Submerged Neolithic of the Western Isles

Interim Report (March 2017)

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Executive Summary

This report details the results of survey work carried out at three islet sites (Loch Arnish, Loch Bhorghastail and Loch Langabhat; see Figure 1) on the Isle of Lewis, Outer Hebrides in July 2016. The survey employed non-intrusive techniques (dual frequency echo sounder, side scan sonar, diver survey and aerial remote sensing) to better characterise the archaeology at these locations. The time spent at each site was short (c. 3 days) and, as such, the results presented here are of a preliminary nature, intended to help shape future research.

The main findings of the survey include:

- all three islets were artificial constructions that made use of local topography
- bathymetric survey indicated that all three islets were constructed on local rises at the edge of deeper water
- all diagnostic pottery recovered from two of the sites (Bhorghastail and Langabhat) was Early Neolithic in date, suggesting that they may date exclusively to that period
- these sites represent a significant resource for improving our understanding of the Neolithic of the Outer Hebrides, and the UK more broadly

Research context

Artificial island settlements constructed in lochs – often known as 'crannogs' – are a geographically widespread and intriguing category of archaeological site. Over 400 such sites are recorded by the RCAHMS in Scotland, and many more no doubt lie undetected. The Outer Hebrides represent a particular hotspot in their distribution, with 100-150 sites identified across the island chain.

Despite their widespread occurrence and, presumably, hugely significant role in Scotland's prehistoric and historic past, crannogs arguably remain "among the most understudied archaeological sites in the UK" (Cavers 2010, 178). Firstly, crannogs have suffered from a lack of excavation. Many of the sites listed by Canmore and in other gazetteers were first identified by survey in the 19th and early 20th centuries, and only a very few have been excavated. Henderson (1998, 227) cited just five dug to modern standards, and even today the number of Scottish crannogs – of any date – subject to modern excavation can be counted on two hands. Consequently, their character – as a single (?) site type – is far from fully understood. The survey-derived terminology relating to these sites can also be confusing – as Armit pointed out, the (often decades old) classification of a given site as a 'broch', 'island dun' or 'crannog' might well be viewed as artificial, and based mainly on its current condition rather than any true difference in the past (1990, 53).

Unusually, this one site type occurs in many different periods. Initially assumed to date mainly to the Early Medieval period, their date span was pushed back considerably by the widespread application of radiocarbon dating from the 1970s onwards. Synthetic dating work carried out by Crone (1993) and Henderson (1998) suggested that the origins of many, and possibly most, sites may actually lie in the Late Bronze Age or Iron Age. The picture is, however, complicated. It is likely that many of these sites were multi-phase – constructed, used and re-used throughout the time span from Late Bronze Age to the medieval period. As the new evidence discussed in this report suggests, some – and possibly many – sites appear to be much earlier in date with origins in the Neolithic (c. 3800-2500 BC).

Figure 1. Map showing the location of the three lochs investigated during the 2016 field season. Topographic data from OS Terrain 5 DTM from EDINA Digimap Ordnance Survey Service © Crown Copyright and Database Right [2017]. Ordnance Survey (Digimap Licence)

Crucially, one islet settlement – Eilean Domhnuill, North Uist – has previously been identified as certainly Neolithic in date (Armit 1996; 2003). The site was excavated by Armit and his team in the late 1980s. Having set out to dig what everyone thought likely to be an Iron Age crannog, Armit soon realised that the site was in fact Early Neolithic – huge quantities of material culture of that date were recovered. Built on what appeared to be a sizeable, artificially-constructed island (25 x 15m) linked to the land by a short causeway, the Neolithic settlement there is now known to have lasted over a thousand years from c. 3650-2600 cal BC (Copper 2015; Armit in prep.). Multiple phases of buildings were identified, and the islet has been interpreted as a seasonally-occupied site of potentially specialised (ritual?) function that was eventually abandoned due to flooding (Armit 2003). Eilean Domhnuill has often been compared to another Neolithic island settlement in North Uist, Eilean an Tighe, which was dug in the 1930s (Scott 1951). The two sites have extremely similar pottery assemblages (Copper 2015) and share other similarities. However, their geographical situation is actually quite different, with Eilean an Tighe sited on a much larger (50 x 15m) island when excavated. As Scott discussed, it is possible that the site was originally located on a promontory, becoming an island much more recently due to raised water levels in the loch (1951, 1-2).

Since the recognition of Eilean Domhnuill as a Neolithic site, many writers have suggested the possibility that other crannogs of an equally early date might be found – as discussed above, the vast majority are unexcavated and thus dated by uncertain typological association only. As Henderson put it, "Eilean Domhnuill is currently the only Neolithic artificial islet site known but there can be little doubt that others will come to light" (Henderson 1998, 229; see also Crone 1993, 248; Armit 1996, 52; Holley 2000, 128; Cavers 2010, 42; Copper 2015, 446 where similar suggestions are made). However, until recently, not a single additional site had come to light, despite sometimes concerted attempts to uncover one (e.g. Henley 2012).

Research background

Underwater reconnaissance work carried out in 2012-2013 by Chris Murray (an amateur underwater archaeologist) and Mark Elliot (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 (Table 1). 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 (Principal Curator of Early Prehistory, National Museum of Scotland), where they currently reside.

Site	**Details of pottery (Copper 2015)**	**Radiocarbon date at 95% confidence (Garrow et al. 2017)**
Loch Arnish	36 sherds are Neolithic	3510-3350 cal BC
Loch Bhorghastail	21 sherds are Neolithic	3640-3380 cal BC
Loch an Dùin (Dun Carloway)	At least 1 of 2 sherds is Neolithic	-
Loch an Duna	8 sherds are Neolithic	3520-3370 cal BC
Loch Langabhat	16 sherds are Neolithic	-

Table 1. Isle of Lewis islet sites with Neolithic pottery discovered by Chris Murray and Mark Elliot

Unsurprisingly, these new discoveries attracted considerable attention within the archaeological community, representing as they did possible evidence of the widespread presence of Neolithic

crannogs that had long been suspected and sought. Our (DG/FS) first involvement with the sites came about through contact with Alison Sheridan, who was aware that we were undertaking a radiocarbon dating programme focusing on Early Neolithic settlement sites on island groups within the 'western seaways' of Britain (Sheridan et al. 2014). Through that project, we were able to date residues on single sherds from three of the loch sites that Murray and Elliot had discovered, all of which confirmed their suspected Early Neolithic 4th millennium cal BC dates (Table 1; see Garrow et al. 2017 for details).

We subsequently contacted Chris Murray about the possibility of carrying out further underwater survey work on some of the sites. Consequently, with the support of Deborah Anderson (then Western Isles Archaeologist), we applied for – and subsequently received – research funding from the British Academy/Honor Frost foundation/Leverhulme Trust to undertake further work. In May 2015, we carried out a reconnaissance visit to Lewis, guided by Chris Murray, visiting all of the sites over the course of two days. The main purpose of the visit was to better determine site morphology and survey strategy, as well as to permit detailed risk assessment for the next phase of the project. The trip was also helpful in clarifying further the context of the archaeology previously uncovered and the logistical accessibility of the sites. Following that visit, we produced a recce report (Garrow et al. 2015) outlining our plans for more substantial future work to be carried out in the summer of 2016. Given the relatively limited budget and thus time available to us in 2016, we decided to focus on three sites only: Loch Arnish, Loch Bhorghastail and Loch Langabhat.

Our priorities were:

(1) to resolve in more detail the topography/bathymetry of the sites in order to understand in detail the local context within which the islets may have been constructed, and thus potentially whether or not they were artificial

(2) to undertake diver-based survey work in order to uncover further diagnostic material and to identify architectural features such as worked timbers, stone causeways, etc.

(3) to carry out underwater geophysical survey work in order to understand the extent/depth of loch-bed sediments

Fieldwork 2016

The 2016 survey season took place from 9-23 July 2016. The recce in 2015 had allowed for an appreciation of the logistical complexity inherent in survey at two of the sites: Loch Bhorgastail and Loch Langabhat. While in fairly close proximity to major roadways, access required crossing potentially waterlogged areas for distances of over 500m. Fortunately marine survey tools have developed to the point where priorities 1 and 3 could be addressed through use of small lightweight instrumentation capable of being mounted on a small boat. Diving equipment, while comparatively heavy when considered against terrestrial archaeological survey equipment, could also be transported over these distances through use of quad bike and trailer.

Prior to the field season, the available topographic and aerial photographic data were collected and integrated within ArcGIS 10.4. This included:

Topographic Data	**Source**
2m Digital Surface Model	Centre for Environmental Analysis
5m Digital Surface Model	Centre for Environmental Analysis

5m Digital Elevation Model	Ordnance Survey via EDINA Digimap
Aerial Photographic Data	**Source**
0.25m Aerial Photographs	Get Mapping
Historic Environment Data	**Source**
Scheduled monument locations	CANMORE
Cartographic Data	**Source**
Vector Mastermap	Ordnance Survey via EDINA Digimap

Table 2. Data sources integrated within the GIS prior to fieldwork

These data provided a valuable baseline with regard to topography and site delineation from aerial photography. However, they gave little indication about loch bathymetry and morphology. As such, the priority for the 2016 field season was to address the underwater aspects of these sites.

Survey Methodologies

The survey design for this project was developed in accordance with Pletts et al.'s (2013) guidance for marine geophysical projects. Principally it included three components:

1. Geophysical Survey
2. Aerial Survey
3. Diver Survey

Geophysical Survey

The following equipment was mounted on a small inflatable boat (see Figure 2).

- Leica Viva RTK GPS with smartnet and independent base station (to ensure correction signal in areas of poor mobile phone coverage) to provide centimetric accuracy in three dimensions (x, y, z)
- Valeport soundbar (for determination of speed of sound through the water)
- Midas Surveyor dual frequency single beam echosounder (33 and 210 khz)
- Tritech Starfish 990F side scan sonar (SSS)

The GPS was pole-mounted directly above the single beam and SSS systems. A measurement was made to provide the offset between the GPS antenna height and single beam and SSS sources. Heading data could be computed from the difference in the two antenna positions, and from a NASA NMEA electronic compass mounted amidships. This allowed for highly accurate positioning of the vessel, its course, orientation and acquired geophysical data.

Shallow freshwater survey is a technically demanding activity. The majority of marine survey tools are designed to operate in depths of greater than 4m, with c. 10m being closer to the norm. As survey depths become shallower systems can begin to suffer from 'ringing', where the amount of energy transmitted through the system reverberates through the water column, overprinting the data you are trying to capture. Equally, the lochs themselves can be highly variable with regard to water salinity, turbidity and depth. In order to address these issues the sound bar was used to gain an accurate measurement for the speed of sound within the water column for each loch. The use of a dual

frequency echosounder offered a lightweight, low energy means of gaining both bathymetric data and an insight into sediment thickness. The 990F SSS is a high resolution, small, portable device, suitable for shallow water survey where identification of small (sub 10cm) features is required.

Figure 2. Geophysical survey and finds recording at Loch Bhorgastail

Side scan sonar data was exported as .xtf files from within Tritech's proprietary Scanline 2.1 software, before being processed within CODA survey engine and exported as geotiffs for integration within ArcGIS 10.4.

Bathymetric data was downloaded via MIDAS's proprietary software before being exported as .xyz files for interpolation to a continuous raster surface within ArcGIS. The difference between the depths returned by the two frequencies was used to give a guide to sediment thickness.

Aerial Survey

A DJI Phantom vision 2+ quadcopter was used to capture photographic and video data over the loch sites. Ground control points were established using the RTK GPS to allow the outputs to be used to produce accurately georefenced images. These data were processed within Agisoft Photoscan Pro to produce 3D data from photogrammetry and orthophotos, and subsequently integrated with the other survey methods via ArcGIS 10.4. The majority of flights and initial data processing was carried out by by Dr Jonathan Benjamin.

Diver Survey

A dive team compliant with Health and Safety Executive (HSE) Diving at Work (1997) regulations, and Scientific and Archaeological Diving Accepted Code of Practice (2014) formed a core part of the 2016 survey team. All dives were conducted using full face masks with redundant air source and through-water communications. This allowed the loch beds to be investigated in detail, addressing the project's principle aim of recovering small amounts of diagnostic material when found on the surface of the loch bed.

Diving operations were split into two phases. Phase 1 saw divers systematically search the area around each crannog site. When material culture/construction features were identified, a marker flag was

placed in the water. Once the phase 1 search had been completed, phase 2 saw documentation of find locations/features. Given the relatively shallow nature of the lochs, a team of divers worked in co-operation with a total station operator on the islet. Through use of the underwater communication system with a diver on the loch bed and a snorkeller on the surface it was possible to use a long (6m) survey pole with reflector to gather positions for finds/features as well as data on what was being recorded (e.g. was it a pot sherd to be recovered (and if so which number it was allocated) or a structural feature). In this manner a rapid and accurate finds distribution and site plan could be developed.

In addition, the dive team carried with them both small (GoPro) and large (Nikon D610) cameras in underwater housings. The photographs and videos captured by each dive team were used to document the context of finds and to create photogrammetric models. In areas of key concern, weighted photogrammetry targets were used to provide a spatial bounding box, with positions for the targets taken by the total station team. This allowed for integration of underwater survey data with terrestrial and aerial data.

Results

The following section provides an overview of interim results from the data gathered in 2016. Each of these datasets will continue to be worked on over the coming months to assist in refining goals and methods for a proposed 2017 season.

Loch Arnish

Loch area: 4.4 hectares
Maximum depth: 10 metres
Crannog area: 263 square metres

Loch Arnish was the first site to be surveyed in 2016. This was due to its ease of access and close proximity to Stornoway. This allowed for systems to be configured and checked whilst in close proximity to hardware suppliers and support.

Figure 3. 'Get Mapping' aerial image of Loch Arnish, showing Crannog and dam

Bathymetric Survey

Bathymetric survey of the loch provided metrical data to support the detailed description given by Chris Murray based on his previous dives. The crannog is constructed at the easternmost edge of a comparatively shallow part of the loch, directly abutting the loch's deepest point (see Figure 4). The dual frequency echo sounder allowed for a coarse evaluation of potential sediment depth (Figure 5). These data indicate potentially deep, fine-grained sedimentary sequences in close proximity to the crannog. While Figure 5 indicates sediment depths of up to 8m, these absolute values should be treated with caution, with dual frequency outputs of this sort being indicative rather than definitive (for reasons discussed below).

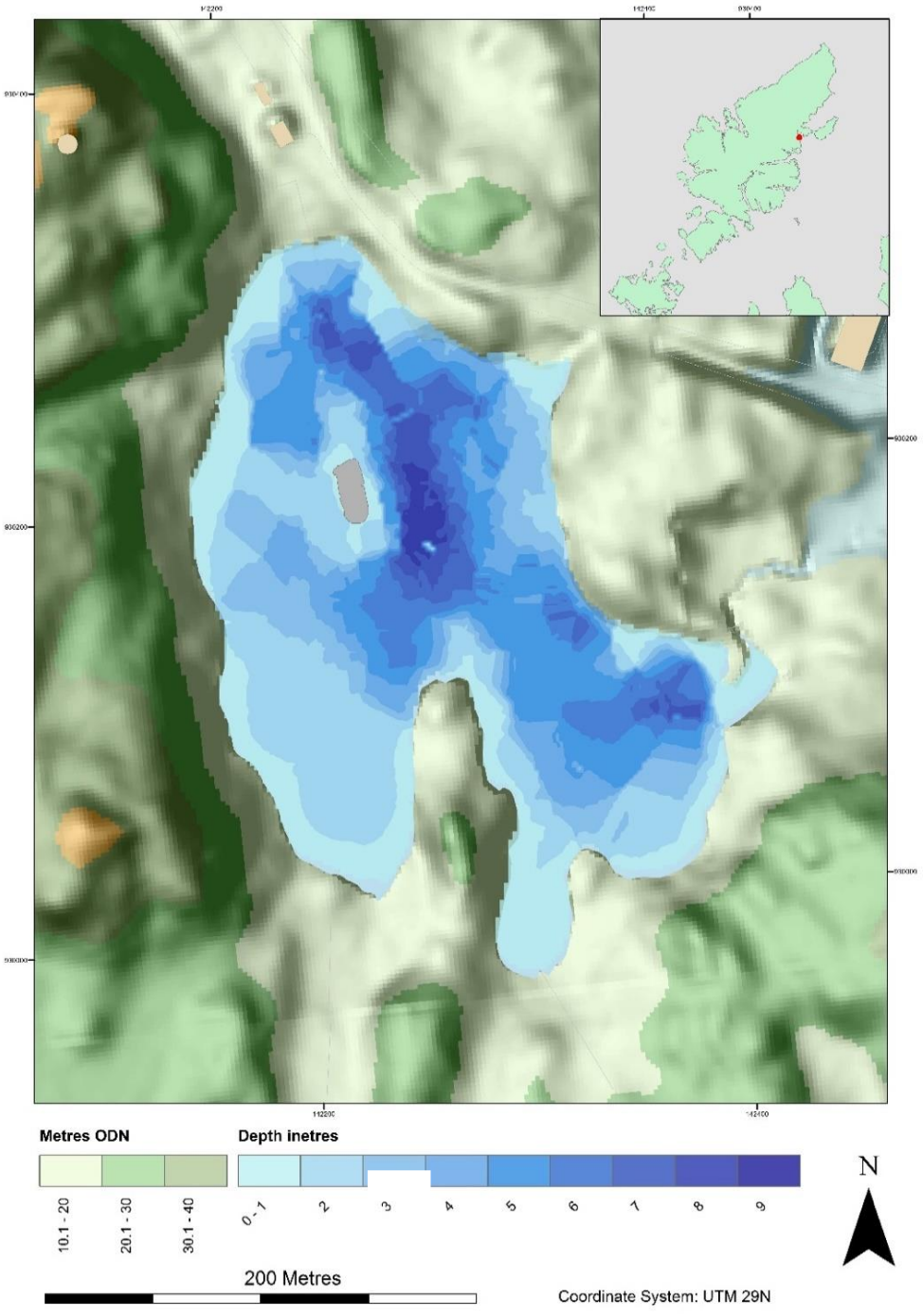

Figure 4. Bathymetric survey results from Loch Arnish

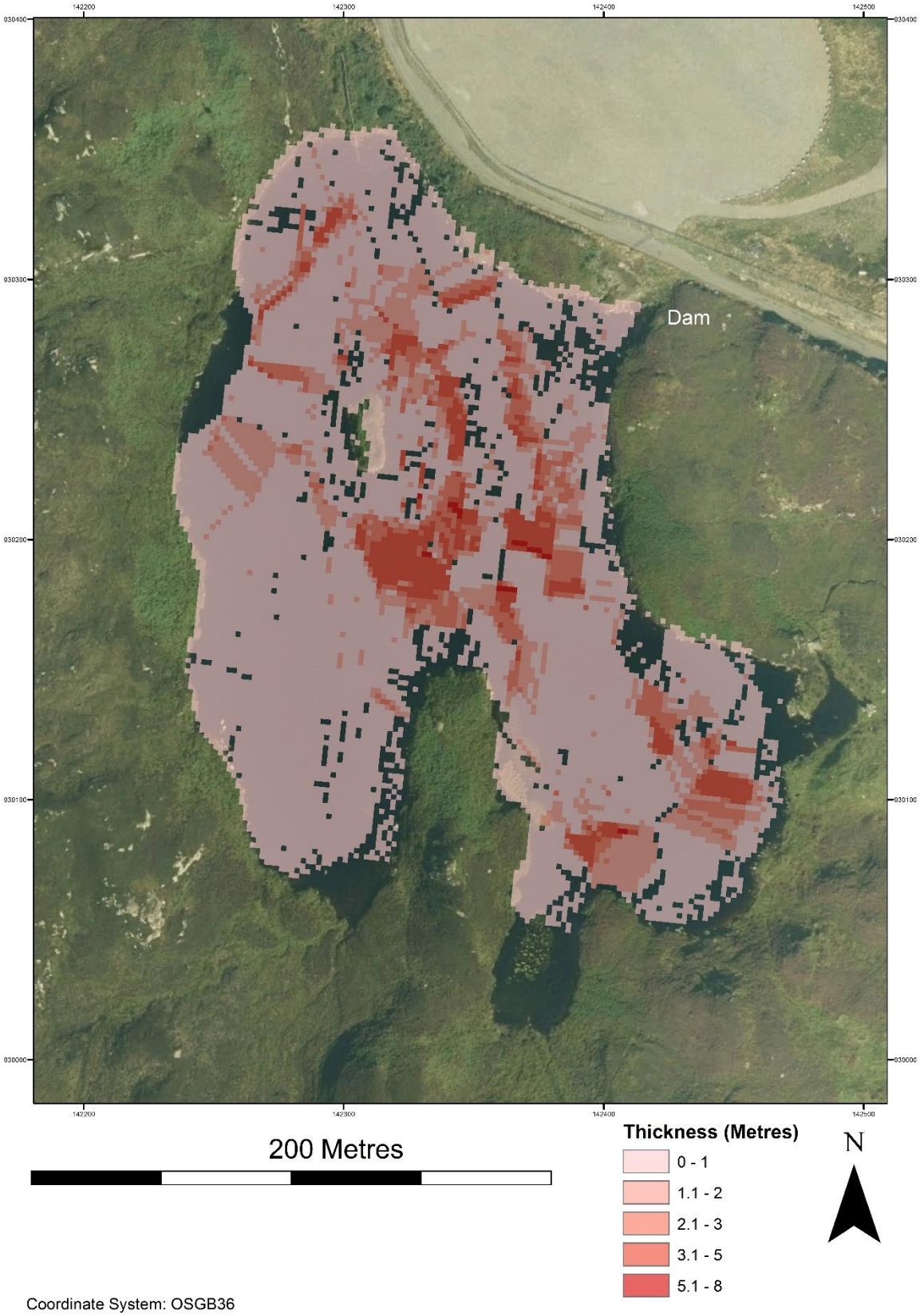

Figure 5. Coarse grained sediment depths determined from dual frequency echo sounder values for Loch Arnish

Side Scan Sonar

Side scan sonar survey of the loch was important for two reasons. First, it allowed the identification and mapping of features on the loch bed. This, when combined with Chris Murray's descriptions, allowed for effective survey planning. Second, the side scan survey allowed divers to be safely deployed on site, even with low visibility, as it allowed identification of potential entanglement hazards.

The side scan survey achieved the desired the results, offering a high resolution image of the loch bed, crannog edges and associated features. In particular the following could be observed when taking into account the results of the bathymetric survey and Chris Murray's previous experience:

1. The crannog is comprised mostly of large boulders (greater than 40 x 40 x 40 cm) piled on top of each other at the edge of a shallow part of the loch (Figures 6, 7 and 8).
2. The shallow area to the west of the crannog (Figures 8 and 9) shows a rubble/boulder spread merging into fine grained sediments. This area had been described by Chris as the potential location of a causeway.
3. There is an area of potential wall collapse, possibly associated with earlier phases at the site, on the south east corner of the crannog.

Aerial Survey

Thick vegetation growing on the crannog complicated survey over the site. However, it was still possible to create a 3D model from the photogrammetric and RTK GPS data. Visible in Figure 6 (bottom centre) is the sharp 'v' shaped boat dock, also visible in Figures 7 and 8. The upper part of the crannog has been built up with dressed stone walls and has other features (iron mooring rings) set into it which speak of the likely multi-period nature of this site.

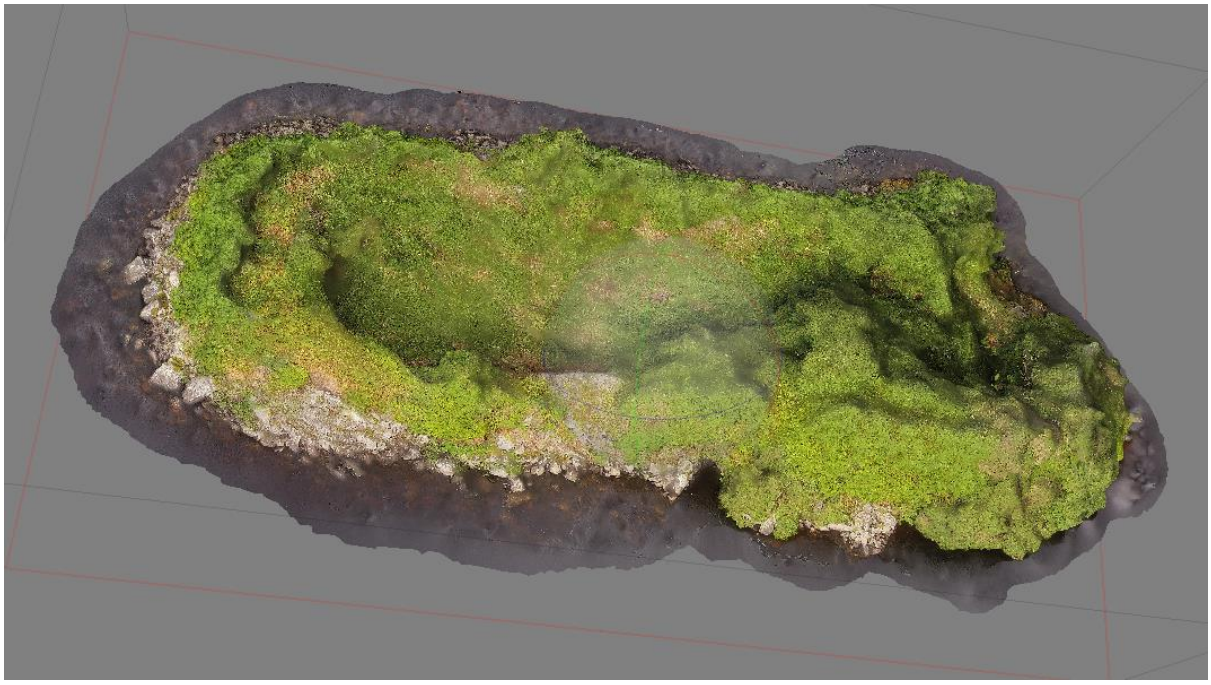

Figure 6. Textured 3D model from photogrammetric data

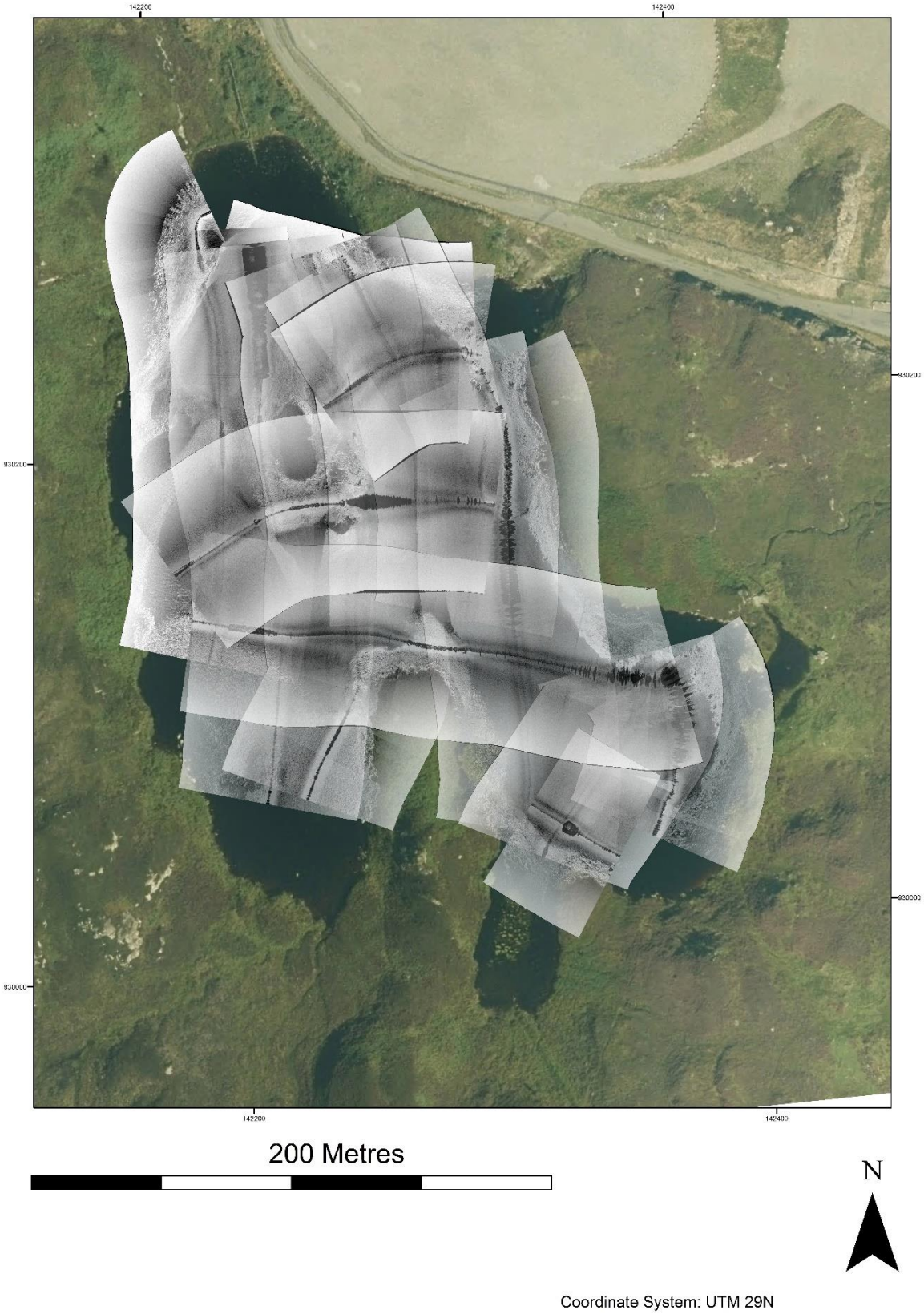

Figure 7. Side scan sonar mosaic of Loch Arnish

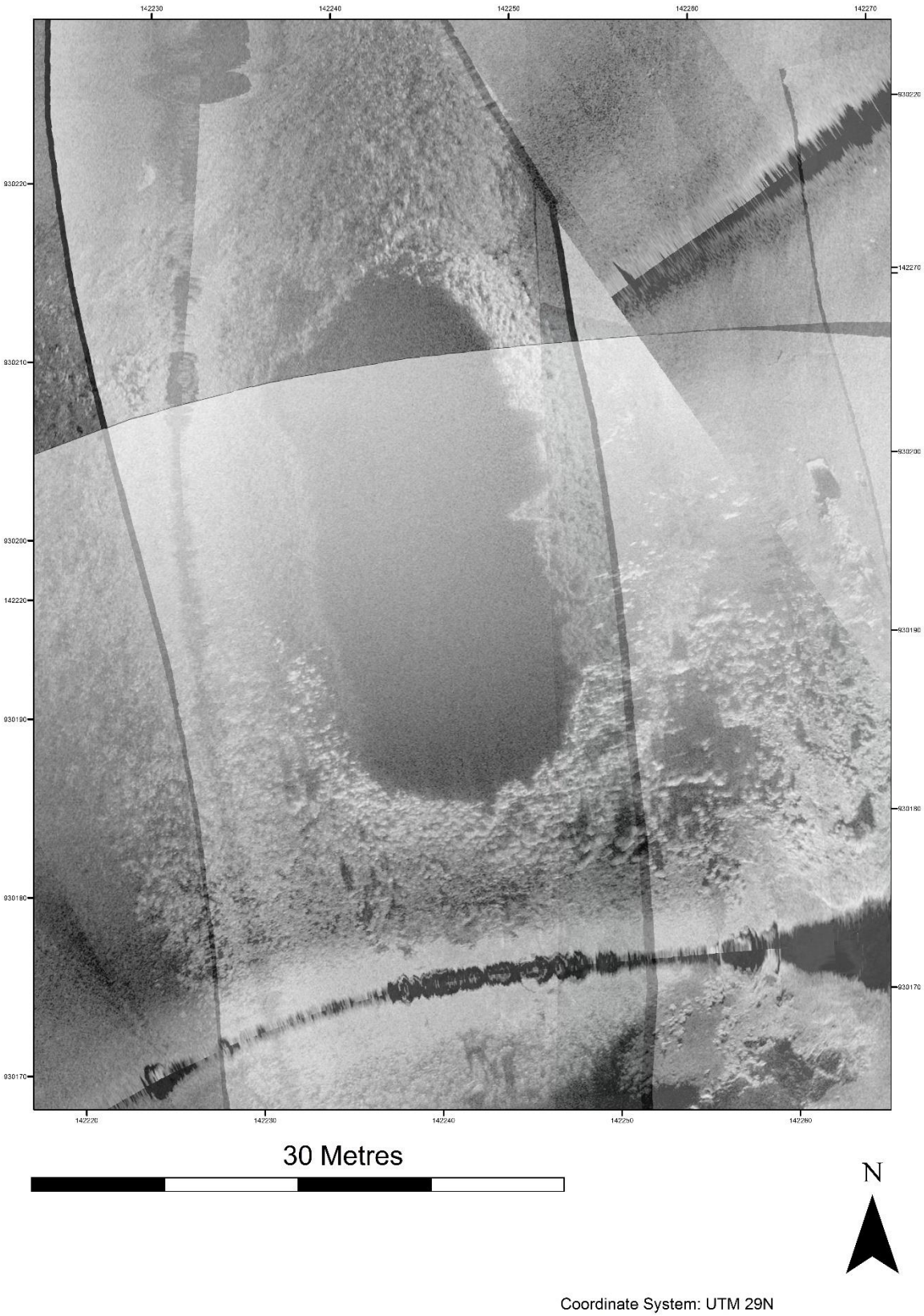

Figure 8. Detail of the Loch Arnish crannog structure from the side scan sonar data

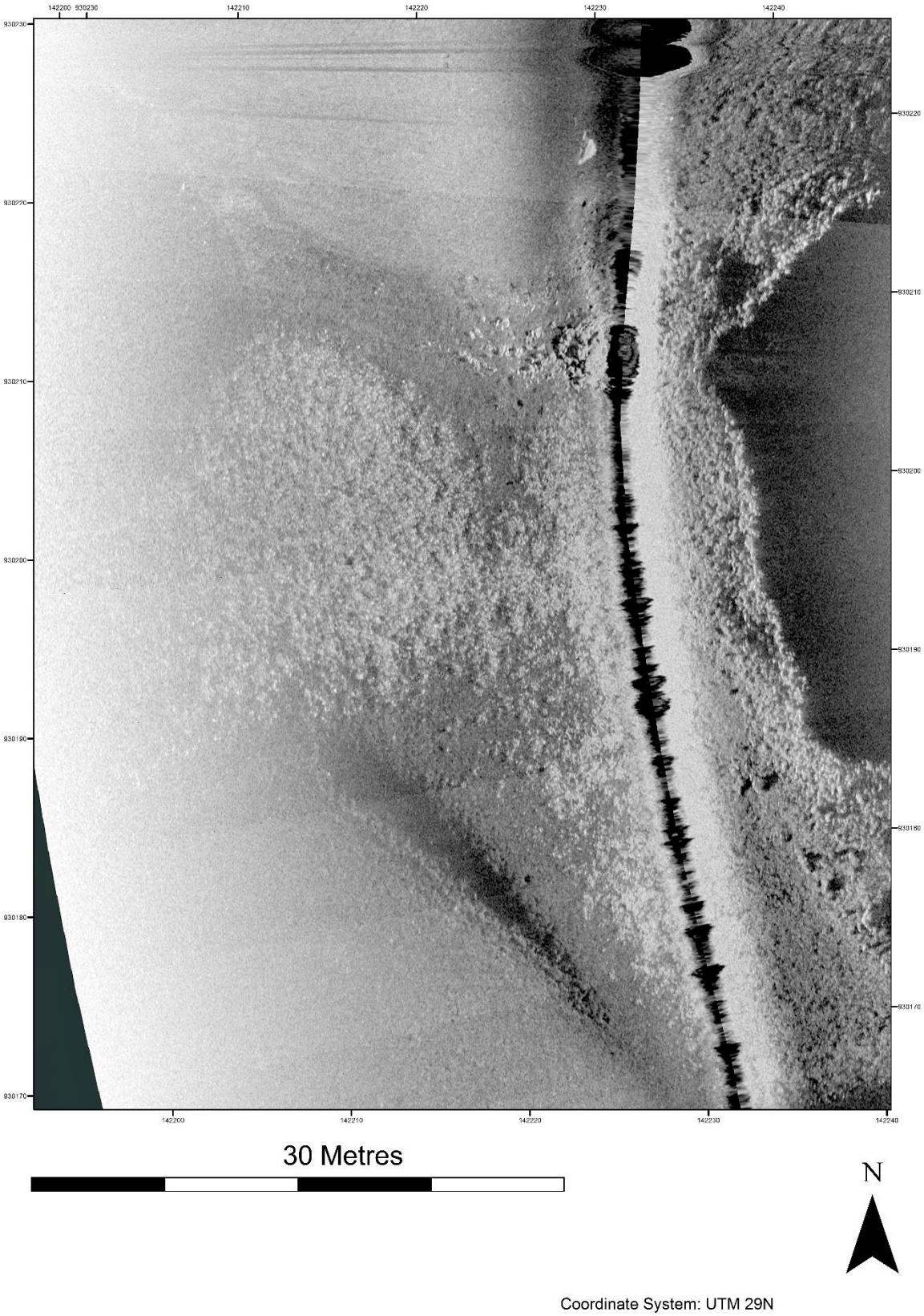

Figure 9. Detail of the 'causeway' area to the west of the crannog

Diver Survey

At Arnish, visibility was poor (less than 30cm) below the top 40cm of the water column. This meant that diver survey was slow, and often reliant on fingertip search. Twelve dives were completed with more than 20 circuits of the crannog undertaken, moving from its base to the surface. During this survey three items of note were discovered:

1. A large perforated timber found off the north east corner of the island
2. Six fragments of prehistoric pottery (at 1.5m depth on the NW tip of the island)
3. Fragments of heather on the possible 'causeway' feature

The timber had been previously noted, raised and described by Chris Murray and Mark Elliot. On this occasion the timber was lifted from the water to allow documentation (photographic and drawn), then replaced with coordinate and depth noted to allow others to recover in future if desired. Photographs of the timber element were sent to Dr Michael Bamforth, University of York, with the opinion offered being that it was potentially a structural element. With no absolute date available, it is not possible to say certainly when this dates to, although it is thought likely to be medieval or post-medieval based on the degree of preservation, squaring-off of the timber, shallow location of recovery and close proximity to later modification of the crannog (dressed stone and iron ring). There is also a possibility that it could be a rubbing strake from a small boat.

The six fragments of pottery were all found on and amongst the rocks from which the crannog is constructed, within a small area on the north-west tip of the island. These most likely date to the Late Bronze Age (see Appendix 1).

Summary

The results from Loch Arnish indicate a complex multi-period site. Chris Murray's earlier finds suggest a Neolithic presence/starting point to the sequence, with later Bronze, Iron Age and medieval/post-medieval additions. The fine grained sediment deposits found in the deeper water next to the site may well be suitable for environmental analysis.

The presence of a modern dam at the NW edge of the loch (see Figure 3) demonstrates one factor that will have led to water level change. This, matched to the recovery of heather/organic matter in the shallower water close to the crannog, indicates that during prehistory water levels are likely to have been lower, with a shallow marsh to the west of the islet. Further research into this sequence would allow for reconstruction of past water levels and an improved understanding of the context within which the crannog was constructed.

Loch Arnish represents a significant multi-period site, with potential occupation/activity spanning the Neolithic to post-medieval period. The continued use and modification of the site means that any more refined understanding of the sequence would require excavation and sampling both above and below the current water level.

Loch Bhorghastail

Loch area: 10 hectares
Maximum depth: 16 metres
Islet area: 163 square metres

Loch Bhorghastail was the second site to be surveyed. The islet was visibly different to that at Arnish, appearing smaller, more like a cairn and lacking the dressed stone upper elements. In addition, the causeway is clearly visible (and can be seen in the aerial photograph given in Figure 10). Access to the loch required movement of equipment by hand and trailer from the nearest access point to the north, over 800m across boggy ground.

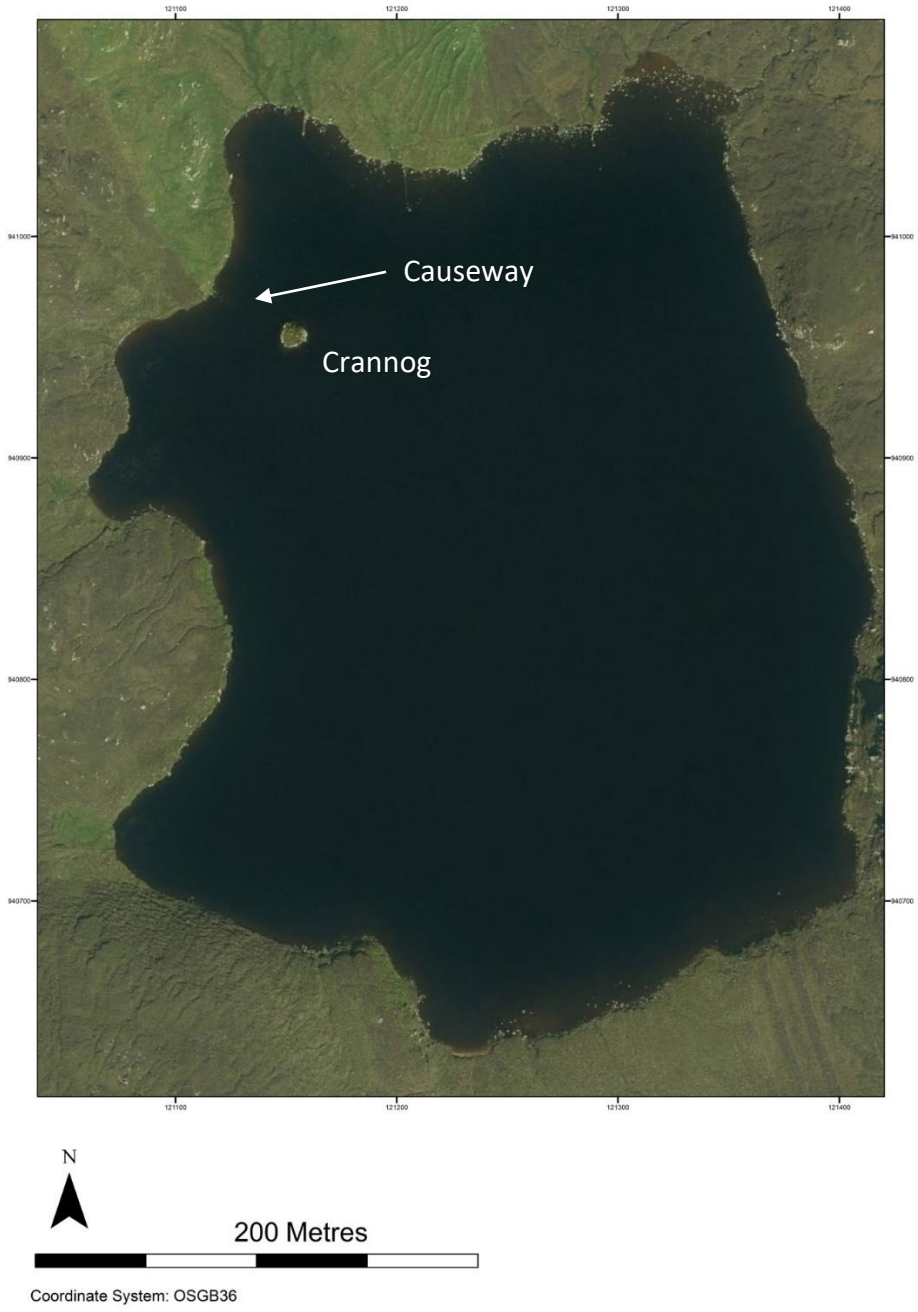

Figure 10. Aerial photograph of Loch Bhorghastail showing crannog and causeway location

Bathymetric Survey

As with Loch Arnish, bathymetric survey revealed that the crannog sits at the far extent of a shallow part of the loch, in close proximity to deep water. The loch has a maximum depth of 15m, but for much of its extent is surrounded by an extensive shallow shelf at the edge. The comparison of depths given by the two frequencies on the echo sounder again indicate the presence of fine grained sedimentary deposits across the loch (Figure 12). In the deeper areas of the loch these may extended to a number of metres. In the shallows around the crannog, depths of sediment were reduced, but may be in the order of one or two metres.

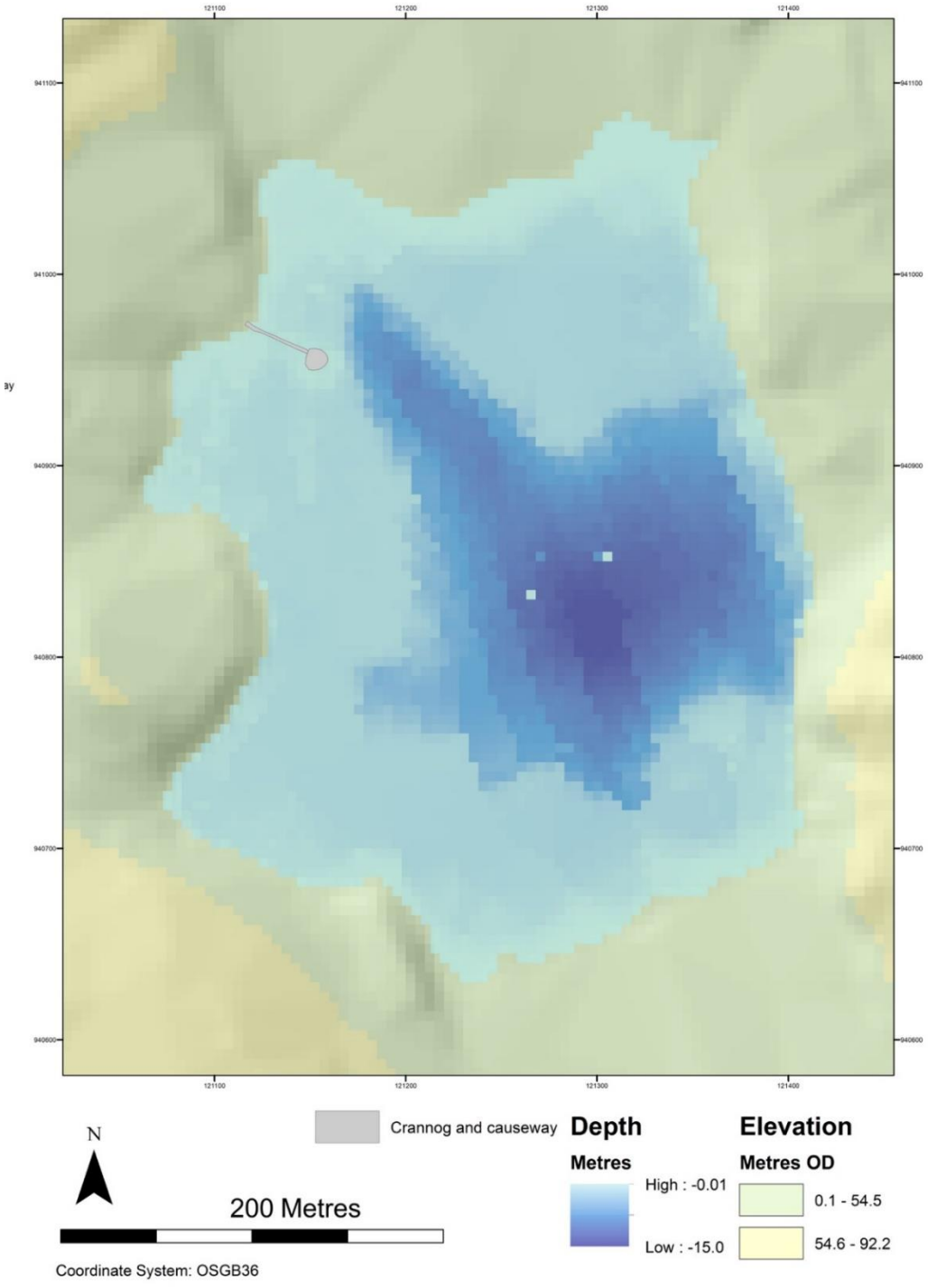

Figure 11. Bathymetry of Loch Bhorghastail

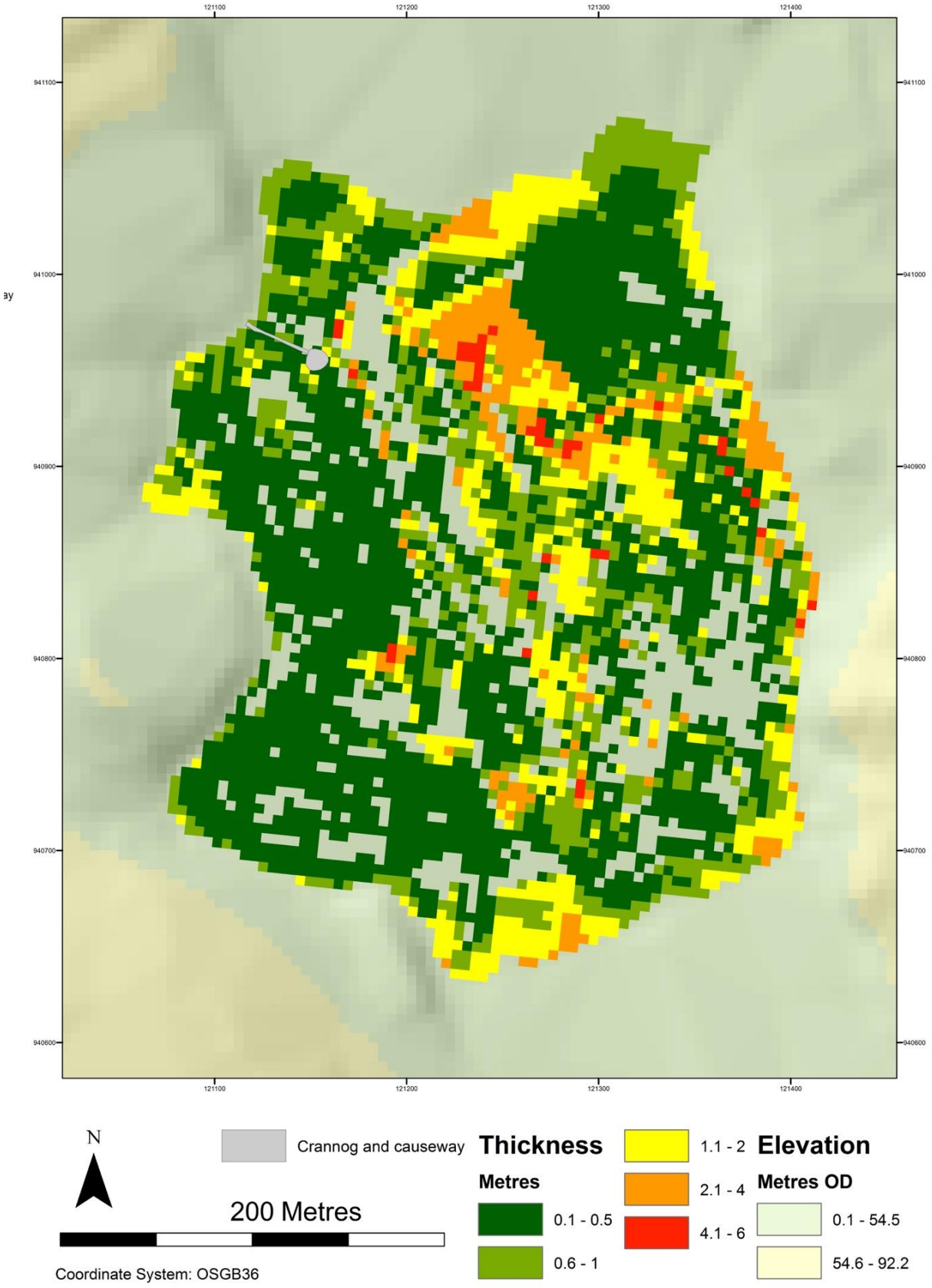

Figure 12. Approximate sediment thickness for Loch Bhorghastail

Side Scan Sonar

Figure 13 provides an overview of selected lines from the SSS survey. This revealed the shallow margins of the loch to be littered with small rocks and boulders, giving way to fine grained sediments and a cleaner floor to the loch as depth increased. This pattern was confirmed through the diver survey (see below).

Figure 14 provides an overview of selected SSS data for the area around the crannog. As at Arnish, the side scan worked well to record the boulder construction of the crannog, and its close proximity to the slope into deeper water.

Figure 13. SSS selected lines from BHO Survey

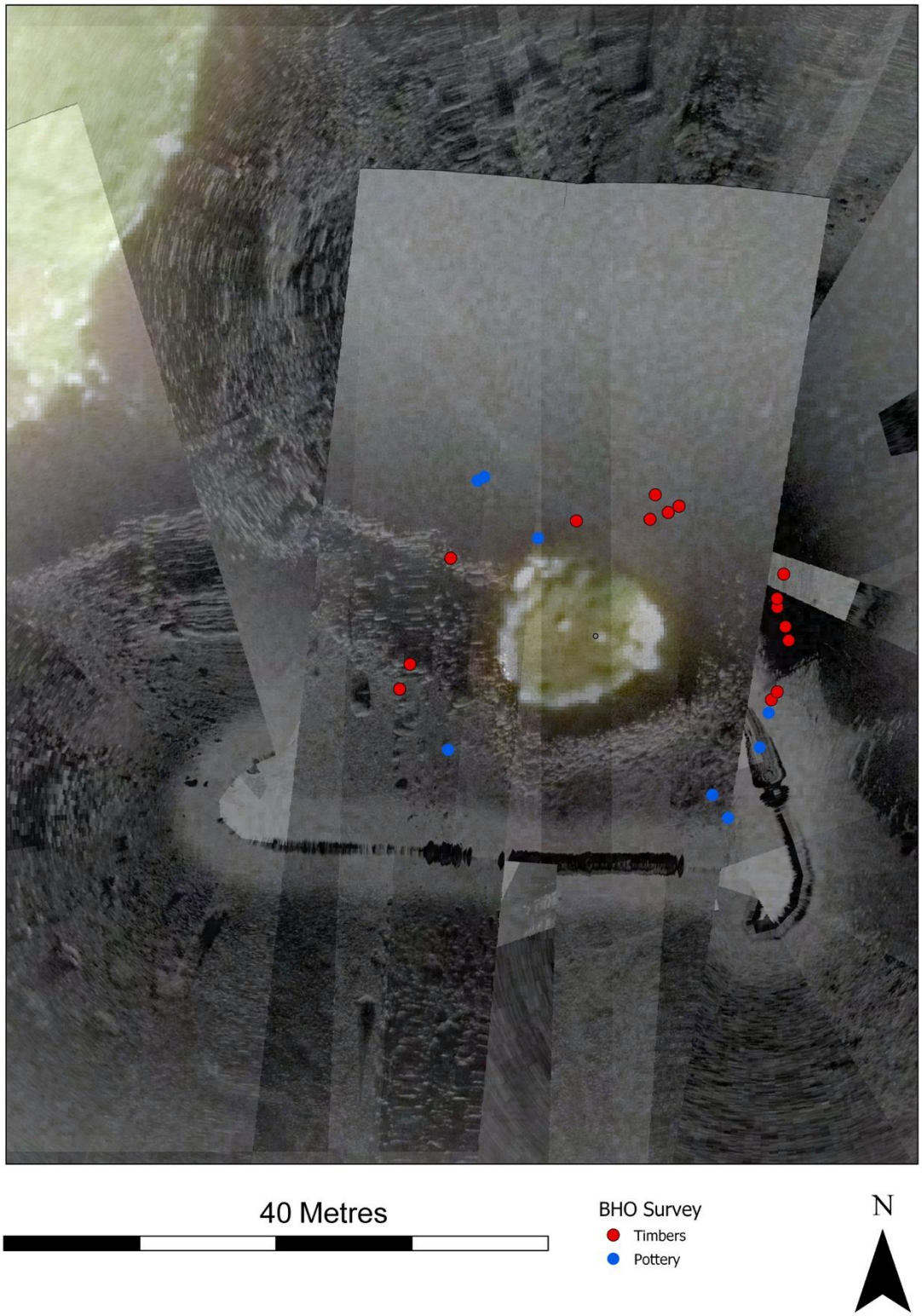

Figure 14. SSS detail for crannog site, showing location of recovered finds and recorded timber elements

Aerial Survey

The use of a polarising filter allowed the drone to capture data both above the waterline and within the shallows. Together with ground control points taken with the RTK GPS this has allowed for a detailed photogrammetric model of crannog to be constructed within Agisoft photoscan pro. The resulting digitial elevation model has been imported into ArcGIS and integrated with the bathymetric and topographic data. Figure 15 provides a view of the texture model from within Agisoft. Future work will look at making this integrated data available in an interactive open access format.

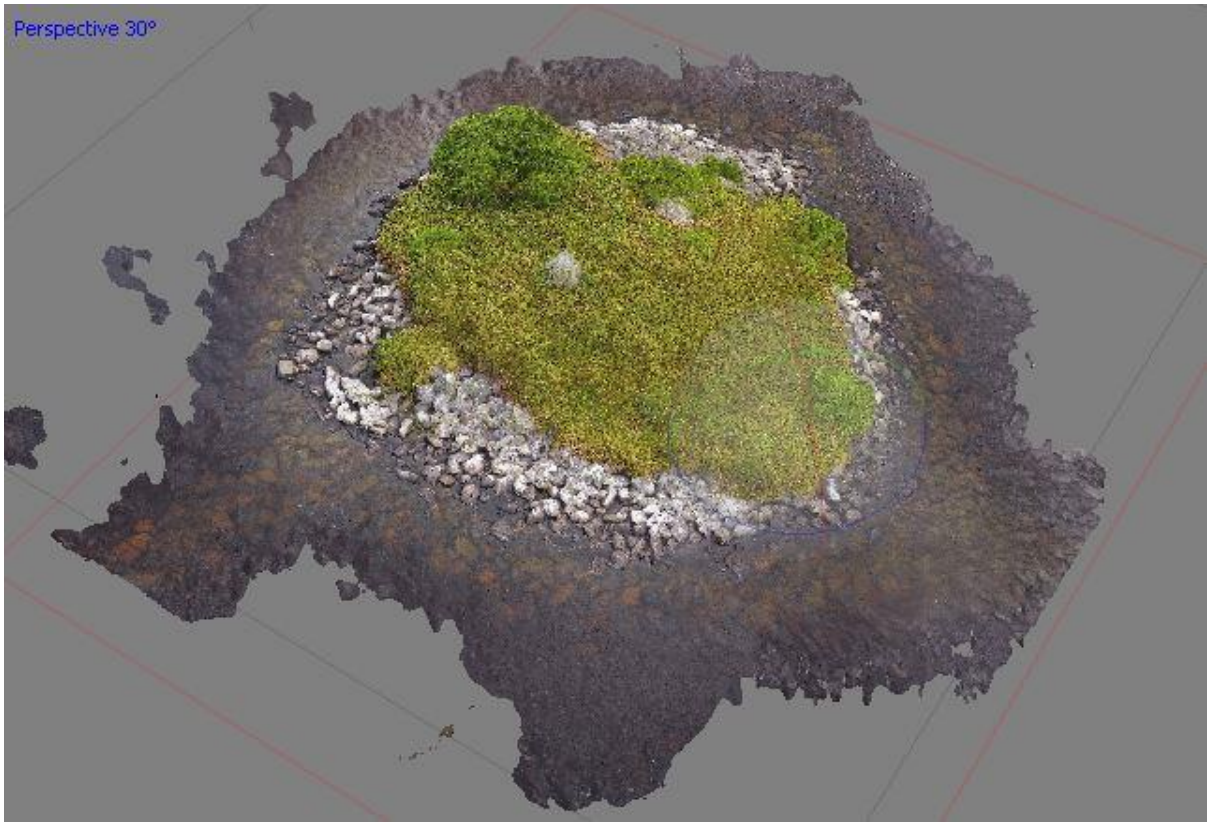

Figure 15. Photogrammetric model of BHO crannog

Diver Survey

In stark contrast to the conditions at Arnish, Loch Bhorghastail offered excellent (1-2m) visibility within the shallows around the crannog. Moving into deeper water, light levels quickly reduced and high powered lights were needed to conduct the survey.

Initial assessment of the site was undertaken by snorkelling due to the clarity of the water and shallow depths involved. This allowed the character of the site to be established and diving operations tailored to conditions. Divers worked in buddy pairs with through-water communication to each other and the surface. Initially divers worked around the crannog to the edge of the drop off into deeper water, placing flags at points where material culture was encountered. Subsequently, teams returned to these locations, recording the location in three dimensions through use of the total station and recovering diagnostic pottery. The distribution of these finds is shown in Figure 14.

Of particular note was the density of pottery and worked quartz encountered on the loch bed, and the number of structural timbers exposed at the base of boulder mound and along the western drop off into deeper water. These outer timbers were suggestive of revetting, while those in close proximity

to the mound appeared to be split and possibly related to its use/construction. Figure 16 shows a composite photogrammetric image of timbers exposed on the western edge of the crannog to the south of the causeway. Figures 17 and 18 give a view of the timbers to the east.

Figure 16. Orthomosaic from photographs taken underwater of western area of timbers to the south of the causeway scales are 8cm in length.

Figure 17. Timbers on the eastern edge of the shallow area around the crannog, in close proximity to the drop off

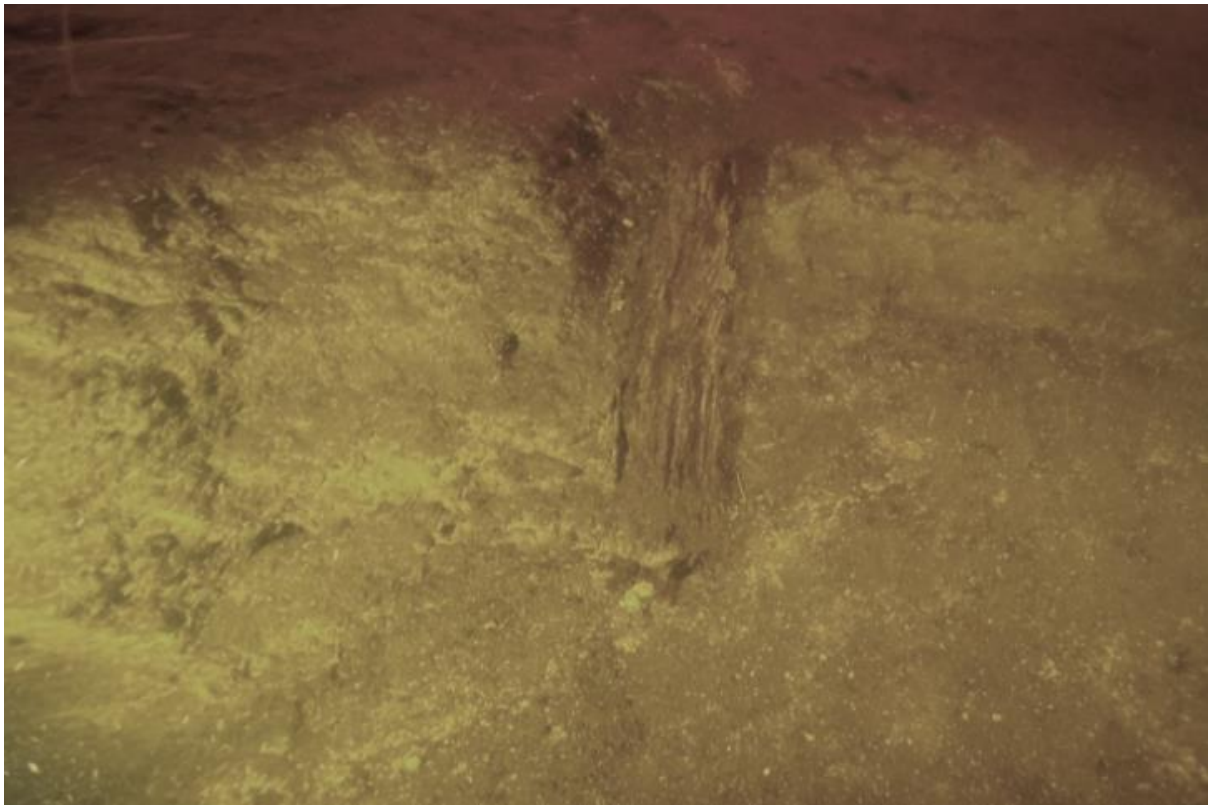

Figure 18. Vertical timber at the eroding edge of the drop off. Timber measures 25cm x 8cm

Thirty four sherds of pottery were recovered from the loch bed surface surrounding the crannog (note that some dots represent more than one sherd in Figure 14). As discussed in Appendix 1, these all date to the Neolithic. As such, it would appear likely that the timber and stone construction also dates to this period – the site at Bhorghastail represents a significant Neolithic structure with organic preservation. The fine grained deposits visible in the exposed section of Figure 18 also indicate the chance for meaningful stratified sequence both above and below the water.

Summary

The crannog and associated finds from Loch Bhorghstail represent a Neolithic site of considerable research potential. The above survey was completed over three days and – thanks to the wealth of archaeology observed – poses many more questions than it answers (see below).

Loch Langabhat

Loch area: 14.3 hectares
Maximum depth: 12m
Islet area: 127 square metres

Loch Langabhat was the third site to be surveyed. The crannog itself was visibly similar to that at Bhorghastail with regard to construction, being largely comprised of large boulders. However, unlike Bhorghastail, no surviving causeway was visible (see Figure 19) . Access to the loch required movement of equipment by hand and trailer from the nearest access point to the south, over 700m of steep, rocky, boggy ground.

Figure 19. Aerial photograph of Loch Langabhat

Bathymetric Survey

Bathymetric survey of the loch (Figure 20) revealed a similar story to that seen at Arnish and Bhorghastail. Again, the crannog was constructed in close proximity to deeper water at the edge of

the shallow loch margin. Estimation of sediment thickness from the difference in the return signal of the two echosounder frequency again indicated areas of sediment over 1m deep in closer proximity to the site (see Figure 21).

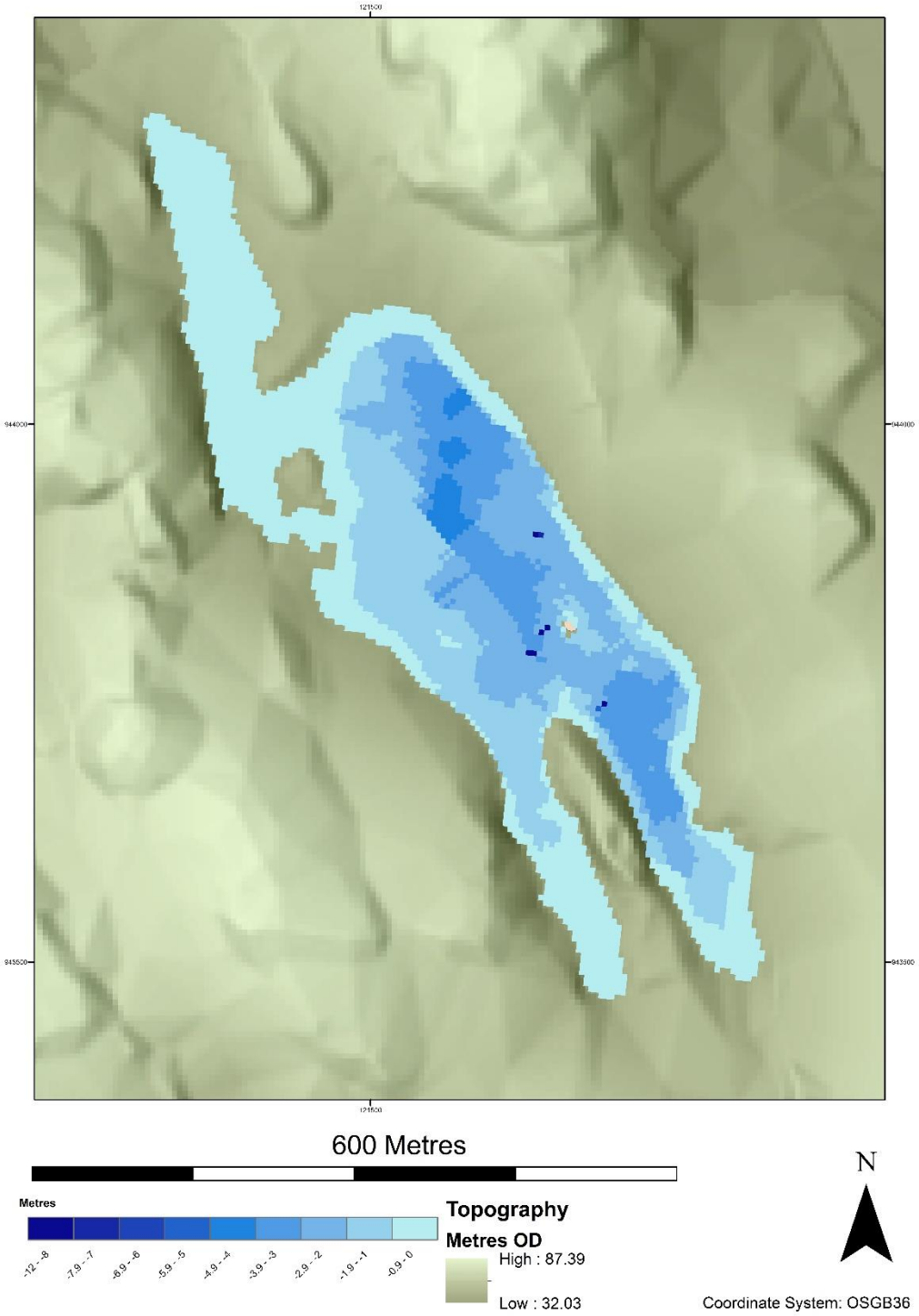

Figure 20. Bathymetric survey of Loch Langabhat

Figure 21. Estimated sediment thickness for Loch Langabhat

Side Scan Sonar

Survey of the loch was aided by its linear form, allowing long survey transects with few turns. The shallow nature of the northern loch margin meant the boat had to stand off further than 30m from the shoreline. However, data quality was very good allowing detailed visualisation of the loch bottom and crannog construction. Figure 22 gives an overview of the survey results for the loch as a whole, while Figure 23 provides a more detailed view of the data from around the crannog.

Figure 22. SSS data for Loch Langabhat

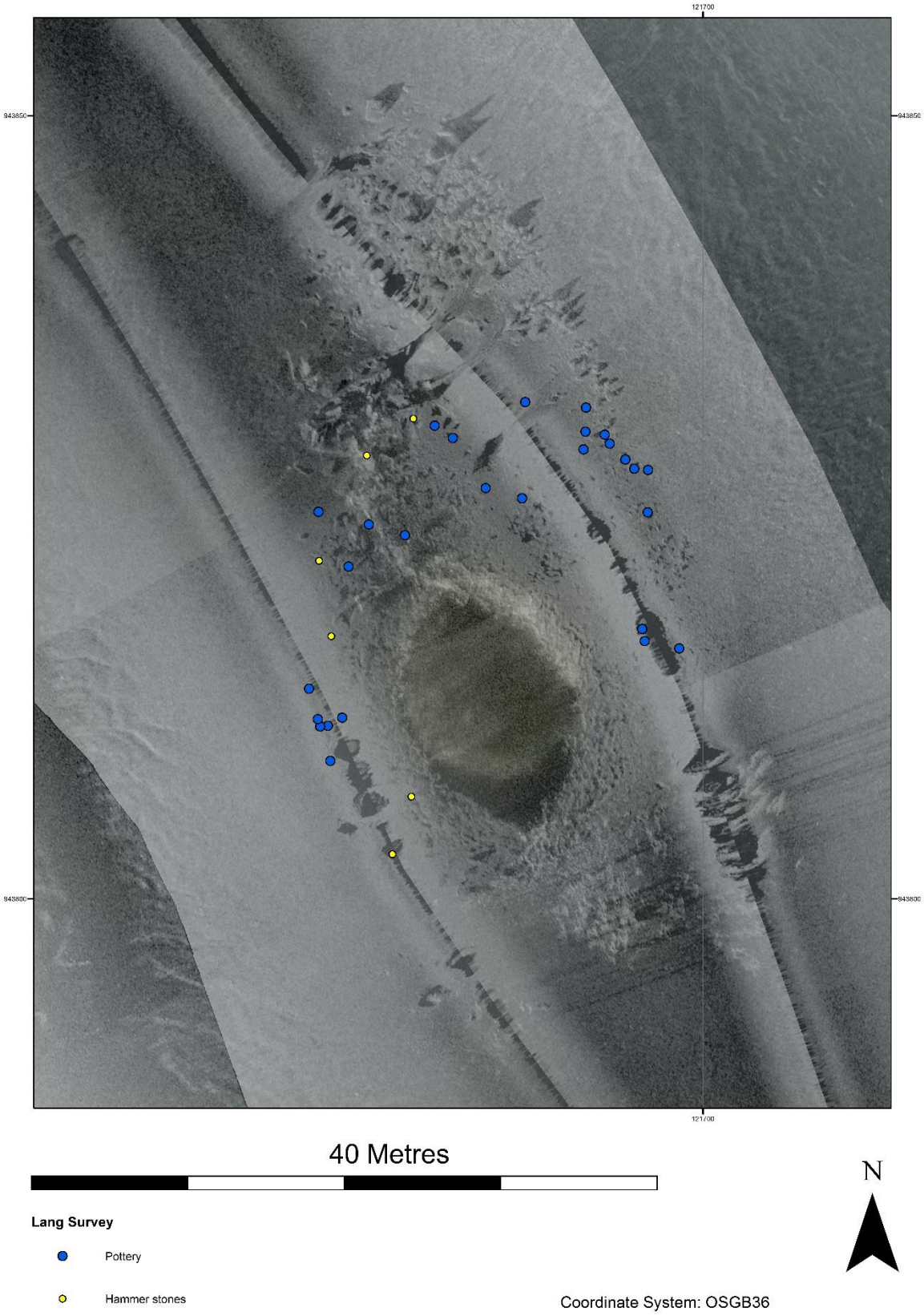

Figure 23. SSS data for Loch Langabhat crannog

Aerial Survey

Aerial survey of the loch was carried out by Dr Jonathan Benjamin. Ground control points were captured with an RTK GPS and Leica flexline total station. This allowed for the creation of a detailed photogrammetric model of the above water elements of the crannog. As at with the previous two sites, vegetation on the islet meant that identification of form/archaeological features was limited. Again the crannog appears to be made of large boulders, greater than 40 x 40 x 40cm in size. This observation was confirmed by divers surveying the below-water sections.

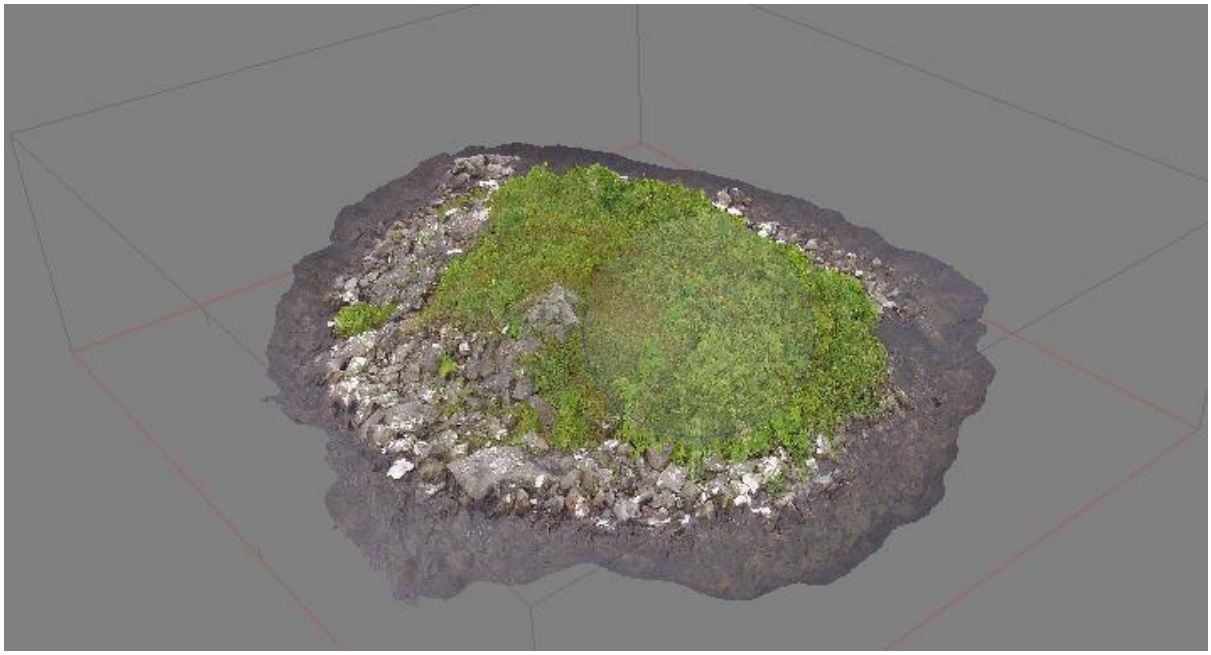

Figure 24. Photogrammetric model of the crannog in Loch Langabhat

Diver Survey

Visibility within the loch was very good, exceeding 1m. This allowed for systematic survey of the crannog margins and surrounding loch bed. As at Bhorghastail, divers used flags to identify material culture and other features (Figure 25). Once this survey had been completed, a survey team recorded the location of each flag and recovered any diagnostic material at that location. The quantity of pottery, quartz tools and hammerstones visible on the loch bottom was greater than that seen at Bhorghastail. However, there were no timber structural elements visible, and no evidence of a causeway. Figure 23 shows the distribution of finds, with over 60 sherds of pottery recovered from the loch (note that some dots represent more than one sherd in Figure 23).

In Figure 23 two 'tails' are visible at the northern and southern tips of the crannog. These areas were examined in detail for any evidence of causeway construction. The entire shallow area to the east of the crannog was also subject to diver survey in the hope of finding some trace of a connecting structure. No evidence could be found. During repeated dives the consensus began to emerge that finds were concentrated at the point where the edge of the crannog structure met the fine grained deposits. It is thus possible that this was material that was gently eroding out of the loch bed, or that had been deposited into the water from the surface during the past.

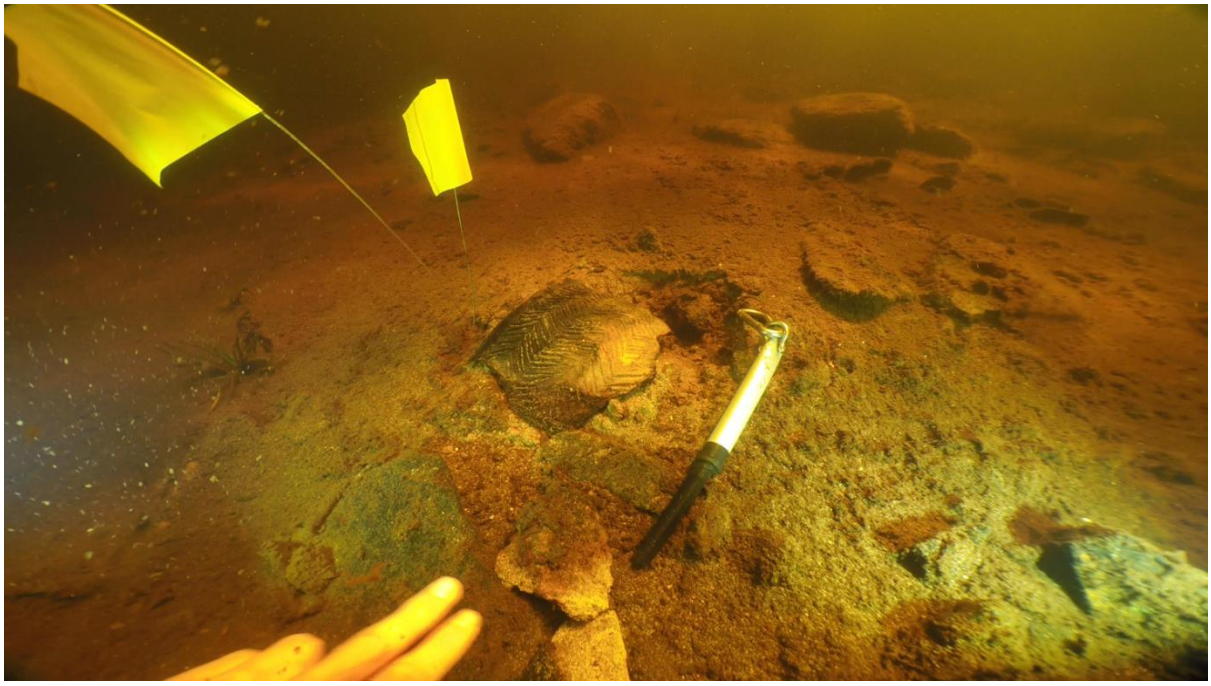

Figure 25. Sherd of 'Hebridean' pottery in situ on the loch bed at Loch Langabhat (see also Figure 27)

Summary

The islet in Loch Langabhat appears to be a small, steeply sided crannog, constructed out of medium to large boulders on a spine of rock upstanding from the loch bed. As described in Appendix 1, the pottery recovered was all Neolithic in date. Thus it would appear likely that the islet's use relates predominantly (and possibly exclusively) to this period. While no timbers were identified, given the site's close comparability in other ways with Loch Bhorgastail, the possibility that they do exist but remain as yet undetected must be considered. Equally, the fine grained deposits surrounding the base of the islet suggest the potential for organic preservation. Again, the research conducted here was intended to verify the anthropogenic nature of the site and to collect limited material to understand the time depth of occupation. With those issues addressed further questions are now raised with regard to the nature of activities at this location in the past and its future role in helping us to better understand the Neolithic of the Outer Hebrides. As at Loch Bhorghstail, the crannog and associated finds from Loch Langabhat represent a Neolithic site of considerable research potential.

Conclusions

The aims of the 2016 fieldwork project were:

(1) to resolve in more detail the topography/bathymetry of the sites in order to understand the local context within which the islets may have been constructed, and thus potentially whether or not they were artificial

(2) to undertake diver-based survey work in order to uncover further diagnostic material and to identify architectural features such as worked timbers, stone causeways, etc.

(3) to carry out underwater geophysical survey work in order to understand the extent/depth of loch-bed sediments

All three of these aims were fully achieved. With regard to Aim 1, the fact that all three islets were indeed artificial constructions was confirmed – all had clearly been constructed by piling up very substantial numbers of sometimes very large rocks and boulders. All three had also been placed in

very similar local topographic locations – on a relative rise in the loch bed, i.e. in relatively shallow water but immediately adjacent to a much deeper part of the loch.

With regard to Aim 2, material culture was recovered from all three sites. At Arnish, visibility was very poor, making the recovery of finds somewhat challenging; the small number of sherds found there have been assigned tentatively to the Late Bronze Age (see Appendix 1), further confirming the site's multi-period usage. In the case of Bhorghastail and Langabhat, material culture (primarily pottery and worked quartz) was observed on the loch beds in substantial quantities. Notably, from both sites, *only* Neolithic material was encountered, suggesting that they were predominantly (and, quite possibly, exclusively) used during that period. With regard to architectural features, important observations were made at Arnish and Bhorghastail. At Arnish, the substantial stone walls and boat docking feature surviving above ground on the islet suggest medieval or post-medieval activity. However, in addition, the side scan sonar results suggest the possibility that a (now below-water) stone causeway may once have joined the islet to land on the western side, supporting diver-based observations made previously by Chris Murray. Bhorghastail was the most revealing in terms of the architecture observed, with substantial worked timbers – probably associated with construction or revetment of the islet – noted in various places, in addition to the stone causeway previously observed. No such features were noted at Langabhat, although given the site's notable similarities of construction with Bhorghastail, the potential for comparable features to survive there as well must be considered.

With regard to Aim 3, deep surviving loch bed sediments were identified at all three sites. This indicates substantial potential for excellent preservation of sequences of environmental evidence immediately adjacent to the islets. The use of a dual frequency echo sounder only gives a very coarse understanding of the depth of these deposits. Now that the water depths of the lochs are better known, it will be possible refine survey methods/techniques, with a sub-bottom survey being desirable for the deep sections. Within the shallows a programme of coring is recommended.

Despite the success of our 2016 fieldwork, as is so often the case with archaeological investigation, it in some ways raised as many new questions as it answered old ones. We still do not have a very good idea as to what the purpose of these islets might have been. As our work in 2016 was focused almost exclusively underwater, and the vegetation on top of the islets was in all three cases very dense, we do not have a good understanding of what the islet represent – are they 'just' massive piles of stone or do any further archaeological features (walls, etc.) survive (as seen at Eilean Domhnuill for example). Are we dealing with one new site 'type' or perhaps a variable set of superficially similar sites? Did all of these islets sites actually house settlements (like their later prehistoric and historic period equivalents) or should they perhaps be viewed as a new kind of (ritual?) site, prhaps comparable to contemporary tombs in the region? Equally, the relationship between the islets and the material culture recovered adjacent to them on the loch bed is not fully understood – was this intentionally deposited in the water from the crannogs (as rubbish and/or 'ritual' deposits) or has it eroded out from cultural layers forming part of the main body of the islets?

Ultimately, it is very exciting to have confirmed what has long been expected – that Eilean Domhnuill is not a one-off, and that potentially many crannogs in the Outer Hebrides date much earlier than previously thought, to the Neolithic. If these artificial islands were settlements, they will transform our understanding of prehistoric social relations at that time – what drove people to isolate themselves from the rest of the community in such a dramatic way shortly after the region was first settled on a substantial scale? Alternatively, if they are specialised, occasional-use sites, what purpose did they fulfil and what roles did they play alongside other monuments? Could they have been meeting/feasting places or venues for other ritual practice, perhaps even including burial? It is not an exaggeration to suggest that these newly discovered islet sites have the potential to cause a step

change in archaeological knowledge, both of this key site type (now, for certain, pushing back the date of crannogs nearly 3000 years) and of the British Neolithic more generally. Future work will, we hope, go some way towards answering the questions which still remain.

Acknowledgements

First of all, we would like to thank the British Academy/Honor Frost Foundation/Leverhulme Trust for funding the work outlined in this report. We would also like to thank the following people: Jonathan Benjamin, Crystal El Safadi, Bob Mackintosh, Chris Murray, Rodrigo Ortiz, Rodrigo Pacheco-Ruiz, Felix Pedrotti and Dan Pascoe for their hard work, good humour and multi-faceted expertise whilst conducting the 2016 fieldwork; Michael Skelly for his logistical assistance in enabling us to get to the sites at all; Becca and Roland Engebretsen for making us feel at home at base camp; Donnie MacAulay, George Macloud, Mary MacLeod, Alex McDonald, Margaret McKay and the Dalmore Estate for their assistance and goodwill in allowing us access to and permission to work on the sites; Deborah Anderson, Jane Hamill and Kevin Murphy for their much-needed and much-appreciated local support for the project; Ian Armit, Alex Hales, Niall Sharples and Alison Sheridan for their broader support; Anwen Cooper for comments on an earlier draft of this report; and finally Chris Murray, for many things, especially his continuing kindness and enthusiasm in facilitating our work in Lewis in so many ways.

Archive

The raw data from this survey project is held at the University of Southampton. On final completion of the project these data will be provided to the HER in Stornoway and Historic Scotland. In the meantime if there is an output or dataset you would like to access please contact F.Sturt@soton.ac.uk.

Appendix 1: Pottery from Loch Langabhat, Loch Bhorgastail and Loch Arnish: Interim Report

Mike Copper (Department of Archaeological Sciences, University of Bradford)

This interim report presents a provisional characterisation and basic overview of the ceramic assemblages from Loch Langabhat, Loch Bhorgastail and Loch Arnish on the Isle of Lewis recovered during fieldwork in the summer of 2016. The assemblage was examined by Dr Mike Copper at the University of Bradford in December 2016. Where relevant, this material is compared to ceramics from the same lochs recovered by Chris Murray prior to 2016 (seen previously by the author). Unless clearly stated, however, descriptions and statistics included in this report relate only to the vessels recovered in 2016. Scales on illustrations are 5cm.

Site	No. sherds	No. vessels	Total weight	Mean sherd weight
Loch Arnish	6	1	271g	45g
Loch Bhorgastail	34	21	1596g	47g
Loch Langabhat	60	42	3509g	58g

Table 3. Summary of the assemblages recovered in 2016

A brief note on nomenclature

During analysis, the sherds were placed into pot groups on the basis of form, decoration and fabric. As each pot group represents—or is highly likely to represent—a single vessel, they are for convenience referred to simply as *vessels* in this report. Vessel numbers employed here are derived from the small finds (SF) numbers assigned during the survey. If a vessel was represented by sherds from more than one SF location then the lowest of the SF numbers is used for the sherd group/vessel as a whole. When more than one sherd group was identified from a single SF location then the vessel is identified by the SF number plus a letter (e.g. BHO16 [12]a, BHO16 [12]b).

Fabrics

The opening agents used in the pottery from all three sites are very similar in character and are consistent with derivation from local igneous gneiss, the principle rock type at all three sites. The main minerals present are feldspar and quartz together with small quantities of biotite (the latter constituting less than 5% of the mineral inclusions). The fabrics form a continuum from fine to coarse. As a result, the divisions between the categories employed here are of necessity somewhat arbitrary. As the colours of many of the sherds have been significantly affected by the environment of the loch bed—notably by algal growth—as well as by the nature of firing and use, colour provides a poor basis for identifying sherd groups. It is of significance, however, that the pale colour of most of the sherds less affected by their depositional context is suggestive of open firing in an oxygen-rich environment.

The fabric types employed during analysis were as follows (terms used correspond to the definitions employed by the Prehistoric Ceramics Research Group (PCRG 2011)).

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 3-4mm.

Fabric 4: (One vessel only - an unnumbered pot from Loch Bhorgastail). As Fabric 2, but with very common to abundant inclusions (30%-50%).

	Fabric 1	Fabric 2	Fabric 3	Fabric 4
Loch Langabhat	12%	69%	9.5%	9.5%
Loch Bhorgastail	10%	67%	14%	9%
Loch Arnish	N/A	N/A	100%	N/A

Table 4. Lewis lochs pottery fabric types

Construction and Decoration

All of the Loch Bhorgastail and Loch Langabhat vessels recovered in 2016 were very well made, well fired and fully ceramic throughout. The Loch Arnish vessel was undecorated and of coarser construction, being fairly well fired but slightly more friable than the Bhorgastail and Langabhat pots. Where apparent, coil breaks suggest that coil/ring building was the main or only building technique employed at all three sites. The slightly segmented profile of several of the multiple ridged jars suggests that they may have been constructed from flattened straps of clay rather than thicker coils, although this could not be confirmed with certainty. The extremely thin walls of some pots, some no more than 3mm thick, is indicative of the considerable skill of the potters. While it is possible that scraping or beating may have been employed to achieve such thin walls no conclusive evidence, such as the presence of beating facets, was identified that could confirm this. Several thicker body sherds show that coils were overlapped to a greater degree towards the base of the vessels, and it may be that extra layers of clay were added during building to reinforce this part of the pot.

Occasionally, extra strips of clay were added to the outside of the pots to form cordons or everted, flanged or collared rims. The multiple ridged nature of some of the baggy jars was achieved both by pinching up ridges and, more rarely, by the addition of clay strips. Some of the ridges appear to have been raised by pressure from inside the vessel, forming shallow internal ‘furrows’ corresponding to the often subtly defined external ridges.

A number of vessels were coated with a fine slip and others smoothed, both inside and out (Figure 26). The precise proportion of slipped and smoothed vessels is hard to ascertain due to the abraded nature of many of the sherds. Just under 22% of the sherds from the largest assemblage (Loch Langabhat) were definitely smoothed and 10% definitely slipped, but abrasion and algal encrustation has removed or hidden much of the evidence on other sherds, meaning that the actual proportions are likely to have been far higher originally.

Figure 26. Large slipped and smoothed ridged baggy jar from Loch Langabhat LAN16 [41]

With the exception of slipping and smoothing (together with a single example of whipped cord impression from a previously recovered pot from Loch Bhorgastail and lines of jabs on a vessel recovered from Loch Arnish prior to the 2016 fieldwork), incision was the only decorative technique employed at Loch Langabhat and Loch Bhorgastail. The Loch Arnish pot recovered in 2016 was undecorated. Motifs—all based on straight lines—include diagonal lines that are often seen to form herringbone patterns when enough of the vessel survives. Vertical line and hurdle motifs occur less commonly, and diagonal 'columns' of short horizontal lines appear on a single vessel from Loch Bhorgastail (BHO16 [12]). Motifs on everted rims, including 'flanged' variants, are invariably of radiating or diagonally radiating lines. As at other Hebridean sites, decorative elaboration, present on just a small number of vessels, is achieved by the multiplication of motifs rather than the creation of entirely new designs.

Abrasion, residue and sooting

Of the thirty-four sherds from Loch Bhorgastail, just seven were categorised as being in 'good' condition (little or no abrasion), five as 'slightly abraded' (subtle abrasion or abrasion affecting only a small part of the sherd surface), eleven as 'abraded' (little of the sherd surface unaffected, some areas of more severe abrasion revealing mineral fragments from below the original sherd surface), and a further eleven as 'heavily abraded' (severe abrasion and/or little or none of the original sherd surface visible). At Loch Langabhat two of the sherds were too encrusted for their condition to be discerned, twenty-five were categorised as 'good', thirteen as 'slightly abraded', eight as 'abraded', and twelve as 'heavily abraded'. All of the Arnish sherds were 'abraded'.

Sooting was present on a small number of vessels, and visible residue was noted on others. The lacustrine environment in which the pots lay had, however, led to an algal crust forming on a large number of the sherds, and this was frequently hard to distinguish from cooking residue and soot,

meaning that the true proportion of vessels exhibiting evidence of sooting or residue accretion was hard to ascertain.

Vessel Forms

With the exception of the single vessel from Loch Arnish, which appears to have been of a thick-walled, deep, cylindrical or barrel shape typical of Hebridean pottery dating to no earlier than the Middle Bronze Age, all of the pots examined in 2016 were of forms securely dated elsewhere in the Outer Hebrides to the mid 4th to early 3rd millennia cal BC (Copper 2015; Garrow and Sturt forthcoming; Armit in prep). Although Copper (2015, 74-103) has drawn attention to the fluid nature of ceramic categories in the Hebridean Neolithic, it is possible to identify certain more coherent or 'prototypical' forms within the Western Isles assemblage as a whole, in particular Unstan-type bowls and the regionally distinctive baggy jars, the latter typically of deep, ovoid forms that include the characteristically Hebridean multiple ridged variants. Vessel forms identified at Loch Bhorgastail and Loch Langabhat included:

Jars: Vessels in which height exceeds maximum diameter. These include necked and ovoid baggy forms, the latter subdivided into ridged and un-ridged variants (Figure 27).

Unstan-type bowls: Shallow, round-bottomed bowls with vertical or slightly concave collars, primarily decorated with motifs comprising horizontal grooves below the rim above vertical or sloping incised lines. Decoration does not occur below the carination separating the collar from the base. The term Unstan-*type* bowl is used here to distinguish these vessels from the larger Unstan bowls known from mortuary contexts in Orkney.

It is also possible that other vessel forms were present but not positively identified due to fragmentation. Elsewhere in the Hebrides such forms include small cups and simple bowls, both decorated and plain, and shouldered bowls – one example of the latter having been recovered from Loch Arnish prior to the 2016 fieldwork. With the exception of a single vessel from Eilean Dòmhnuill (Copper 2015, 277-8), all known Early/Middle Neolithic vessels from the Outer Hebrides are round-based.

Rim forms noted in the assemblages from Lochs Bhorgastail and Langabhat included simple (rounded), everted (including internally bevelled and flanged variants) and collared (formed by the addition of an external strip of clay to create a steep external bevel or collar). Variations on these forms included flattened simple rims and rims with more than one decorative facet. At Eilean Dòmhnuill there is some evidence that the collared rim form may have become less common and the everted form correspondingly more common toward the end of the 4th millennium, although this is likely to have been more a matter of proportionality than of absolute presence and absence (Copper 2015, 137-65).

Figure 27. Large multiple ridged baggy jar from Loch Langabhat (LAN16 [40])

Dating

The most recent Bayesian model for Hebridean Neolithic pottery suggests that the insular Early/Middle Neolithic styles date from 3845-3590 cal BC at 2σ (3745-3645 cal BC at 1σ) and probably came to an end between 2830 and 2600 cal BC (Copper 2015, 390-3). Whether their replacement by Grooved Ware was a rapid event or a drawn out process has yet to be determined. At present, Early/Middle Neolithic pottery and Grooved Ware occur together at only one reliably stratified site in the Outer Hebrides, An Doirlinn in South Uist, where there does not appear to have been any chronological overlap in their use (Garrow and Sturt forthcoming). It is of interest, and possibly of some significance, that no Grooved Ware or Beaker pottery has yet been found in association with any of the islet sites. Prior to the 2016 fieldwork and analysis a number of dates were obtained from vessels recovered from various lochs in Lewis, including Lochs Bhorgastail and Arnish. A date of 3512-3348 cal BC (OxA-28953) was obtained from residues adhering to a vessel from Loch Arnish, a second of 3637-3381 cal BC (OxA-28954) from charred residue on a vessel from Loch Bhorgastail, and a third of 3519-3365 cal BC (OxA-28955) from residue on a pot from Loch an Duna (all at 2σ). Further dates from Eilean an Tighe fell between 3620 and 3341 cal BC at 2σ (Garrow et al. 2017). On-going dating at the islet site of Eilean Dòmhnuill in North Uist suggests an occupation lasting several hundred years from before 3650 cal BC to after 2900 cal. BC (Armit in prep). It therefore appears most likely that the Neolithic pottery from the three lochs investigated in 2016 dates to the second half of 4th millennium BC.

The single vessel from Loch Arnish examined in 2016 belongs to the diverse northern and western British and Irish tradition of coarse domestic vessels once categorised as 'Flat-rimmed Ware' (Coles and Taylor 1970). It has long been argued that this somewhat tautological term is too imprecise to represent the varied assemblages to which it has been applied (Halliday in Sherriff 1988, 108). Hedges (1975, 69) described Flat-rimmed Ware as being '*so unsophisticated in manufacture and form that it is very likely to occur… on sites of all sorts of periods*'. Nonetheless, in eastern Scotland at least there is increasing evidence that such vessels are likely to date to the late second or early first millennia cal. BC (Halliday in Sherriff 1988, 108). In the Western Isles, coarse, plain pottery occurs throughout the sequence at the settlement site of Cladh Hallan from the Middle Bronze Age to c.400 BC (Parker Pearson 2012, 403). At this site, flat-rimmed vessels of bucket, jar and bowl forms resembling that from Loch Arnish are associated in particular with the Late Bronze Age occupation, by analogy providing a likely date for the Arnish pot.

Descriptions of the assemblages

Loch Langabhat

The Loch Langabhat pottery recovered in 2016 comprises 60 sherds weighing a total of 3,509g, giving an average sherd weight of just under 58.5g. Forty-two sherd groups were identified on the basis of form, decoration and fabric, each likely to represent a single vessel. The pottery presents a range of forms and decorative motifs typical of Hebridean Early/Middle Neolithic pottery recovered in considerable quantities elsewhere in the Western Isles from sites including Eilean an Tighe, Northton and Eilean Dòmhnuill (Scott 1951; Johnson 2006; Brown n.d.) as well as from mortuary contexts at Unival and Clettraval (Scott 1935; Scott 1948). Diagnostic pot forms recovered from Loch Langabhat included twenty-nine vessels of jar form, twenty-eight of which were baggy jars, with eleven of the latter being of the typically Hebridean ridged form (Figure 28). A single jar of necked form was identified. Three Unstan-type bowls were present within the assemblage, but in contrast to a number of other Outer Hebridean sites, including Loch Arnish, no shouldered vessels were recorded.

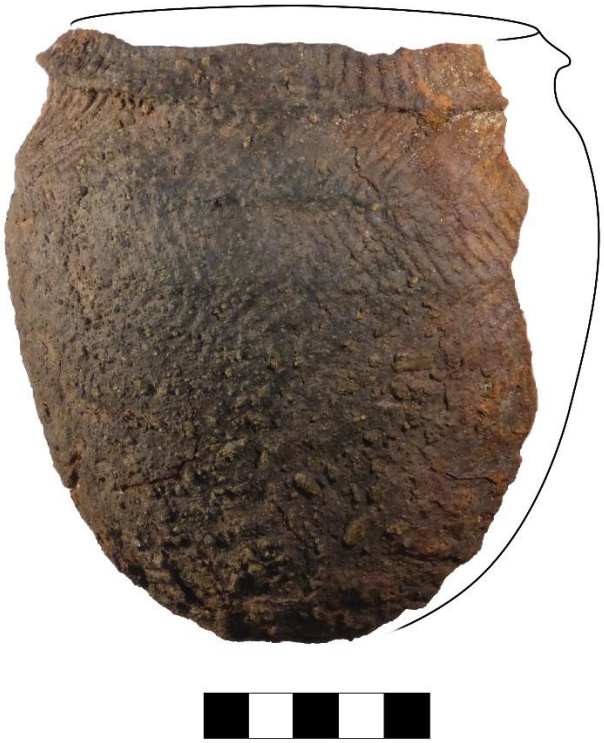

Figure 28. Small multiple ridged baggy jar from Loch Langabhat (LAN16 [42])

Various types of everted rim represented the primary rim forms at Loch Langabhat. Two vessels had everted rims lacking bevels, six had everted rims with internal bevels, four possessed everted rims with flattened tops, and three bore flanged rims where the everted rim emerges at a right angle to the vessel wall. Simple rims occurred on all three Unstan-type bowls. Collared (externally bevelled) rims, one of slightly inverted form, occurred on three vessels. One rim of unusual style was formed by the addition of a coil of clay just below the top of the vessel, smoothed to resemble a collar and decorated with vertical lines between the rim and coil (LAN16 [19]). All of the rims and collars, with the exception of the unusual rim mentioned above, were decorated with the diagonally radiating lines motif that predominates at other Early/Middle Neolithic sites in the Outer Hebrides. One vessel (LAN16 [40]) has an unusual ridged rim-top, the ridges forming narrow internal and external bevels decorated with radiating lines.

Body decoration was entirely incised and linear in nature, although often subtly applied, perhaps when the vessels were leather hard rather than still fully plastic. Motifs included diagonal lines on ten vessels, seen to form herringbone motifs on a further eleven and hurdle patterns on three more (Figure 29). Two vessels were decorated with horizontal lines, one with vertical lines, and one with a combination of a herringbone motif and vertical lines. Two vessels were left undecorated. All three Unstan-type bowls bore motifs of horizontal grooves above vertical or sloping incised lines, the most common motif associated with this vessel form elsewhere in the Outer Hebrides. Thirteen vessels showed evidence for smoothing, and a further six were slipped. The thin, fine slip used is, however, often hard to tell apart from smoothing. One vessel (LAN16 [7]) bore a perforation just below the rim. It is possible that this was made after firing, perhaps in association with repairs following damage.

Figure 29. Multiple ridged jar from Loch Langabhat decorated with herringbone motifs (LAN16 [16]a)

Prior to the 2016 fieldwork, twenty-five sherds had been recovered from Loch Langabhat. With one possible exception (a large, plain and formally undiagnostic wall fragment) these are all likely to be Neolithic, with sixteen being of highly characteristic Early/Middle Neolithic forms or bearing typically Neolithic decorative motifs. Unambiguously Neolithic vessels were all baggy and/or multiple ridged jars with collared and everted and/or internally bevelled rims decorated with diagonally radiating lines. Body decoration included herringbone and hurdle motifs and lines of short slashes.

Loch Bhorgastail

The Loch Bhorgastail assemblage recovered in 2016 comprises thirty-four sherds weighing a total of 1,596g, giving an average sherd weight of just under 47g. Twenty-one sherd groups were identified on the basis of form, decoration and fabric, each probably representing a single vessel. The range of forms present at Loch Bhorgastail closely parallels that at Loch Langabhat and includes sixteen jars, of which fifteen are baggy jars, with nine of the latter being multiple ridged jars. A single Unstan-type bowl sherd was also identified (Figure 30).

Figure 30. Unstan-type bowl from Loch Bhorgastail (BHO16 [8])

The remaining vessels were of uncertain form. Rim types included a simple but everted rim on one vessel, everted rims with internal bevels on four vessels, and flanged rims on two vessels. Two simple rims were noted, one on the Unstan-type bowl and the second on a multiple ridged baggy jar that is notable for the presence of a lug just below the rim (BHO16 [12]a: Figure 31). Lugs are uncommon in Outer Hebridean Neolithic contexts. Only five were identified from amongst over 22,000 sherds at Eilean Dòmhnuill and none at all at Northton (Johnson 2006, 68; Copper 2015, 232-3). The lug on vessel BHO16 [12] was decorated on top with short incised lines. A single incised line encircled the vessel itself, looping beneath the lug.

Figure 31. Lugged Vessel from Loch Bhorgastail (BHO16 [12]a)

Decoration was clearly visible on six rims, in five cases consisting of radiating or diagonally radiating lines. Algal encrustation may have hidden motifs on other rim sherds. One rim (BHO16 [12]) had been

squared off around its outer edge and a single line had been incised around the circumference. The final decorated rim was of a more elaborate form in which three narrow, concentric bands of radiating lines were incised onto the internal bevel. Such multiplication characterises decorative elaboration elsewhere in the Hebrides, where wholly original motifs are rare.

Vessel BHO16 [28]a was perforated just below the rim. A slight ridge is visible around the hole on the inside suggesting that this may have been made before firing, perhaps to facilitate suspension.

It is most likely that all of the thirty-three sherds recovered from Loch Bhorgastail prior to the 2016 fieldwork are of Early/Middle Neolithic date (mid-4th to early 3rd millennia BC). They included at least twenty-one unambiguously Neolithic sherds. Vessel forms identified were mostly jars, including ridged variants, and one Unstan-type bowl bearing an unusual motif in which the horizontal grooves below the rim were formed from whipped cord impressions. Rim forms noted included collared, flat-topped/externally thickened, and everted forms, with the Unstan-type bowl bearing a simple rim. On the non-Unstan-type vessels, rim decoration was exclusively of incised diagonally radiating lines. Body decoration included multiple applied cordons (on an otherwise plain jar) and hurdle and herringbone motifs.

Loch Arnish

The single vessel recovered from Loch Arnish in 2016 was made up of six sherds weighing a total of 271g. Three sherds conjoined and one larger rim sherd, weighing 155g, was also present. The pot was of a similar coarse fabric to a number of the larger vessels from Loch Langabhat and Loch Bhorgastail, despite being of later date. Although fully ceramic it was slightly more friable than the Neolithic pots. The pot was probably of approximately cylindrical form with a slight convexity and had been roughly smoothed and wiped prior to firing but was otherwise undecorated. The rim had been flattened, perhaps to take a lid.

At least thirty-six of over one hundred sherds discovered prior to the 2016 fieldwork at Loch Arnish were of Early/Middle Neolithic types. In addition, a nearly complete Unstan-type bowl was also recovered from this loch. Neolithic vessel forms identified included baggy jars (including probable ridged jars), a single shouldered jar/bowl, and part of a second Unstan-type bowl. Rim forms included hurdle motifs and the more common diagonally radiating incised lines. 'Nicking' and short slashes on the outer edges of simple and everted rims also occurred. Body decoration included sloping lines, opposed sloping lines, hurdle and herringbone motifs, horizontal bands of jabs, broad horizontal grooves creating a false relief effect of parallel ridges, and Unstan-style horizontal grooves above sloping or vertical incised lines on both the shouldered and Unstan-type bowls. Also recovered were sherds of later date. These included at least six crogans (also known as craggans): roughly spherical plain vessels with raised everted or cylindrical necks, of likely post-medieval date. Amongst the crogans from Loch Arnish were decorated examples; one bearing an unusual motif of impressed circles around 3-4mm in diameter. A number of sherds from undecorated vessels of ambiguous form are possibly of Bronze or Iron Age date. The difficulty of assigning reliable dates to later prehistoric pottery in the Western Isles were noted by Campbell (2002, 139-40), and abrasion, fragmentation, and the lack of diagnostic features on most of the post-Neolithic pottery from Loch Arnish compound this issue. As such, the presence of these vessels will simply be noted at this point.

Discussion

Hebridean Early/Middle Neolithic pottery shows clear stylistic links with both the northeast and southwest of Scotland, notably with Orkney, Argyll and the area around the Firth of Clyde. Vessel forms shared with these areas include the distinctive, closed and carinated, shouldered vessels known as Beacharra bowls (Childe 1935, 66; Piggott 1954, 170-3; Scott 1964, 150-8), a number of which derive from chambered cairns in the southwest, and Unstan-type bowls that are found in significant numbers in Orkney and which developed from modified Carinated Bowl pottery in the second quarter of the 4th millennium cal BC. Together with the elaborately decorated multiple ridged jars, the Unstan-type bowl is of particular interest in that it exhibits a high degree of coherence ('family resemblance') which at Eilean Dòmhnuill can be seen to persist for several hundred years (Copper 2015; Armit in prep). Unstan-type bowls occur across the whole of the north of Scotland from Aberdeenshire to the Outer Hebrides, yet in Orkney and the Western Isles they are associated with different and regionally distinctive vessel styles. Interestingly, the characteristic Unstan-style decoration of horizontal grooves above vertical or sloping lines is also found on shouldered vessels in the Hebrides, including the example from Loch Arnish, but this sharing of Beacharra-like form with Unstan-style motifs is not known from outside this region. Present dating gives us no reason to prefer any single point of origin for Unstan-type bowls, and they may conceivably have developed across a wide area through on-going processes of communal interaction. Found in large quantities at a number of 4th millennium BC sites in the Outer Hebrides, including several islet sites, yet absent from An Doirlinn and Screvan Quarry (Downes and Badcock 1998) where the assemblages also lacked multiple ridged jars and were of a notably plainer and more 'utilitarian' character, it is likely that Unstan-type bowls possessed a particular significance that constrained deviation from well understood cultural norms. The association between elaborately decorated Hebridean assemblages and sites of unusual character such as the Hebridean islets suggests that such locales may have been a focus for particular non-domestic activities, perhaps involving periodic and possibly formalised commensal activities within which social interaction was mediated. In this respect it is of interest that not all of the Early Neolithic settlements investigated in recent years in the Bay of Firth area of Orkney possessed Unstan-type bowls (Richards and Jones 2016).

The multiple ridged jars found at Loch Langabhat and Loch Bhorgastail are a distinctively Hebridean vessel form resulting from the multiplication of formal elements and motifs found on other vessel types. It is arguable whether there is a skeuomorphic aspect to such pots, perhaps relating to leather, animal stomach or intestine prototypes. Multiple ridged jars vary from deep pots with thick walls to small and very fine vessels. Decoration is usually carefully executed and slipping is frequently employed. As with Unstan-type bowls, the high levels of skill and time invested in the creation of these vessels implies that there was likely to have been a significance to their production and use that went beyond the purely mundane, again drawing attention to the nature of the sites on and around which they are found.

The decorative schemes, vessel forms and manufacturing techniques evidenced at Loch Langabhat and Loch Bhorgastail closely resemble those recognised at many other contemporary sites in the Western Isles. The largest comparable assemblages come from Eilean an Tighe and Eilean Dòmhnuill in North Uist (Scott 1951; Armit 1986; Armit 1987; Armit 1988; Armit 1990a; Armit 1990b; Armit 2003; Copper 2015; Armit in prep) and Northton in Harris (Simpson et al. 2006), with other significant assemblages from Allt Chrisal in Barra (Gibson 1995) and An Doirlinn in South Uist (Garrow and Sturt forthcoming) where the pottery was notably less elaborate than at the former sites. A number of smaller assemblages of similar character to those from the Lewis lochs have also been recorded from other lacustrine and dry land sites across the Outer Hebrides (for a recent overview see Copper 2015,

315-97). Significant assemblages have, in addition, been recovered from chambered cairns in North Uist (Scott 1935; Scott 1948; Dunwell et al. 2003) and redeposited at the stone circle at Calanais (Sheridan in Ashmore 2016, 573-803). If the Hebridean Neolithic assemblage as a whole contained both a basic and an elaborated variant, as exemplified respectively by the assemblages from An Doirlinn and Eilean Dòmhnuill, then it is of interest that the elaborate assemblages are frequently associated with places of unusual character such as the islets in Loch Langabhat and Loch Bhorgastail.

The presence of both Neolithic and post-Neolithic pottery at Loch Arnish is of considerable interest as it may imply that some loch islets may have been continually occupied, regularly reoccupied, or frequently re-visited, from the mid-4th millennium until as late as the medieval or post-medieval periods. Arguing against this possibility, however, is the absence of Grooved Ware and Beaker pottery from any of the islet assemblages, suggesting that the reoccupation of such sites in the Mid to Late Bronze Age after a period of abandonment is perhaps more likely on current evidence. More detailed examination—and ideally dating—of the post-Neolithic pottery from all of the Lewis loch islets investigated so far should facilitate a better understanding of how such sites were understood and utilised after their initial occupation and how this may perhaps relate to the development of crannogs.

Overall, the ceramic assemblages from Lochs Langabhat, Bhorgstail and Arnish provide a significant contribution towards our understanding of the nature of Hebridean pottery, raising interesting questions about how these small Outer Hebridean islet sites were understood both at the time of their construction and initial use and in subsequent periods.

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