top of gravel, below shell layer (118) from co-ordinates 3.2x1.2m |
| 331 | A | 105 | Modern pottery |
| 332 | A | 105 | Three pieces of flint, possibly burnt |
| 333 | A | 105 | Two pieces of flint |
| 302 | A | 118 | Flint from grid square 1.5x1.0m |
| 304 | A | 118 | Flint from slumped area of oyster shell in grid square 0.5x0.5m |
| 305 | A | 118 | Flint from grid square 1.5x1.0m |
| 306 | A | 118 | Possible flint core found in soil between the shells, from grid square 1.5x0.5m |
| 313 | A | 118 | Flint from co-ordinates 1.2x1.1m |
| 309 | A | 123 | Flint from grid square 2.5x0.0m (2.45x0.3m) |
| 307 | A | 125 | Flint from grid square 1.0x0.5m |
| 308 | A | 125 | Two pieces of struck flint, from grid square 1.5x0.0m |
| 310 | A | 125 | Flint flake from grid square 2.5x0.5m (2.7x0.74m) |
| 315 | A | 139 | Flint from below shell layer (118) from grid square 1.0x0.5m |
| 319 | A | 139 | Flint (?natural), from grid square 1.0x0.0m |
| 320 | A | 139 | Flint from co-ordinates 1.0x0.45m |
| 321 | A | 139 | Flint from grid square 1.0x0.0m (1.25x0.48m) |
| 322:1 | A | 139 | Large flint flake from grid square 1.0x0.0m (1.2x0.0m) |
| 334 | A | 139 | Flint from grid square 0.5x0.5m (0.7x0.75m) |
| 316 | A | 140 | Flint flake from co-ordinates 0.5x0.5m |
| 317 | A | 140 | Flint core from grid square 0.0x0.0m (0.35x0.11m) |
| 318 | A | 140 | Flint from grid square 0.5x0.5m (0.85x0.6m) |
| 322:2 | A | 141 | Flint from grid square 0.0x1.0m (0.45x1.3m) |
| 325 | A | 142 | Flint found in redeposited gravel, from co-ordinates 2.3x0.34m (associated sample, No. 581) |
| 311 | A | 106 | Flint scraper from Sample No. 571 |
| 303 | B | 103 | Struck flint from gravel under Midden lens B |
| 326 | E | 126 | Large flint flake (Bann-like flake) |
| 301 | N/A | N/A | Struck flint found below level of beach gravels in western area of site |
| 327 | N/A | Unstrat. | Eight pieces of unstratified flint |
| 328 | N/A | Unstrat. | Five pieces of unstratified flint from near Midden lens E |

## Appendix 7: Samples Record

*Note: The samples are sorted by midden lens and context number. Sample numbers 509, 520, 521, 526, 527, 549, 589 and 591 were not used.*

| *Sample No.* | *Midden lens* | *Grid Square* | *Context No.* | *No. of bags* | *Weight (kg)* |
|---|---|---|---|---|---|
| 561 | A | N/A | 102 | 1 | Not weighed |
| 501 | A | N/A | 105 | 2 | 15.5 |
| 502 | A | 0.0x0.0m | 118 | 1 | 3.73 |
| 503 | A | 0.0x0.5m | 118 | 1 | 4.55 |
| 504 | A | 0.0x1.0m | 118 | 1 | 4.17 |
| 505 | A | 0.5x0.0m | 118 | 1 | Not weighed |
| 506 | A | 0.5x0.5m | 118 | 1 | 4.75 |
| 507 | A | 0.5x1.0m | 118 | 1 | 5.01 |
| 508 | A | 1.0x0.0m | 118 | 1 | 4.5 |
| 510 | A | 1.0x1.0m | 118 | 1 | 5.81 |
| 511 | A | 1.5x0.0m | 118 | 1 | 5.37 |
| 512 | A | 1.5x0.5m | 118 | 1 | 5.65 |
| 513 | A | 1.5x1.0m | 118 | 2 | 9.75 |
| 514 | A | 2.0x0.0m | 118 | 1 | 4.82 |
| 515 | A | 2.0x0.5m | 118 | 1 | 3.41 |
| 516 | A | 2.0x1.0m | 118 | 1 | 3.95 |
| 517 | A | 2.5x0.5m | 118 | 1 | 5.1 |
| 518 | A | 2.5x0.5m | 118 | 1 | 4.94 |
| 519 | A | 2.5x1.0m | 118 | 1 | Not weighed |
| 522 | A | 3.0x1.0m | 118 | 1 | 1.71 |
| 525 | A | 0.0x1.0m | 118 | 1 | 4.28 |
| 528 | A | 1.0x1.0m | 118 | 1 | 5.5 |
| 529 | A | 0.0x1.0m | 118 | 1 | 4.18 |
| 530 | A | 0.5x1.0m | 118 | 1 | 5.12 |
| 531 | A | 0.0x1.0m | 118 | 1 | 4.55 |
| 532 | A | 1.0x1.0m | 118 | 1 | 3.0 |
| 533 | A | 0.0x0.0m | 118 | 1 | 3.43 |
| 534 | A | 2.0x0.0m | 118 | 1 | 5.4 |
| 535 | A | 1.0x0.5m | 118 | 1 | 6.4 |
| 536 | A | 0.0x0.5m | 118 | 1 | 4.33 |
| 537 | A | 1.0x0.0m | 118 | 1 | 4.76 |
| 538 | A | 1.0x0.5m | 118 | 1 | 2.47 |
| 539 | A | 0.5x0.5m | 118 | 1 | 3.5 |
| 540 | A | 1.0x0.0m | 118 | 2 | 8.0 |
| 541 | A | 1.0x0.5m | 118 | 1 | 4.7 |
| 542 | A | 1.5x0.0m | 118 | 1 | 3.24 |
| 543 | A | 1.5x0.0m | 118 | 1 | 3.98 |
| 544 | A | 1.5x0.5m | 118 | 1 | 3.55 |

| ***Sample No.*** | ***Midden lens*** | ***Grid Square*** | ***Context No.*** | ***No. of bags*** | ***Weight (kg)*** |
|---|---|---|---|---|---|
| 545 | A | 1.5x1.0m | 118 | 1 | 4.24 |
| 547 | A | 2.0x1.0m | 118 | 1 | 4.4 |
| 563 | A | 1.0x1.0m | 118 | 1 | Not weighed |
| 564 | A | 1.5x0.0m | 118 | 1 | 3.37 |
| 565 | A | 1.5x0.5m | 118 | 3 | Not weighed |
| 569 | A | 2.5x1.0m | 118 | 2 | Not weighed |
| 573 | A | 2.0x1.0m | 118 | 1 | 4.74 |
| 574 | A | 1.5x0.5m | 118 | 1 | 4.68 |
| 590 | A | - | 118 | 1 | 1.17 |
| 523 | A | 0.0x0.0m | 121 | 1 | 3.9 |
| 524 | A | 0.5x1.0m | 122 | 1 | 3.56 |
| 559 | A | 2.2x0.0m | 123 | 1 | 4.85 |
| 560 | A | 2.5x0.5m | 124 | 1 | 4.96 |
| 546 | A | 1.0x0.0m | 125 | 1 | 1.87 |
| 551 | A | 0.5x0.5m | 125 | 1 | 3.78 |
| 552 | A | 1.0x0.5m | 125 | 1 | 4.5 |
| 553 | A | 1.0x0.5m | 125 | 2 | 8.18 |
| 555 | A | 2.0x0.5m | 125 | 1 | 4.88 |
| 556 | A | 1.5x0.5m | 125 | 1 | 3.69 |
| 557 | A | 1.5x0.5m | 125 | 1 | 5.45 |
| 558 | A | 2.0x0.0m | 125 | 1 | 5.68 |
| 566 | A | 3.0x0.5m | 125 | 1 | 6.0 |
| 562 | A | - | 136 | 2 | 8.01 |
| 581 | A | - | 136 | 1 | 1.93 |
| 568 | A | 1.5x0.0m | 137 | 1 | 1.7 |
| 570 | A | 1.5x0.0m | 137 | 1 | 4.9 |
| 582 | A | 2.7x0.5m | 138 | 1 | 4.55 |
| 585 | A | 1.4x0.0m | 138 | 1 | 7.0 |
| 586 | A | 1.4x0.0m | 138 | 1 | 1.5 |
| 587 | A | 2.9x0.5m | 138 | 1 | 2.03 |
| 580 | A | 0.5x0.1m | 139 | 2 | 13.05 |
| 579 | A | 0.0x0.5m | 140 | 1 | 4.45 |
| 583 | A | - | 141 | 2 | 9.0 |
| 584 | A | 2.0x0.0m | 142 | 1 | 3.18 |
| 550 | A | N/A | 106 | 1 | 7.1 |
| 571 | A | N/A | 106 | 1 | 4.5 |
| 572 | A | N/A | 106 | 1 | 4.7 |
| 575 | A | N/A | 107 | 1 | 4.2 |
| 548 | A | N/A | 108 | 1 | 7.5 |
| 554 | A | N/A | 133 | 1 | 6.9 |
| 567 | A | N/A | 133 | 1 | 1.27 |
| 588 | B | N/A | 134 | 2 | 9.12 |
| 577 | E | N/A | 126 | 1 | 4.44 |
| 576 | E | N/A | 128 | 2 | 3.95 |
| 578 | E | N/A | 129 | 1 | Not weighed |