

# Marine crannogs: previous work and recent surveys

Alex Hale\*

## ABSTRACT

*Recent survey of four sites below high-water mark in the Beaully Firth and five in the Firth of Clyde has underlined the inherent diversity within the group of sites commonly referred to as crannogs. Yet the sites in the Beaully Firth and the Firth of Clyde, known as marine crannogs, show a set of common characteristics which link them clearly with their tidal environment.*

## INTRODUCTION

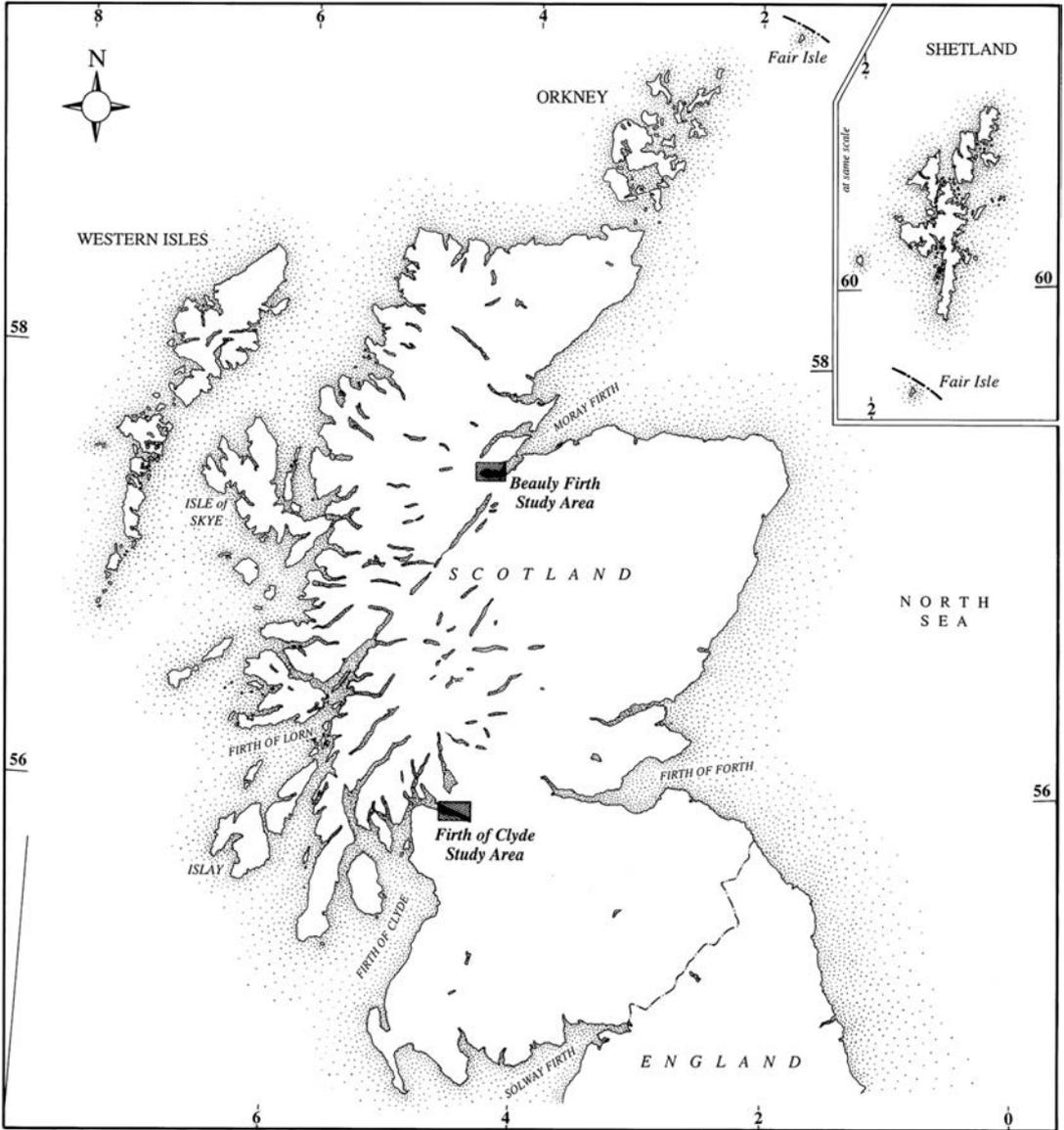
Recent research has highlighted the diversity of the large corpus of sites known collectively as crannogs, both in terms of geography and chronology (Crone 1993; Henderson 1998). This paper aims to illustrate a further example of this diversity by describing a sub-group within the corpus, hereafter referred to as marine crannogs (a term which is used to define their current environmental conditions alone and should not be taken as indicative of their structural, functional and chronological attributes). It further aims to outline possible reasons why marine crannogs are located in tidal firths.

## PREVIOUS INVESTIGATIONS (ILLUS 1)

Limited previous research on marine crannogs has taken place sporadically over the past century and a small number of unpublished manuscripts and publications provide preliminary glimpses of the potential of such sites and also the problems presented when researching in an intertidal environment. The most comprehensive excavation of a marine crannog to date was undertaken in 1898 on the Dumbuck site in the Firth of Clyde, by John Bruce and William Donnelly (Bruce 1900). Bruce (1908) then went on to investigate Langbank East in the Firth of Clyde, between 1901–2. More recent investigation of a marine crannog in the Firth of Clyde took place during 1984, when the Erskine site was planned using photogrammetry (Hanson & Macdonald 1985). Additionally, samples were taken for radiocarbon dating and dendrochronological analysis.

Research into the sites in the Beaully Firth began with historical notices discussing their actual locations and possible functions (Maclagan 1875; Munro 1890). The site referred to as Carn Dubh was more closely investigated in 1908 by Odo Blundell and in 1936 by members of the Inverness Field Club and Scientific Society (Blundell 1910; Fraser 1936).

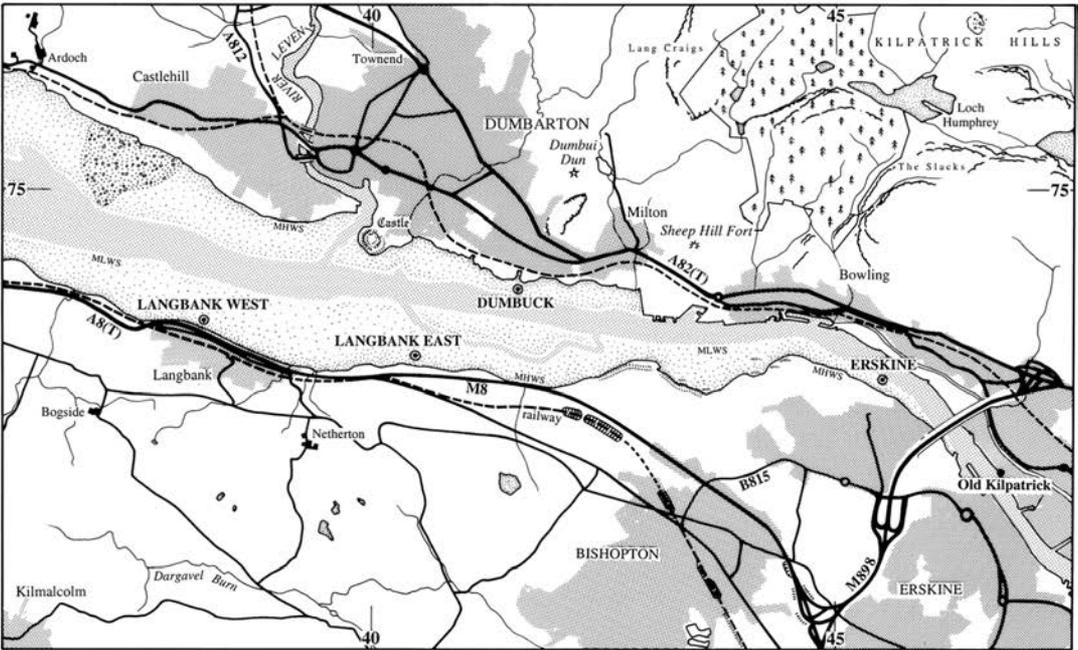
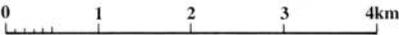
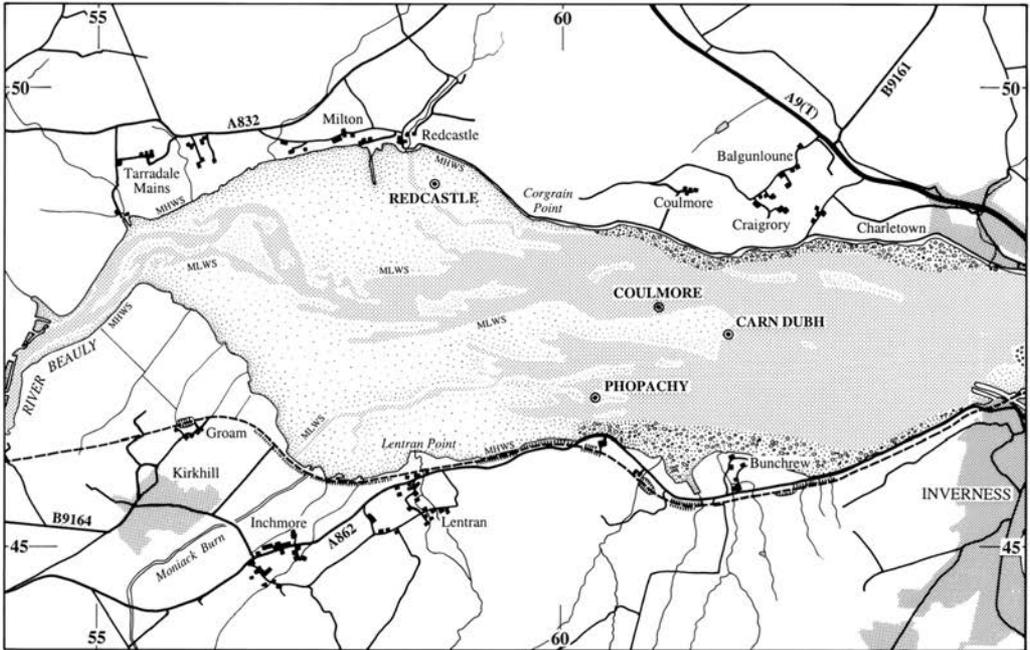
\* RCAHMS, John Sinclair House, 16 Bernard Terrace, Edinburgh EH8 9NX



ILLUS 1 Location map of study areas (Based on Ordnance Survey maps © Crown copyright)

**SURVEY RESULTS**

The current surveys of the known marine crannogs were undertaken between 1995–7, producing information on four sites in the Beaully Firth and five in the Firth of Clyde (illus 2). A number of adaptations had to be made to the survey methodology due to the nature of the intertidal zone and the problems of accessing the sites. All the surveys therefore took place during low-water periods and were timed to coincide with mean low-water spring tides (MLWST). This was designed to give maximum exposure of the sites and enabled the intertidal zone surrounding them to be included in the surveys with interesting results. The heights of the sites were taken from



ILLUS 2 Location maps of the Beaully Firth (top) and the Firth of Clyde marine crannogs (Based on Ordnance Survey maps © Crown copyright)

shoreline bench-marks in order that the remains were levelled to Ordnance Datum (OD). The survey results were plotted using Penmap computer software, which enabled contour plots of the sites to be produced. This was an important aspect of the surveys because in the intertidal zone low-lying or sub-surface features cannot necessarily be detected by the eye alone, given the apparent uniform homogeneity of intertidal mud and sand flats. The contour plots enabled such hidden features to be identified. The shorelines of the Beaully Firth were walked, during low-tide periods, to identify the location of the remaining marine crannogs. Three of the sites — Carn Dubh, Coulmore and Phopachy — were visited by boat whereas the fourth, Redcastle, was reached by walking across the exposed mudflats.

#### BEAULY FIRTH (ILLUS 2)

##### *Carn Dubh (illus 3)*

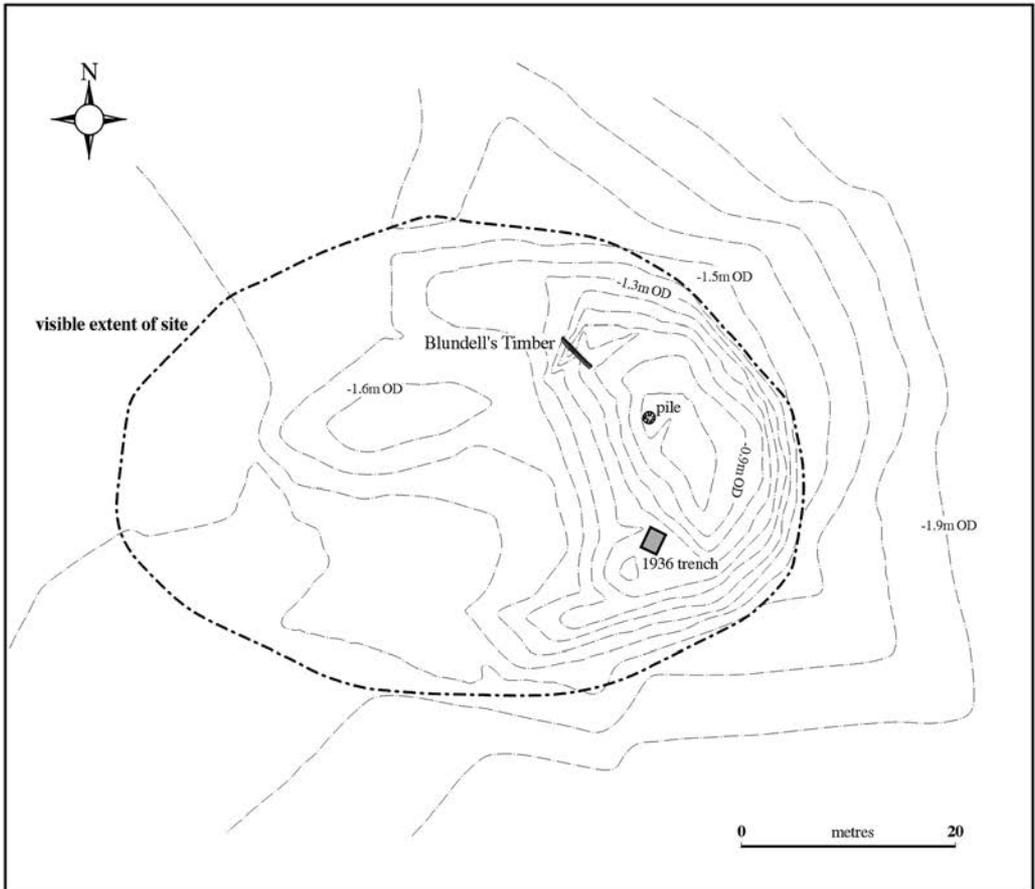
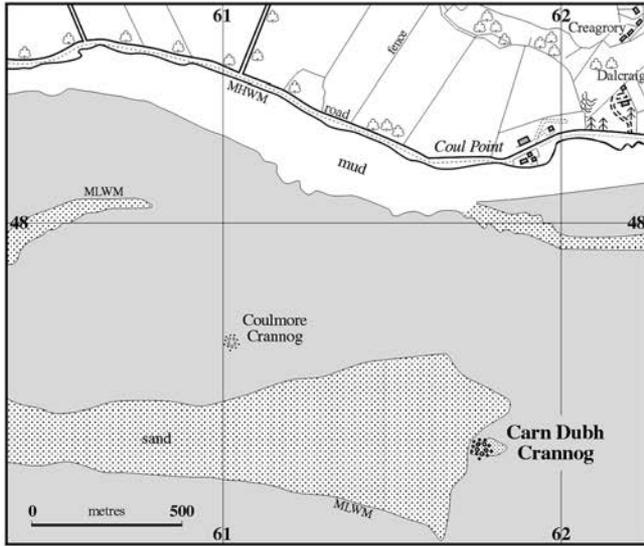
The 1:100 scale survey of Carn Dubh (NGR: NH 6175 4730) recorded the morphology of the site and a number of surface features. The site is an oval mound 62 m east/west and 45 m north/south, and has a maximum exposure time of approximately four hours during mean low water (MLW). There is a distinctive built-up eastern margin and an almost indistinguishable western side. The eastern side of the site forms a crescent feature, steeply sloping to the east with a more gentle gradient to the west. The surface of the site is covered with large Old Red Sandstone (ORS) stones, colonized by large quantities of seaweed, beneath which are smaller ORS pebbles and gravel. The surface stones are well rounded and also well sorted in size.

Among the smaller pebbles and gravel, and protruding from between the surface stones are three timbers. One is a pile near the highest part of the site, the second, a near horizontal timber, protruding about 0.4 m from the interstitial sediments and the third is a very large horizontal timber, c 2 m in length. The largest timber was photographed by Odo Blundell (1910, 18) during his visit to the site in 1908. During the recent survey this timber was sampled and identified as oak (*Quercus* sp). A sub-sample was sent for radiocarbon dating (Table 1). The pile was also sampled, identified as pine (*Pinus* sp) and sub-sampled for radiocarbon dating (Table 1). Evidence of a previous excavation was identified and proved to be the location of a trench dug by members of the Inverness Field Club and Scientific Society, who visited the site in 1936 (Fraser 1936).

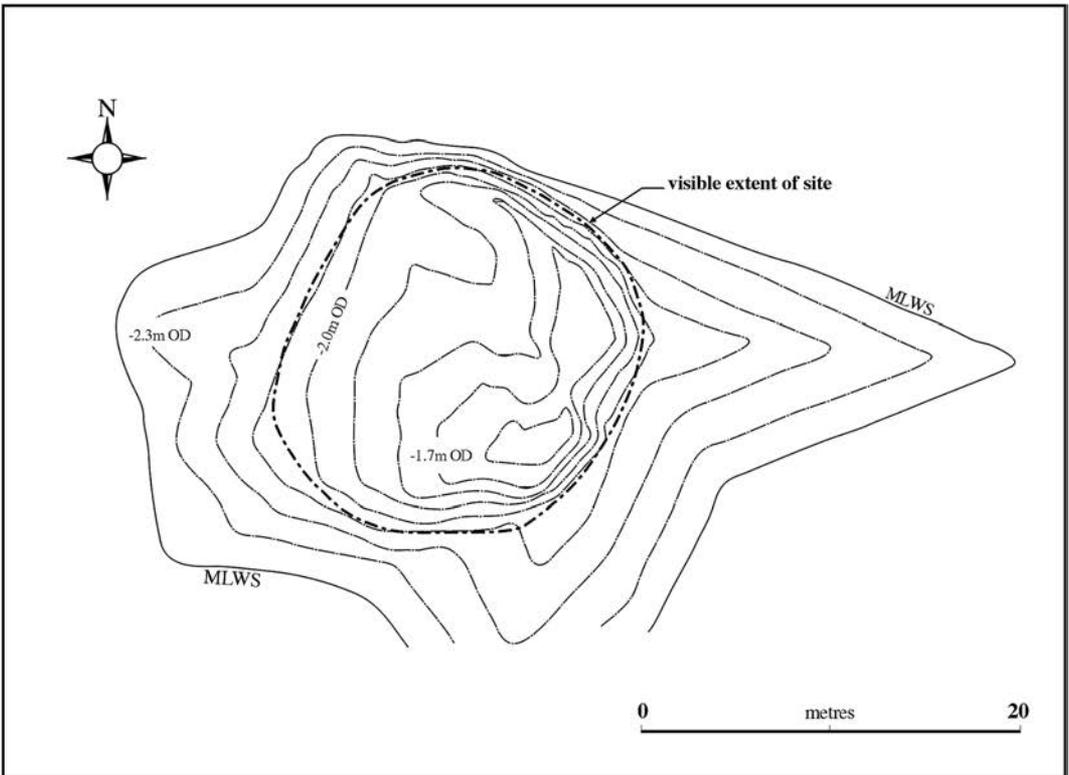
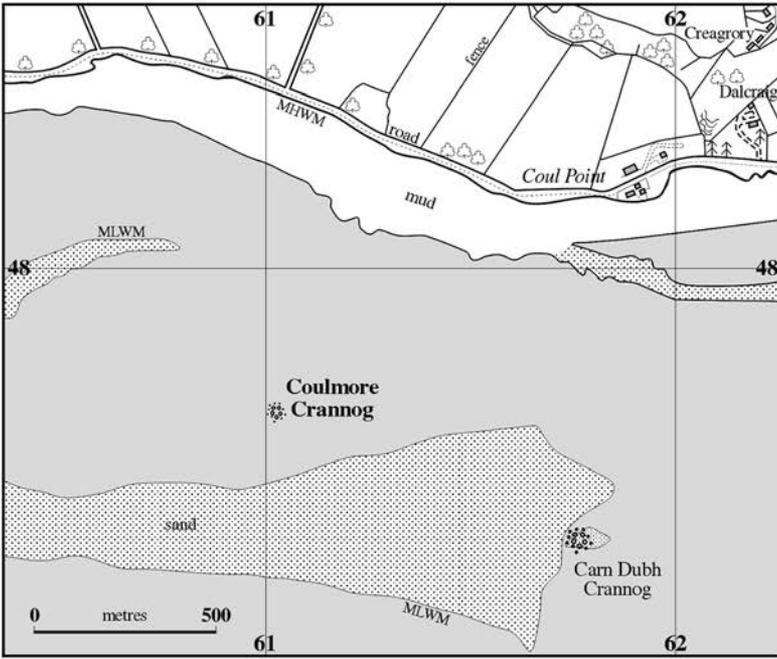
The contour survey highlighted the crescent shape of the eastern part of the site and defined the western margin and interior features more clearly. Contour survey beyond the margins of the site also indicated that Carn Dubh is situated on a linear, east/west sandbank. The eastern end of the site stands 0.8 m above the surrounding sandbank and was levelled to  $-0.9 \text{ m} \pm 0.1 \text{ m OD}$ . In contrast, the western margin of the site is delineated only by individual stones and not by a distinct break in slope. The surrounding sandbank slopes steeply away towards the north and east of the site, unlike those to the south and west. This may be due to the underlying geology, the position of the main east/west tidal channel in the Firth and to the predominant direction of the tides. These topographical features may demonstrate localized sediment movement in that part of the Firth, causing erosion on the western side and accretion on the east. The linear sandbank on which the site is built appears itself to have been formed by the dominant east/west movement of the tide.

##### *Coulmore (illus 4)*

The 1:100 plan of Coulmore (NGR: NH 6102 4764) shows a small, almost oval site consisting of an upstanding mound covered with stones and estuarine sediments. The surface stones are large



ILLUS 3 Location map and plan of Carn Dubh



ILLUS 4 Location map and plan of Coulmore

well-rounded ORS stones overlying smaller less well-sorted ORS pebbles and gravel. The surface stones are colonized by seaweed which covers the entire site. The upstanding mound is 20 m east/west and 25 m north/south. It has steeply sloping margins on the north, east and south sides and the western margin is a more gentle gradient. The highest part of the site is the south-east side at a level of  $-1.6 \text{ m} \pm 0.1 \text{ m OD}$  and in the centre is a shallow depression. The Coulmore site has the shortest exposure time of all the sites, less than two hours. After two hours, the margins of the site quickly become submerged making survey of the surrounding area difficult.

The contour survey indicates that the steepest part of the site is the northern margin. This side of the site is adjacent to the main tidal channel of the Firth and therefore undergoes almost continuous contact with the water and thus possibly increased erosion. The more prominent eastern side of the site stands 0.5 m above the sandbank, whereas the western sloping edge is only 0.2 m above it. The sandbank on which the site is situated is the continuation of the same feature on which Carn Dubh is built, 800 m to the east.

#### *Phopachy (illus 5)*

Phopachy (NGR: NH 6022 4660) is situated on the same east/west linear sandbank as Carn Dubh and Coulmore, located 500 m from mean high-water mark (MHW) on the southern shore. Phopachy is separated from the shoreline by a tidal channel which allows for approximately three hours of total exposure during low-water periods. The edges of the site are situated at mean low-water mark (MLWM) but during mean low-water neap tides (MLWNT) the edges remain submerged. During MLWST, the southern tidal channel is dry and the site can be accessed on foot. The surface of the site consists of seaweed covered ORS stones and estuarine sediments and beneath the large surface stones are smaller stones of similar geology. On the eastern margin some areas are covered by sand rather than surface stones. The highest part of the site is  $-1.1 \text{ m} \pm 0.1 \text{ m OD}$ , near to the centre.

The contour survey indicates that the site is an upstanding oval mound with irregularly sloping margins. The steepest edges are the northern and southern slopes. Small-scale excavations exposed sub-surface structural timbers on the south side of the site and four of the timbers were radiocarbon dated (Hale 2000) (see Table 1).

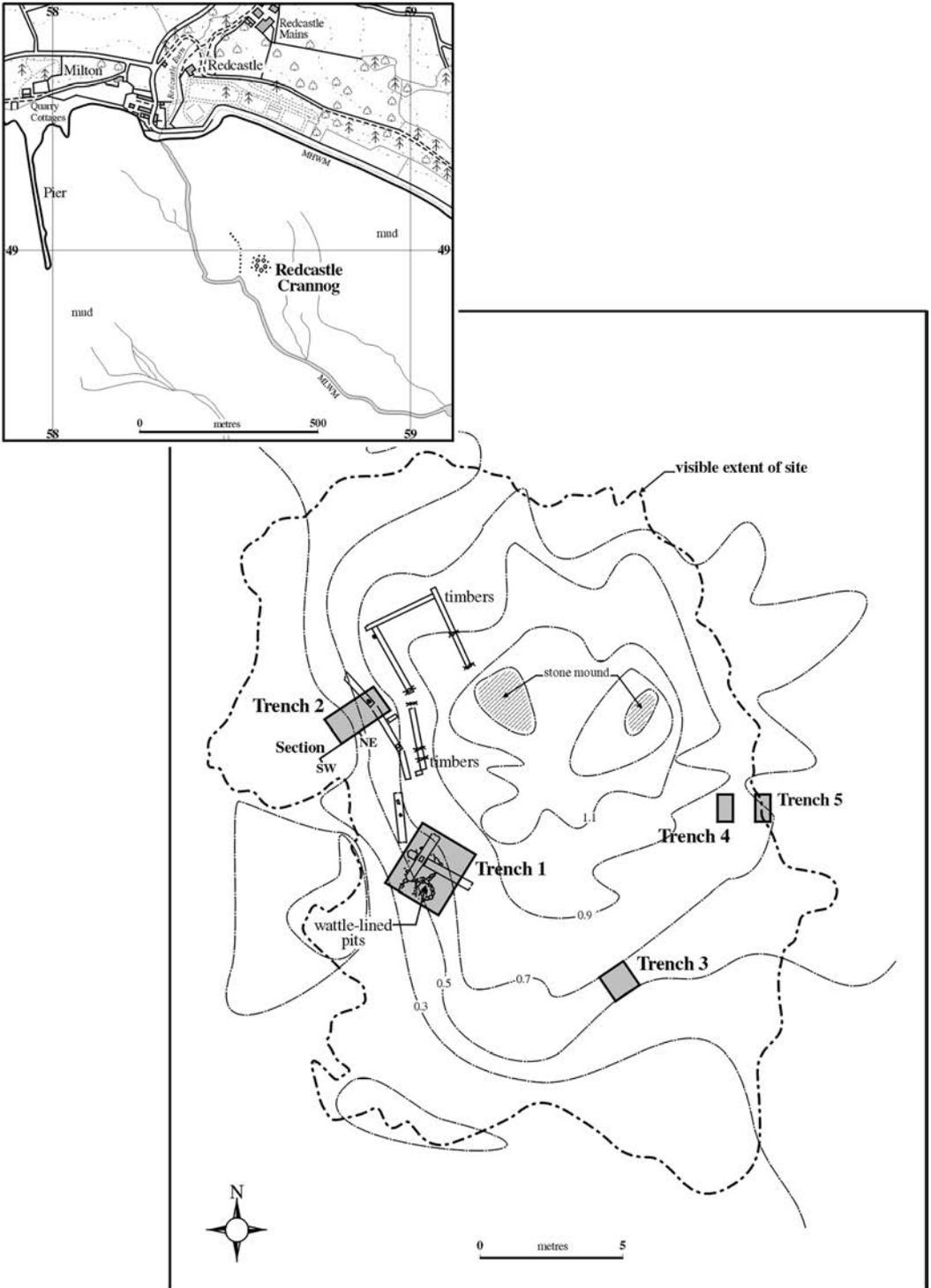
#### *Redcastle (illus 6 & 7)*

The Redcastle site (NGR: NH 5858 4895) is exposed for approximately six hours at each low tide. This relatively long exposure time, compared with the other sites in the Firth, allowed for a more extensive survey and limited excavations to be carried out.

The site is an irregularly shaped mound, measuring 38 m north/south and 28 m east/west. Large well-rounded ORS stones cover most of the surface of the site and other stones that are present on the surface are quartz rich and metamorphic in origin. Among and beneath the large stones are smaller ones of ORS origin. The origin of these ORS stones on this site and the others in the Beaully Firth appears to be local because they are similar to those found on the current shorelines and scattered over the intertidal features in the Firth.

The 1:100 survey recorded the position of two stone mounds near the centre of the site. Two are oval features 5 m in diameter and less than 1 m high. These mounds are recent additions and are probably the result of the site being used by wildfowling, the mounds providing shelter and wind-breaks. Small-scale excavations on the site located sub-surface timber structural remains, some of which were sampled for radiocarbon assay (Table 1).





ILLUS 6 Location map and plan of Redcastle



ILLUS 7 Redcastle viewed from the south (*photograph by G B D Jones*)

A notice of the site from 1956 recorded a curvilinear stone feature next to the site and this feature was also examined in the current survey (Woodham 1956, 85). Observation of the rising tide around the site suggests that this feature prevents the tide on the western side of the site from covering the site for a considerable amount of time each tide (c 30 min). It also appears to prevent the surface drainage runnel and Redcastle Burn from encroaching on the site, from the north and west. The feature therefore seems to act as a breakwater delaying tidal submergence, an interpretation supported by its position in relation to the site.

The contour survey of Redcastle covered an area centred on the site, encompassing the intertidal zone from the present MHW to MLWM. Specific topographical variations and features were identified in the survey. These include a very distinct break in slope on the south-west edge of the site. North of the site is a raised linear feature running in a NNE direction. Two hundred metres NNE of the site the raised feature becomes absorbed into the NW/SE contours. The survey results suggest that the contours to the north of the site could be the remains of a palaeo-shoreline with associated drainage channels, and that the site is located on the end of a raised promontory feature, which protrudes from the main palaeo-shoreline.

The limited excavations (1994–6) concentrated on the south-west edge of the site and included an area where structural timbers had been exposed by tidal erosion (Hale 2000). Results of the excavations showed that two phases of building took place directly on the underlying geology. The first phase comprised three shallow wattle-sided pits, which had been dug into the sand surface, up to 0.3 m deep. The pits were partly clay-lined and in the bottom of one of them a number of de-haired calf-hide fragments were found. Surrounding the pits were large quantities



ILLUS 8 Dumbuck, from a scaffold tower, looking north (*photograph by Alex Hale*)

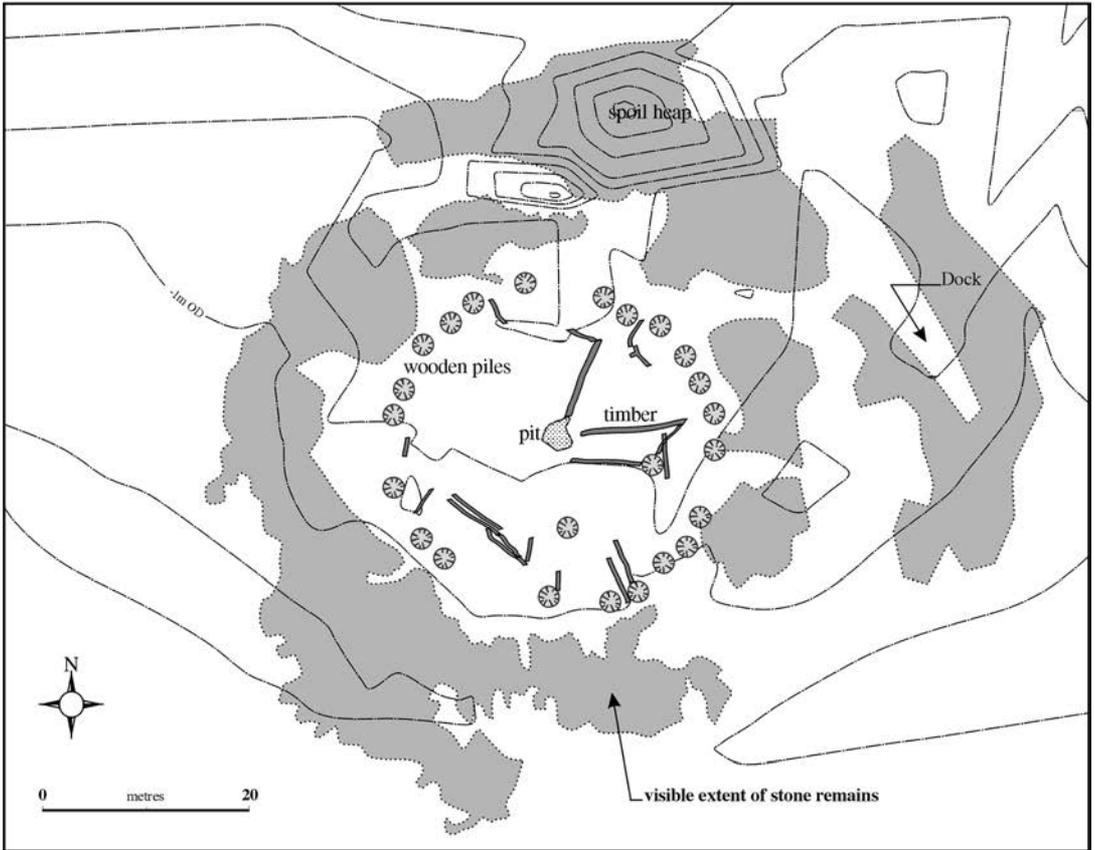
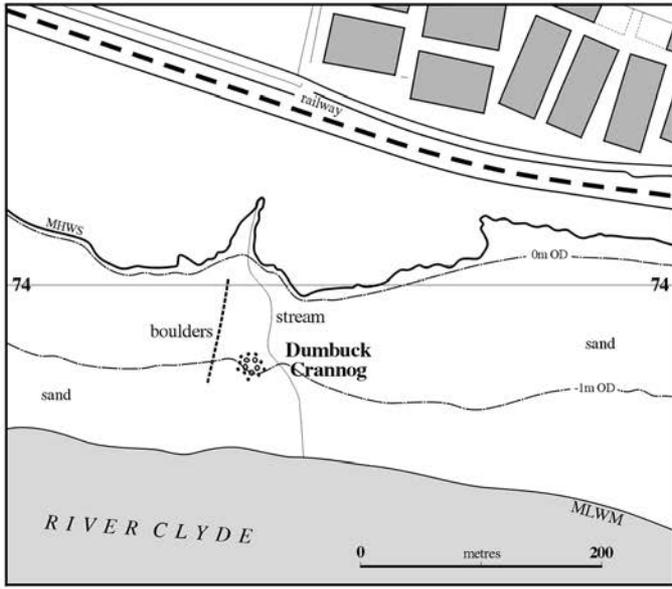
of animal bones, some of which showed signs of butchery and the species were identified as predominantly cattle with some sheep/goat, pig, horse and bird included. Overlying and adjacent to the wattle pits, which had been partly infilled with large stones was the second structural phase. This comprised large horizontal timber beams, identified as alder, which were held in position by oak retaining piles, sometimes through mortise holes where the beams intersected. The second phase of structural remains formed the foundation of a superstructure, which in the area excavated was absent. However, towards the centre of the site the greater depth of deposits still contain traces of such a structure. The absence of domestic finds, such as pottery, may indicate that the site was not necessarily used for such functions, and the leather in the pit and the butchered animal bones suggest that specific activities were taking place.

#### FIRTH OF CLYDE (ILLUS 2)

The survey of the Firth of Clyde marine crannogs involved walking the north shoreline between Dumbarton Rock and Erskine Bridge in order to identify sites. On the southern shore, between Langbank village and Erskine Bridge, the shoreline was also walked during MLWST periods. In total five sites were identified: Dumbuck, Erskine, Langbank East, Langbank West and Old Kilpatrick.

#### *Dumbuck (illus 8 & 9)*

Situated on the northern shore of the Firth of Clyde, to the east of Dumbarton Rock, the Dumbuck site (NGR: NS 4167 7392) is surrounded by mudflats and lies 80 m from MHW and



ILLUS 9 Location map and plan of Dumbuck

30 m from MLWM. The oval site is fully exposed for approximately six hours during each low tide and is 38 m east/west and 30 m north/south. The remains do not form a large upstanding, consolidated mass of estuarine sediments, stones and organics like the sites in the Beaully Firth, but consist of distinctive features, such as timber and stone structures protruding through the estuarine muds.

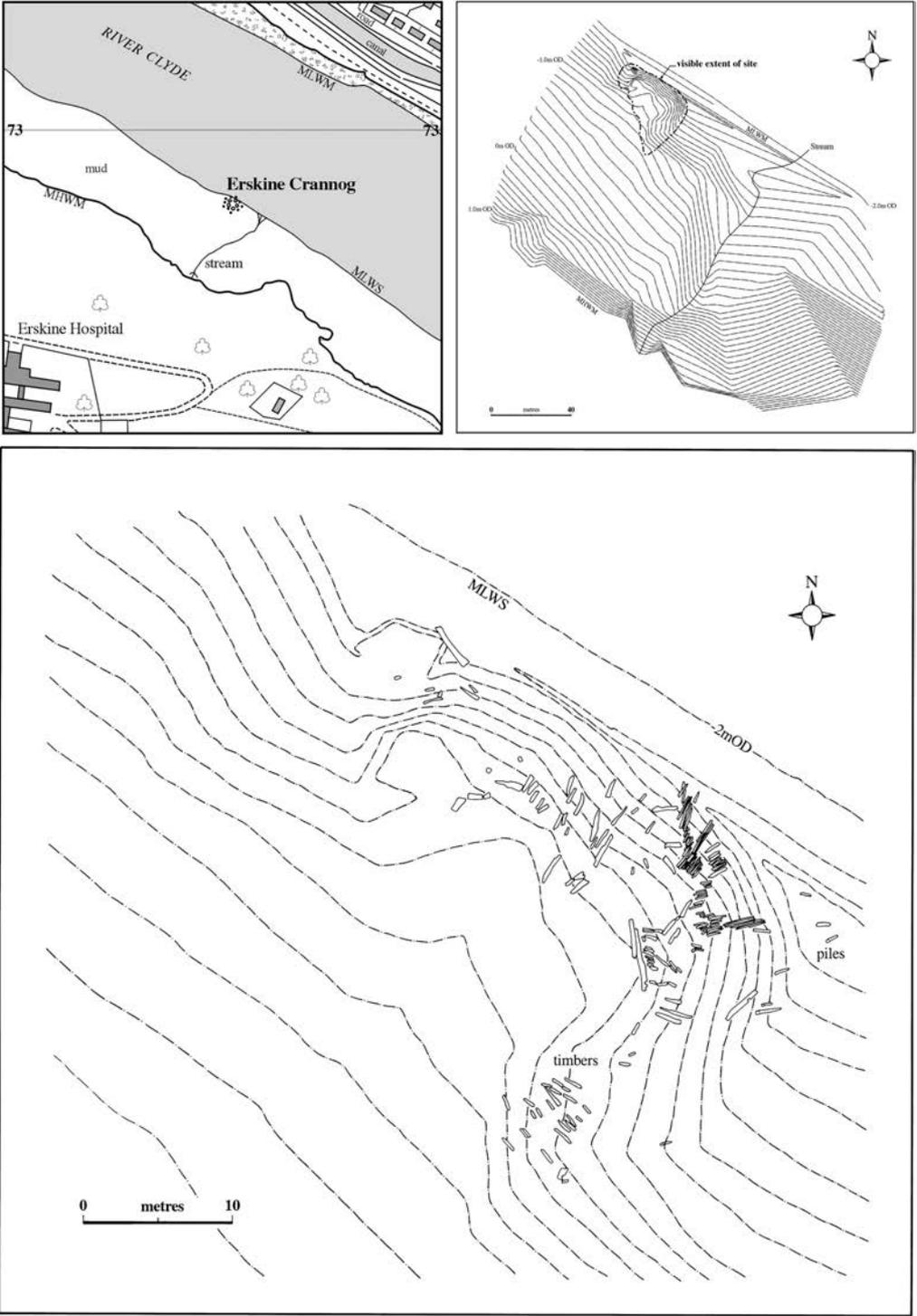
The survey revealed surface remains consisting of stones and timbers over an area measuring approximately 100 sq m. Various specific features were identified and are comparable with the previous plans of the site (Munro 1905). The centre of the site is marked by a circular stone feature around which are 10 radially projecting horizontal timbers. These form part of what Munro (1905, 142) calls the timber 'flooring', which is approximately 15 m in diameter. The edge of the horizontal timber structure is marked by 22 piles, and in one place a single timber was found between two of the piles. Two of the piles were sampled and identified as oak (*Quercus* sp) and the adjacent horizontal timbers were alder (*Alnus* sp) and sub-samples were submitted for radiocarbon dating (Table 1). Surrounding the timber structure at a distance of between 1 m and 8 m is a stone feature which forms a scattered 'breakwater' again an interpretation suggested by Munro (1905, 138). The stones which make up the breakwater are sub-rounded to rounded and their geology originates from the olivine-rich basalt of the area (Cameron & Stephenson 1985). According to the previous excavation reports a timber-lined dock, holding a 10 m long logboat, was found to the north-east of the site (Bruce 1900, 439) and part of the dock feature was relocated during the current survey. Results from the contour survey of the site and surrounding intertidal zone indicate that the site forms a short, raised promontory feature, which projects southwards from the present MHW.

#### *Erskine (illus 10)*

Survey of the Erskine site (NGR: NS 4555 7288) indicated the presence of surface timbers, associated with an extensive scatter of stones. The current survey was compared to a 1984 photogrammetry survey in order to assess any changes to the surface remains. The site is exposed for approximately four hours during low tide. However, its position directly adjacent to the main river channel means submergence is rapid during tidal flow.

Results of the re-survey of the site showed that the upstanding remains consist of a mass of timbers and stones, 100 m from the southern shore of the Firth on the edge of a large sandbank. The visible remains cover an area 40 m long and 30 m wide. The remains do not form an upstanding mound, like the sites in the Beaully Firth; rather the remains protrude from the estuarine sediments and are exposed on the steep slope at the edge of the river channel. The survey identified both horizontal and vertical timbers which form a distinctive curved structure adjacent to MLWM on the northern part of the site. On the southern part of the site, the structural remains may be obscured by the accumulation of sediment forming a raised sandbank. The surface stones are a mixture of sedimentary sandstones and igneous basalt.

Large quantities of timber remain exposed, predominantly on the northern and eastern sides of the site. Some of these timbers form a sloping side to the site, at approximately 40 degrees from the horizontal, and appear to have slumped towards the tidal channel, possibly due to increased erosion in that area. The margins on the north and east sides of the site are surrounded by seven piles. Towards the highest part of the site are five very substantial horizontal timbers, two of which show wood-working marks on their sides. However, these marks may have been made when the timbers were sampled during the 1984 investigations, for species identification and dendrochronological analysis (A Crone, pers comm).



ILLUS 10 Location map and plan of Erskine

The variations between the 1984 plan and the 1997 survey demonstrate the vulnerability of exposed timber remains in intertidal environments. Since 1984 a number of the timbers, especially on the north and north-east side of the site have disappeared, probably as a result of tidal scour. Timbers on the south and south-east of the site have also disappeared. It seems probable, however, that these timbers have been re-buried by sediments, as a result of accretion.

The exposed timbers on Erskine have been attacked by wood-boring animals such as the 'shipworm' (Pearson 1987). The pitted surfaces of the timbers also show evidence of biological damage from algal growth. Hanson & Macdonald's radiocarbon dates from the site are included in Table 1 for comparative purposes.

#### *Langbank East (illus 11)*

Langbank East (NGR: NS 4050 7336) is 95 m offshore from the southern MHW, surrounded by intertidal mudflats covered with sub-rounded basalt stones similar to those on-site. It is over 300 m from MLWM which allows an extended exposure period of over six hours during each low tide.

The site is 45 m east/west and 30 m north/south at the widest point and forms an irregular-shaped raised mound of stones and estuarine sediments. The raised central area of the site is characterized by a rectangular stone structure, one course high, 20 m long and 15 m wide. The steepest part of the site is on the southern margin, adjacent to the rectangular feature. The western flank is more gently sloping and the point where the edge of the site ends and the surrounding mudflat begins is not clearly visible. No evidence of the timber remains formerly identified were found during the survey.

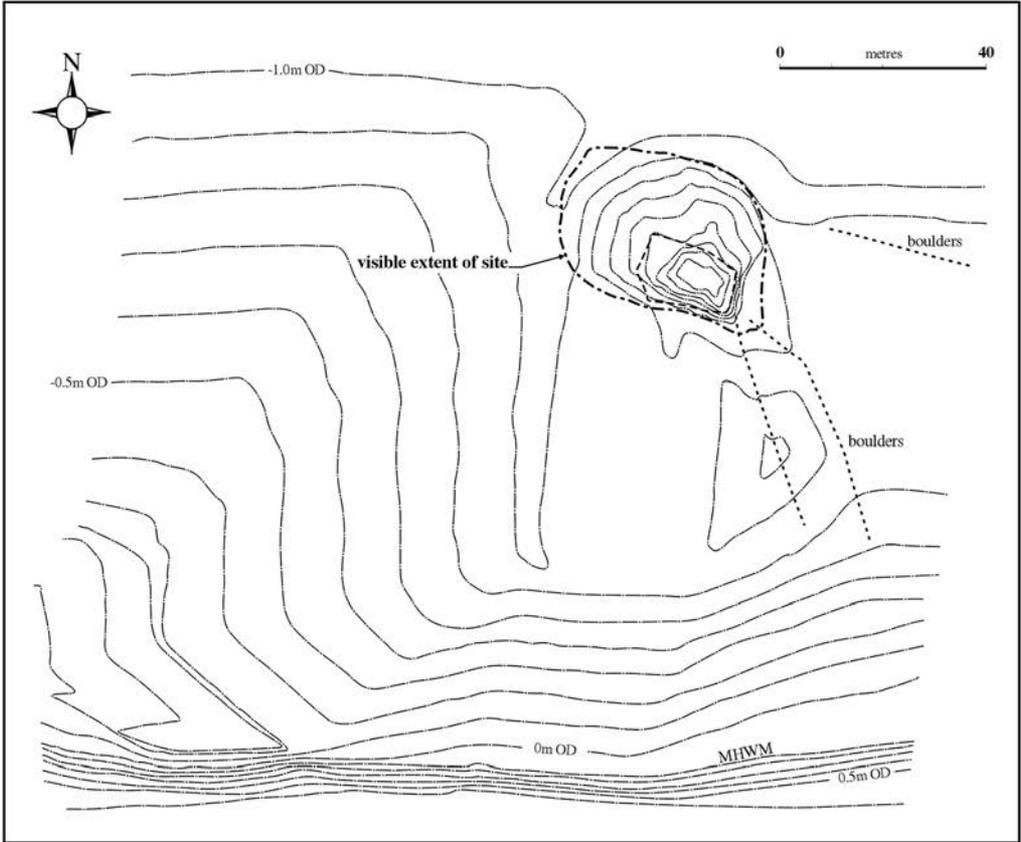
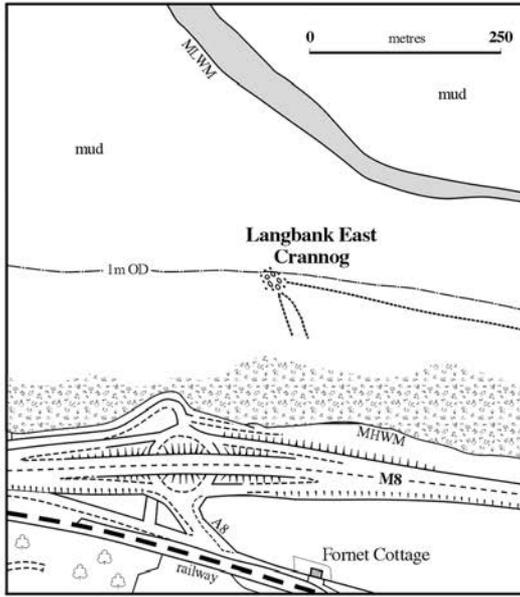
Between the site and the shoreline are two parallel lines of stone. These have previously been identified as a causeway (RCAHMS NMRS site no NS47 SW 29). The results of the contour survey suggest that these features may have been demarcating an area between the present shoreline and the site. This type of feature is unique to this site and may be the result of reuse, possibly when there was a ford in the area (Riddell 1979).

Contour survey identified an area of level mudflat between the site and the current shoreline. Elsewhere, surrounding the site, the mudflats form gently sloping gradients from MHW to MLWM. The site is located on a break of slope, which is possibly the remnants of a buried palaeo-shoreline, parallel to the current MHW, rather than being located on a promontory feature like Redcastle.

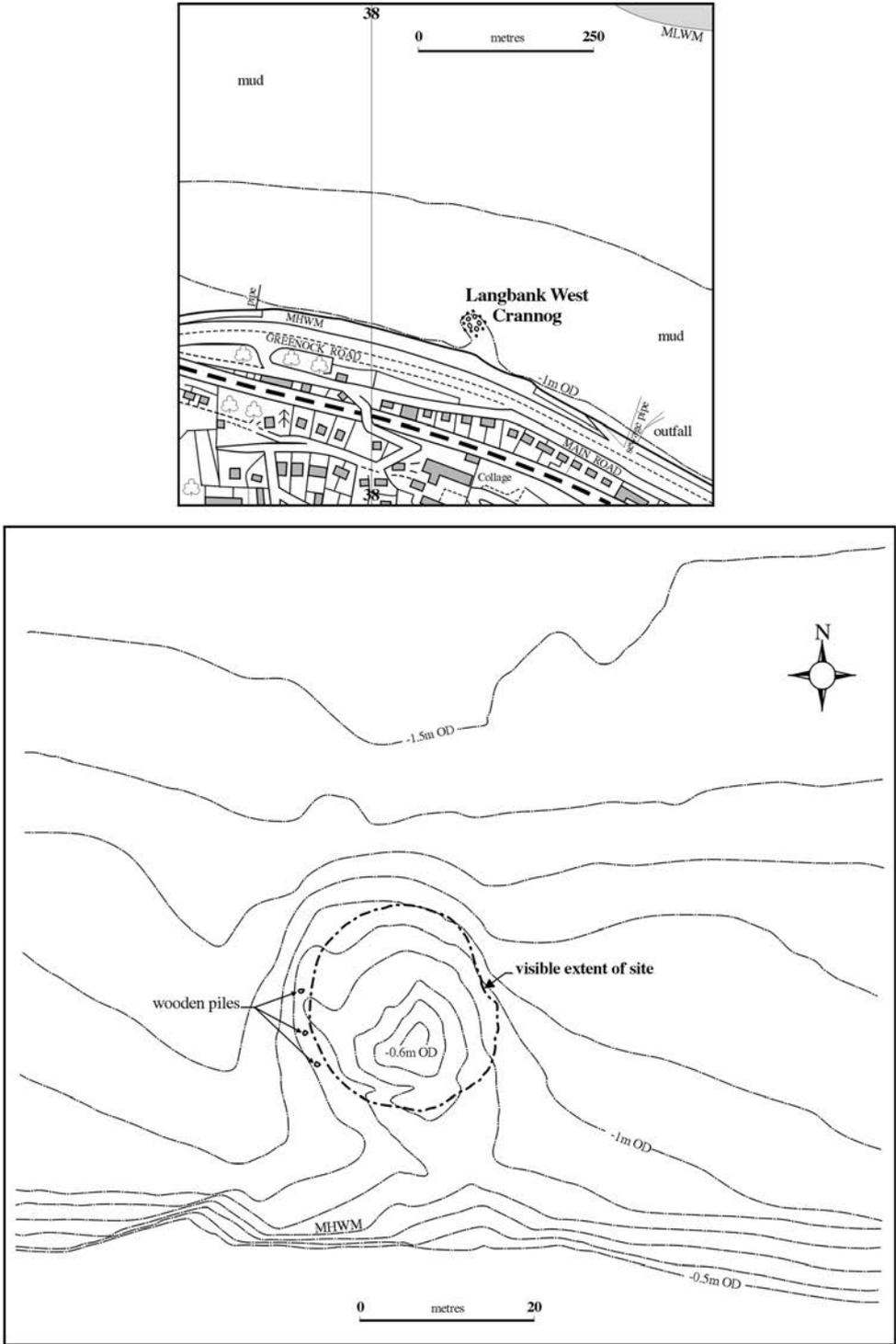
#### *Langbank West (illus 12)*

Langbank West (NGR: NS 3822 7365) is situated near the southern shore, north of the village of Langbank. Maximum exposure time of the site is approximately five hours during low tide. The site is a raised oval mound of stones and estuarine sediments, 30 m in length and 20 m broad. The surface stones on the site are well-rounded sandstones and are colonized by seaweed. Beneath them are smaller, well-rounded pebbles and gravel. One metre outside the western margin of the site are three small wooden piles protruding from the intertidal sediments. The margins of the site are clearly discernible from the surrounding stone-strewn, gravel foreshore.

Contour survey of the site and its surroundings shows the remains of a short promontory from the modern shoreline towards the site. This low feature is only 20 m long and does not continue beyond the northern visible edge of the site. The northern edge of the promontory is marked by a relatively steep slope to the surrounding mudflats. Recent land reclamation on the



ILLUS 11 Location map and plan of Langbank East



ILLUS 12 Location map and plan of Langbank West

current shoreline resulting from the construction of the M8 motorway has obscured the previous shoreline. These alterations may have affected the sedimentary regime around the site and caused a build-up of sediment between the site and the shoreline. Further assessment of this feature would be necessary to establish whether this was the case or if it was part of a natural promontory feature, on which the site was built.

### *Old Kilpatrick (not illus)*

Field observations in the vicinity of this site (NGR: NS 4656 7211), identified from map sources and a number of photographs in the NMRS, shows that it was disturbed and possibly destroyed during the construction of a shipyard and by later land reclamation. The total destruction of the remains is not documented and a single timber was found protruding from the estuarine sediments in the intertidal zone in the vicinity of the approximate location of the site, during shoreline walking in 1997. Future examination of the area where the timber was found may reveal more evidence of the site.

TABLE 1  
Radiocarbon dates from marine crannogs

| Lab Code   | Site                | Material Dated                         | Years BP uncalibrated |
|------------|---------------------|--|-----------------------|
| GU-4539    | Carn Dubh           | pine pile                              | 280 ± 50              |
| Beta 48764 | Redcastle 1992 (ii) | sub-surface alder timber               | 1750 ± 90             |
| GU-7471    | Dumbuck 97 2        | alder horizontal 'flooring' timber     | 1910 ± 50             |
| Beta 48765 | Phopachy 1992 (i)   | sub-surface alder timber               | 1940 ± 60             |
| GU-2328    | Erskine             | oak timber                             | 1950 ± 50             |
| GU-2187    | Erskine             | oak timber                             | 1970 ± 50             |
| GU-4099    | Phopachy 1994 (i)   | sub-surface alder timber               | 1990 ± 50             |
| Beta 48766 | Phopachy 1992 (ii)  | sub-surface alder timber               | 2030 ± 60             |
| GU-7472    | Dumbuck 97 3        | oak pile                               | 2040 ± 50             |
| GU-4098    | Phopachy 1994 (ii)  | sub-surface alder timber               | 2060 ± 50             |
| GU-7473    | Dumbuck 97 4        | alder horizontal 'flooring' timber     | 2060 ± 50             |
| GU-7470    | Dumbuck 97 1        | oak pile                               | 2090 ± 50             |
| Beta 48763 | Redcastle 1992 (i)  | sub-surface alder timber               | 2150 ± 60             |
| GU-2383    | Erskine             | oak timber                             | 2170 ± 60             |
| GU-2186    | Erskine             | alder timber                           | 2210 ± 50             |
| AA-21249   | Redcastle, phase 1  | leather fragment                       | 2220 ± 70             |
| GU-4094    | Redcastle, phase 1  | alder sail from wattle-sided pit       | 2310 ± 50             |
| GU-4095    | Redcastle, phase 1  | oak sail from wattle sided-pit         | 2330 ± 50             |
| GU-4097    | Redcastle, phase 2  | alder horizontal foundation timber     | 2480 ± 50             |
| GU-4541    | Redcastle, phase 2  | oak pile fixing foundation horizontals | 2510 ± 50             |
| GU-4540    | Carn Dubh           | oak timber                             | 2530 ± 50             |
| GU-4543    | Redcastle, phase 2  | alder horizontal foundation timber     | 2550 ± 50             |
| GU-4542    | Redcastle, phase 2  | oak pile fixing foundation horizontals | 2570 ± 50             |

## MARINE CRANNOGS AND THEIR WIDER IMPLICATIONS

The results of the surveys have provided a record of the external and visible remains of the individual sites from the two concentrations of marine crannogs. Within the two groups it is clear that variations exist. For example, all of the Beaully Firth sites are covered by a capping of varying sized stones, whereas those in the Firth of Clyde display a greater diversity of surface remains. Dumbuck has clearly defined timber structures as well as stone features and Erskine shows both timber and stone remains. Whether these surface remains are a reflection of underlying structural design or more a result of post-abandonment taphonomic processes remains unclear without further monitoring and investigation.

By increasing the survey area around the crannogs and in particular around Redcastle, the micro-topography of the sites has shown evidence of geomorphological features otherwise masked by the intertidal deposits. The presence of these geomorphological features can be used to outline environmental and functional attributes of marine crannogs. For example, it appears from the contour surveys that some crannogs are situated on breaks of slope within the intertidal zone, which may reflect palaeo-shorelines or locations of previous tidal channels. In the case of Redcastle, the site forms a raised feature on the end of a low promontory which juts in a north/south direction 750 m short of the present low-water mark. Erskine, by contrast, is situated on the very edge of the low-water channel and on the edge of a short, steep break of slope. Whatever the shape of the site, it is clear that the position of these sites allows them to take advantage of the opportunity for access offered by the firths.

In general terms, the firths in which all the sites are located are good access points for transport by water, both upstream and as starting points for coastal and marine routes. Firths are significant locations between open sea and inland riverine routes because they are places where boats used for riverine transport can be changed for others more suitable to coastal and fully marine conditions and vice versa (Westerdahl 1992). The upper parts of firths are also usually the lowest points where rivers can be crossed or forded, prior to the body of water becoming affected by fully marine conditions. For example, it has been reported that before the dredging and canalization of the Firth of Clyde the river could be forded as far down as Dumbarton Rock (Riddell 1979). McGrail (1987, 269) has identified tidal estuaries or firths as favourable locations for launching and landing boats. He argues that firths are meeting places between fast-flowing and slow-moving water which causes the deposition of a shallow beach, ideally suited to launching and landing boats. The position of marine crannogs within firths may take McGrail's argument a step further in that they are dry access points in the firth between the hinterland and the water.

The surveys of the marine crannogs in the Beaully Firth and the Firth of Clyde have highlighted the advantageous position of these sites in terms of access. Redcastle, Dumbuck and possibly Langbank West are all built on the end of promontory features, projecting into the water from palaeo-shorelines. Carn Dubh, Phopachy, Coulmore and Erskine are all built on raised features adjacent to deeper-water channels suitable for access by shallow-draught boats, such as logboats, even at low tide. Langbank East is built on a former shoreline rather than on a promontory feature but still offers easy access to the water. Current evidence of the location of Old Kilpatrick suggests this site may also have been built on a raised promontory of land, similar to Redcastle and Dumbuck. The use or enhancement of a natural raised feature in the intertidal zone is therefore a common factor in the development of many of the marine crannogs. This raised feature may be a promontory or part of a former shoreline but would ultimately have been used to allow access to the site from the land. Marine crannogs would also have formed prominent shoreside sites built to stand at and above the water level. Clearly it would be impractical to build a site which would be fully submerged at high tide. This must inevitably lead to the conclusion that these sites were originally built at or above MHW. Despite their limited elevation, which is measured in tens of centimetres rather than metres, these sites would have stood proud above the surrounding land surface and water level.

There are other sites in the archaeological record of north-west Europe which make use of raised ground in this way. The rectangular timber structures excavated at Goldcliff on the intertidal shores of the River Severn in south-west Britain are an example of this kind of land use (Bell 1992). The Goldcliff structures are located on top of a peat shelf feature, on slight rises in the peat. Bell (1992, 25) suggests that the seven Goldcliff structures were used seasonally during

the later part of the first millennium BC, because the area was liable to occasional flooding. The actual purpose of erecting structures on such a site is currently unclear, although Bell (1995, 122) suggests that they could have been used for holding cattle, given the good-quality grazing land of the coastal marshes and the large quantity of cattle hoof prints surrounding structure 8. Prehistoric sites built on raised areas adjacent to waterways have also been extensively researched in the Netherlands, especially during the Assendelver Polders project (Brandt *et al* 1987). Site F is particularly interesting as it was built adjacent to a tidal creek system in a similar position to Dumbuck and Redcastle. The excavation results from the Assendelver Polders shows that these sites were built as domestic units which included areas where animals could be stalled in the same building. Clearly the builders of these sites recognized the value of raised points in wetland environments and also the resources available for their livestock.

The Firth of Clyde has long been a major transportation route and the large number of logboats found along its length testify to the antiquity of its use as such, aided by the existence of landing and access points in the form of marine crannogs. Logboat finds are concentrated between Glasgow and Dumbuck and, since 1800, 34 boats have been recovered from the river or from former river channels (Mowat 1996). The number of finds from this part of the Firth can be accounted for as a result of recent development in that area, which has led to excavations of former river channels and terraces during construction projects.

Two of the Firth of Clyde logboats are of particular interest and offer direct evidence that boats were used in conjunction with some of the marine crannogs. The first was found during the original excavation inside the dock structure at the Dumbuck site, reinforcing the suggestion that the site could have been accessed using a logboat and that the location of the site was a point of access from the Firth to the shoreline and from the shoreline to the Firth. Whether the dock in which the boat was found opened directly onto the river channel is unclear from the previous reports but the current survey has relocated the probable location of this structure and its open side seems to have been directed towards the main channel.

The second logboat of interest was found near Erskine harbour, opposite Old Kilpatrick, in 1977. The boat was found exposed in the intertidal muds in a location where two other boats had been found in the later part of the 19th century (Mowat 1996). A sample of the boat was submitted for radiocarbon dating and the resultant date was  $1955 \pm 45$  BP (GU-1016) (W Hanson, pers comm). This date corresponds with the radiocarbon dates from both the Erskine and the Dumbuck marine crannogs, demonstrating that logboats were certainly plying the Clyde at the same time as these crannogs were being used. It seems likely therefore that marine crannogs, particularly in the Firth of Clyde, provided points of access to the river channels and it is possible that logboats with their shallow draught would have been ideal craft to ply between the crannogs.

By contrast, only one logboat has been discovered in the area of the firths of north-east Scotland, in a former channel at the confluence of the River Conon and the Cromarty Firth (Bruce 1882; Mowat 1996). The paucity of logboats in this area is not necessarily indicative of a different function for the Beaully Firth marine crannogs but probably related more closely to the circumstances of discovery of the logboats in the Clyde. The large amount of public works in the Firth of Clyde has resulted in the opportunity for discovering shoreside or river-related finds like logboats. This kind of activity in the Beaully Firth has been minimal, especially at the River Beaully end of the Firth. The opportunity for the discovery of logboat-type finds is therefore significantly smaller. Thus, the idea of the Beaully Firth marine crannogs as access points is not undermined by the paucity of evidence of a relationship between these sites and logboats. It merely begs questions about the context of the discovery of logboats in the Beaully Firth region.

## CONCLUSIONS

The surveys of the marine crannogs in the Beaully Firth and the Firth of Clyde have recorded a number of characteristics which clearly define a sub-group of crannogs. The sites are built in a tidal environment and contour survey has shown that they have been constructed to take advantage either of promontory features or of former shorelines. This allows them to be used as nodal points at interfaces between the waterways of the firths and the surrounding hinterland. They are thus, partly at least, access points to navigable channels taking advantage of the natural transport routes, which from the radiocarbon dates from the various sites appear to have been used since the latter part of the first millennium BC.

From the previous and current limited excavations it would certainly appear that Dumbuck and Redcastle were not sites designed to be domestic in function. The small finds from Dumbuck were conspicuous in the absence of any pottery or other typically domestic artefacts, apart from one rotary quern. The site is better known today for a number of small finds that were reworked — if not, indeed, manufactured — by some of the excavators, forming carved figurines and abstract forms. Redcastle also shows a distinct absence of domestic small finds and, allowing for the limitations of the small excavation area, the site can also be interpreted as having a non-domestic function.

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