

**Excavation and survey at Loch Bhorgastail,
Isle of Lewis, Outer Hebrides (July 2023)
- Interim report -**

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1. Executive summary

Following on from previous surveys carried out in 2016 and 2017 and more substantial excavation in 2021, a final season of work was undertaken on and around the crannog in Loch Bhorgastail (Figure 1) during July 2023. This involved terrestrial and underwater excavation, coring of the loch bed and photogrammetric Uncrewed Aerial Vehicle (UAV) surveys.

On the surface of the island, following initial clearance of a larger quadrant, a 2.50 x 1.00 m trench was excavated at the centre of the stone islet exposed above water. This trench revealed further evidence for Middle Bronze Age activity and well-preserved Early Neolithic timber architecture (including wattling and glimpses of the site's primary basal timber 'platform'). A small amount of Early Iron Age activity (previously unseen on the islet) was also identified. Excavation of the terrestrial trench had to end, due to water ingress, at c. 0.60 m below loch level.

Adjacent to the stone islet, our 2021 underwater trench had revealed an extensive spread of laid timbers; in 2023, this trench was extended both horizontally and vertically. Close to the above-water stone islet, it was extended further to the NW (i.e. in towards the islet), allowing us to join up the 'underwater' and 'terrestrial' stratigraphy as a whole. A small sondage was also excavated close by, through the uppermost laid timber layer, revealing further timbers (2-3 logs thick) below it; these had ultimately been placed directly on top of loch bed silts, demonstrating that the timber platform had been constructed in a wet, lacustrine environment. At the other end of the trench, furthest from the stone islet, the trench was extended to the SE, revealing the full spatial extent of the laid timbers, which ultimately extended 7.5 m out from the stone islet edge.

Alongside this excavation work, coring of the loch bed was undertaken in order to assess further the site's potential for sedaDNA and to enhance understanding of the extent of the timber platform around the stone islet. Multiple UAV surveys were also undertaken to build a topographic model of the site and to record successive stages of excavation.

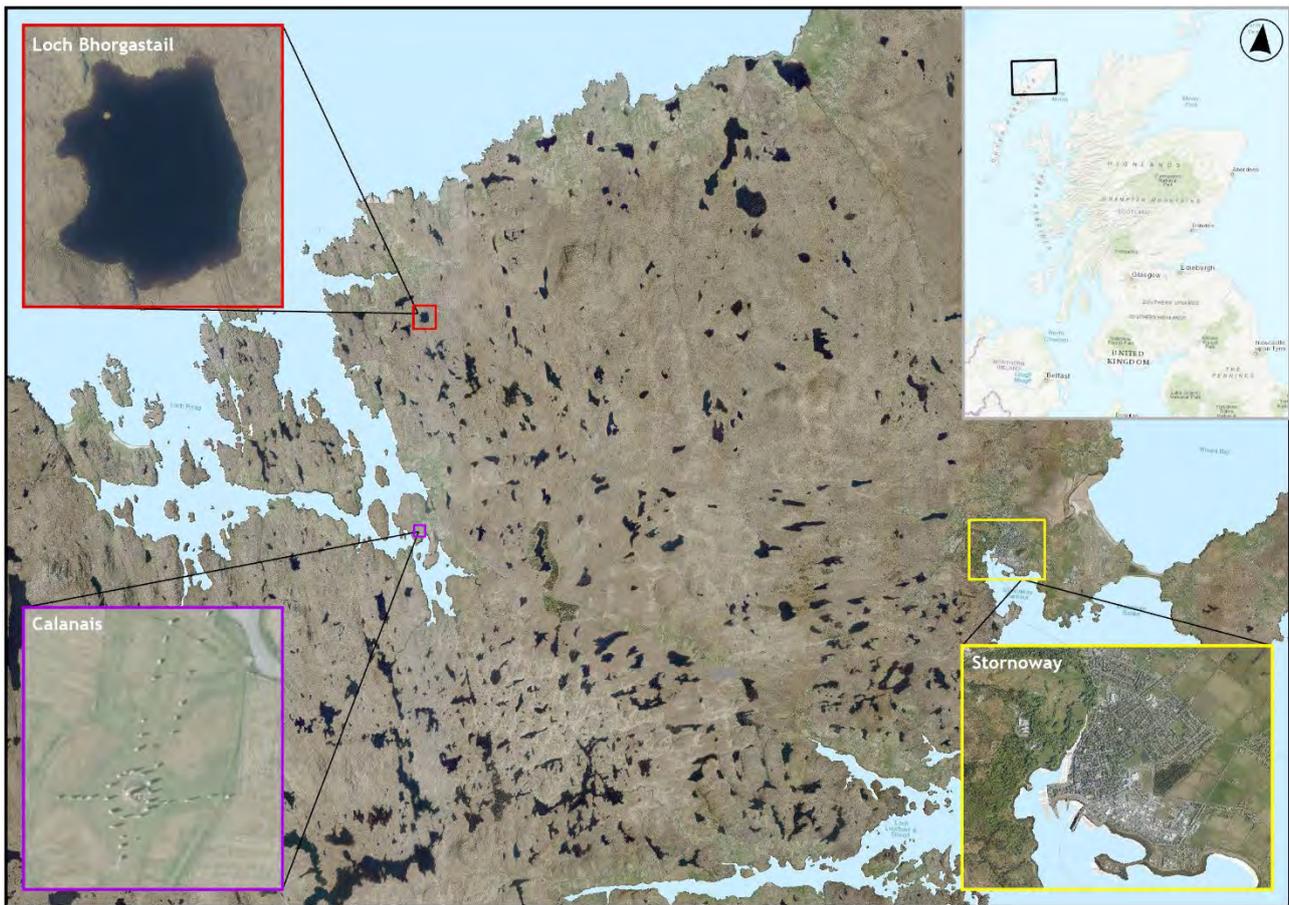


Figure 1. Map showing the location of Loch Bhorgastail and its geographic relationship to Calanais, an extensive Neolithic stone monument, and Stornoway, the main harbour and largest town in the Outer Hebrides

2. Research background

Underwater reconnaissance work carried out in 2012-2015 by Chris Murray (an amateur underwater archaeologist) and Mark Elliot (then Conservation Officer, Museum nan Eilean, Stornoway) revealed the presence of identifiably Neolithic pottery in association with islet sites in five different lochs across the Isle of Lewis, including Loch Bhorgastail (Garrow & Sturt 2019a). Other diagnostic material culture (including worked quartz, quernstones, etc.) as well as architectural features (including worked timbers and artificial stone causeways) were also identified. This work was carried out on an ad hoc, voluntary basis, with notes made on finds locations, photos taken of artefacts in situ, and all finds reported to and subsequently examined by Alison Sheridan (National Museum of Scotland). Further work undertaken by Murray on some of these sites since then has also been declared to Treasure Trove, with the pottery reported on by Mike Copper (Garrow & Sturt 2019b, Appendix 1).

Unsurprisingly, these new discoveries attracted considerable attention within the archaeological community, representing as they did possible evidence for the widespread presence of Neolithic crannogs. We subsequently contacted Chris Murray about the possibility of carrying out further underwater survey work on some of the sites and obtained funding from the British Academy/Honor Frost Foundation to undertake three short seasons of work from 2015-17 (Garrow & Sturt 2019b).

Following our work in 2016 and 2017, in 2018 we submitted a new grant application to the Arts and Humanities Research Council. This was successful, with the associated funding enabling three further seasons of fieldwork focused on Neolithic crannogs in the Outer Hebrides in 2021-23. During the 2021 and 2023 seasons, our focus was on excavating the project's 'showcase' site at Loch Bhorgastail (see below); in July

2022, we successfully attempted to identify further Neolithic material in association with known islet sites in North Uist, Benbecula and South Uist (Blankshein et al. 2023).

Excavations at Loch Bhorgastail in 2021 resulted in a transformed understanding of two key aspects of the site: its architectural form(s) and its chronology. It became clear that the crannog had both a timber and a stone phase. Radiocarbon dating indicated that, contrary to our prior expectations about the site, a substantial portion of the stone architecture is likely to be Middle Bronze Age or later in date. Burnt layers dating to the Middle Bronze Age were observed underneath the main stone 'floor' of the islet.

The Neolithic phase of the islet consisted of a 'packwerk' crannog constructed with piled-up brushwood on top of larger, laid timbers on the loch bed. The full extent of this timber architecture was not established but thought potentially to extend up to 23 m across in total, if its edges were defined by the upright piles identified underwater. Two clear phases of wooden construction were observed within the 2021 terrestrial sondage. The lower of the two appeared to match up with the timber layer observed underwater, and was associated with large quantities of Neolithic pottery and quartz. The upper brushwood layer, by contrast, produced very little material culture and was thought to be Middle Bronze Age in date (this has subsequently been confirmed through radiocarbon dating).

Key issues/questions identified in 2021 (Blankshein et al. 2022, 31) as being important to address through further work in 2023 were:

1. Spatial extent of the Neolithic timber phase platform/mound
2. Presence/absence of any (timber?) architecture, or other features associated with the timber phase
3. Depth of Neolithic stratigraphy underwater – are there layers pre-dating the timbers observed in 2021 and what are they like?
4. Resolution of whether the upper brushwood layer is Middle Bronze Age
5. Refinement of our understanding of the Middle Bronze Age phase features and character/purpose of associated activity
6. Presence/absence of any Middle Bronze Age material culture on the site
7. Date/function of stone phase architecture
8. Date of peat formation on top of context [36] (stone capping)
9. Fluctuating loch levels and site formation processes
10. Creation of age/depth model for terrestrial peat formation/basin infill

As will become clear below, it did prove possible to address all of these questions through our fieldwork in 2023.

3. Dry-land excavation (2023)

3.1. Methodology

It is necessary to explain at the outset that our planned approach to excavation of the terrestrial trench in 2023 had to be altered significantly due to flooding. Initially, our strategy was to investigate a wide area of the above-water islet, with the specific aim of assessing the wooden phase(s) of architecture in plan. Initially, therefore, we removed all vegetation cover [32] and upper peat deposits [33] from one quadrant (south) of the site, excavating this approximately 5 m radius 'slice' of the circular 'cake' down to the stone islet 'base' [36] (Figure 2, red outline). The stone 'base' was also removed, leaving a lower layer of stones [50] across some parts of the quadrant, and also revealing the remainder of the burnt peat ash deposit [41/49] that had been encountered within the sondage in 2021 (Figure 4). At this point, after one week of excavation, substantial rainfall occurred over a 48 hour period, resulting in a 0.30 m rise in the loch level. This led to the quadrant trench flooding – it was now essentially 'in' the loch. Since this area was under c. 0.05-0.10 m of water, it was not feasible to excavate the remaining deposits there using either underwater or terrestrial techniques.

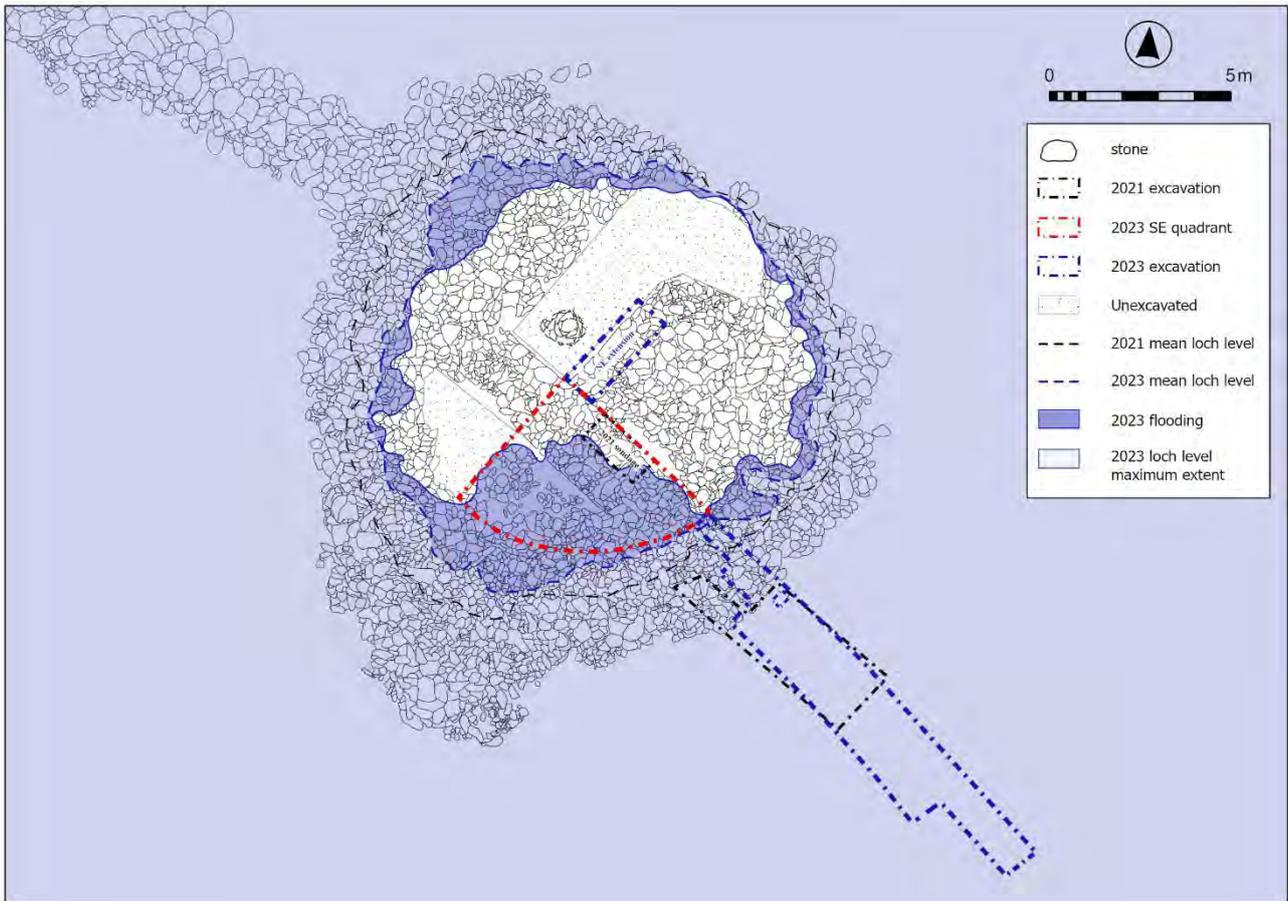


Figure 2 Plan of 2021/2023 excavated areas

After two more days, with no sign of the loch level dropping quickly, we took the decision to change our plan and dig another, smaller trench (termed the ‘northern extension’) at the centre of the islet. This area of the site still remained above loch level and, we hoped, seemed less likely to flood if further rainfall occurred. Although this revised strategy did not facilitate the wide, open area inspection of deposits that we initially anticipated, it did allow us to excavate what was in effect a second, larger ‘sondage’, adding to what was reported on from 2021. The ‘northern extension’ trench measured 2.5 x 1.0 m and was ultimately excavated to a total depth of 1.2 m (Figure 3).

As in 2021, all of the vegetation and soil excavated from the islet had to be transported manually by boat across the loch to an area of shore suitable for the storage of spoil, ultimately filling twenty-two one tonne rubble bags. Stones were not moved by boat but stacked temporarily as a cairn on the islet. Excavation of the terrestrial trench was carried out by trowel and hand-shovel. The majority of spatial recording on site was carried out digitally, with context sheets and some drawings completed on paper/permatrace. Context extents were recorded with the RTK GPS (Topcon HIPer SR) and through photogrammetry. Photogrammetric surveys were completed most days; these were conducted for the whole islet via UAV (Matrice 300 RTK) and for the underwater trench using two Go Pros (Hero9) fixed on a stereoscopic mount. Photogrammetric surveys were processed every evening using DJI Terra for the UAV surveys and Agisoft Metashape for the underwater surveys. Low resolution photogrammetry models were created during the excavation season (for the sake of time and efficiency), but during post-excavation processing high resolution (between 0.5 and 0.1 cm) digital elevation models (in plan and section), orthomosaics and 3D models were generated. The locational accuracy of these models was maintained through the use of ground control points (GCPs) which were fixed on the islet, on the grid of the underwater trench and around the loch shore. These control points were recorded with the RTK and their coordinates (as well as those of the Matrice 300 RTK) used to retain spatial accuracy when processing the photogrammetric surveys. The use of GCPs ensured that the

photogrammetric outputs could be 'stacked' in ArcGIS in order to visualise the contexts and phases of work as well as generate digital plans from them. This process was assisted by the recording of features and context boundaries with the RTK GPS, also imported into ArcGIS. Profiles across the digital elevation models and digital sections from the 3D models were generated and subsequently combined with digitised hand-drawn sections in CorelDRAW in order to create the sections.

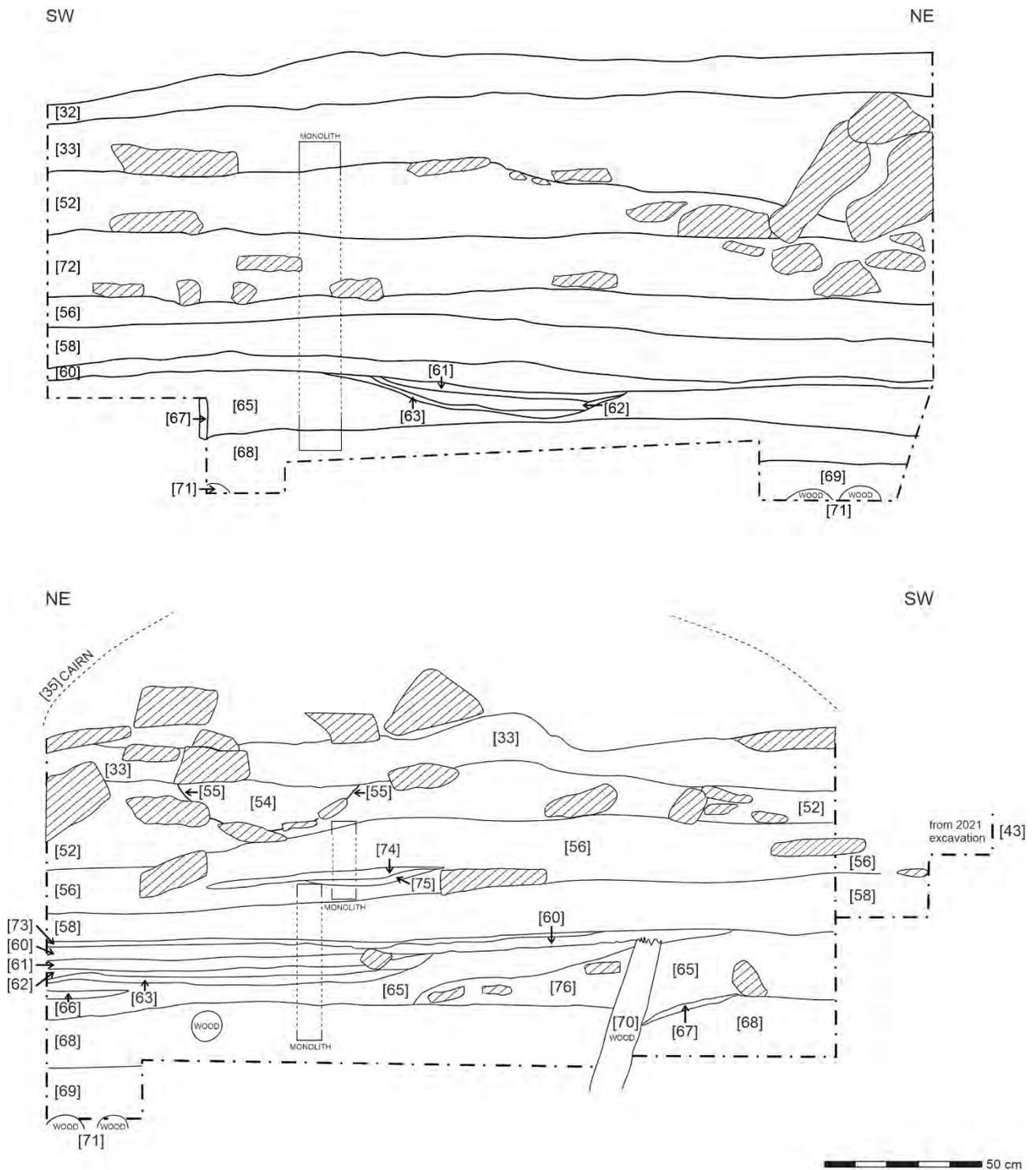


Figure 3. Northern extension sondage sections: south-east facing (top) and north-west facing (bottom)

3.2. Observed features

Stone phase

The stone phase features observed in 2023 were the same as those recorded in 2021: a circular stone 'cairn' (F3) located towards the eastern edge of the islet, a slightly raised 'ring-like' element around the outer edge of the central area (F1) and a flattish base (F2) towards the centre (Figure 4). Following removal of a single layer of stones from the islet base, a lower area of more stones [50] was revealed towards the western side of the quadrant trench. Flooding prevented further exploration of this layer. As was the case in 2021, very few artefacts were recovered in association with the stone phase: a single sherd (61g) from a Bronze or Iron Age flat-bottomed jar was found in association with the outer ring of stones (F1).

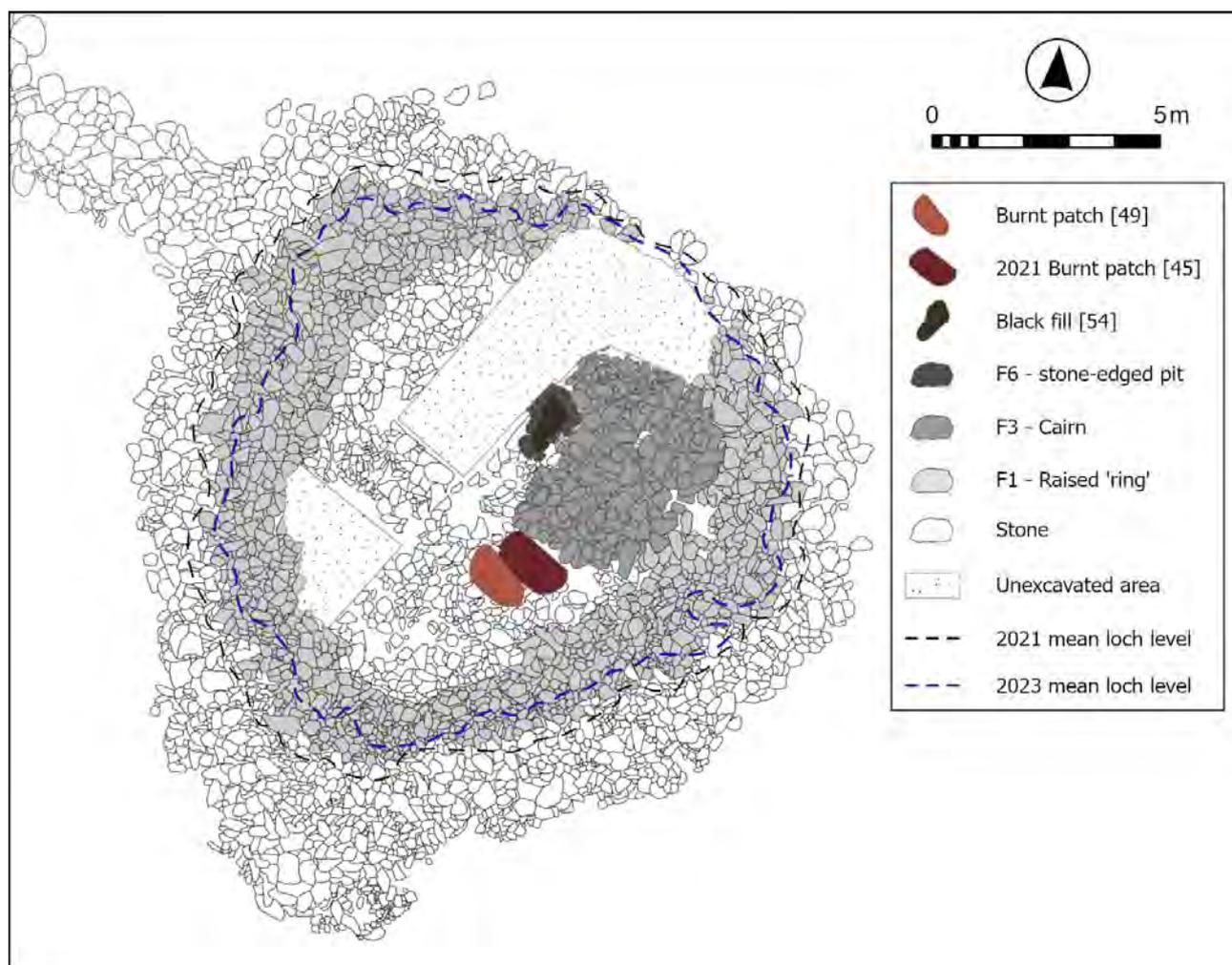


Figure 4. Plan of upper layers, including pit F6, cairn F3 and burnt layers [45/49]

Timber phase

As mentioned above, excavation continued below the stone phase architecture [35] within the 2.5 x 1.0 m northern extension trench. Initially, a gritty clay silt with charcoal flecks [51] was encountered; this layer was patchy and did not extend visibly into either drawn section. Below it was a roughly oval feature (F6, cut [55]), measuring c. 1.20 x 0.50 x 0.15 m deep, whose southern extent was marked clearly by stones but whose northern extent was less well defined (Figures 3-5). The fill of F6, [54], was a dark grey/black clayey peaty silt with abundant white, occasionally blue flecks, as well as charcoal. The white/blue material was visible in section as a clear layer within [54] and had the appearance of burnt bone when excavated (Figure 5). Its texture was very soft and no clear fragments (with any solidity or physical coherence) could be recovered. Concentrated in the southern end of the feature was a collection of 15 sherds (602g) from a Bronze or Iron

Age jar. Radiocarbon dating subsequently indicated that this pottery, and thus the associated layers, date to the Early Iron Age, c. 750-410 cal BC. Activity of this date had not previously been detected on the islet.



Figure 5. Photo of pit F6, half-sectioned (scale: 0.10 m). Note the white, burnt bone (?) layer visible just above the 10 cm scale bar.

F6 had been cut into a 0.10-0.20 m thick dark brown peaty layer containing abundant orange-brown degraded stones [52]; this deposit extended right across the trench and represents the stone 'floor' of the islet (within the Northern Extension). Below this was a dark grey clay [43/56]¹, and below that the upper brushwood layer [44/58] (organic material comprised mainly of twigs and small roundwood) which was c. 0.15 m thick in this area of the site. Below this was a series of thin layers, which alternated between gritty blue-grey sand and dark brown, organic peaty clay – the former [62, 64] interpreted as in-washing events of water onto the islet, when this area became submerged; the latter [61, 63] interpreted as stabilisation phases, when soils began to form on top of these during relatively dry periods. Underneath these was a brushwood layer containing small twigs and very abundant hazelnuts [65]; this layer also contained abundant medium sized stones which became more frequent towards the southern part of the trench. In plan, these stones had an almost laid brick-like appearance; they are interpreted as an attempt to consolidate or solidify the layer as it became wetter. Notably, one small patch that had been blackened by burning was observed towards the northern end of the trench [66]; this is interpreted as an in situ hearth or fire. Below [65/66] was a related brushwood layer [68], which also contained abundant hazelnuts, but by contrast very few stones. Located physically in between [65/66] and [68] was F7, an area of wattling [67] extending across the full width of the northern extension, and five associated posts [70] which had been inserted down into [68] to hold the wattling in place (Figures 3 and 6); layer [65] had then seemingly built up against the wattling, along with [76], a related blue, grittier layer. The wattling was vertical on the western side of the trench but had collapsed (?) to an approximately 45 degree angle on the eastern side. Below the lowest brushwood layer [68], a fairly thick 0.15 m layer of gritty grey/blue sand [69] was observed in a small sump dug at the northern end of the trench to assist with water pumping. Underneath this, substantial horizontal timbers [71] were observed but unfortunately could not be excavated (or sampled) due to severe flooding at that level.

¹ During our 2023 excavation, new context numbers were sometimes given out to layers that were also observed in the 2021 sondage. In this report, we include both to facilitate cross-referencing – in this case [43] from 2021 and [56] from 2023. See also site matrix in Table 1.



Figure 6. Photo of wattling F7 [67] and associated posts [70], with Mike Copper excavating in the foreground. The increasingly flooded conditions were clearly in evidence by this point in the excavation.

2021 sondage	2021+2023	2023 N. extension
	32 Woodrush	
	34 Tumble from cairn	
	33 Peat	
	35 Cairn	
	37 Outer ring	
	36/50 Stone base	Not sure how 51 and 54 relate to the stone base
		51 Patchy burnt layer, on surface of [52]
		54 Cist fill
		55 Cist cut
38 Soil under base		
39 Hearth fill		
40 Hearth cut		
41/49 Orange peat ash		
42 Black patch		52 Biscuity layer
	43/56 Dark grey clay	
	44/58 Upper brushwood	
45 Grey silt patch		
	47/60 Blue grey gritty sand	
		61 Black charcoal rich layer/lens
		62 Blue grey sand
		63 Thin brown/black 'stabilisation' layer
		64 Blue grey sand
	65/66 Stoney brushwood	
		67/70 Wattling/posts
	48/68 Lower brushwood	
		69 Lowest blue grey sand
		71 Basal wood horizontals
Med		
IA		
BA		
Neo		
Not dated		

Table 1. Site matrix for 2021 and 2023 terrestrial excavations. The central column contains those contexts that were visible in both the 2021 sondage and the 2023 northern extension trench. Radiocarbon dated layers are indicated with colouring.

4. Underwater excavation (2023)

4.1. Methodology

As in 2021, our excavation strategy from the outset was to directly link dry-land and underwater sequences. To this end, the 2023 underwater trench was set out in the same location as the underwater trench from 2021, providing a continuation of the initial dry-land 2 m wide trench (the latter subsequently expanded significantly) running from NW to SE across the islet (Figure 7). Initially a 2 x 6 m underwater trench was defined, with a metal grid frame providing a reference for the trench edges and ground control points as well as a firm anchor point that could be used as a support whilst excavating. The trench was ultimately extended for an additional 4.5 m to the SE to identify the far end of the timber 'platform' and for c. 3 m at its NW end (closest to the islet) to investigate the stratigraphic relationship between timber and stone phases. Single context excavation was carried out across the full extent of the underwater trench, with deposits removed

using hand fanning and trowelling combined with an induction dredge to remove spoil. To help control excavation over the underwater site the grid was broken down into a series of 1.0 x 1.5 m grid squares (Figure 7). Within square B1 and B0 sondages were cut through exposed timbers to help answer questions of stratigraphy and architecture.

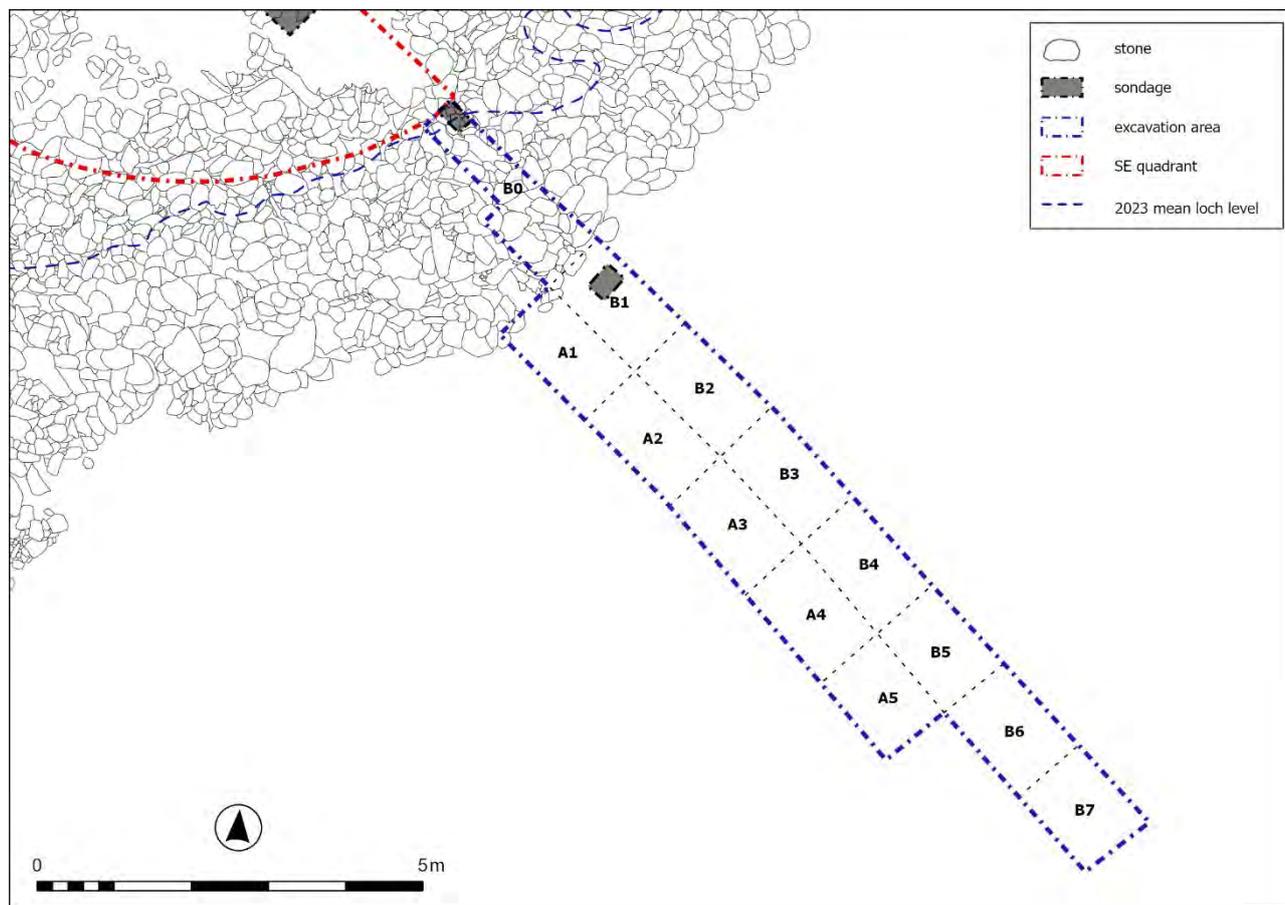


Figure 7. Underwater trench showing 1.0 x 1.5 m grid squares

4.2. Observed features

In the initial 2 x 6 m trench, the same series of layers were encountered as had been identified in 2021 (Table 2). At the NW end of the underwater trench the sequence from top to bottom began with stones [37] that comprised the stone-phase islet edge; these were packed with/filled by grey sandy silts [214]. These silts are likely to have derived from a combination of deliberate introduction during construction and natural in-washing over time. On the islet, the stones and grey silts were underlain first by an upper brushwood layer [215] of small twigs and branches, which appears to correlate with layer [44/58] of the dry-land excavation. Beneath this was a layer of grey silts and sands [210] before another layer of brushwood [208] which correlates with [48/68], rich in both hazelnut shells and pottery. A thin grey/black organic rich silty layer [204] was formed on top of large roundwood and timbers [205/206], which underpinned the brushwood layer and formed a substantial platform/raft on which all of the layers above rest. Underneath these was a thin band of smaller twigs, branches and wood fragments [211]. These gave way to a white/yellow mottled clay [212] of c. 3-5 cm thickness, prior to a homogenous grey clay [213]. Both of these clay deposits are interpreted as being lacustrine loch bed material.

Beyond (i.e. outside) the islet's stone architecture, the underwater sequence was as follows: a thin gravelly sand layer [201], c. 1-3 cm thick (the present-day loch bed); a bright yellow sandy silty clay layer [202] which varied slightly in thickness (c. 1-2 cm), getting thicker towards the deep-water end of the trench, interpreted as a low energy in-washing sediment; a grey-white gravelly silty sand [203], again of variable thickness (c. 3-6 cm), interpreted as weathered rock and loch silts; a laminated pink, black and grey silty clay [207],

thickening from c. 1-5 cm down slope, interpreted as slumping occupation related materials; patches of dark grey/black organic rich silt containing small wood fragments, most evident at the north-west end of the trench [204], perhaps eroded remnants of [208]; and finally a substantial wood layer [205/206], comprised of timbers up to c. 16 cm in diameter (Figure 8).

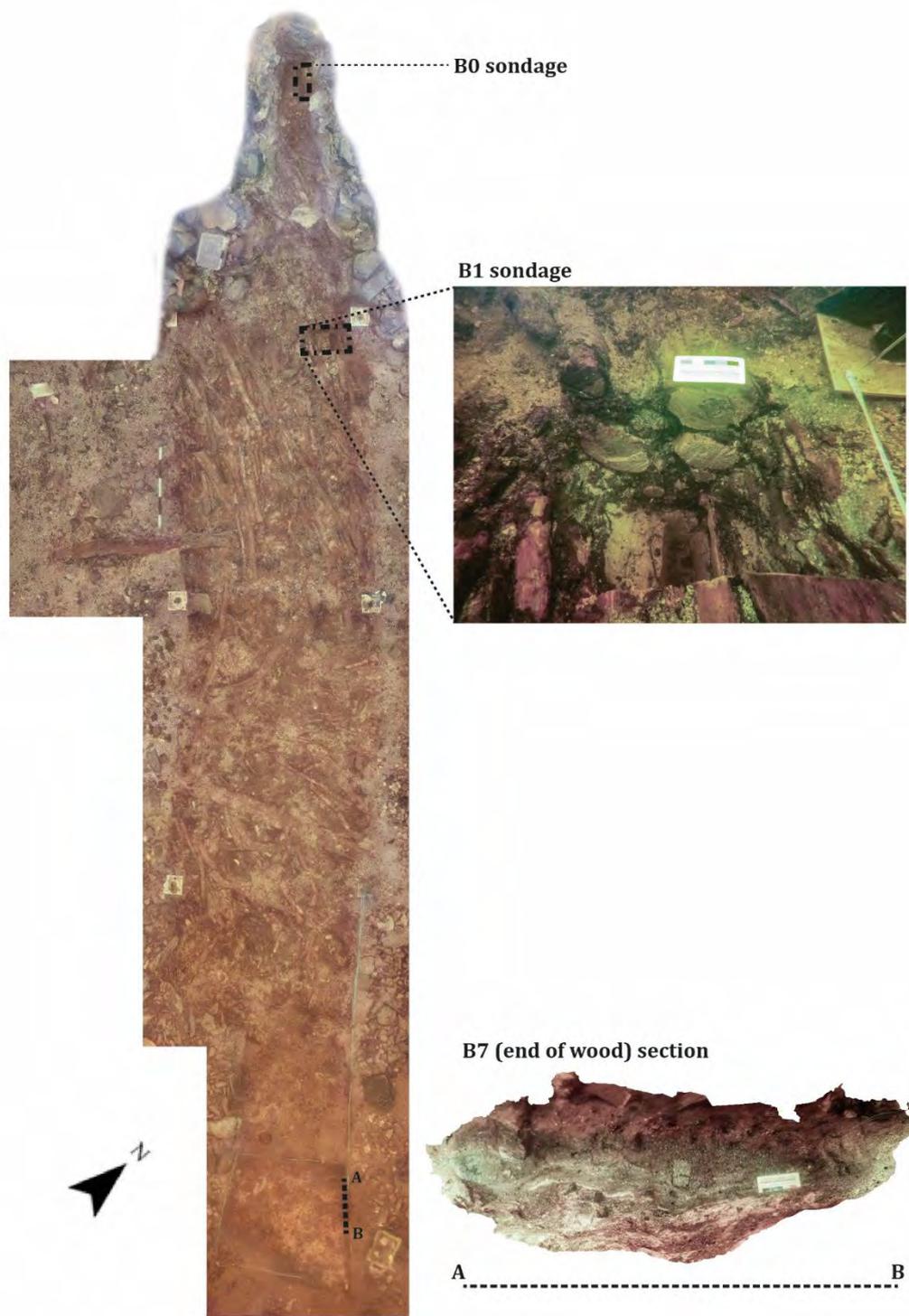


Figure 8. Orthomosaic showing full extent (as revealed in 2023) of wooden layer [205/206]. Scale: 1 m. Inset: sondage through wooden layers in grid B1 [205/206] showing contact of lowest roundwood/brushwood layer [211] with white/yellow loch bed clay [212]. Scale: 10 cm

The underwater trench was extended at its SE end to identify the end of the timber spread. Measured from the edge of the stone islet, the timbers extended for 7.50 m (ending in a present-day water depth of c. 1.50

m). From around 6 m out, the yellow sandy silty clay layer [202] was no longer observed and the loch bed deposits [203] thickened considerably (from 3 cm to 7 cm). Significant amounts of material culture continued to be found in [207] and [210]. This appeared to be material moving downslope and towards a notable drop-off in the topography of the loch bed. The loch bed surface sediments were very soft towards the outer end of the trench, with the coarser [201] and [203] layers limited to the shallower portions of the site (Table 2). Altogether 10.25 m of timber was exposed within the underwater trench, with the wood observed to continue underneath the stones towards the centre of the island.

Grid Square B0 sondage		Grid Square B1 sondage		SE end of trench		Interpretation
214	Grey silty sandy gravel packed in amongst stones comprising the armouring of the crannog					In-washing and potentially deliberately deposited fine grained packing material
215	Stoney brushwood					Packwerk material
209	Grey intervening layer					Deposit, potentially redeposited lake marls
208	Compact brushwood (organics, Neo sherds)					Lower brushwood of crannog construction (packwerk)
		201	Gravelly sand with stones	201	Gravelly sand with stones	Present-day loch bed deposits
		202	Yellow sandy silty clay			Low energy in-wash
		203	Grey-white gravelly silty sand	203	Grey-white gravelly silty sand	Weathered rock and loch silts washed in
204	Dark grey/black organic rich silt	204	Dark grey/black organic rich silt			Organic rich construction material
205	Roundwood (larger branches)	205	Roundwood (larger branches)			Timber construction layer
206	Timber	206	Timber			Larger, more consolidated timber construction layer
211	Layer of small twigs/branches underlying [205/206], base of construction sequence	211	Layer of small twigs/branches underlying [205/206], base of construction sequence			Debris from construction
				207	Laminated pink, black and grey sediments with quartz and charcoal	Slumping of outer crannog - potentially occupation/activity related.
				210	Dark brown organic rich silt	Onlapping with 207 at end of roundwood and merging into 212
212	White/yellow clay, upper lakebed marls	212	White/yellow clay, upper lakebed marls	212	White/yellow clay, upper lakebed marls	Loch deposits under wooden structure
213	Grey clay/marl - loch bed			213	Grey clay/marl - loch bed	Loch bed deposits

Table 2. Summary of excavated contexts, within the underwater trench

5. Interpretive summary of excavated deposits

The primary phase of the islet in Loch Bhorgastail appears to have been a large, approximately circular timber platform, c. 23 m in diameter; this architecture extends to the east well beyond the stone island visible above water today (Figure 9). This wooden platform was constructed c. 3500-3350 cal BC through the laying down of substantial quantities of felled willow and birch logs directly onto loch bed silts in an already wet environment. A number of timber uprights, forming a probable revetment at the edge of this spread, are visible (without excavation) in places on the eastern, deeper-water side of the site. Beyond the edges of the excavated underwater trench, a number of large stones are also visible on the present-day loch bed. If, as seems very likely, the timber platform extends east and north into this area, these stones must overlie any such laid wooden elements (the latter now covered over with loch silts). Indeed to the north of the underwater trench large stones can be observed directly on top of exposed timber. Given the fact that the Phase 1 structure was built into a wet, lacustrine environment, it seems likely that these stones also relate to the primary phase of construction – placed on top of the timbers essentially to prevent them from floating away. Our working hypothesis is that, originally, these stones may have extended across the full extent of the wooden platform – or perhaps only around the outer perimeter, with brushwood in the middle – but that, probably in the MBA, the stones were moved westwards (into shallower water) in order to construct/consolidate the smaller stone islet and cairn that are visible above-water today.

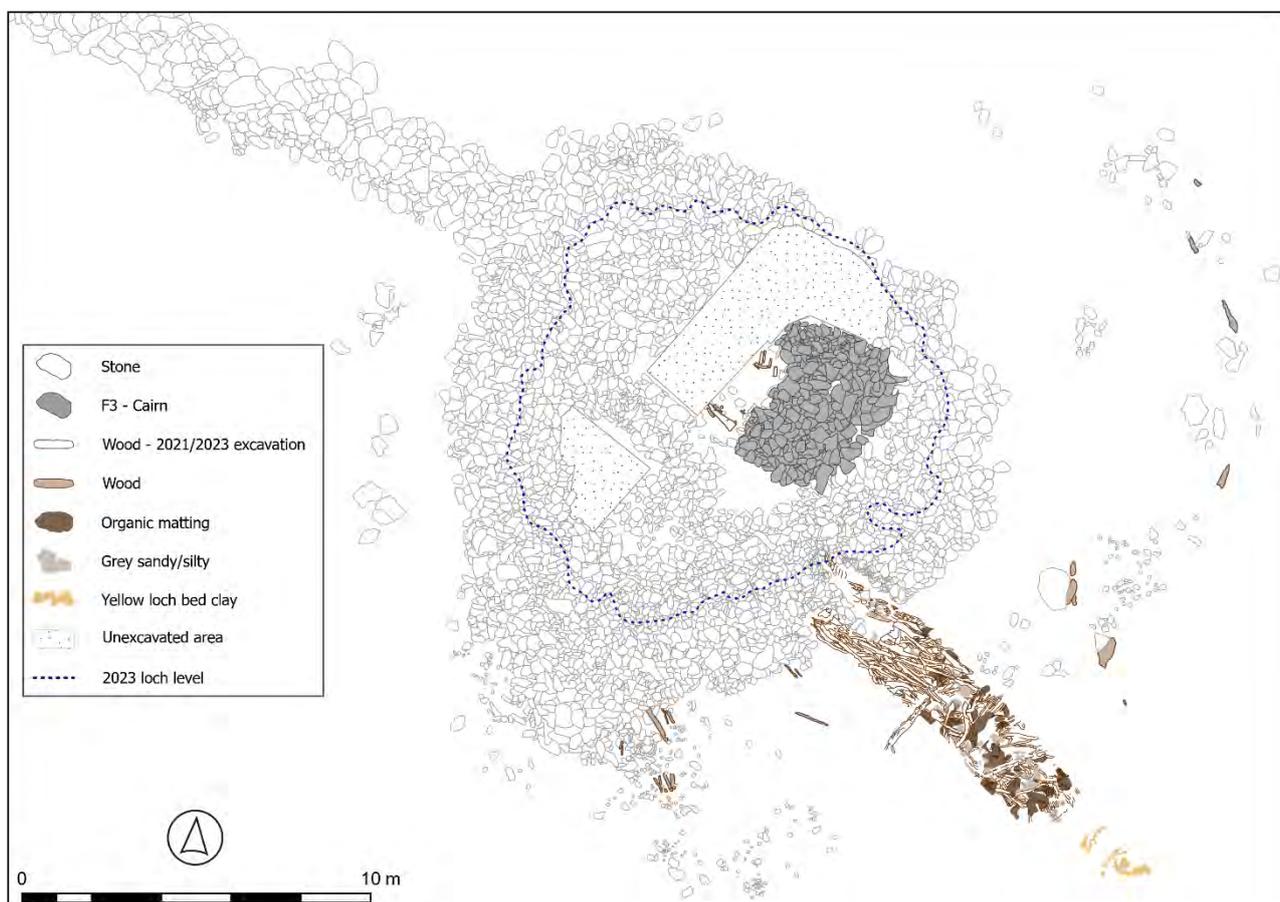


Figure 9. Plan of site, as revealed in 2023

Our 2023 northern extension trench revealed a series of Neolithic layers, following on from the primary construction described above.

It is likely that the lower brushwood layer [48/68] was also associated with the initial construction of the wooden platform. A blue-grey sand [69] layer was observed (but only within the narrow, flooded sondage dug at the northern end of the trench) above the logs, potentially laid as a kind of foundation bed for this

brushwood layer. The latter was comprised mainly of hazel brushwood and contained very high quantities of hazelnuts, indicating that it is likely to have been laid down in the autumn. Subsequently, a wattle structure, F7 [67], was built towards what would have been the central point of the Phase 1 platform, with supporting stakes [68] rammed down through the layer below. While its exact function is not immediately evident, what is clear is that a number of in-washing and associated consolidation/turf formation layers built up against it on its northern side. A second layer of brushwood [65] was then added on top of the wattling phase level, and additional stones, forming a 'pavement' of sorts, added to it – again, presumably, to combat rising water levels. The next major layer in the sequence is [44/58], what we have termed the 'upper brushwood' layer, which dates to the MBA. This brushwood was overlain by a thick grey clay [56], presumably representing another period of in-washed sediments from the loch.

On top of this clayey layer, a stone-rich peaty deposit [52] had accumulated – representing the stone 'base' of the islet, which had now been raised above maximum natural loch level. A small pit (F6) had been cut into this layer during the Early Iron Age. This was associated with a small patch of burnt material [51] but no other features.

Peat formation at the top of the islet sequence (i.e. above the stone 'base') has now been radiocarbon dated to c. 900-1030 cal AD.

6. Pottery

Mike Copper

6.1. Introduction

During the summer of 2023, 413 sherds of pottery weighing a total of 7887g were excavated at Loch Bhorgastail from contexts on the islet itself and from the surrounding loch bed. The 2023 assemblage can be added to the 372 sherds (weighing 6184g) recovered during excavations in 2021 and the ninety nine sherds resulting from work at the site before that date (Copper in Garrow and Sturt 2019b: 45–7). The assemblage was analysed in the autumn of 2023 by Mike Copper at the University of Bradford.

As is common with Hebridean prehistoric pottery, the restricted range of diagnostic features and limited variation in fabrics at Loch Bhorgastail means that estimating the precise number of vessels is problematic, and not all of the sherds could be unambiguously assigned to specific vessels. It is possible, however, to give a minimum number of 163 vessels for the assemblage recovered in 2023, and the figure could be as high as 186, though the latter is less likely as it is based on the number of sherd groups identified rather than positively identified vessels (see below). Five of the vessels recovered are Bronze or Iron Age jars closely resembling vessels of likely Bronze Age date from the 2021 assemblage. The remainder of the vessels are of typical Hebridean Early Neolithic forms.

The average number of sherds per vessel (where assignation to a specific vessel was certain) was 1.9 and the average sherd weight 22.8g. Sixty-seven per cent of the vessels were identified from a single sherd, with the maximum number of sherds unambiguously associated with a single vessel being 22 (Vessel 236).

6.2. A note on analytical method

During analysis, the sherds were placed into sherd groups on the basis of form, decoration and fabric. A sherd group may comprise a single sherd or multiple sherds. Many sherd groups represent—or are highly likely to represent—a single vessel, though certain vessels are made up of sherds from two or more sherd groups. In the assemblage catalogue, the name of each sherd group comprises a context number followed by the number of the group (e.g. 207/6 indicates the sixth sherd group identified from context 207). When a sherd group can be associated with an individual pot, the pot is given its own vessel number in addition to a sherd group number or numbers. Sherds which could potentially belong to one of a number of vessels were recorded as ‘Vessel Uncertain’. This avoids overestimating the number of vessels present, which would adversely impact on assessments of percentages of different types of vessels, fabrics employed, etc.

6.3. Fabrics

The opening agents added to the clay used to make the Loch Bhorgastail pottery vary little from one vessel to the next. Minerals present, primarily quartz, feldspar and biotite, are in keeping with the local geology (igneous gneiss). Small, sandy beaches around the shores of Loch Bhorgastail provide easy access to this material in a form that can be added directly to the clay with little or no processing. Furthermore, wave action on the beaches has the effect of sorting the sand into fine, medium and coarse fractions. Three main and two uncommon fabric types were defined at Loch Bhorgastail, though these represent points on a continuum rather than discrete groups.

- Fabric 1: Fine, well-fired clay varying from dark grey to pale earthy yellow and orange and containing common to very common (20%-40%) sub-rounded to sub-angular, well-sorted fine sand with rare larger fragments (>2mm across).
- Fabric 2: As Fabric 1, but with the addition of moderate (10%-20%) inclusions of up to 3mm (small granules). Inclusions in Fabric 2 are moderately sorted.
- Fabric 3: Well-fired clay varying from dark grey to pale earthy yellow and orange, with common (20%-30%), moderate to poorly sorted, sub-rounded to sub-angular inclusions ranging in size from fine sand to sparse (<10%) granules of 3-4 mm or larger.

- Fabric 4: As Fabric 2, but with very common to abundant inclusions (30%-50%).
- Fabric 5. One sherd only (Vessel 244). An unusual sherd with numerous angular voids resulting in a cork-like texture.

Fabric 3 made up twelve of the vessels (7.5%) from the 2023 excavation in comparison to 3% of the 2021 assemblage. This included three of the five Bronze/Iron Age vessels. Seventy-six per cent of the pots were of Fabric 1 with the remaining 13.5% being of Fabric 2 (the latter including the remaining two Bronze/Iron Age pots), compared to 82% and 15% respectively from 2021. As was the case in the 2021 assemblage, despite Fabric 1 being the finest of the fabrics, this was used for both large and small vessels. Fabric 4 was not represented in the 2023 assemblage but is noted here due to its presence in 2021. Just one sherd of the unusual, 'corky' Fabric 5 was recorded (Vessel 244). Sheridan et al. (2016: 577) have suggested that similar corky sherds found in pre-monumental contexts at Calanais may have been of local manufacture, with the voids resulting from the leaching or burning out of soft stone. This suggestion does not sit well with the local igneous and metamorphic geology, however, and the inclusion of organic material in the paste before firing may better account for the nature of such sherds.

The pale colour of much of the pottery is indicative of it having been fired in an oxygen-rich environment, most likely an open or partially enclosed fire. As is the case with most Hebridean Neolithic pottery, the Loch Bhorgastail Neolithic pots were well made and fired, though the Bronze/Iron Age vessels were of much coarser construction with little attention given to creating smooth surfaces. Where it was possible to ascertain construction methods, all pots were coil-built.

6.4. Abrasion

Forty-six per cent of the sherds exhibited very little abrasion. This compares to 54% in 2021. Thirty-two per cent were classified as 'abraded' or 'highly abraded', in comparison to 22% for 2021. The remaining 22% exhibited only minor or differential abrasion. This not only reflects the excellent preservation conditions at the site but also suggests that the pottery was deposited shortly after being broken before abrasion had had time to occur.

6.5. Organic Residues

Organic residue was visible on 15 sherds, all Neolithic. Along with sooting and the very pale colour of many sherds that probably resulted from direct exposure to heat after firing (primarily sherds from vessel bottoms), this indicates that many pots had been used for cooking.

6.6. Vessel forms

The vessel categories used during analysis of the Loch Bhorgastail pottery correspond to those previously defined by Copper (2015: 88–91). Where vessel forms could be identified with certainty, the Loch Bhorgastail 2023 assemblage can be broken down as follows (Table 3):

Neolithic		
Vessel Type	Number of Positively Identified Vessels	Percentage of Positively Identified Vessels
Baggy Jars*	61	38.5
Ridged Baggy Jars*	23	14.5
Necked Jars	1	0.5
Small Jars or Bowls	13	8
Other Jars	11	7
Unstan Bowls	14	9
Cups/Small Bowls	12	8
Uncertain	23	14.5

Bronze/Iron Age		
Vessel Type	Number of Positively Identified Vessels	Percentage of Positively Identified Vessels
Jars (flat-bottomed where identifiable)	5	100

Table 3. Vessel forms

**Ridged baggy jars constitute a sub-set of baggy jars. However, vessels were only assigned to the ridged baggy jar category if ridges could be identified. If it was uncertain if a baggy jar was ridged, then it was assigned to the higher level ‘Baggy Jar’ category. As such, some baggy jar sherds may have come from ridged vessels.*

The distinctive Outer Hebridean baggy jars vary in shape from globular to ovoid and are characterised by multiple horizontal bands of incised decoration—usually of sloping lines that can often be seen to form a herringbone motif—that may be separated by subtle ridges or, in one case (Vessel 236), by single, horizontal grooves. In the case of unambiguous ridged baggy jars, 95.5% of body sherds bore bands of diagonal lines, of which 41% could be seen to form herringbone motifs. More unusual patterns included ‘hurdle’ motifs, in which bands of decoration were composed of alternating panels of vertical and horizontal lines, or—very rarely—undecorated vessels.

The most common rim forms on the Neolithic vessels are collared (usually resulting from the application of a strip of clay to the outside of the lip to form a steep external bevel) or flattened with an external lip that may be extended to form a distinctive ‘flange’. Diagonal lines—or radiating diagonal lines when they occur on flat rim tops or bevels—are the most common motif, though more complex patterns occasionally occur, including twisted cord-like concentric impressions on flanged rims (Fig. 10) resembling those on Vessel 50a from the nearby islet on Loch Langabhat (Garrow and Sturt 2019b: 44). One baggy jar had an unusual, funnel-shaped neck with a decorated internal bevel (Fig. 11). While, in contrast to Eilean Dòmhnuille on North Uist, only one other necked (but not ‘baggy’) jar was found in 2023 at Loch Bhorgastail, the presence of a neck on a baggy jar illustrates that not all vessel forms were formally delineated.



Figure 10. Concentric grooves containing radiating impressions possibly formed by impressing thick, twisted cord onto a flanged rim, Vessel 149.

As was the case in 2021, a small number of Unstan bowls was recovered during the 2023 excavation at Loch Bhorgastail. All of these bore the conventional Unstan motif of horizontal grooves above upright or sloping lines on their vertical collars. One, however, was constructed in such a way that the collar overlapped the shallow base, forming a sharp ‘eave’. Two Unstan bowls (Vessels 249 and 261) bore decoration of diagonal lines on their bases, an unusual feature for this style of pot though previously noted amongst the vessels from Loch Langabhat (Garrow and Sturt 2019b: 24).



Figure 11. Funnel-necked baggy jar (Vessel 253)

Other Neolithic vessel forms included small cups/bowls (Fig. 12) and one necked jar. The latter is a vessel form common in the large assemblage from Eilean Dòmhnuiill but rare at Loch Bhorgastail. While certain vessel forms—most notably Unstan bowls—represent well-defined categories exhibiting little variation, others are less well defined, raising questions about the significance of certain vessel forms (and especially Unstan bowls) for their makers and users.



Figure 12. Small, undecorated cup/small bowl (Vessel 245)

The five Bronze/Iron Age vessels were all of simple, vertical-sided form with no body decoration. Where bases could be identified, these were all flat. Rim sherds from three of the vessels showed that these were all simply flattened and undecorated.

Estimating vessel sizes is complicated by the fact that vessels with similar rim diameters may have had very different volumes due to variation in vessel shapes. Thus, a shallow Unstan bowl may have had a much smaller capacity than a deep baggy jar despite having a wider rim diameter. Table 4 illustrates the range of rim diameters for vessels in which this could be measured. Unstan bowls varied in diameter from 16cm to 24cm while ridged baggy jars have an average rim diameter of 21.5cm and other baggy jars of 23.4cm. In contrast to the 2021 assemblage, no clear clustering could be identified, though the wide variation in rim sizes within the baggy/ridged baggy jar category is of interest, suggesting that these vessels may have served multiple purposes.

Rim diameter (cm)	Vessel Form	10-13	14-17	18-21	22-25	26-29
Jars	Jars (possibly baggy/ridged)	0	0	1	1	0
	Baggy Jars (possibly ridged)	3	5	7	5	2
	Unambiguous Ridged Baggy Jars	0	1	5	4	3
	Total Jars	3	6	13	10	5
Bowls/cups	Unstan Bowls	0	2	2	2	0
	Other Bowls	0	0	1	0	0
	Cups	4	0	0	0	0
	Total Bowls/cups	4	2	3	2	0
Bronze/Iron Age vessels	Jars	1	0	0	1	0
	Total B/A Jars	1	0	0	1	0

Table 4. Measurable rim diameters by vessel type

6.7. Discussion

The pottery excavated at Loch Bhorgastail in 2023 can be added to that recovered at the site in previous years to give a total assemblage of 884 sherds weighing 15,667g in all, with an average sherd weight of just over 17.7g. The combined Neolithic assemblage from all work undertaken at Loch Bhorgastail so far is shown in Table 5.

Neolithic		
Vessel Type	Number of Positively Identified Vessels	Percentage of Positively Identified Vessels
Baggy Jars (some of which may be ridged)	79	36
Unambiguous Ridged Baggy Jars	50	23
Necked Jars	1	0.5
Small Jars or Bowls	19	8.5
Other Jars	11	5
Unstan Bowls	20	9
Cups/Small Bowls	15	7
Uncertain	25	11

Table 5. Numbers of positively identified vessels from all work undertaken at Loch Bhorgastail until 2023

It is of interest that Unstan bowls are considerably less well represented at Loch Bhorgastail and the nearby site of Loch Langabhat than at certain other Early Neolithic sites in the Western Isles, notably Eilean Dòmhuill and Northton (Johnson 2006; Copper and Armit 2018). Shouldered bowls, which bear a distinct carination above which the 'Unstan-style' motif of horizontal grooves over diagonal lines is often found and which may have been understood as equivalents to the latter vessel form, are also absent from Loch

Bhorgastail. The significance of this will be discussed in more detail in the final report for the Loch Bhorgastail excavations.

Given the nature of the local geology and the pastes used to form the Loch Bhorgastail vessels, there is no good reason to suggest that these were of anything other than local manufacture. The one possible exception to this is the unusual ‘corky’ fabric of Vessel 244. If such sherds are a feature of the Calanais area, as suggested by Sheridan, then this vessel may have been brought to the site from outside.

The 2023 assemblage from Loch Bhorgastail repeats certain themes common to Hebridean Early Neolithic pottery, including the reproduction of a limited range of vessel forms and decorative motifs. Most of these give a distinctively ‘Hebridean flavour’ to the assemblage, though the presence of Unstan bowls—a vessel form shared with Orkney and parts of the northern Scottish mainland—shows that understandings of how vessels should look, and presumably also be employed, were not limited to the Western Isles. On a more local level, the decoration of bases of Unstan bowls and the presence of twisted cord-like motifs on flanged rims are both unusual features shared with the assemblage from Loch Langabhat, just 3km to the north. The Bronze/Iron Age pots provide a strong contrast to the well-made and elaborately decorated Neolithic vessels. The simple forms, coarse finishing and lack of decoration draw attention to very different conceptions of the nature and role of pottery in the 4th and mid-2nd millennia cal BC.

7. Stone tools

Hugo Anderson-Whymark

Report to follow.

8. Plant remains and wood

Anne Crone & Jack Robertson

At the time of writing, full analysis of both the BHO21 and BHO23 assemblages has been completed. Reporting was undertaken for the site as a whole, and will be published in the full Loch Bhorgastail site report in due course. In order to maintain focus on BHO23 within this report, basic results only are presented below.

8.1. The wood assemblage

Sample no.	Context	Sample Series	Purpose of Sample	Species	Diameter (mm)	rings per cm	Age (max est)	Notes
35	67	C14/Wood	Dating Wattle	<i>Corylus avellana</i>	10			
36	70	C14/Wood	Dating Wattle	<i>Corylus avellana</i>	65 x 55			
37	70	C14/Wood	Dating Wattle	Maloideae	55			facets at tip to flattened base
38	70	C14/Wood	Dating Wattle	Maloideae	33			chisel-edged tip
39	70	C14/Wood	Dating Wattle	<i>Salix</i> sp.	70			
40	70	C14/Wood	Dating Wattle	<i>Betula</i> sp.	100 x 100 > 70 x 60	10	50	tip faceted to hexagonal cs
46	58	C14	Bottom of Upper Brushwood	cf <i>Salix</i> sp.	2			
47	58	C14	Top of upper brushwood	<i>Salix</i> sp.	5			
48	68	C14	Top of lower brushwood	<i>Corylus avellana</i>	5			also contains hazelnut
49	68	C14	Near base of lower brushwood	twig too decayed for ID				also contains hazelnut
50	68	C14	Charcoal for ID	<i>Betula</i> sp.				
53	205	C14/Wood	Wood ID/C14	<i>Corylus avellana</i>	7			
54	211	C14/Wood	Wood ID/C14	<i>Corylus avellana</i>	7			
55	206	C14/Wood	Wood ID/C14	<i>Salix</i> sp.	180 x 120	5	38	
56	206	C14/Wood	Wood ID/C14	<i>Corylus avellana</i>	125 x 95	9	50	
57	206	C14/Wood	Wood ID/C14	<i>Betula</i> sp.	140 x 120	7	45	
58	206	C14/Wood	Wood ID/C14	<i>Salix</i> sp.	110 x 110	10	55	end chopped off - toolmarks blurred but present
59	206	C14/Wood	Wood ID/C14	<i>Betula</i> sp.	70			
60	206	C14/Wood	Wood ID/C14	<i>Salix</i> sp.	75 x 45	10	30	
61	206	C14/Wood	Wood ID/C14	<i>Betula</i> sp.	90	11	50	
62	206	C14/Wood	Wood ID/C14	Maloideae	30			also contains x1 potsherd/x2 hazelnuts/frags of bracket fungi
63	206	C14/Wood	Wood ID/C14	<i>Salix</i> sp.	120	12	72	Cleft rw? Withies compressed into cleft face

Table 6. The wood assemblage

8.2. The ecofact assemblage

Project 23819: Table 1 Ecofact samples			Key: watellogged macroplants semi quantified, *=<10, **=10-29, ***=30-99, ****=>100, ©=								
Sample			27	28	29	30	Check	31	32	33	34
Context			49	51	54	56	58	66	68	63	61
Weight (kg)			13	6	37	10	2 (sub)	9	28	10	7
% Analysed			100	100	100	100	25	100	25	100	100
Species	Name	Part									
Crops											
<i>Hordeum distichon</i> L.	Two-row barley	© Caryopsis/es						5			41
<i>Hordeum distichon</i> L.	Two-row barley	© Rachis/es									18
<i>Hordeum</i> sp.	Barley	© Caryopsis/es						6			84
<i>Cerealia</i> sp.	Cereal	© Caryopsis/es						2			14
Peatland											
<i>Calluna vulgaris</i> L.	Heather	Seed(s)					**				
<i>Calluna vulgaris</i> L.	Heather	Fruit(s)					****				
<i>Calluna vulgaris</i> L.	Heather	Leave(s)	*								
<i>Calluna vulgaris</i> L.	Heather	Stem(s)					****				
Peat		© Frag(s)						**	*		*
Peat		Frag(s)	*		****	*		**		**	*
Peat/roots		Frag(s)				*		**	*	**	
Woodland											
<i>Alnus glutinosa</i> L.	Alder	Bud/scale							*		
<i>Corylus avellana</i> L.	Hazel	© Shell frag(s)						1			1
<i>Corylus avellana</i> L.	Hazel	© Whole(s)						1			
<i>Corylus avellana</i> L.	Hazel	Shell frag(s)		*				****	****	*	
<i>Corylus avellana</i> L.	Hazel	Whole shell(s)							*		
Bark		Frag(s)						**	***		
Buds		Bud/scale						*	***		
Buds		© Bud/scale									1
Wood		Roundwood						****	****		
Wood		Frag(s)		<4mm				****	***	****	***
Weeds											
<i>Carex</i> sp.	Sedge	Nutlet(s)									
<i>Persicaria maculosa</i> L.	Redshank	Achene(s)				*					
<i>Persicaria</i> sp.	Knotweeds	Achene(s)					*				*
<i>Potentilla erecta</i> L.	Tormentil	Achene(s)					*		*		
<i>Potentilla</i> sp.	Cinquefoils	Achene(s)							*		
<i>Rumex longifolius</i> DC	Northern dock	Achene(s)							*		
<i>Rumex</i> sp.	Dock	Achene(s)							**		
<i>Rumex</i> sp.	Dock	© Achene(s)						1			4
<i>Stellaria media</i> L.	Common chickweed	Seed(s)							**		
<i>Stellaria</i> sp.	Chickweed	Seed(s)							*		
<i>Viola</i> sp.	Violet	Capsule(s)							*		
Unknown	Indet	Achene/fruit/seed							**		
Roots		Frag(s)	****	**	**	****				*	**
Plant stems		Frag(s)	****	**	**	****		***	*	****	**
Other											
Charcoal		Frag(s)	*	***		<4mm	<4mm	****	*	**	****
Burnt Bone								*			
Moss											
<i>Sphagnum</i> sp.		Loose leaves			*				****		*
Moss sp.		Stem/leaves					****	*	****	*	*
Spores											
<i>Cenococcum</i> sp.		Spore(s)						*	****		****
Mega spores		Spore(s)			***						
Insects											
Beetle		Frag(s)			*				*		
Earth worm		Capsule(s)			***		**				
Mod cont											
Yellow wool									*		

Table 7. The ecofact assemblage

8.3. Charcoal

Project 23819: Table 2 Charcoal							
Sample	Context	Species	Name	Frag	RW	Weight	Comments
27	49					<4mm	Too small to id
28	51	<i>Amygdalaceae/Sorbus</i> sp.	Apple/pear/hawthorn/rowan	4			
28	51	<i>Corylus avellana</i> L.	Hazel		1		
28	51	<i>Fraxinus</i> sp.	Ash	1			
28	51	<i>Pinus</i> sp.	Pine	2			
28	51	<i>Salix</i> sp.	Willow	2		3.7	
30	56					<4mm	Too small to id
31	66	<i>Corylus avellana</i> L.	Hazel		20	32.7	Mix of roundwood and twigs
32	68	<i>Betula</i> sp.	Birch	3		0.1	
33	63	<i>Betula</i> sp.	Birch	10		3	
34	61	<i>Alnus glutinosa</i> L.	Alder	2			
34	61	<i>Betula</i> sp.	Birch	2			
34	61	<i>Corylus avellana</i> L.	Hazel	5	1	3.7	

Key: Frag=frgment, RW=roundwood, weight recorded in grams

Table 8. The charcoal assemblage

9. Radiocarbon dating

Duncan Garrow

A total of 25 occupation-related samples from our 2023 field season were submitted to SUERC for radiocarbon dating (Table 9).

Site code	Material	Context	Sample ID (orig)	Age	error	1s from rounded	to rounded	BC/AD	Lab No.	Context description	Classification (e.g. species)
BHO23	Peat	33	BHO23_33.1	1049	24	900	1030	AD	GU68476	Peat forming 'capping' on top of stone islet	n/a
BHO23	Peat	33	BHO23_33.2	1069	24	900	1030	AD	GU68477	Peat forming 'capping' on top of stone islet	n/a
BHO23	Charcoal	51	BHO23_51.1	2454	24	-750	-420	BC	GU68478	Patchy burnt layer, on surface of [52]	Maloideae
BHO23	Wood charcoal	51	BHO23_51.2	2432	24	-750	-410	BC	GU68479	Patchy burnt layer, on surface of [52]	<i>Corylus avellana</i> L.
BHO23	Charcoal	54	BHO23_54.1	2437	24	-750	-410	BC	GU68483	Fill of possible cist	Maloideae sp.
BHO23	Waterlogged wood	58	BHO23_58.1	3045	24	-1400	-1220	BC	GU68480	Top of upper brushwood	<i>Salix</i> sp.
BHO23	Waterlogged wood	58	BHO23_58.2	3072	24	-1410	-1270	BC	GU68481	Bottom of Upper Brushwood	cf <i>Salix</i> sp.
BHO23	Carbonised nutshell	61	BHO23_61.1	0	0	0	0		GU68482	Black charcoal rich layer/lens	<i>Corylus</i>
BHO23	Carbonised cereal caryopses	61	BHO23_61.2	4632	24	-3510	-3360	BC	GU68460	Black charcoal rich layer/lens	2-row hulled barley
BHO23	Wood charcoal	61	BHO23_61.3	4640	29	-3520	-3360	BC	GU68636	Black charcoal rich layer/lens	<i>Corylus avellana</i>
BHO23	Waterlogged nutshell	63	BHO23_63.1	4592	24	-3500	-3140	BC	GU68462	Thin brown/black 'stabilisation' layer	<i>Corylus</i>
BHO23	Wood charcoal	63	BHO23_63.2	4620	25	-3510	-3350	BC	GU68463	Thin brown/black 'stabilisation' layer	<i>Betula</i> sp.
BHO23	Carbonised cereal caryopses	66	BHO23_66.1	4683	24	-3520	-3370	BC	GU68461	Stoney brushwood	2-row hulled barley
BHO23	Waterlogged nutshell	66	BHO23_66.2	4680	24	-3520	-3370	BC	GU68464	Waterlogged plant material from occ. deposits	<i>Corylus</i>
BHO23	Waterlogged wood	67	BHO23_67.1	4575	24	-3490	-3110	BC	GU68465	Wattling	<i>Corylus avellana</i>
BHO23	Waterlogged wood	68	BHO23_68.1	4695	25	-3610	-3370	BC	GU68471	Top of lower brushwood	<i>Corylus avellana</i>
BHO23	Waterlogged wood	68	BHO23_68.2	4561	24	-3490	-3110	BC	GU68472	Bottom of lower brushwood	Unidentifiable
BHO23	Waterlogged wood	70	BHO23_70.1	4613	24	-3500	-3350	BC	GU68466	Stake associated with wattling	<i>Corylus avellana</i>
BHO23	Waterlogged wood	70	BHO23_70.2	4654	24	-3520	-3370	BC	GU68467	Stake associated with wattling	Maloideae
BHO23	Waterlogged wood	70	BHO23_70.3	4665	25	-3520	-3370	BC	GU68468	Stake associated with wattling	Maloideae
BHO23	Waterlogged wood	70	BHO23_70.4	4662	24	-3520	-3370	BC	GU68469	Stake associated with wattling	<i>Salix</i> sp.
BHO23	Waterlogged wood	70	BHO23_70.5	4550	24	-3370	-3100	BC	GU68470	Stake associated with wattling	<i>Betula</i> sp.
BHO23	Waterlogged wood	206	BHO23_206.562	4704	25	-3620	-3370	BC	GU68473	Basal wood horizontals u/w	Maloideae
BHO23	Waterlogged wood	206	BHO23_206.563	4593	24	-3500	-3190	BC	GU68474	Basal wood horizontals u/w	<i>Salix</i> sp.
BHO23	Waterlogged wood	211	BHO23_211	4567	24	-3490	-3110	BC	GU68475	Twigs from base of timber layer u/w	<i>Corylus avellana</i>

Table 9. Radiocarbon dates for BHO23 occupation-related deposits

10. Other analytical work

Fraser Sturt

A number of other elements of our research programme were undertaken as part of the 2023 field season (and associated post-ex) but will not be reported on in detail here since analytical work is still ongoing. Two key areas are worth briefly noting while analysis is still underway. These pieces of work were undertaken to address questions that had arisen through work in 2021 and to act on new opportunities.

10.1. Sedimentary DNA

In 2021 a core was taken for Sedimentary DNA analysis, with results still pending. While the work of Brown et al. (2022) has demonstrated the clear potential of this technique for sampling the environs *around* lake sites, less work has been done on samples from *within* these structures. As such, a series of monoliths were collected from the exposed section of the northern extension trench for this purpose. These have now been sampled at the laboratory in Southampton and are currently being processed. The aim here is to be able to compare results from the core and monoliths to improve our understanding of both activity on site and efficacy of the method.

10.2. Loch coring

Through-water radar survey (WPR) was conducted in the spring of 2023. This, matched to the aerial imagery from the drones, underwater photogrammetry and excavation data has provided a clear understanding of the site. To help address remaining questions and provide direct verification of features seen in the WPR, four short cores were collected from around the crannog through use of Livingstone corer. Cores were collected from a floating platform and positions captured with a handheld GPS. Locations were chosen to help establish the presence or absence of organic construction material.

The cores taken confirmed the overall sequence described in the account of excavated deposits above. Critically, they confirmed our understanding of the distribution of these deposits. Liv-6 helped to verify the edge of the transition to a different depositional sequence (stiff clays at the loch margin) and the end to the platform in that area.

BHO23-Liv 1	Description	Interpretation
0-7.5cm	Mid orangey brown clayey silt, with flecks of back	Organic rich crannog construction material (packwerk)
7.5-16.5cm	Sharp transition onto Light buff clay	Lake bed deposits
16.5-25.5cm	Dark grey and black flecked finely laminated clay	Lake deposits
25.5 – 52	Light grey clay, very	Loch bed deposits

BHO23-Liv 3	Description	Interpretation
0-6cm	Mid Orangey brown silty sandy gravel	Modern loch bed deposits [201]
6-8cm	Organic rich silt with hazelnut inclusions	Crannog construction material [204]
8-10cm	Wood	Crannog wooden platform [206]
10 -	Light grey clay	Loch bed [213]

BHO23-Liv 4	Description	Interpretation
0-1cm	Mid Orangey brown silty sandy gravel	Modern loch bed deposits [201]
1-10cm	Organic rich silt with hazelnut inclusions	Crannog construction material [204]
10-16cm	Wood	Crannog wooden platform [206]

BHO23-Liv 5	Description	Interpretation
0-3cm	Mid Orangey brown silty sandy gravel	Modern loch bed deposits [201]
3-6cm	Organic rich silt with hazelnut inclusions	Crannog construction material [204]
6-8cm	Wood	Crannog wooden platform [206]
8-12cm	Light grey clay	Loch bed [213]

BHO23-Liv 6	Description	Interpretation
0-1cm	Mid Orangey brown silty sandy gravel	Modern loch bed deposits [201]
1-15cm	Stiff green/grey clay with orange banding	Loch bed deposits

Table 10. Core descriptions

11. Discussion

At the start of this overall discussion section, we will begin by revisiting all of the key questions identified in 2021 as being important to address through further work in 2023.

1. Spatial extent of the Neolithic timber phase platform/mound

This has been as fully resolved as it can be without substantial further excavation. The overall size of the primary phase timber platform is roughly 23 m in diameter. This is based on the combined results of excavation, coring, aerial photography and water penetrating radar.

2. Presence/absence of any (timber?) architecture, or other features associated with the timber phase

Our intention in 2023 was to resolve this issue through excavation of the South quadrant, whose large spatial extent was thought most likely to reveal any such structures. Unfortunately, this aim was thwarted by flooding, but the wattling revealed within the Northern extension does appear to be an architectural feature of some kind. The sequence surrounding it indicates that the crannog represented a dynamic environment which was over topped by water periodically, with architectural work/rebuilding happening on a regular basis. These architectural elements could represent attempts to consolidate the islet. It is of course possible that they reflect different forms of structure, but without broader excavation it is not possible to say.

3. Depth of Neolithic stratigraphy underwater – are there layers pre-dating the timbers observed in 2021 and what are they like?

This issue was resolved through excavation of a sondage down through the full vertical extent of the underwater timbers. This revealed a depth of at least two timbers thick indicating an even more substantial construction than expected. These timbers were sampled for radiocarbon dating, which demonstrated that these are probably contemporary with (rather than clearly earlier than) those observed in 2021.

4. Resolution of whether the upper brushwood layer is primary Middle Bronze Age

Hand-picked twig samples for radiocarbon dating were taken from the top and bottom of this layer in order to resolve this issue. It dates to the MBA, and thus presumably represents a raising of the islet at that point, most likely towards the western half of the original wooden platform (the eastern half may have been tipping down into the water by then).

5. Refinement of our understanding of the Middle Bronze Age phase features and character/purpose of associated activity

No new MBA layers were detected in 2023, meaning that no significant new understandings were forthcoming. However, in addition, a small pit and a patch of burnt material dating to the Early Iron Age were observed, indicating probably low-level activity on the islet during this period as well; occupation from this phase had not previously been detected on the site.

6. Presence/absence of any Middle Bronze Age material culture on the site

Pottery dating to the Bronze and Iron Age is often indistinguishable diagnostically. Some Bronze/Iron Age sherds were found in 2023; one of these (with charcoal adhering to it) was radiocarbon dated to the Early Iron Age. The MBA phase therefore remains not certainly represented on the site in terms of material culture.

7. Date/function of stone phase architecture

The stone islet – in the form it is visible today – accumulated over multiple phases. As outlined above, some stones are thought likely to have been brought in initially during the primary Neolithic phases, in order to consolidate and spatially fix the timber platform (possibly only around the edges), perhaps also serving to contain an inner area of brushwood. The substantial MBA burning events observed in our 2021 and 2023 excavation trenches took place on top of a clay layer [56] deposited above the upper brushwood.

Subsequent to this activity, the islet form that we largely see today was created – this involved creation of the internal stone ‘floor’ probably involved consolidation of the outer ring of the (now much smaller) stone

islet, and creation of an internal stone ‘floor’, as well, perhaps, as enhancement of the pre-existing stone cairn. It is during this phase of alterations that, we think, many of the stones originally placed on the eastern side of the platform during the Neolithic were ‘robbed out’, brought over to consolidate and raise the level of the island (broadly covering the above-water area seen today).

8. Date of peat formation on top of context [36] (stone capping)

Two samples of the peat layer were taken for radiocarbon dating during our 2023 excavations. These produced radiocarbon dates of c. 900-1030 cal AD, establishing a TAQ for the final phase of stone architecture on the islet.

9. Fluctuating loch levels and site formation processes

Given the additive construction sequence of the islet’s architecture, in combination with clear signs of loch-related in-washing within especially the northern extension trench, it is clear that rising loch levels – perhaps also in combination with sinking/compression of the crannog itself – were an issue throughout most of the site’s lifetime. As discussed above, it is likely that – perhaps even as early as the Neolithic, but certainly during the site’s reoccupation in the Middle Bronze Age – the islet was consolidated/enhanced only on its western side, towards the closest shoreline and away from deep water. The latter presumably caused a greater degree of water ingress and/or down-tipping into/of the original platform. The outlet from the loch today is set naturally by the local topography; when full enough, water runs out from the north-eastern part of the loch. It is not entirely clear, at present, what caused the rising water levels witnessed over the lifetime of the site. It is possible that de-wooding of the local landscape (not least to construct the platform) may have led to increased run-off. Similarly, peat growth in the local landscape also may have affected the way in which the loch levels fluctuated – as we ourselves experienced in 2023, following heavy rainfall (for only two days), loch levels can (and therefore presumably always could) rise significantly within a short amount of time; today, the boggy ground all around the loch soaks up large amounts of water, ensuring continued inflow and thus also high water levels for many days.

10. Creation of age/depth model for terrestrial peat formation/basin infill

The dates collected on the cores taken for this project will allow for an understanding of localised peat formation to be produced when results are returned.

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