Highland Archaeology Services Ltd

Bringing the Past and Future Together

Dornoch Bridge Quarry, Evelix, Dornoch, Highland

(Proposed Quarry Extension - Phases 5 to 9)

Archaeological Evaluation Project 2017

Final Report

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Dornoch Bridge Quarry, Evelix, Dornoch, Highland
Archaeological Evaluation Project 2017
Final Report

with contributions by
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Summary

A staged archaeological project involving preliminary documentary research, walkover survey and trial trenching was undertaken to evaluate the area of a proposed extension (Extension Phases 5 to 9) to the Pat Munro Limited quarry at Dornoch Bridge, Evelix, Dornoch. The project was designed to establish the archaeological potential of the proposed quarry extension areas and the potential impact future aggregate extraction might have upon heritage assets.

Desk-based Assessment identified sites of potential archaeological significance within or adjacent to the study site including a hengiform enclosure, the purported burial place of a Viking leader, 'Sigurd the Powerful', a possible ring-ditch and a hut circle. Walkover survey confirmed the earthworks of the hengiform enclosure but failed to identify any evidence of either the ring ditch or hut circle.

A total of 71 evaluation trenches of varying size were opened to establish the presence or absence of significant buried archaeological remains. Of these a total of 55 were archaeologically sterile. Buried archaeological deposits of varying quality and importance were revealed in the remaining 16 trenches. The principal archaeology recorded on the site consisted of the hengiform earthwork, a disturbed human earth grave burial, two human cremation burials, a shell-midden and a group of post-pads possibly reflecting the remnant of a former timber structure. A significant assemblage of prehistoric pottery was recovered from the area of the cremation and inhumation burials. The AMS determinations obtained from the cremations date them to second half of the first millennium BC, in the period c 400 to c 200 cal BC, the middle Iron Age, earlier than most known typological parallels for the pottery and illustrating the longevity of the form. An AMS radiocarbon determination of the inhumation burial dates the remains to the period 998-1155 cal AD at 95% confidence. This suggests the burial is very unlikely to be that of the Viking Sigurd.

The time lapse between the two sets of human burials is considered significant and suggests both a later awareness of and deliberate reuse of a much older funerary site, an interpretation reinforced by the presence of the hengiform funerary monument.

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Acknowledgements

Thanks are due to Pat Munro (Alness) Limited for funding the archaeological project and for providing machinery and operators to open and close the archaeological trenches. Thanks are also due to specialists Dr Angela Boyle, Bristol AMS Dating Laboratory (BRAMS), Dr Gemma Cruickshanks (NMS), Matthew Law (L-P Archaeology), Dr Orlene McIlfatrick and Dr Susan Ramsay for their contributions to the report.

Fieldwork was directed by Steven Worth with the assistance of Michel Sharpe and Lachlan Mckeggie. This report draws on earlier material and was written by Andrew Young MCIfA.

Legislation and Policy

The common principles underlying international conventions, national legislation and local authority planning policies are that cultural heritage assets should be identified in advance of development and safeguarded where practicable; if disturbance is unavoidable appropriate recording of features and recovery of portable artefacts should take place. These have been set out in international and European Union agreements, and UK and Scottish legislation, as well as national and local planning policies[1].

Professional standards maintained throughout the present project adhered to the Codes of Conduct and Approved Practice and Standards of the Chartered Institute for Archaeologists[2].

[1] A summary of relevant international, EU, UK and Scottish legislation and policies is available from the HAS office on request.
[2] Chartered Institute for Archaeology (CIfA) Standards and Guidelines for Archaeological Excavation.

Location

The site is located to the west of Dornoch at Evelix in Sutherland, Highland (Figures 1 and 2). It incorporated the area of a proposed extension to an existing aggregate quarry, the development of which is planned to be undertaken in a series of stages designated Phases 5 to 9.

The site has an overall footprint of approximately 82,400 square metres and is situated just to the NE of the existing quarry works, centred at NGR NH 7637 8920 (see Figure 2). At the time of the evaluation fieldwork the area consisted of open farmland separated and bounded by a series of prominent glacial eskers (see cover).

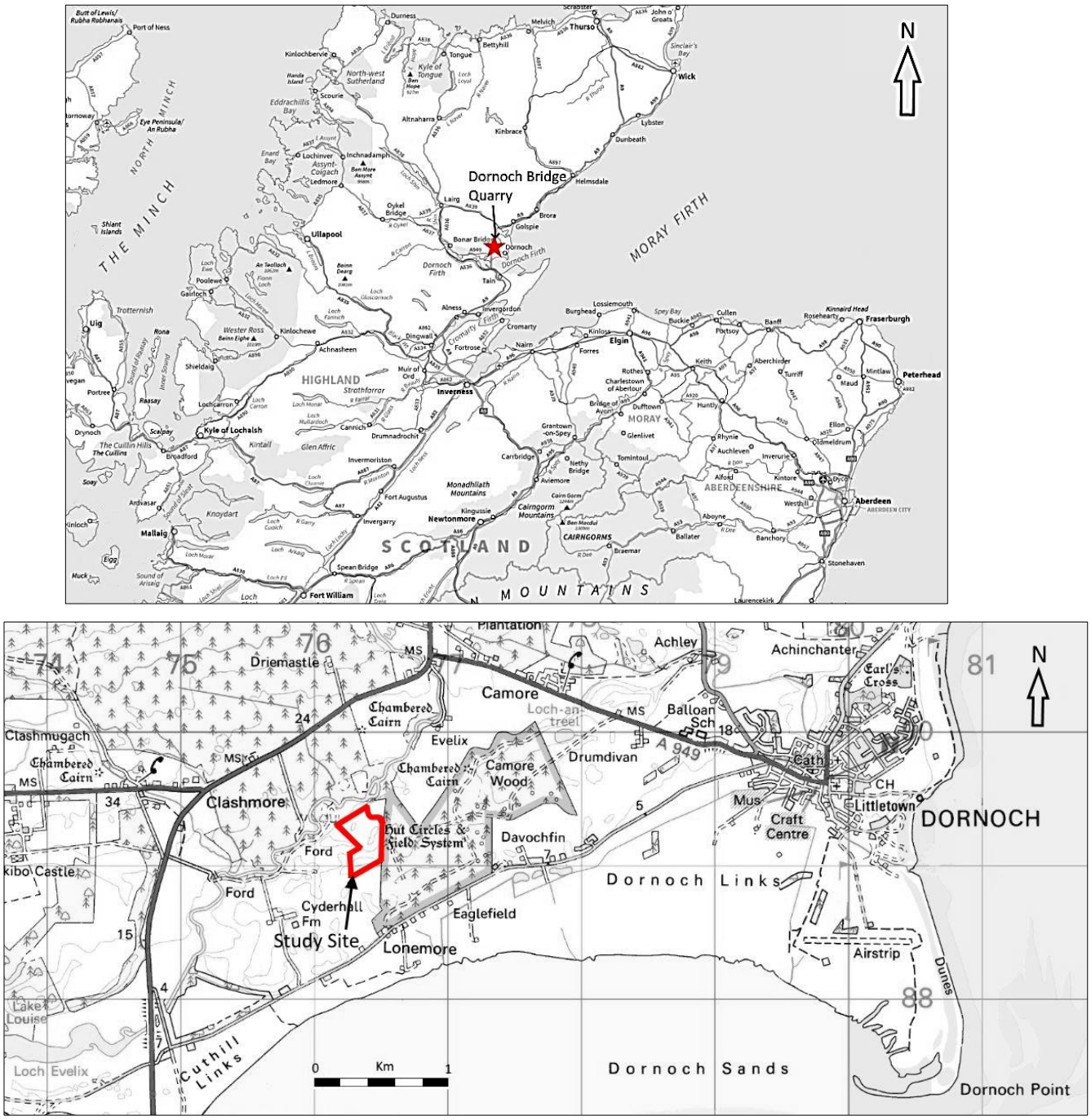


Figure 1 – General Site Location and boundary of the Study Area

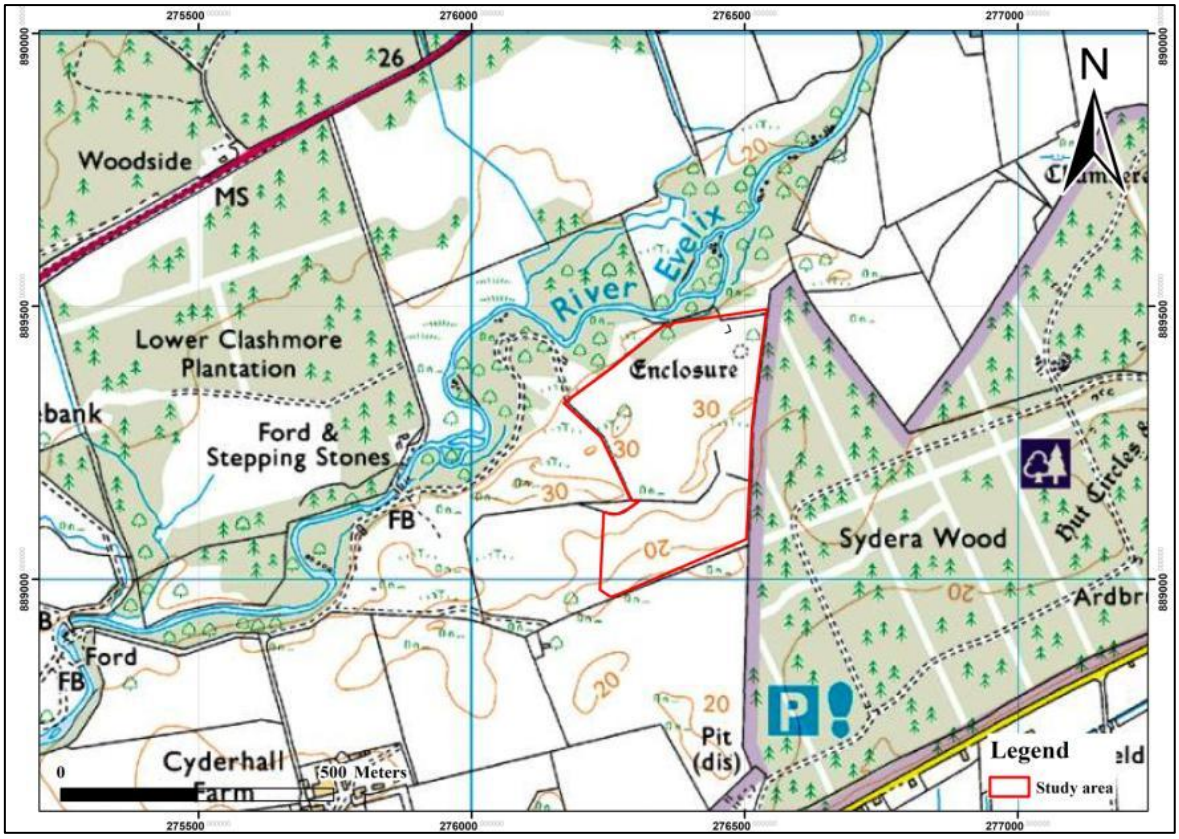


Figure 2 – Detail of the study area showing boundary of the Study Site.

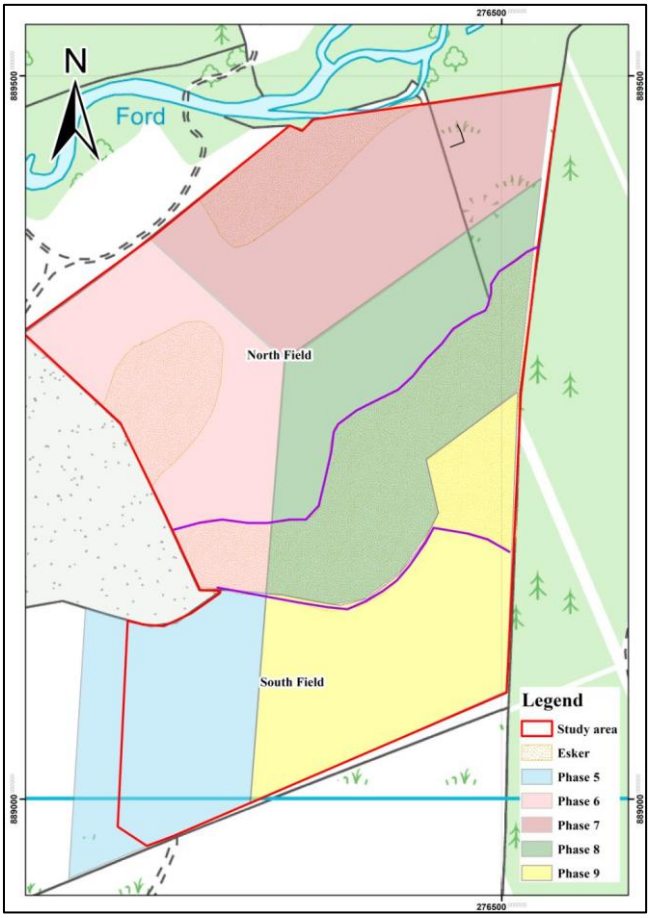


Figure 3: Site layout showing development phases

Background

Pat Munro Limited have been granted planning consent to extend the area of aggregate extraction at Dornoch Bridge Quarry near Evelix, Dornoch, centred at NGR NH 7637 8920 (Figures 1, 2 and 3). It is expected that the extension to the quarry will be undertaken in a series of stages over several years. The programme of archaeological fieldwork was designed to establish the presence or absence of significant buried heritage assets within areas of proposed extension, designated Quarry Extension Phases 5 to 9. At the time of the fieldwork the study area (Figures 1 and 2) consisted of open agricultural land bounded by a series of prominent steep-sided ridges representing glacial eskers.

Documentary & Historical Background

Historic Environment Record

The Highland Council Historic Environment Record (HHER) and the National Monuments Record for Scotland (NMRS) were consulted during the preliminary stages of the project to ascertain relevant historical and archaeological features located within approximately 1km of the proposed development area.

Significant heritage assets recorded within or adjacent to the boundary of the study site include at least one hut circle, an enclosure, and a hengiform earthwork, the latter tentatively suggested to represent the final resting place of a Viking leader, Sigurd 'The Powerful'. The hengiform monument was also known to have been disturbed by a trench dug during WWII.

The following recorded heritage assets were considered significant to the Study Site and are described in detail in the preliminary Desk-based Assessment (Worth 2017).

- **Cyderhall Farm:** Grid Reference: NH 7628 8937. Canmore ID: 14627, HHER ID: MHG11828 - *A ring ditch, period unassigned*.

- **Hengiform earthwork, Sydera Wood :** Grid Reference: NH 7649 8940, Canmore ID: 78614626, HHER ID: MHG11795 - *an enclosure consisting of an oval ditch 3m wide and 0.6m maximum depth with traces of an outer bank some 2.5m wide.*

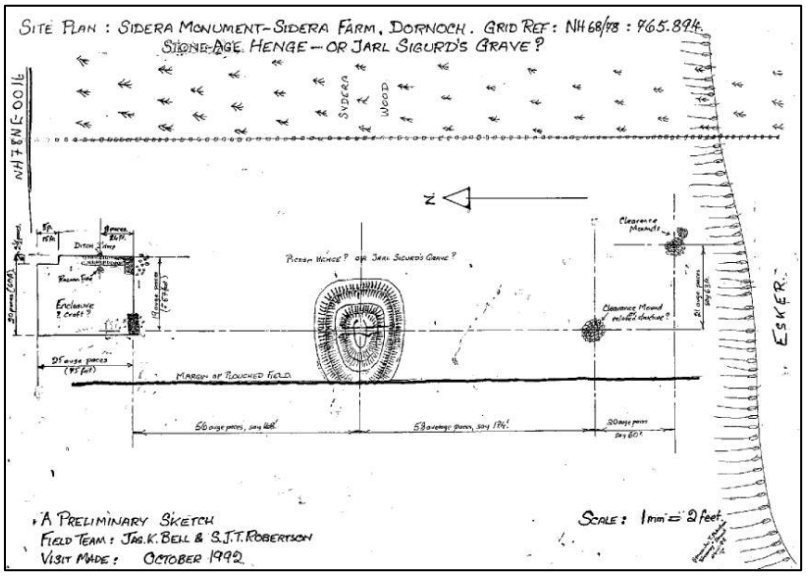


Figure 4: Plan of Hengiform earthwork (courtesy of Dornoch Heritage Society)

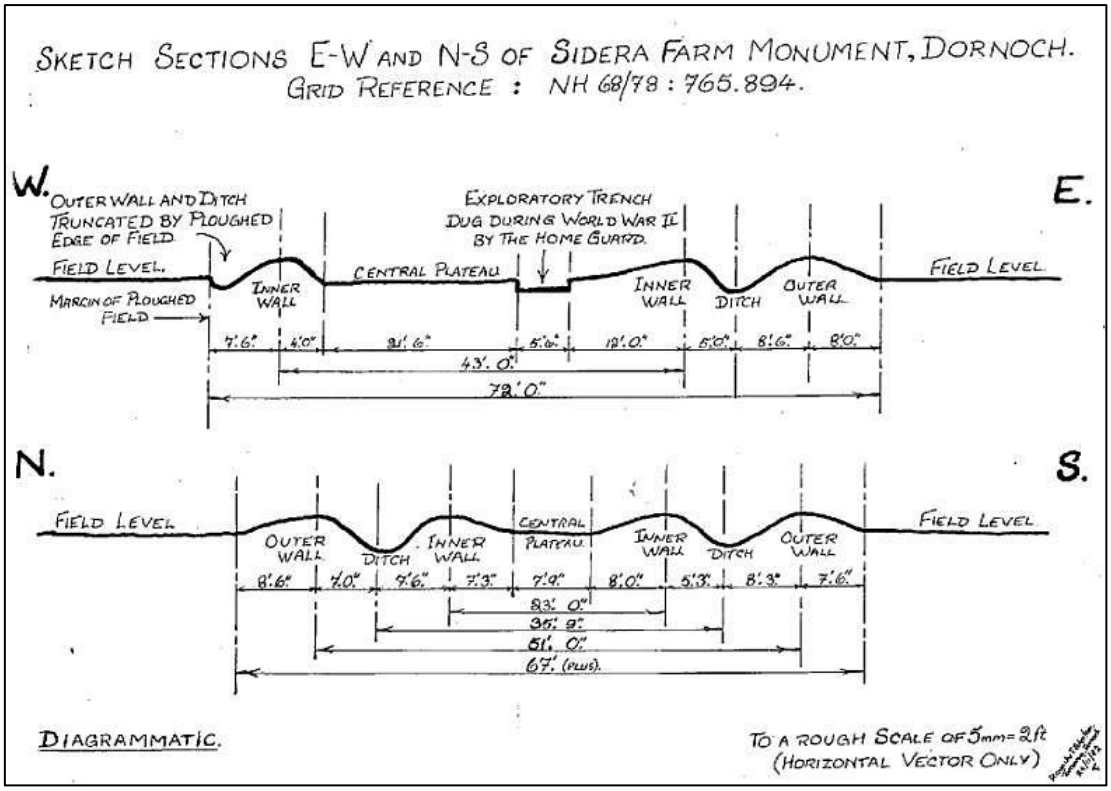


Figure 5: Profile of Hengiform earthwork (courtesy of Dornoch Heritage Society)

- **Burial site of Jarl Sigurd, Cyderhall:** Grid Reference: NH 7623 8915, Canmore ID: 14640, HHER ID: MHG12994 - *Jarl Sigurd, also called Sigurd the Powerful, deceased 875 AD, was buried in a howe at Oykel's Bank near Cyderhall ie. Sidera, near Dornoch. The tradition of the burial is known locally and often associated with the hengiform monument (above).*

- **Hut circle, Cyderhall:** Grid Reference: NH 7649 8916, Canmore ID: 275282, HHER ID: MHG32280 and MHG48770 - *Low walled circular earthwork, crest of knoll hard against but outside boundary of Camore Wood in Cyderhall Farm land. Badly mutilated & overgrown.*

- **Cydera settlement:** Grid Reference: NH 7600 8900, HHER ID: MHG14302 - site of former settlement incorporating the remains of at least three buildings.

Historic Maps

Historic maps were consulted using the National Library of Scotland's online mapping service.[3] Cyderhall Mill and associated watercourses are shown to the NE of the walkover area. Field boundaries are much the same as at present.

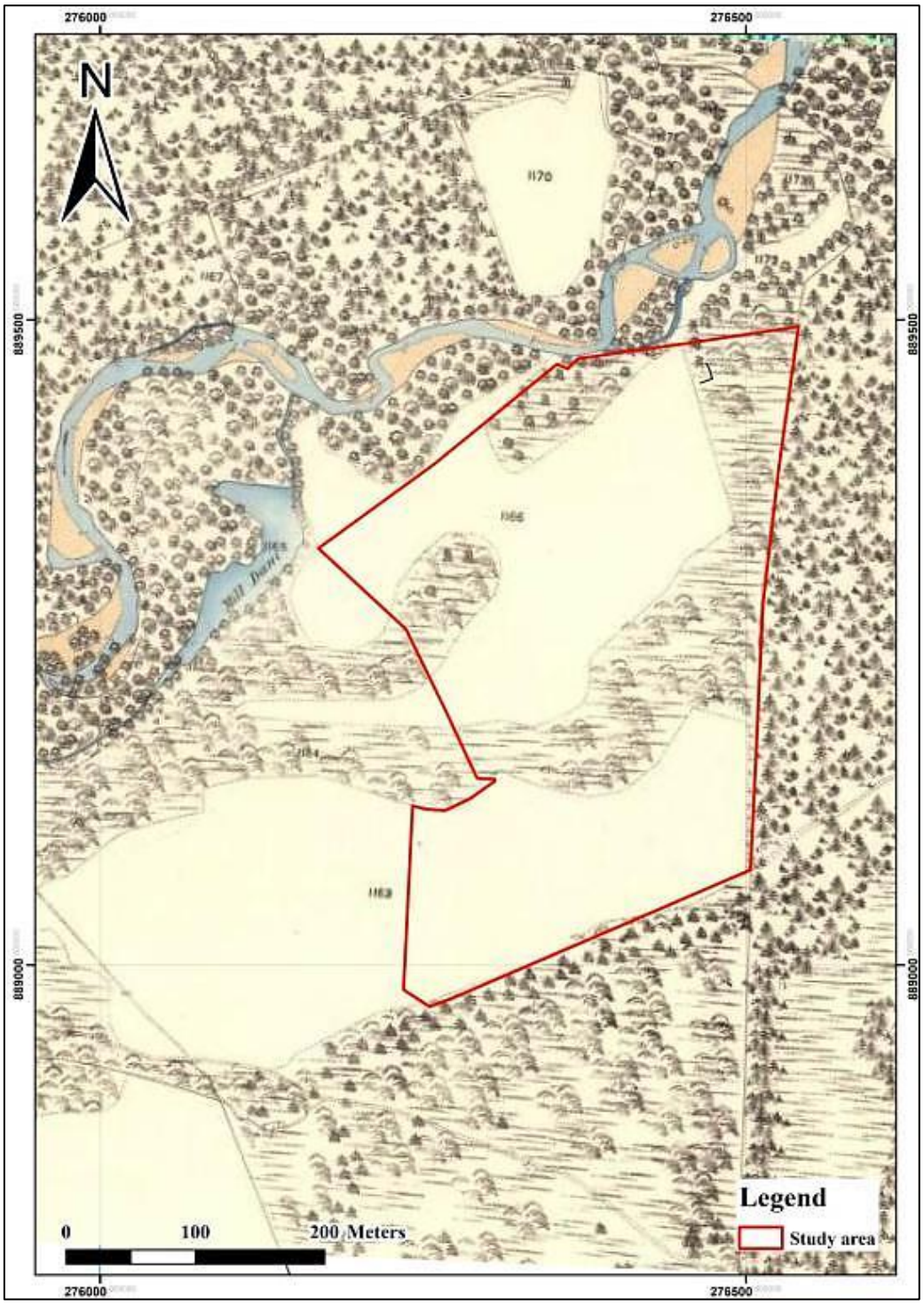


Figure 6 - Extract from the 1st edition OS 25" map surveyed 1874 showing boundary of the study area *Sutherland CXII.8*

[3] http://maps.nls.uk/geo/find/

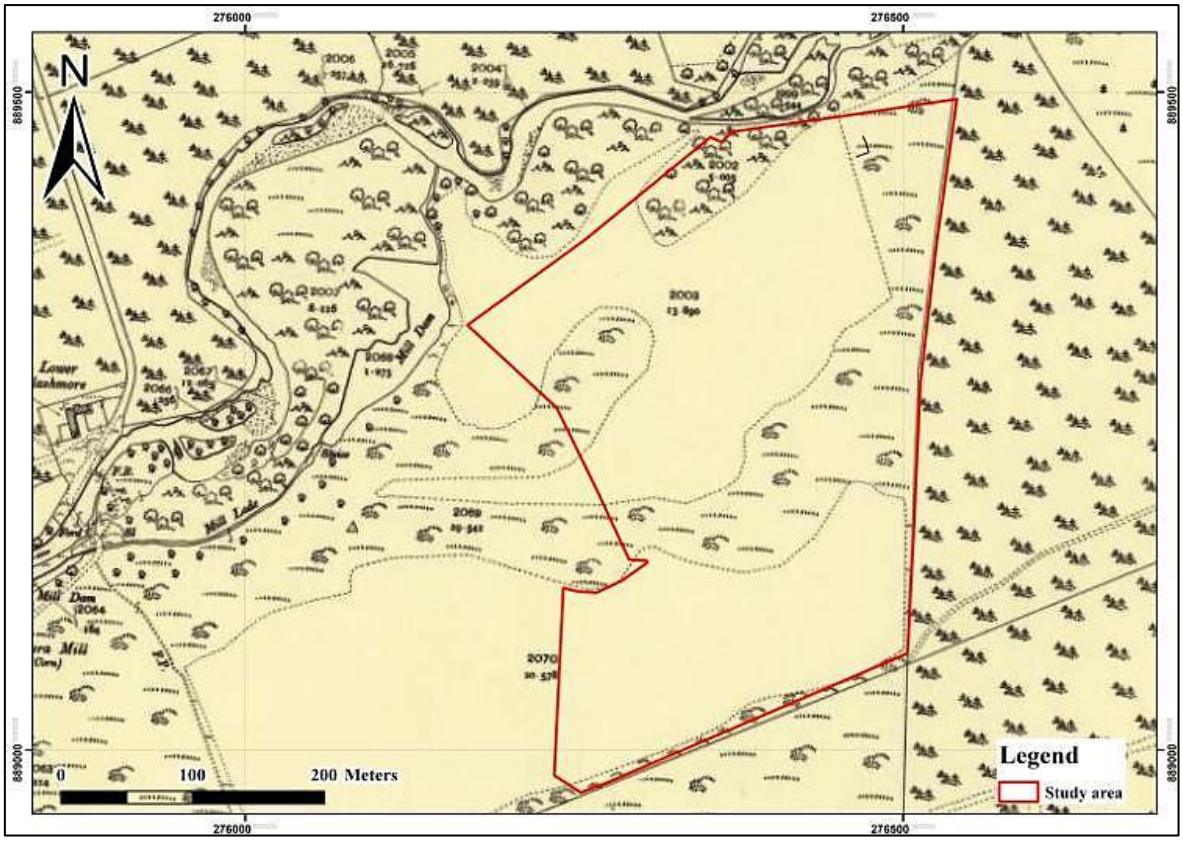


Figure 7 - Extract from the 2nd edition OS 25" map surveyed 1904 showing boundary of the study area and indicative topography.

Statistical Accounts

The Old and New Statistical Accounts for the parish of Dornoch were reviewed for references to archaeological features within or near to the study area. No significant references were found, apart from topographical notes and the mention of the lack of bridges across the River Evelix, which lies N and W of the walkover area.

The Evaluation Trenches

Methodology

The evaluation involved the excavation of seventy one (71) trial trenches (Figure 8), the layout and size of which were designed to provide a representative sample of the site and target areas or locations flagged up by documentary evidence. Most were opened in flat grassland to provide a sample of approximately 5,800 square metres, approximately 7% of the overall study area. The trenches were opened using a slew tracked excavator equipped with a 2m wide grading bucket. Excavation was conducted in shallow spits until either indications of archaeology or undisturbed natural deposits were reached. All trenches were backfilled to ensure safety once recording had taken place.

Results

The overall depth of deposits present across the site varied between 150mm and 1.2m, the topsoil varying between 200mm to 300mm. The natural substrate consisted of a mixture of sand, iron-pan grit and stone, with the incidence of grit and stone increasing adjacent to the eskers.

Trenches 2, 3, 4, 5, 6, 8, 9, 12, 14, 15, 16, 18, 19, 22, 23, 24, 25, 27, 28, 29, 30, 31, 32, 34, 35, 36, 38, 39, 40, 42, 44, 48, 49, 50, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 67, 68, 69, 70 and 71 were all entirely archaeologically sterile and produced no significant archaeological deposits or finds.

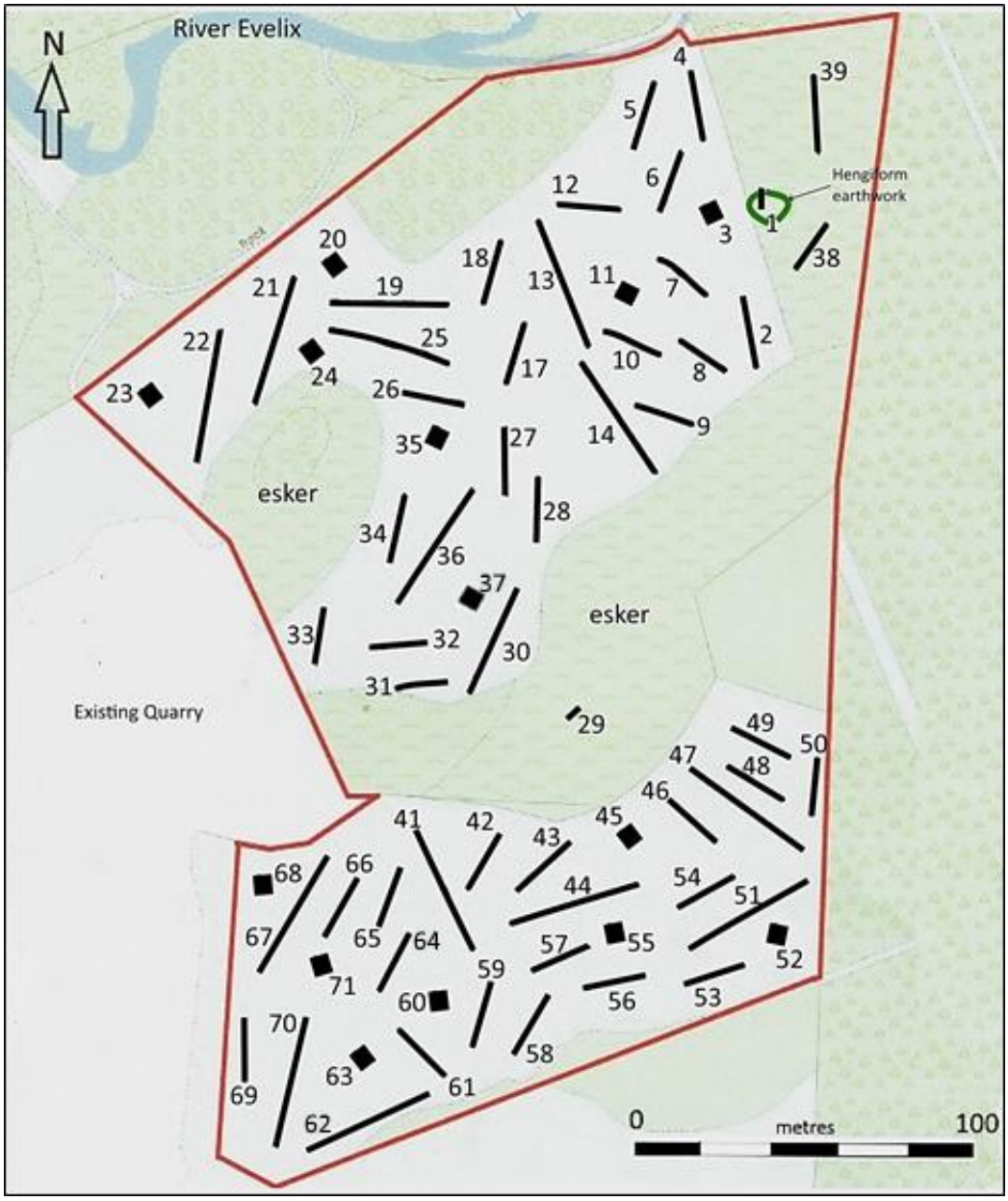


Figure 8 - Plan showing the layout of the Evaluation Trenches

Archaeological deposits and artefacts of varying quality and significance were revealed in Trenches 1, 7, 10, 11, 13, 17, 20, 21, 26 and 37. Further archaeological deposits were revealed in Trenches 41, 43, 45, 46, 47 and 51.

Description of Recorded Archaeology

Principal Archaeological Deposits and Features

The following section is selective and focuses on the archaeology identified by the trenching that is considered to be of the greatest quality and significance. A full description of all archaeological deposits and features identified in the trenches can be found in the preceding Data Structure Report (Worth 2017).

Trench 1
The trench was opened across the hengiform earthwork, specifically the scar of the trench that was opened across it in the 1940s. The monument is visible as a low earthwork on the edge of cultivated ground, although it appears to have suffered minor truncation from ploughing at its western edge.

A small area measuring just 3m by 2m was de-turfed at the northern end of the WWII trench. The removal of the turf and subsequent cleaning revealed evidence of linear cut [001] precisely in line with the trench scar. Once cleaned the edges of the 1940s excavation were clearly visible. No further excavation was undertaken in Trench 1 on the instruction of the Archaeological Officer for Highland Council.

Trench 20
Trench 20 was located on the most likely location of a possible Ring-ditch. No evidence of a ring ditch was identified although a series of pits and deposits containing modern finds were identified.

Trench 37
The trench was opened adjacent to a low mound on flat ground surrounded on three sides by prominent eskers. The cutting revealed a series of negative soil features including a number of small pits or postholes (contexts 15, 16 and 18), each of which produced fire-cracked stones. An L-shaped soil feature (context 13) was revealed in the south of the trench, which consisted of a shallow scoop with rounded edges. The fill of the feature contained a substantial number of fire-cracked stones plus occasional charcoal fragments. The feature extended beyond the trench and its overall extent was not ascertained.

Stratified finds were restricted to a single flint chunk with cortex. A prehistoric quartz thumb scraper (SF 2) and flint debitage were recovered unstratified from spoil heaps. The cut soil features were interpreted to reflect evidence of some unspecified prehistoric human activity, possibly occupation.

Trench 41
The trench revealed a cluster of smaller stones (027) up to 150mm, some of which were rounded and fire-cracked, set in a matrix of charcoal-rich silty sand (027). The deposit was heavily disturbed by burrowing and contained nodules of iron hard-pan throughout. The feature was interpreted to reflect a fire-pit of unknown date.

Trench 43
The trench revealed a large shell-midden (028) (Plate 1) directly below the topsoil that filled a U-shaped cut [035]. The deposit extended beyond the trench to the northwest and southeast and was 1.2m wide and up to 600mm deep. It consisted of a compact deposit of marine shells (see marine Molluscs below) and fire-cracked stoness. Inclusions of heat-affected and fire-cracked stone accounted for less than 5% of the overall volume of the midden whilst fragments of charred

material were rare (see Charred Plant Remains below). The deposit failed to produce any associated artefacts.

Plate 1 - Trench 43 showing detail of shell-midden deposit (028) [035] as excavated. (Scales 1m and 0.5m)

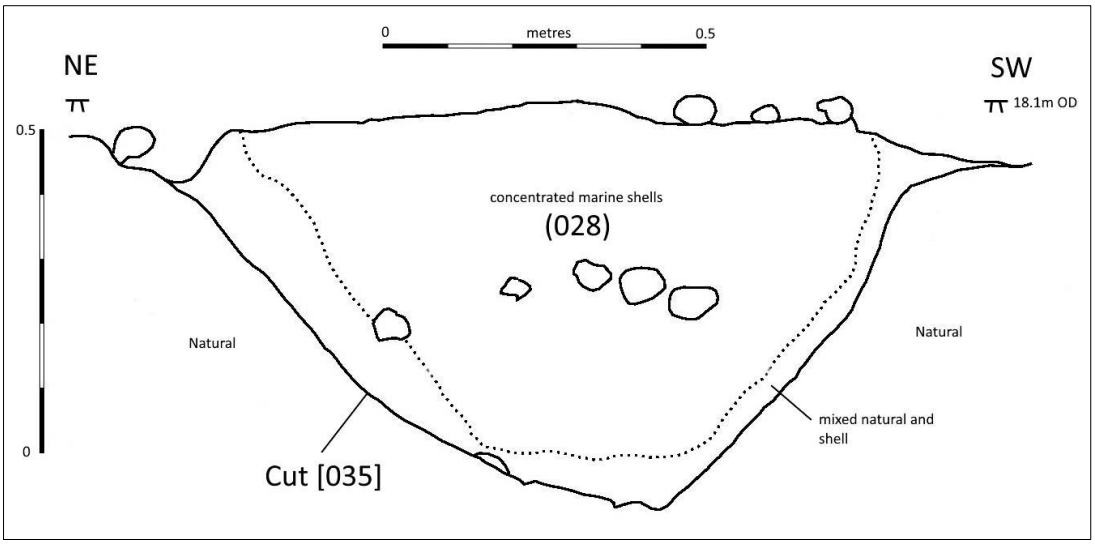


Figure 9 - Section through shell midden feature [035]. Scale shown

Trench 47
The trench was opened across a low earthwork suggested to represent the remnant of a hut circle.

The northern end of the cutting revealed an arrangement of tabular flagstones (043) of varying sizes below the topsoil (Figure 10 and Plate 2) at a level of 19.22m OD. The soil (046) surrounding the slabs produced sherds of abraded prehistoric pottery (see Pottery below) and a highly degraded metal object (SF 31).

The largest of the flagstones covered an un-urned cremation burial (055) (Plate 3) (see Human Remains below). A second cremation deposit (051) (see Human Remains below) (Plate 4) was revealed just a metre away from the first, the cremation deposit placed on a larger flat stone.

Plate 2 - The NW end of Trench 47 after cleaning showing area of slabs and cremation burials before excavation. Facing SE. Scales 2m and 1m. Facing SE

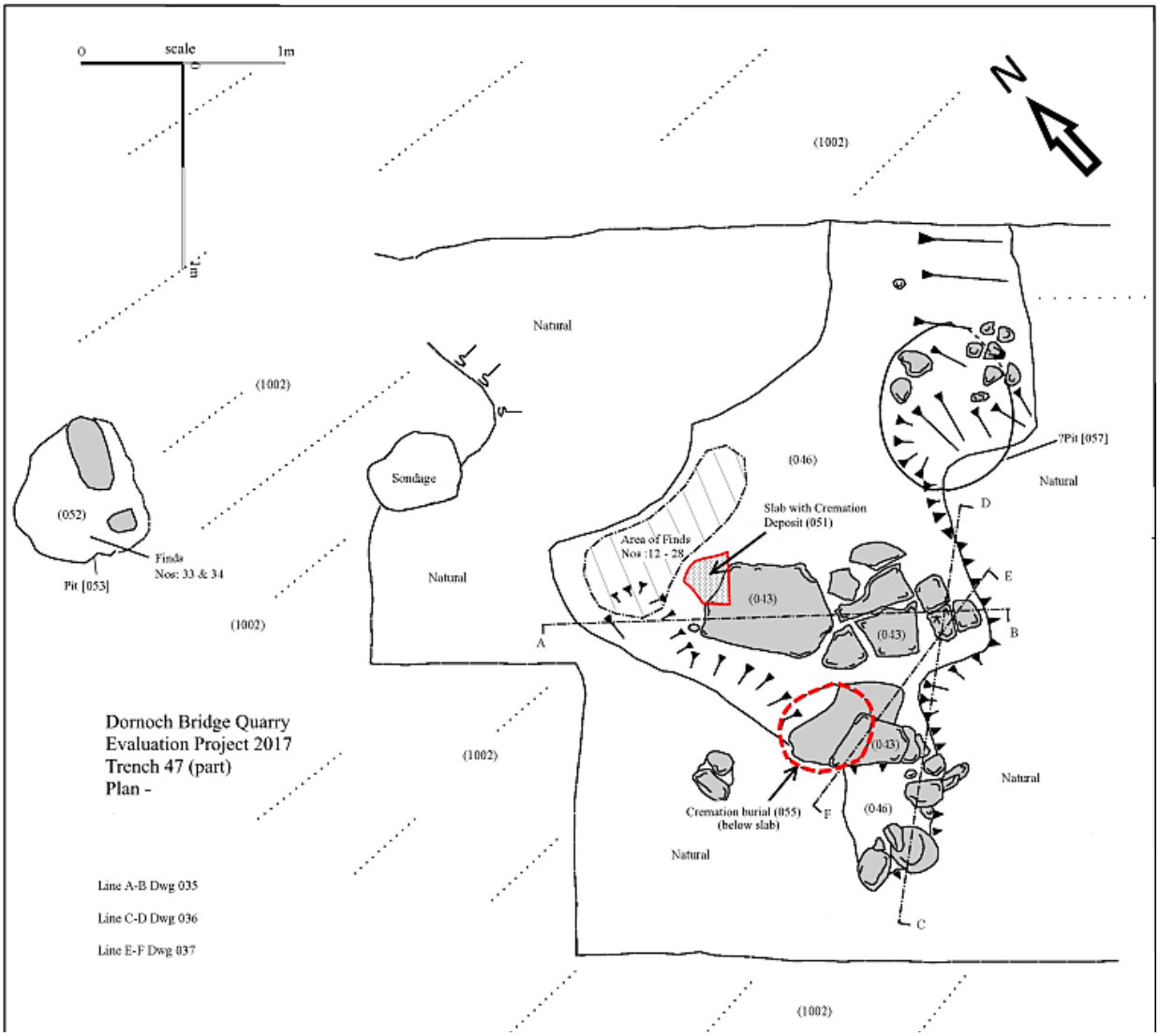


Figure 10 – Detail of features revealed in Trench 47 showing cremation burials and associated prehistoric deposits and features. Scale shown

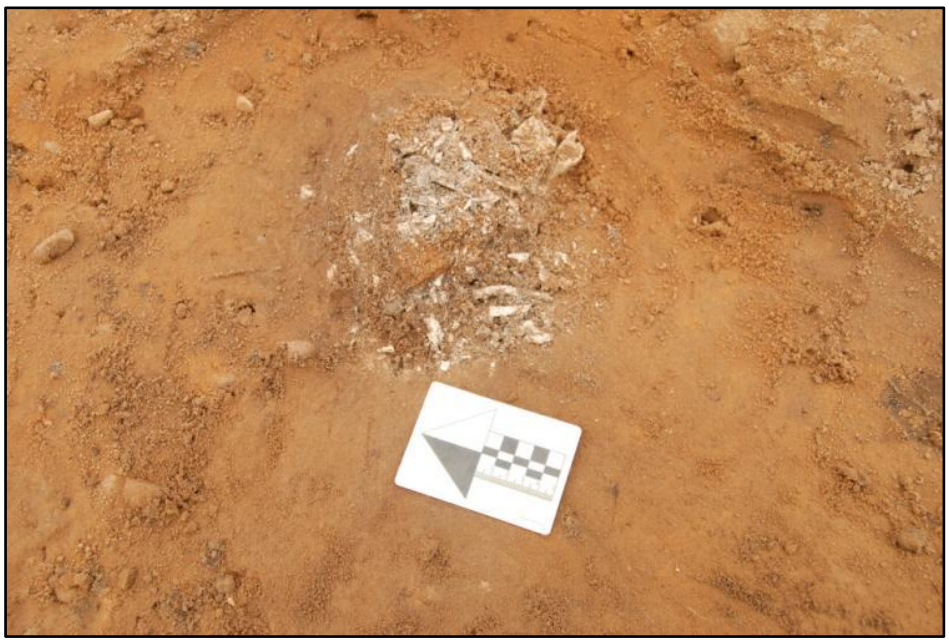


Plate 3 - Trench 47, Cremation deposit (055) after removal of slab and before excavation (scale cms)

Plate 4 - Trench 47, Cremation deposit (051) after initial cleaning (scales in 100mm graduations)

A pit [053] was revealed to the northwest of the cremations, at the north western end of the trench. The lower fill (054) produced a substantial assemblage of decorated prehistoric pottery sherds (Plate 5) (see Pottery below). A further well-defined pit [057] (Figure 10) contained rubble in the upper fill (Plate 6), possibly reflecting a further cremation burial. This was planned and photographed but not excavated.

Plate 5 - Prehistoric pottery sherds from Deposit (054) in Trench 47. Scale in cms

Plate 6 - Trench 47, Pit (057) after cleaning (scales 1m)

A further soil feature [039] was revealed that was initially interpreted to represent a small pit or a posthole. Excavation of the feature revealed fragments of a human skull and human teeth (Plate 7) (see Human Remains below). The fragments consisted of part of the top of a skull that appeared to have been placed top down. The cut [039] was traced to the northeast by extending the trench. This produced a few additional fragments of human bone (see Human Remains below). As fully excavated the cut [039] was greater than 1.6m long and 1m wide with a distinctive curved shape in plan.

Plate 7 - Trench 47, detail of human skull fragments during excavation of Cut [039] (scales 500mm and 200mm)

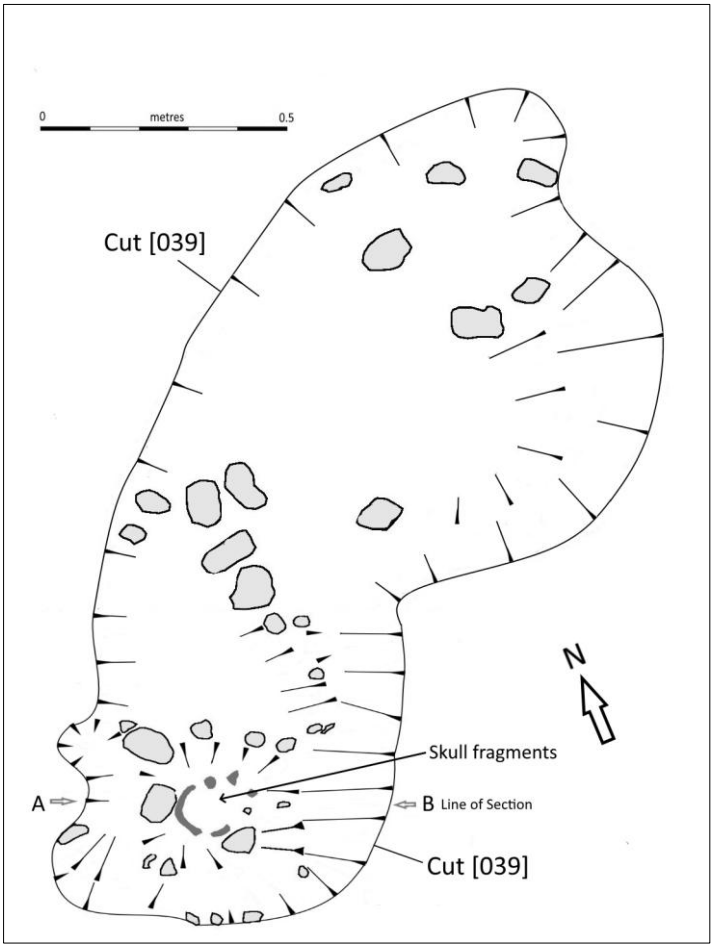


Figure 11 - Grave [039] as excavated. Scale shown

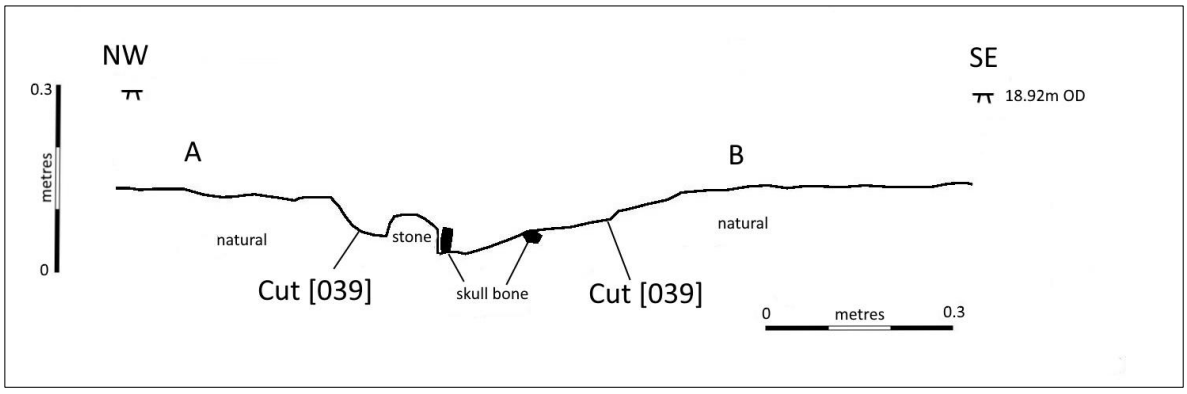


Figure 12 - Section A to B across Grave [039] as excavated. Scale shown

Trench 51

Trench 51 revealed the cut of a small oval pit [037] with vertical sides and concave base. The feature was less than 200mm deep and filled by a deposit of fine compacted silt (038) containing fragments of degraded wood. No significant finds were recovered from the pit or elsewhere in the trench.

Other Archaeological Deposits

In addition to the principal archaeology described above a series of poorly defined stone spreads were recorded in Trenches 7, 13 and 17 directly below the topsoil. In each case these were interpreted to reflect the remnants of highly disturbed former boundary dykes.

Trenches 45 and 46 revealed a group of very shallow, undated and archaeologically sterile linear soil features. Trench 26 revealed a localised patch of heat-affected cobbles.

Plate 8: Excavation of cremation (051) underway

Specialist Reports

The Pottery by Dr Orlene McIlfatrick

Summary

The assemblage comprises 78 sherds of coarse pottery from a minimum of 9 hand-built vessels, made by either the coil or strap method of construction. Few diagnostic sherds are present, though out-turned and upright rims suggest bucker or jar-shaped vessels and two vessels display stabbed decoration. The pottery was recovered from 5 contexts, plus topsoil (see context summary). The hand-made vessel forms and decoration can be readily paralleled on Middle and Late Iron Age assemblages throughout northern Scotland and a similar date seems likely for this assemblage. One sherd of medieval or later wheel-thrown pottery was also recovered (unstratified).

Context Summaries

Trench 47; Context 54; Feature 53
Pottery was most plentiful from this context, yielding 49 sherds in total, representing 3 vessels. 38 body sherds, 2 refitting rim sherds from an out-turned rim vessel, with a slight beading feature on the lip (Vessel 1) (Figure 13). Two further rim sherds with a stabbed pattern (Vessel 2) Figure 14), and a further 2 refitting rim sherds plus 4 body sherds (Vessel 3) (Figure 13 and Figure 14).

Trench 47; Context 46
Thirteen body sherds representing a single vessel (Vessel 4). This vessel is hand-made and low-fired, and the sherds are particularly dirty.

The rim and body sherds belong to the same vessel (Vessel 5) and the neck sherd from another vessel (Vessel 2) (Figure 14). The neck sherd bears decoration, being stabbed with horseshoe shaped indents. This sherd belongs to the same vessel as is represented by a rim sherd in Context 54.

Trench 21; Context 12
A single base sherd, very small, with a vertical notched pattern (Figure 14). This base was designated Vessel 10, though it may belong to one of the vessels in Trench 47. Given the context is part of an animal burrow, a stray find is not unusual.

Topsoil: Trench 57
Three body sherds, find numbers 8 (single sherd) and 9 (two refitting sherds). Sherd, find number 8 is in a pale cream coloured fabric, and appears to be wheel finished, and may be Medieval. The sherds comprising find number 9, appears to have small micaceous grits as temper (Vessels 8 and 9 respectively).

Trench 43; Context 28; Feature 35
Recovered from a midden deposit, a single body sherd of reddish-brown coarse pottery with small sparkly grits as temper. Representing a single vessel (Vessel 7).

Trench 47; Context 52
This context produced 2 refitting rim sherds, of out-turned form (Figure 14), a neck sherd and 2 body sherds.

Description of individual vessels (Vessels 1 to 10)

1. Vessel 1 – (Figure 13) Most likely jar-shaped with an out-turned rim finishing in a slightly rolled lip. This 'roll' is not consistent across the two refitting rim sherds, and shows fast and informal method of manufacture.

2. Vessel 2 (Figure 14) represents one of the two decorated vessels from the assemblage. The sherds are yellow-cream in colour, made from a very sandy clay and display linear rows of stabbed horseshoe-shaped indents, perhaps executed using the end of a bird bone. The diameter of the rim lies between 200-210mm.

3. Similar to Vessel 2, made from the same sandy fabric and decorated in the same manner, yet the pattern placement varies between vessels. Diameter could not be determined.

4. The form of Vessel 4 cannot be determined. The fabric is low fired, and particularly crude in manufacture.

5. The form of Vessel 5 cannot be determined. The fabric is low fired, similar to Vessel 4. (Due to the overall condition of the sherds it is not possible to determine if the sherds from Vessels 4 and 5 are from the same vessel or not, therefore they are separated here)

6. Represented by a single brown, featureless body sherd in poor condition.

7. Represented by a single reddish-brown, featureless body sherd in poor condition. Contains sparkly grits as temper.

8. Vessel 8 is probably medieval or later, it is a cream-coloured wheel-thrown body sherd from plough soil.

9. Two refitting, featureless body sherds, containing small sparkly grits.

10. A single base sherd (Figure 14) in a brown, seemingly untempered fabric. The base sherd is upright and decorated with a vertical 'notched' pattern. Vessel 10 was isolated as a separate vessel as it could not be paired with confidence to any of the body or rim sherds elsewhere, however it could belong to any of the material in Context 52.

Condition

The sherds were not cleaned, owing to the high risk of such a low-fired fabric disintegrating. Lack of cleaning therefore made analysis in terms of inclusions difficult, however it is possible to note that most of the breaks display small white flecks of grit less than 1mm^2. Beneath the film of dirt, it is possible to see traces of soot and heat-scorching on many of the sherds. Overall the pottery is in variable condition, with many of the softer sherds displaying significant abrasion.

Discussion

The northern mainland region of Scotland has produced a significant quantity of coarse wares from excavations of brochs and roundhouse excavations, some of which yield good parallels for the material from Dornoch Quarry. The author's own research (McIlfatrick 2013) resulted in the production of a preliminary typology for the region, indicating that the pottery of the Long Iron Age tended to be comprised of long-lived vessel forms, sparse decoration, and predominately grit-tempered fabrics. This results in the chronology being loose, with C14 dates or relative-datable finds still often being required to orientate more precisely the pottery finds on a site-by-site, context-by-context basis. Despite this, the diagnostic sherds here place occupation in the Middle to

Later Iron Age, though six of the ten vessels are represented only by body sherds, leaving us with an incomplete picture of the overall assemblage.

Parallels for Vessel 1 are widespread in Northern Scotland. At the Howe of Howe broch on Orkney, out-turned rim vessels, in the form of jar with wide shoulders and relatively narrow bases, are in use in the Middle Iron Age and continue to be in use until the end of the Late Iron Age. An example (Ross in Ballin Smith 1994: Illus. 152, sherd 4588) originated in Phase 8 which dates from c.4th-7th centuries AD (Ross in Ballin Smith 1994:253, 266). At Crosskirk, Caithness, the so-called 'Early Broch Ware' of Class 2 contains two vessels of this rim form. Class 3A also contains "one or two slightly out-curved rims" (Fairhurst 1984:113). The rolled lip, being intermittent and inexpertly executed, may or may not be deliberate, and as such, lending it weight as a diagnostic feature is not advisable. In the event that it is a deliberate design feature, the parallels from Crosskirk would still place it in the middle-late Iron Age (*ibid*: 113).

Further west, Dun Mor Vaul broch on Tiree, yielded one vessel with an out turned rim from Phase 2 (context Alpha 1 and 2). The vessel has a wide belly and the angle of out-turn is very rounded and 'flowing' (MacKie 1974: 119, Fig 14 vessel 193). This phase encompasses the construction of the broch, which MacKie dated to c.60AD +/- 90 (MacKie 1997).

Stab-decorated vessels 2 and 3 are harder to parallel from northern assemblages, though incised wares are to be found both at Howe and Crosskirk in the Middle-Late Iron Age (Fairhurst 1984:114; Ross in Ballin Smith 1994: 247, Illus.147, vessels, 5718, 7543 and 7114). The Howe examples of stab decoration date broadly to the 1st -4th century AD. Several examples are extant from Dun Mor Vaul where rows of dots or elongated stabs (MacKie 1974: 118, Fig. 13) are common in the Phase 1 / 2, context Theta which is likely to have a date in the 1st century BC (MacKie pers. comm.). Stabbing under the rim of barrel shaped vessels (*ibid*: 119, Fig 4) can also be found in Phase 2A at Dun Mor Vaul, in a phase dating to the first centuries AD or BC (MacKie 2007: 1006). As the rim sherds are too uneven in manufacture to determine the exact angle of the rim against the body, or the diameter of the vessel mouth, it is not possible to say what form of vessel they represent; however bowl and jar forms are both extant in the examples from Howe in particular. The coarse sand and grit tempered fabrics which all the vessels are made from are common to all Later Prehistoric ceramic assemblages with which the author is familiar. Coarse gritted pottery fabrics predominated in both the early and later prehistoric (Iron Age) assemblages of Caithness and Sutherland, with coarse gritted pottery found at Sutherland sites such as Kilphedir (Fairhurst 1971) and in the various early-later prehistoric occupation layers at Upper Suisgill (Barclay 1985).

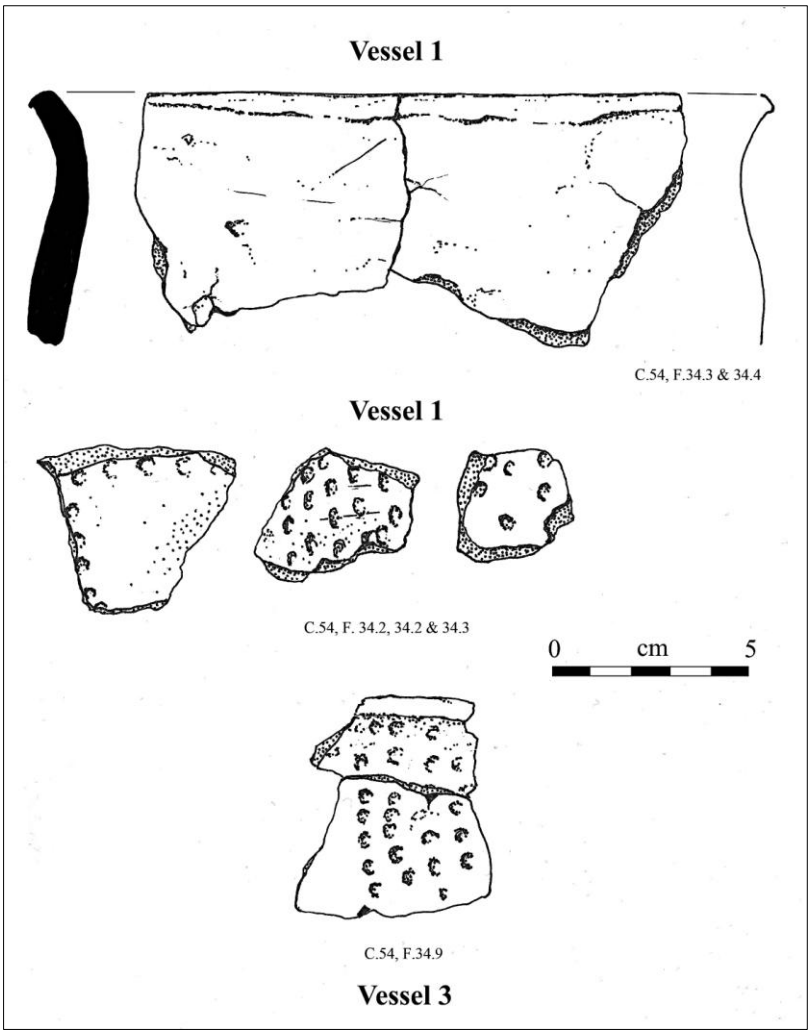


Figure 13 – Late prehistoric pottery sherds from Trench 47

The favouritism towards coarser fabrics also predominates in the Western and Northern Isles throughout the Iron Age, and as such are chronologically unhelpful (McIlfatrick 2013) on a super-regional scale, though additional petrographic analysis by thin section, or chemical analysis by X-Ray Fluorescence may reveal fabric use or clay source patterning within the site over the course of the occupation period. In this manner targeting sherds from pits (Context 47), working surfaces (Context 46) and fill deposits (Context 52&54) alongside C14 sampling may prove useful.

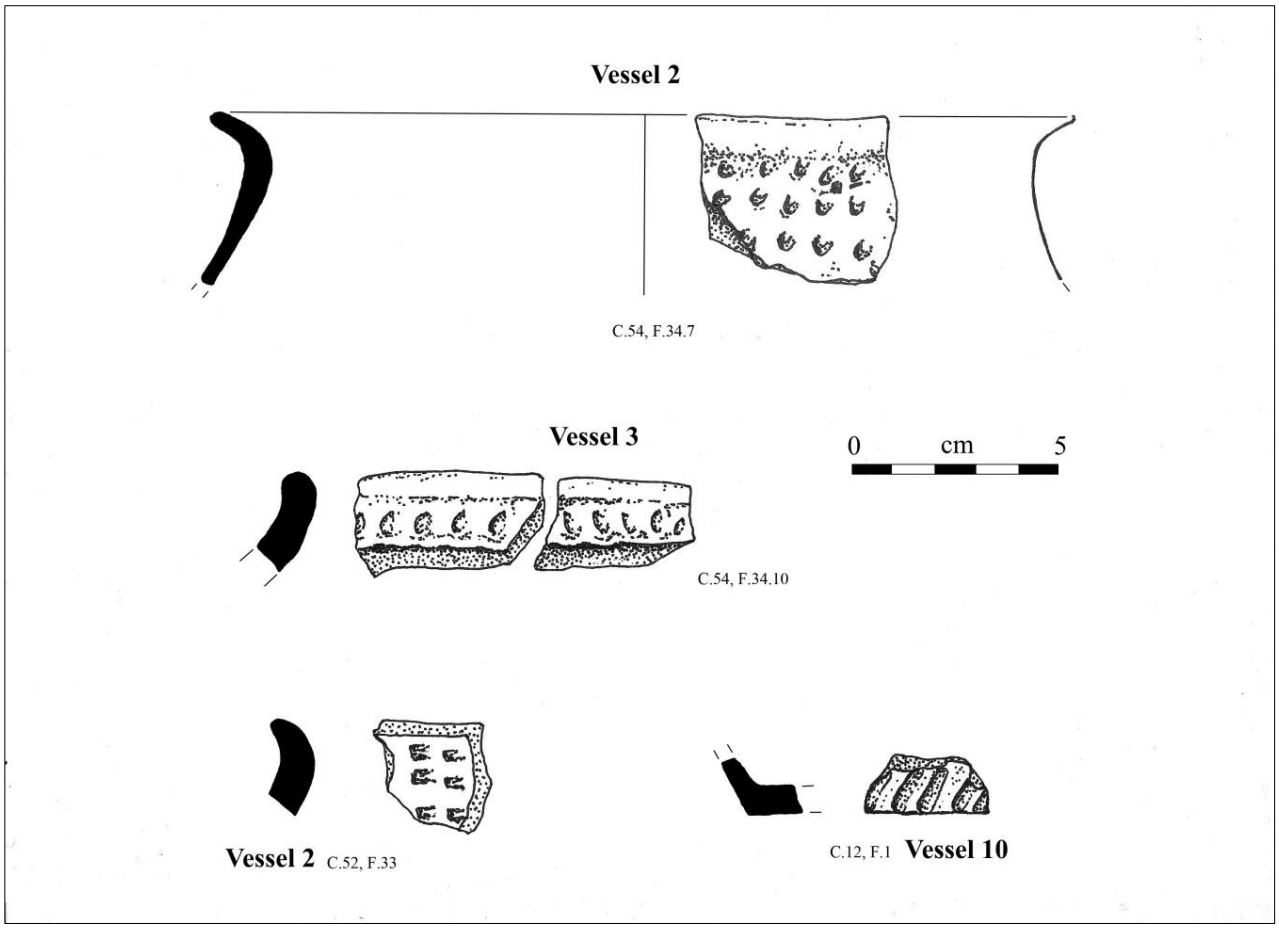


Figure 14 – Late prehistoric pottery sherds from Trench 47 and Trench 21 (Vessel 10)

Struck lithics *by Dr Hugo Anderson-Whymark, NMS*

Four struck flint artefacts were recovered from the evaluation, comprising an end and side scraper and three fragmentary flakes. Three of the flints were unstratified finds and one flake was recovered from the unexcavated fill of Pit 57; all were in fresh condition indicating they have not moved far from their original place of deposition.

Little technological information can be gained from such a small assemblage, but platform and bipolar reduction was noted. A broad Neolithic to early Bronze Age date can be proposed for the scraper and the flakes are likely to fall in the same date range, although they are not intrinsically datable.

Catalogue

TR.33. SF 2. Unstrat. D-shaped End and side scraper, probably manufactured on a bipolar flake. Grey-white pebble flint with a chattered cortex. Neolithic to Early Bronze Age.

TR.37. SF 3. Unstrat. Platform struck side trimming flake. Grey to orange-brown flint with rough cortex. Probably Neolithic to Bronze Age.

TR. 47. Pit 57, fill 58. SF 41. Fragmentary flake. Orange-brown flint. Probably Neolithic to Bronze Age.

TR.57. SF 11. Fragmentary flake, probably bipolar. Orange-brown flint with rough cortex. Probably Neolithic to Bronze Age.

Marine Molluscs *by Matthew Law, L-P Archaeology*

Introduction

This report presents an analysis of mollusc shells from samples taken from a shell midden deposit at Dornoch Bridge Quarry, Dornoch, Highland.

The samples come from one context, (28), which was a compact deposit of shells and fire cracked stones in a silty sand matrix which extended over 3.4m in length, 1.2m in width, and 0.6m depth. It was the fill of a cut feature, context [35].

A total of 3 samples were analysed, samples 6, 8 and 9, as well as an assemblage of hand-collected shells. Sample 6 was from the upper part of the deposit, sample 8 from the lower part of the deposit, and sample 9 from a NW extension to the midden spread.

Methodology

Identifications were carried out using a reference collection. Ecological information is derived from (Allcock et. al. 2017).

Nomenclature follows WoRMS (WORMS 2018). In the case of *Littorina cf. fabalis*, the abbreviation 'cf.' has been inserted in the species name to reflect the fact that the shell could not confidently be identified to species level. From the shape of the aperture and the angle at which the outer lip impinged on the body whorl, *L. fabalis* was the most likely determination, however there is considerable overlap in shell form with *Littorina obtusata*, which may make differentiating the two species from shells alone impossible.

Minimum number of individuals (MNI) for gastropods was determined by counting all non-repeating elements of that species within a sample and using the largest number as the MNI. In the case of bivalves, only shell hinge fragments or intact valves were counted. Minimum numbers of left and right valves are presented separately. The highest of these two numbers is used as the MNI.

Results

Results are presented in Table 1.

Preservation was largely good in all samples, with a mixture of intact and fragmentary shells present and some articulated bivalves. Shells did not appear to be wave-worn, suggesting that this is not a natural accumulation. An exception to this is the mussel (*Mytilus edulis*) shell, which was poorly preserved and chalky in texture.

The midden deposit is overwhelmingly dominated by common cockle (*Cerastoderma edule*), with lesser numbers of common periwinkle or winkle (*Littorina littorea*) and common mussel (*Mytilus edulis*). Other species (*Nucella lapillus* and *Littorina cf. fabalis*) are only present in very low numbers.

The dominant taxon present is common cockle, *Cerastoderma edule*, which makes up 67.8% of the MNI. Common cockles are found in intertidal settings lower than mid-tidal level on sandy mud, sand or fine gravel shores. Where conditions are favourable and there is an abundant supply of plankton, they are able to obtain immense numbers forming densely populated cockle beds (Barrett & Yonge 1962: 157; Laurie 2008: 14; Chambers 2009: 158; Allcock et. Al. 2017: 575).

Winkles (Littorina littorea) are common in the upper part of the deposit and within the NW extension. These are also found on the middle shore or lower, although they tend to be found on rocks or on seaweed (Barrett & Yonge 1962: 135; Allcock et. Al. 2017: 481).

Mussels (Mytilus edulis) appear only in the NW extension. These are also an intertidal species, associated with rocky shores, although they can appear in muddy shores where stones are available for initial attachment. Like C. edule, it is capable of forming dense populations (Barrett & Yonge 1962: 151; Allcock et. al. 2017: 554).

Table 1: ***Molluscs by context***

Context		**28**	**28**	**28**	**28**
Sample		**6**	**8**	**9**	**-**
Littorina littoria (L)		69		612	10
Littorinia cf.fabalis (W. Turton, 1825)				3	
Nucella lapillus (L.)				1	
Mytilus edulis (L.)	Left valve			14	
	Right valve			14 13	
Cerastoderma edule (L.)	Left valve	477	750	176	87
	Right valve	464 477	698 750	139 176	83 87

Table 2 - ***Molluscs from Context 28***

Context	**28**	**28**	**28**	**28**
Sample	**6**	**8**	**9**	
Littorina littoria (L)	69		612	10
Littorinia cf.fabalis (W. Turton, 1825)			3	
Nucella lapillus (L.)			1	

Mytilus edulis (L.)			14	
left valve			14	
right valve			13	
Cerastoderma edule (L.)	477	750	176	87
left valve	464	698	139	83
right valve	477	750	176	87

The other two species in the assemblage, dog whelk (*Nucella lapillus*) and flat periwinkle (*Littorina cf. fabalis*), are also intertidal species. *N. lapillus* is found on rocks, where it is a predator of other molluscs. It is worth noting that some of the cockle shells were seen to have small holes bored in them, which may suggest that in this case, *Nucella* was living on a cockle bed. *Littorina fabalis* is usually found on the fronds of seaweeds. Neither species are likely to be food waste; instead they are probably accidental collections. Thomas and Mannino (2017: 50) suggest that at the Culverwell mesolithic midden on the Isle of Portland, Dorset, *N. lapillus* may have been collected by inexperienced foragers, perhaps children. In this case, they may also have been incorporated into the assemblage by use of a bulk harvesting technique, such as raking.

Marine shell assemblages in Scotland tend to be dominated by three taxa: limpets (Patella spp.), winkles, and cockles (Pollard 1994; Hardy 2013; Law 2018). Generally, the former two tend to dominate on rocky shores whilst cockles dominate sandy embayments and estuaries. Cockle-dominated assemblages are the least common, although they include a Mesolithic midden at Morton in Fife (Coles 1971).

Overall, the samples from Dornoch Bridge Quarry are suggestive of exploitation of the local shore, where the environment is dominated by soft sediment, although the appearance of mussels and winkles in the upper part of the deposit and the NW extension may suggest a broadening of collection strategy to include both more species and a rockier environment.

Charred Plant Remains *by Dr Susan Ramsay*

A total of 11 bulk environmental samples were taken from archaeological features during the course of the evaluation fieldwork. Samples were taken from deposits containing cremated bone, unburnt human bone, marine and terrestrial molluscs and cultural material. The samples are likely to contain further cremated, unburnt and carbonised material that have the potential to provide important information relating to human funerary activity and the agricultural and wider natural environment. The samples were also likely to contain material, for example sapwood charcoal, suitable for radiocarbon dating. The processed flots and residues were examined by specialist Dr Susan Ramsay (below).

Archaeobotanical Report *by Dr Susan Ramsay*

Introduction

The following archaeobotanical report details the analysis and interpretation of carbonised botanical remains recovered from samples taken during archaeological evaluation and excavation work at Dornoch Bridge Quarry, Evelix, Dornoch. The work was carried out by Highland Archaeology Services Ltd on behalf of Pat Munroe Ltd in advance of the extension to the quarry at Dornoch Bridge (Worth, 2017). The excavations revealed a range of archaeological features including a hengiform enclosure, a disturbed human burial, two human cremation burials a shell midden and a group of postholes that may be the remains of a timber structure.

Methodology

Sample Processing

A programme of bulk sampling was undertaken in order to examine the carbonised archaeobotanical remains from Dornoch Bridge Quarry. In total, 11 bulk samples were analysed for the presence of botanical remains. The bulk samples were processed by flotation by Highland Archaeological Services and the unsorted flots and sorted retents given to the author for analysis.

Macrofossil Analysis

Dried flots and sorted retents were examined using a binocular microscope at variable magnifications of x4 - x45. For each sample, estimation of the total volume of carbonised material >4mm was made and all charcoal >4mm was identified. All carbonised seeds were identified and any other plant macrofossil remains were noted.

The testa characteristics of small seeds and the internal anatomical features of all charcoal fragments were further identified at x200 magnification using the reflected light of a metallurgical microscope. Reference was made to Schweingruber (1990) and Cappers *et al* (2006) to aid identifications and vascular plant nomenclature follows Stace (1997).

Results & Discussion

Results will be discussed by area and by trench, as per the data structures report. The full results of this analysis are shown in Table 7 (Appendix 1) at the end of this report. Table 8 (Appendix 2) details the material selected for potential AMS carbon dating from each sample.

Trench 20

Trench 20 was located over a possible ring ditch that was identified during the desk based assessment. However, no evidence for a ring ditch was located during excavation. A rectangular pit [024] was located but the fill (026) produced fragments of modern glass. A mixed charcoal assemblage was dominated by Scots pine but with heather type and traces of hazel and alder also identified. This assemblage could date from any period as all types would have been available locally throughout the prehistoric and historic periods and probably represent the remains of hearth waste.

Trench 43
Excavation of Trench 43 revealed a large shell midden (028) that lay directly below the topsoil and comprised marine shells and fire cracked stones. The samples were analysed from this context but very little charcoal was recovered. Although the charcoal assemblage was diverse, with birch, hazel, heather type, Scots pine type, oak and willow recorded, none were present at any more than 0.04g and so this probably represents the remains of scattered hearth/midden waste from elsewhere. A single carbonised oat grain was the only cereal present. Whilst oats are generally found from the Norse period onwards in Scotland, occasional grains are found as weeds amongst other cereal crops and so a single grain does not give a definitive guide to dating this feature.

Trench 45
A posthole [029] was identified within Trench 45. The fill (030) produced only traces of oak charcoal but these are not sufficient to suggest the remains of an oak post burnt *in situ*.

Trench 47
Trench 47 was opened over an area identified in the desk based assessment as a possible hut circle. An area of flagstones (043) overlay a cremation burial (055), which produced a mixed charcoal assemblage of oak, with traces of hazel and indeterminate cinder. Prehistoric cremation pyres were often fuelled by oak as it can produce hotter temperatures than other wood types (Gale & Cutler, 2000).

A second cremation deposit (051) was located approximately 1 metre from cremation (055). Cremation deposit (051) produced a more mixed charcoal assemblage of oak, hazel, Scots pine type, cherry type and willow, together with a few fragments of hazel nutshell and some cremated bone. If the charcoal represents pyre fuel then the mixed deposit suggests that oak was the main fuel but that other types were also included, perhaps as kindling. The presence of hazel nutshell fragments may indicate that hazelnuts were placed onto the pyre as an offering of food.
To the northwest of the cremations was a large pit [053], with an upper fill (052) and lower fill (054), which was rich in prehistoric pottery sherds. The charcoal assemblage from these two fills was very similar with oak and willow charcoal the main components along with a few fragments of hazel nut shell. In addition (052) produced a single barley grain and (054) produced a few fragments of birch charcoal. The combination of oak and willow could suggest debris from a wattle structure destroyed by fire. However, the addition of the cereal grain, hazel nutshell and birch charcoal would lend more weight to this being the remains of domestic hearth waste.

A further cut feature [039] was initially thought to be a pit or posthole but the remains of a human skull and teeth were located within the fill and further investigation revealed more fragments of human bone and the cut became more elongated in shape. The fill (049) produced a diverse charcoal assemblage of alder, birch, hazel, heather type, Scots pine type and oak, but none of the charcoal types was present in significant amounts. This suggests that this material may be residual from a nearby hearth, midden or occupation layer rather than being associated with the burial itself.

Osteological Analysis of Human Remains *by Angela Boyle*

Introduction

A small assemblage of human remains comprising two un-urned cremation burials (051 and 055), a disturbed inhumation burial (049) and a single fragment of burnt human bone (046) were recovered during archaeological evaluation at Dornoch Bridge Quarry, Inverness. The evaluation was carried out by Highland Archaeology Services Ltd in 2017. No direct dating evidence was recovered, therefore the inhumation and the cremation have been radiocarbon dated.

Methodology

The cremation burials were examined in accordance with national guidelines (McKinley 1994a, 1994b, 2004, 2017). The recording system for the cremation burials can be defined as follows: each deposit was passed through a series of three Endicott laboratory test sieves with mesh sizes of 10 mm, 5 mm and 2 mm, beginning with the largest and ending with the smallest mesh size. At each of the three stages the bone sample recovered was examined in detail and sorted into identifiable bone types which have been defined as skull, axial, upper limbs and lower limbs. Each of these categories was weighed and details of largest fragment size recorded, also where possible, the presence of identifiable individual bones within these categories was recorded. Any remaining bone was classified as unidentified. Analysis of the cremation burials included estimation of the minimum number of individuals present, with an age estimation and sex determination based on skeletal morphology where possible. Pathology and non-metric traits were recorded. Colour, fragmentation, extent of warping and fracture patterns were also recorded. All observations were made macroscopically.

The inhumation was recorded in accordance with national guidelines (Mitchell and Brickley 2017). The bulk of the material was received within a soil block and was excavated by the writer prior to analysis. All surviving bones are extremely fragmented and have been dry-brushed as they are too fragile for washing.

Aims Of The Analysis

The aims of the analysis are presented below.

- To determine where possible the age and sex of the inhumed and cremated remains
- To identify any surviving skeletal and dental pathology for both the inhumed and cremated remains
- To identify non-metric traits for both the inhumed and cremated remains
- To identify and discuss any evidence relating to the cremation process
- To identify and discuss evidence for selective burial of parts of individuals
- To identify and discuss evidence for multiple burial
- To consider the implications for our understanding of funerary practice

Results

The cremation burials

Preservation

Preservation of the cremated bone in both deposits was generally good apart from some of the trabecular bone. A summary of the osteological data is presented in Table 3 below.

Table 3: ***Summery of osteological data, cremation burials***

Cremation No	Age	Sex	Total weight	Colour (oxidisation)	Distortion/dehydration	Non-metric traits	Pathology
051	18+ years	Male?	1365.83 g	White	Slight distortion	Parietal foramen, lambdoid ossicles	Joint disease
055	18+ years	?	1118.81 g	White	Slight distortion	None	None

A single fragment of burnt human bone was recovered from context (046) which also contained 15 sherds of prehistoric pottery and a highly degraded metal object (find no. 31). The fragment was identified as probable adult skull vault which was white and well oxidised. It weighed 0.87 g and measured 13.73 mm.

Age and sex

Sex estimation was based on skull morphology (Buikstra and Ubelaker 1994) as no surviving diagnostic elements of the pelvis survived. It was only possible to estimate sex for (051) as a possible adult male because of the morphology of the mastoid process and the nuchal crest (see Plate 9 below).

Plate 9: Cremation burial (051), left mastoid process

Both burials were classified as adult (18+ years) rather than non-adult (less than 18 years). This assessment was based on the degree of skeletal fusion and to a lesser extent on the degree of ectocranial suture closure (Meindl and Lovejoy 1985). Ectocranial suture has been shown to be unreliable on its own (Key *et al.* 1994). In addition, the high pressures generated within the cranium during the cremation process may often cause the sutures to forcibly burst open, leading to erroneous under-ageing of the individual.

Pathology
A single thoracic vertebral body from (055) exhibited mild porosity which is indicative of joint disease. Dental pathology is difficult to recognise in cremated bone due to the tendency of teeth to shatter during the cremation process. Only roots and a single fragmented molar survived.

Non-metric traits
Lambdoid ossicles and a parietal foramen were observed on the skull of (051). Lambdoid ossicles are extra bone pieces that occur within a suture in the cranium. These are irregular isolated bones which appear in addition to the usual centres of ossification in the cranium. They occur most frequently in the lambdoid suture but are occasionally seen within the sagittal and coronal sutures. Parietal foramina are inconstant foramina on each side of the posterior aspect of the parietal bone near the sagittal suture and represent a normal anatomical variant. They transmit the emissary veins, draining to the superior sagittal sinus, and occasionally a branch of the occipital artery. They are variably present, and often absent.

Oxidisation
Both cremation deposits comprised bone that was almost entirely white and well oxidised. Bone colour can be used as an approximate guide to firing temperature and the efficiency of the cremation process. Uniformity of colouration denotes even firing, with no evidence for variation across different parts of the body. Bone which is white and well calcined is indicative of temperatures in excess of 645º and probably in excess of 940º (Shipman et al 1984). Colour changes indicate the duration of the conflagration and the temperature at which the body was burnt, although the extent of burning is very influenced by the depth and type of soft tissue overlying the bone. The whiter the bone the more thorough the burning, while colours such as blue, black and dark grey may reveal that the bone lay at a greater distance from the main heat focus (the centre of the pyre) than more thoroughly burnt material. Examination of bone colour and its distribution on the skeleton may indicate the position in which the corpse had been laid out on the pyre.

This simple interpretation is complicated by consideration of the depth of soft tissue overlying different bony elements, as this must be burnt away before the bone is in direct contact with high temperatures and begins to cremate. The type of soft tissue is also important. For example, the presence of fat tends to facilitate burning, and hence, the abdomen, buttocks and hips may burn more thoroughly than the hands and feet, on which there is little fat to aid combustion, despite the fact that overlying soft tissue is relatively shallow (McKinley 1989, 66). Similarly, emaciated adults and children, who usually carry little fat reserves, tend not to cremate as readily as well-fed adults.

The thoroughness of cremation of the corpse on a pyre is very dependent on high temperatures being sustained for at least 7-8 hours (McKinley 1989). This often requires tending the pyre and adding fuel during the conflagration. By the end of this period, soft tissue should be burnt away, and most of the skeleton oxidised, although experimental work has revealed that the pelvis may continue burning in the hot pyre debris for several hours after the pyre has collapsed (ibid., 67). Thus, effective cremation requires sufficient fuel and a technology of pyre construction that allows the free flow of oxygen through the structure (McKinley 1989; 2000b).

Minimum number of individuals
The number of individuals within a deposit is demonstrated either by obvious age-related differences in bone size and development as one would see between an immature and adult individual, or by duplication of identifiable bone fragments (more than one duplicated fragment is highly desirable, cf. McKinley 1997, 130). There was no evidence that either of these deposits contained the remains of more than a single individual.

Weight
Investigations in modern crematoria have found that the average bone weight of cremated adult individuals ranges from approximately 1,000-2,400 g, with an average of 1,650 g (McKinley 2000a,

269). It is unlikely that either of these deposits represents the complete remains of a single individual. While a range of reasons for potential loss of material need to be considered (incomplete recovery, disintegration related to soil type and truncation due to ploughing), this can be suggestive of deliberate selection and burial of a token deposit (Boyle 1999, 176). It has been argued for prehistoric Britain that the collection of entire cremated remains rarely ever occurred (Lange et al 1987; McKinley 1989, 1993).
From a sample of c 4000 multi-period British cremations a range of 57-2200 g was obtained from undisturbed adult burials. On average c 40-60% of the expected bone weight is recovered from burials (McKinley 1993; 1994b) and therefore the recovery of relatively large quantities of bone from deposits of pyre debris should not be unexpected. It would not have been difficult to select particular body parts from the pyre after cremation as the body would largely retain its anatomical structure (prior to any post-burn treatment).

Predictably, individuals of smaller and more gracile build (such as many females and children) will often have a lower bone weight, and poorer bone survival of the articular surfaces and spongy bone has been observed in modern older individuals with osteoporosis (McKinley 2000b, 404). Cremated bone deposits which are not placed within a cinerary urn are more susceptible to damage by overlying soil weight, and dispersion by bioturbation and other taphonomic processes.

Fragmentation
Fragment size represents the measurements taken during analysis and does not necessarily represent fragment size at the time of deposition. Factors that affect fragmentation include both components of the cremation rites, such as the cremation, collection, deliberate crushing and burial of the human remains, bone preservation in the burial environment and the much later process of archaeological excavation and post-excavation processing (McKinley 1994b, 340). The extent of fragmentation is detailed in Table 4 below.

Table 4: ***Extent of fragmentation of the assemblage***

Cremation No.	Total weight	>10 mm	% total	10-5 mm	% total	5-2 mm	% total	2-0.5 mm	% total
051	1365.83 g	738.62	54.08	489.13	35.81	92.61	6.78	45.47	3.33
055	1118.81 g	425.04	37.99	541.9	48.44	77.61	6.94	74.26	6.64

Far less fragmentation was seen in deposit (051) with 54.08% of the bone falling within the >10 mm fraction, compared to deposit (055) were 48.44% of the deposit was contained within the 5-10 mm fraction.
The fragments display the characteristics fissures which result from the cremation of fleshed remains. Burning dry bones causes cracking and longitudinal splitting, but no warping or twisting while burning of green or flesh-covered bone creates curved transverse fracture lines, irregular longitudinal splitting and marked warping (Ubelaker 1978, 33, figs 50-51). Therefore, if the bones have undergone extreme combustion, observation of their fracture patterns can reveal whether or not the individual was cremated in the flesh. Many of the long bone fragments are twisted and some show elliptical cracks: in some fragments the inner and outer tables of the cranial vault have separated exposing the diploë, and some distortion has occurred.

Element representation
The percentage of identifiable bone within cremation deposit (051) was 35.49% (484.75 g) and within (055) was 30.57% (342.07 g). Details of element representation appear in Table 5 below.

Table 5: ***Representation of skeletal elements***

Cremation No.	Total wt (g)	Ident. wt (g)	% total	Skull wt (g)	% ident	Axial wt. (g)	% ident.	Upper limb wt (g)	% ident.	Lower limb wt (g)	% ident.
051	1365.83	484.75	35.49	313.06	64.58	66.61	13.74	48.12	9.93	56.96	11.75
055	1118.81	342.07	30.57	86.38	25.25	63.55	18.58	112.19	32.80	79.95	23.37

The total weight of a dry skeleton is approximately the same as a cremated skeleton. The percentages by weight are skull at 18.2%, axial at 20.6%, upper limb at 23.1% and lower limb at 38.1%. All skeletal elements were identified in both deposits, though in very different proportions. The bulk of the identifiable elements within deposit (051) were skull at 64.58% which is in marked contrast to deposit (055) where skull only accounted for 25.25% of the identifiable bone. The most commonly identified element within the deposit was upper limb at 32.80%. Within deposit (051) upper limb only accounted for 9.93% of the identifiable bone.

Discussion

The cremation burials

Cremation burials (051) and (055) were both located in Trench 47 which was positioned in the likely area of a known feature (hut circle, Canmore ID: 275282). An arrangement of flagstones (043) of varying sizes was revealed at the northern end of the trench. A total of 15 sherds of abraded pottery and a highly degraded metal object (find number 31) were recovered from the surrounding soil (046). Cremation burial (055) was covered by the largest of the flagstones. Cremation burial (051) was located approximately 1 m to the north of (055) and had been placed on a large flat stone.

Cremation burial involves a multi-stage funerary rite: the laying out and display of the body on a bier and/or the pyre, the cremation on a pyre, the collection of bone following the burning, and the burial of selected human remains within a pit or grave (Pearce 1998, 105). Elements of this process can be identified here. The predominance of white calcined bone indicated that thorough cremation had been performed in both cases, and that neither fuel nor technological expertise in pyre construction was lacking. The total weight and element representation suggest that some care was involved in collection of the bone after burning.

A radiocarbon date of 2292 +/- 25 BP (BRAMS-2595; 95% probability; 405-357 cal BC, 81.3% probability; 285-235 cal BC, 14.1% probability) has been obtained on cremation deposit (051). A slightly later date of 2257 +/- 26 BP (BRAMS-2596; 95% probability; 395-350 cal BC, 39.1% probability; 306-209 cal BC, 56.3% probability) has been obtained on cremation deposit (055).

The inhumation

Disturbed inhumation (049) was recovered from cut [039], also located in Trench 47. This feature measured more than 1.6 m in length and was 1 m in width with a distinctive curved shape in plan. The skull was recorded as having been placed face down in the feature although this may be the result of disturbance. The condition of the skeleton, identified as a possible adult male, was poor. No evidence of skeletal or dental pathology was identified and there were no non-metric traits.

There is a reference (Canmore ID: 14640) to the burial place of Jarl Sigurd, also known as Sigurd the Powerful, who died in AD 875 in the vicinity at Oykel's Bank near Cyderhall, ie Sidra, near Dornoch. The tradition of the burial is known locally, but there is no trace of it in the vicinity of Cnoc Skardie. A radiocarbon date of 977 +/- 25 BP (BRAMS-2599; 95% probability, 998-1076 cal BC) obtained on this deposit disproves this tradition.

Recommendations

Both deposits are almost entirely fully oxidised and therefore sampling for aDNA is unlikely to be of any value because aDNA does not survive at temperatures greater than 600° C (Harbeck *et al* 2011) and potentially no greater than 300-400° C at which point much of the organic component is oxidised (McKinley 2017, 17).

There may be some potential for aDNA analysis of the inhumation as the right petrous temporal has survived. There may also be potential for isotope analysis of the surviving dentition.

Catalogue

Cremation burial 051

Context:	(051)
Burial type:	Un-urned burial
Grave goods:	None
Age:	Adult (18+ years)
Sex:	Male?
Weight:	1365.83 g
Maximum fragment size:	112.32 mm (right tibia shaft)
Pathology:	None
Non-metric traits:	Lambdoid ossicles; parietal foramen
Skull and mandible:	Occipital, left and right temporals, left and right parietals, right maxilla, left and right mandibular condyles, mandibular body, left (?) zygomatic, sphenoid, left mandibular coronoid, 11 tooth roots
Axial:	Cervical, thoracic and lumbar bodies and facets, head of 1st left rib, rib shafts, acetabulum (?), sternum (?), blade of scapula
Upper limb:	Humeral head (?), humeral shaft, radial shaft, right proximal ulna (2 conjoining fragments), ulna shaft, 1st metacarpal (proximal end), metacarpal head, metacarpal shaft, 1st proximal phalanx (proximal end), proximal phalanx (distal end), 2 distal phalanges
Lower limb:	Left and right patella, left (?) distal end of femur, femur shaft, tibia shaft, fibula shaft (2 conjoining fragments), 1st metatarsal (distal end)
Oxidisation:	Almost entirely white and well oxidised
Distortion:	Light and consistent with burning of fleshed remains
Animal bone:	None
Charcoal:	None
Staining:	None

Cremation 55

Context:	(055)
Burial type:	Un-urned cremation
Grave goods:	None
Age:	Adult (18+ years)
Sex:	Unsexed
Weight:	1118.81 g
Maximum fragment size:	78.22 mm
Pathology:	Joint disease: mild porosity on superior surface of a thoracic body
Non-metric traits:	None
Skull and mandible:	Occipital, left and right parietal. Right frontal, 5 tooth roots, fragments of 1 molar crown

Axial:	Rib shafts, 2 left rib heads, head of right 1st rib, vertebral facets, clavicle (?) shaft, scapula (?), iliac crest (?), Virtually complete 7th cervical vertebra, cervical and thoracic bodies and facets
Upper limb:	Humeral head, distal end of left humerus, humeral shaft, radial shaft, ulnar shaft, distal end of right ulna, scaphoid (?), 3 metacarpal heads, 4 proximal phalanges
Lower limb:	Left and right patella, femur shaft, tibia shaft, fibula shaft, distal end of 1st metatarsal, right and left 1st proximal phalanges, 1 distal phalanx
Oxidisation:	Almost entirely white and well calcined
Distortion:	Light, consistent with burning of fleshed remains
Animal bone:	None
Charcoal:	None
Staining:	None

Inhumation 49

Context:	(049)
Burial type:	Inhumation within pit (039)
Grave goods:	None
Surface preservation:	3
Fragmentation:	Severe
Completeness:	0-20%; occipital, right temporal, humeral head and shaft (unsided), femoral shaft, left and right maxillary 3rd molars, right maxillary 2nd molar
Age:	Adult (18+ years)
Sex:	Male?
Skeletal pathology:	None
Dental pathology:	Attrition grade 3-4
Non-metric traits:	None

AMS Radiocarbon Dating by *BRAMS (University of Bristol AMS Laboratory)*

Three samples of human bone taken from the inhumation and cremation burials were submitted to BRAMS for AMS radiocarbon determinations.

1 ***BRAMS 2599*** – bone sample taken from human skull fragments located in Trench 47, Cut [039].

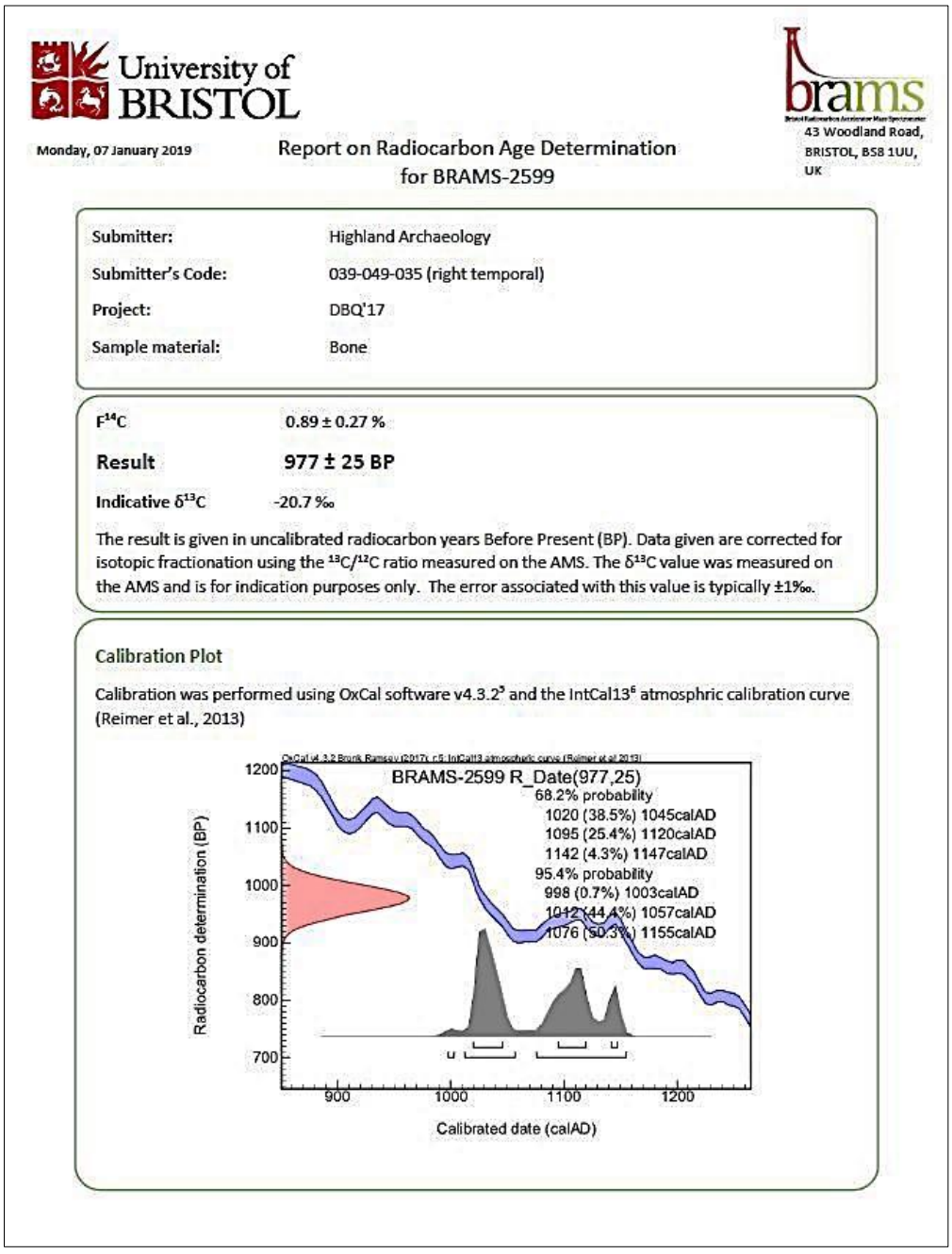
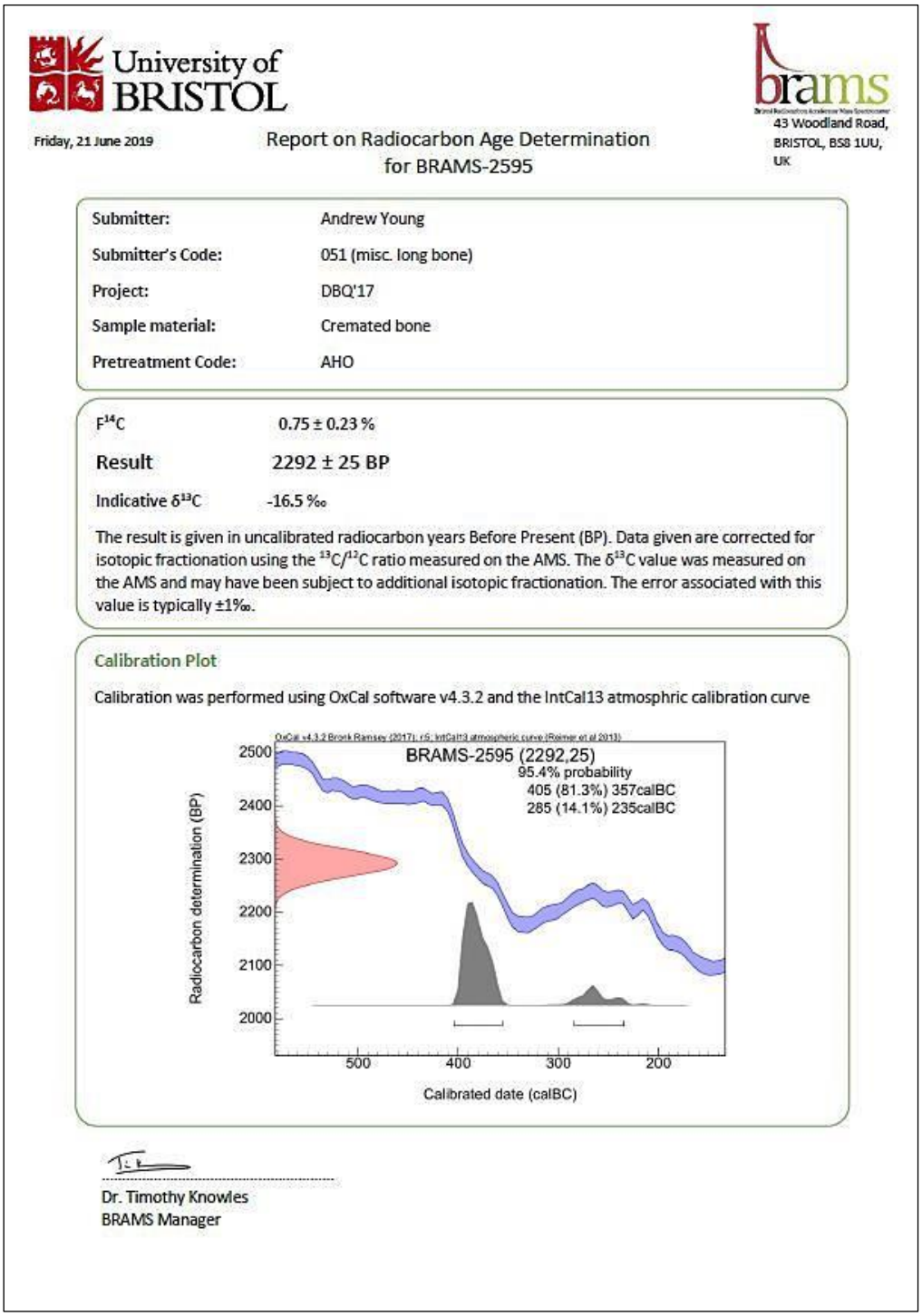


Figure 15 – AMS radiocarbon determination for the human burial in Trench 47

The 2σ AMS date range of c 998 – c 1155 cal AD places the date of the inhumation burial in the early medieval period, broadly around the beginning of the 2nd millennium AD. This is considered to eliminate the possibility that these remains are those of the Viking leader Jarl Sigurd, aka *Sigurd*

the Powerful, whose burial is recorded in c AD 875, well outside the AMS distribution probability range.
The date of the burial and its location is nonetheless considered significant and is discussed below.

2 ***BRAMS 2595*** – cremated bone sample <051> taken from cremation burial in Trench 47, Context (051).



University of BRISTOL

brams
43 Woodland Road,
BRISTOL, BS8 1UU,
UK

Friday, 21 June 2019

Report on Radiocarbon Age Determination for BRAMS-2595

Submitter:	Andrew Young
Submitter's Code:	051 (misc. long bone)
Project:	DBQ'17
Sample material:	Cremated bone
Pretreatment Code:	AHO

$F^{14}C$	0.75 ± 0.23 %
Result	**2292 ± 25 BP**
Indicative $\delta^{13}C$	-16.5 ‰

The result is given in uncalibrated radiocarbon years Before Present (BP). Data given are corrected for isotopic fractionation using the $^{13}C/^{12}C$ ratio measured on the AMS. The $\delta^{13}C$ value was measured on the AMS and may have been subject to additional isotopic fractionation. The error associated with this value is typically ±1‰.

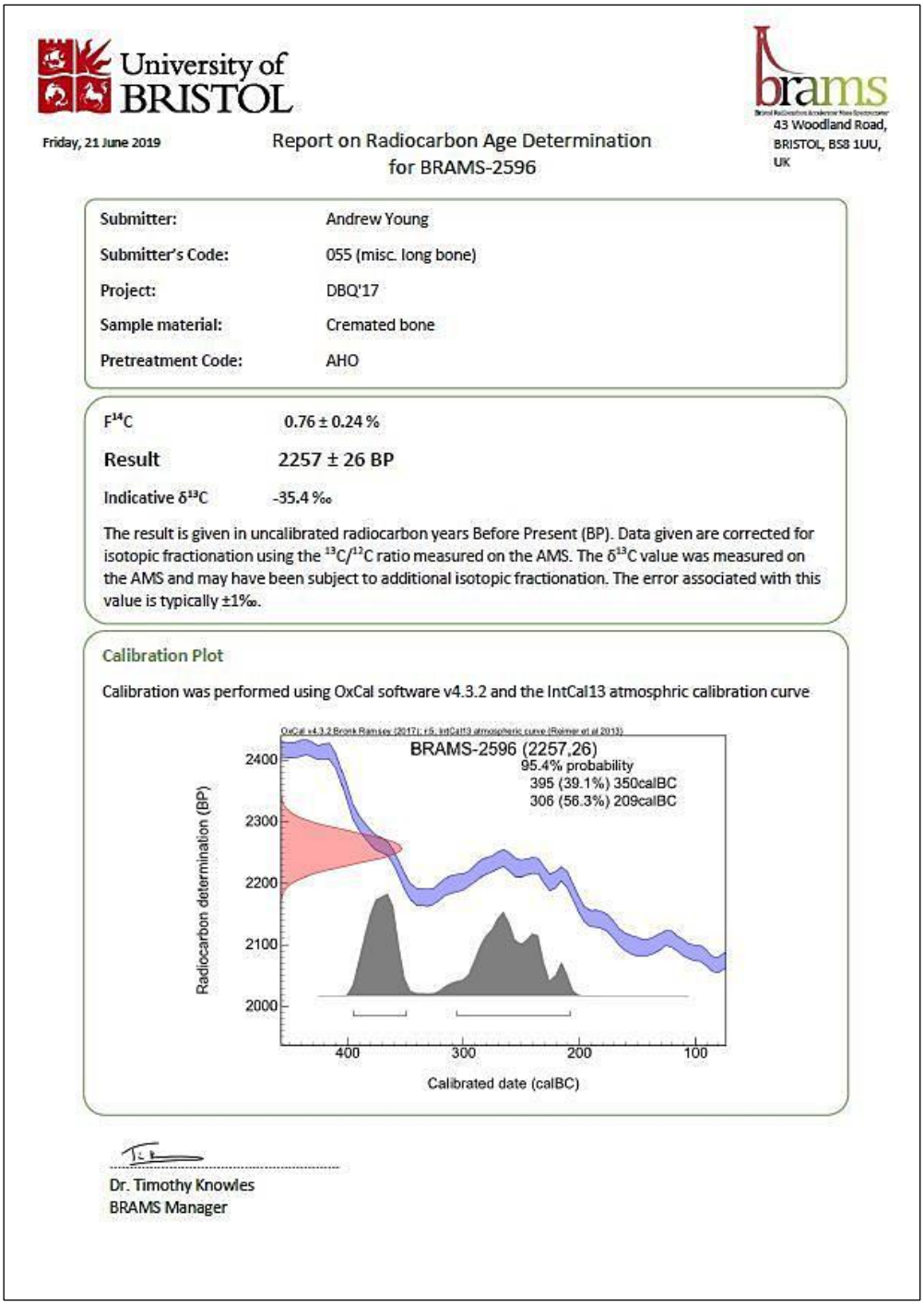
Calibration Plot

Calibration was performed using OxCal software v4.3.2 and the IntCal13 atmosphric calibration curve

Dr. Timothy Knowles
BRAMS Manager

Figure 16– AMS radiocarbon determination for cremation burial 051 in Trench 47

3 ***BRAMS 2596*** – cremated bone sample <055> taken from cremation burial in Trench 47, Context (055).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UK

Friday, 21 June 2019

Report on Radiocarbon Age Determination for BRAMS-2596

Submitter:	Andrew Young
Submitter's Code:	055 (misc. long bone)
Project:	DBQ'17
Sample material:	Cremated bone
Pretreatment Code:	AHO

$F^{14}C$	0.76 ± 0.24 %
Result	**2257 ± 26 BP**
Indicative $\delta^{13}C$	-35.4 ‰

The result is given in uncalibrated radiocarbon years Before Present (BP). Data given are corrected for isotopic fractionation using the $^{13}C/^{12}C$ ratio measured on the AMS. The $\delta^{13}C$ value was measured on the AMS and may have been subject to additional isotopic fractionation. The error associated with this value is typically ±1‰.

Calibration Plot

Calibration was performed using OxCal software v4.3.2 and the IntCal13 atmosphric calibration curve

Dr. Timothy Knowles
BRAMS Manager

Figure 17– AMS radiocarbon determination for cremation burial 055 in Trench 47

The 2σ AMS dates for the two cremation deposits indicate that they reflect funerary activity during the second half of the 1st millennium BC, in the period c 400 - 200 BC, the Iron Age.

The group of three AMS dates confirm that the human cremations and the inhumation are separated in time by more than a millennium and not directly related in any way. Their close association is nonetheless considered significant and is discussed below.

Other Finds *by Dr Gemma Cruickshanks (NMS)*

A handful of other finds (Table 6 below) were recovered during the evaluation trenching, none of which illuminate past human activity on the site in any significant way.

Table 6: ***Miscellaneous finds***

SF	Context	Tr	Material	Identification	Catalogue (measurements in mm. L length, W width, T thickness, D diameter)	Date
4	26	20	Glass	Bottle fragment	SF 4: Shard of dark green bottle glass, most likely from a post-medieval 'onion' bottle. L42,W40,T2.	Post-medieval
7	28 (surface)	43	Vitrified material	Ironworking slag	SF 7: Small fragment of iron slag, most likely from the edge of a smithing hearth base and therefore diagnostic of blacksmithing. Dense, dark grey with a high magnetic attraction and stright broken edges. It is smooth on the upper surface and dimpled on the underside (no charcoal impressions). L43, W22, T21; 48.2g	Undiagnostic
5	Unstratified	43	Vitrified material	Vitrified slag or fuel ash slag	SF 5: Small black, glassy, slightly bubbled slag fragment. Most likely a small fragment of vitrified ceramic or fuel ash slag. Both types of slag can form during a range of high-temperature processes and are therefore not diagnostic, eg of a particular craft. L14, W13, T8; 1.3g	Undiagnostic
31	46	47	Iron	Nail head	SF 31: Fragmentary, corroded disoidal nail head with shank mostly missing. Head D14, T2; L16; shank T 4.	Undiagnostic

Discussion & Conclusions

The overall distribution of archaeological deposits identified on the site is illustrated by Figure 18. It shows a general focus of activity immediately to the south of the central esker, as revealed in Trenches 43 and 45 to 47, where the archaeology recorded includes both the inhumation and cremation burials and the shell midden.

The close proximity of the inhumation grave and the two cremation burials, all of which were revealed in Trench 47, is considered significant and suggests a deliberate choice of place and site for funerary activity, albeit perhaps sporadically, over an extended period between the middle Iron Age and the early medieval period. The impression that the site has had a strong association with funerary activity is reinforced by the presence of the hengiform earthwork in Trench 1, a notable prehistoric funerary monument.

The few stratified and dateable artefacts recovered from the site are principally represented by the collection of hand-made pottery sherds recovered from deposits adjacent to the cremation burials. The assemblage has parallels from sites elsewhere in the north of Scotland and is dated by Dr McIlfatrick (see above) to the Later Roman Iron Age, broadly the period c 200 - 700 AD. This typological dating is somewhat later than the AMS radiocarbon determinations from the cremation deposits themselves, which paces their burial during the second half of the first millennium BC.

The pottery sherds and charred plant remains, including hazel nut shells, recovered from soil (046) located directly adjacent to the cremation deposits suggests their burial may have been accompanied by some associated ritual that included the deposition of special, structured, deposits. Although undated, it is at least possible that the deposit of edible marine shells and fire-cracked stones revealed in Trench 43, a short distance to the west, could also be associated with such activity. The absence of any pottery sherds from within either of the cremation deposits suggests they were placed in the earth and not originally urned whilst the radiocarbon dates, during the second half of the first millennium BC, is of no particular significance as there is no single tradition of burial in Scotland during the Iron Age (see Scarf 2012; Maldonado-Ramirez 2011), although cremation burial was generally the more common.

The AMS determination from the bones that survived in the inhumation burial provide a date in the earlier medieval period, sometime during the very late tenth to twelfth centuries AD. This suggests the individual buried is very unlikely to be the Viking Sigurd. Following the recommendation from Angela Boyle an attempt was made to extract material for isotope analysis from the teeth of this individual by Bristol University however this was not possible. Nonetheless, the presence of the remains alone supports the notion that the placing of the burial on the site reflects the reuse of a much older burial site (see above). As such further burials, either inhumations or cremations, can reasonably be expected to be present in unexcavated areas in the vicinity of Trench 47, the area designated for development during Phase 9 of the proposed quarry extension.

Elsewhere on the site the series of rubble features recorded to the north of the central esker, in Trenches 13 (008), 17 (009) and 7 (004), appear to indicate a linear arrangement aligned SW to NE. The group appear likely to reflect the line of a former field boundary dyke, if so, most probably of post medieval origin.

The group of small pits and postholes (contexts 15, 16 and 18) revealed in Trench 37 all produced fire-cracked stones along with small amounts of charcoal. These were accompanied by an L-shaped soil feature (context 13) in the southern part of the trench. In combination, this group could reflect the location of a former earthfast timber structure, albeit one of unknown date, character or overall size. Moreover, if this interpretation is correct, the absence of any significant number of associated finds could indicate a non-domestic function.

As mentioned above, the midden of edible marine mollusc shells revealed in Trench 43, which is undated, could reflect activity associated with the cremation burials or indeed the later inhumation burial, but could reflect hunter gathering of very much earlier, Mesolithic, date, as has recently been recorded at waterside sites as part of the ongoing *Tarradale Through Time* project.

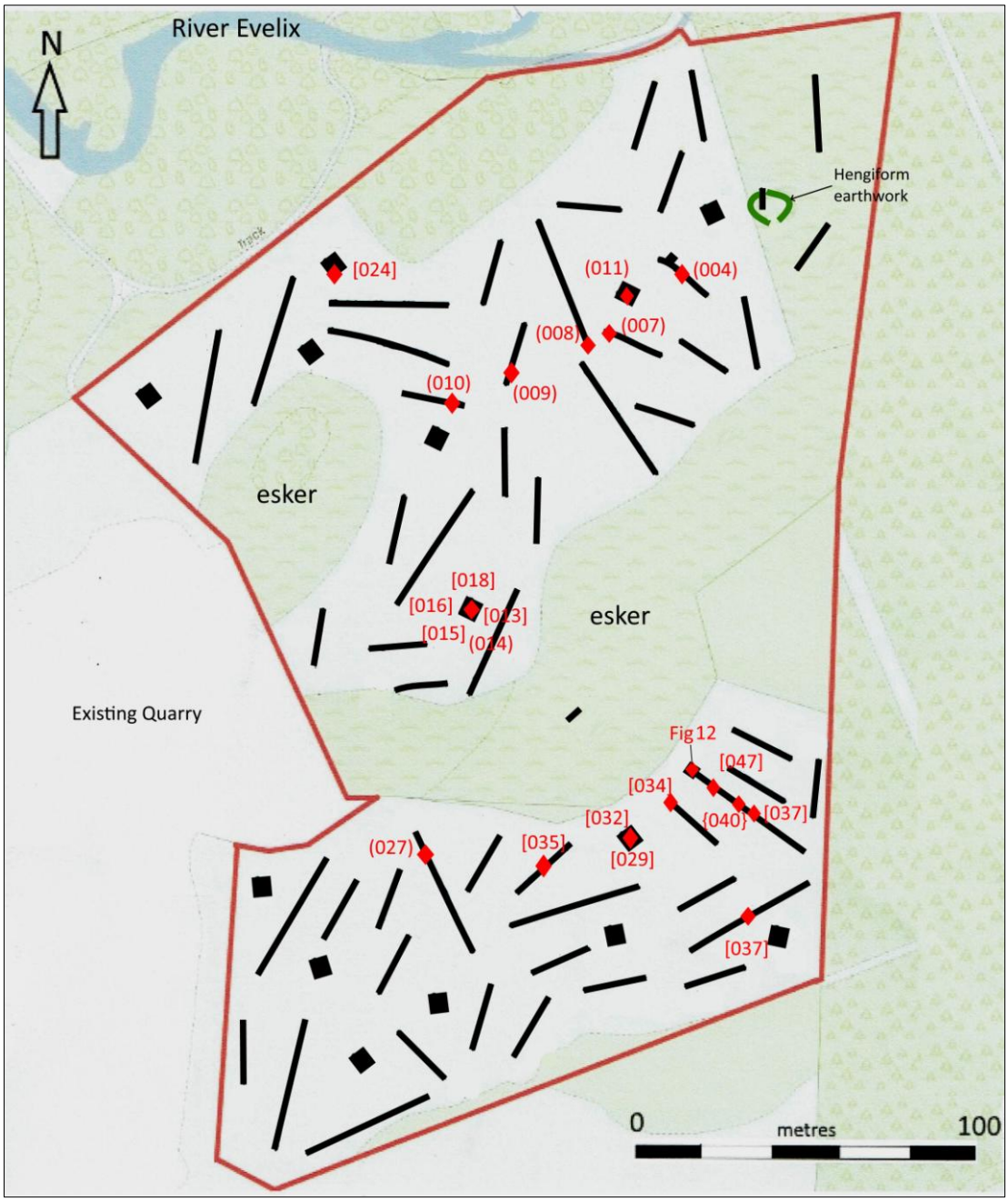

Figure 18 - Overall distribution of archaeological deposits and features recorded in the evaluation trenches. Scale shown

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Appendix 1: Tables from archaeobotanical report Dr Susan Ramsay

Table 7: ***Botanical remains from Dornoch Bridge Quarry***

	Trench	T20	T43			T45	T47					
	Context	026	028	028	028	030	049	049	051	052	054	055
	Sample	003	006	008	009	004	013	015	010	011	012	014
	Description	Fill of pit [024]	Midden with shell & fire-cracked stone	Midden with shell & fire-cracked stone	Midden with shell & fire-cracked stone	Fill of posthole [029]	Fill of possible grave cut [039]	Fill of possible grave cut [039]	Fill of possible cremation burial pit [050]	Fill of pottery rich pit [053]	Primary fill of pit [053]	Cremation burial deposit
Volume of charcoal >4 mm		10ml	<<2.5ml	<2.5ml	<2.5ml	<<2.5ml	2.5ml	<2.5ml	5ml	2.5ml	2.5ml	10ml
Charcoal												
Alnus cf glutinosa	alder	3 (0.04g)	-	-	-	-	6 (0.07g)	-	-	-	-	-
Betula spp	birch	-	-	4 (<0.01g)	-	-	2 (0.02g)	-	-	-	4 (0.08g)	-
Corylus cf avellana	hazel	4 (0.06g)	-	-	2 (0.04g)	-	3 (0.11g)	1 (<0.01g)	1 (0.01g)	-	-	1 (0.02g)
Ericales	heather type	19 (0.23g)	-	2 (<0.01g)	-	-	-	6 (0.04g)	-	-	-	-
Pinus sylvestris type	Scots pine type	30 (0.48g)	-	1 (<0.01g)	-	-	1 (0.01g)	1 (<0.01g)	1 (0.01g)	-	-	-
Prunoideae	cherry type	-	-	-	-	-	-	-	1 (0.02g)	-	-	-
Quercus spp	oak	-	-	-	9 (0.04g)	4 (0.02g)	1 (0.01g)	-	67 (0.90g)	7 (0.11g)	2 (0.07g)	38 (0.93g)
Salix spp	willow	-	3 (0.01g)	-	-	-	-	-	1 (0.01g)	11 (0.14g)	10 (0.20g)	-
Indet charcoal	indet charcoal	-	-	-	-	-	-	-	-	-	-	3 (0.13g)
Indet cinder	indet cinder	-	-	-	-	-	-	-	-	-	-	1 (0.03g)
Carbonised cereals												
Avena spp	oats	-	-	-	1	-	-	-	-	-	-	-
Hordeum vulgare sl	barley	-	-	-	-	-	-	-	-	1	-	-
Carbonised seeds												
Corylus avellana nutshell	hazel nutshell	-	-	-	-	-	-	-	4 (0.04g)	20 (0.23g)	12 (0.14g)	-
Misc												
Bone	bone	-	-	-	-	-	-	-	8 (0.18g)	-	-	-

Table 8: ***AMS potential for Dornoch Bridge Quarry samples***

Context	Sample	AMS potential
026	003	Pinus sylvestris type charcoal (0.20g) Corylus cf avellana charcoal (0.04g)
028	006	Salix sp charcoal (0.01g)
028	008	None
028	009	Corylus cf avellana charcoal (0.03g)
030	004	None
049	013	Corylus cf avellana charcoal (0.07g) Alnus cf glutinosa charcoal (0.03g)
049	015	None
051	010	Prunoideae charcoal (0.02g) Corylus avellana nutshell (0.02g)
052	011	Salix sp charcoal (0.02g) Corylus avellana nutshell (0.03g)
054	012	Salix sp charcoal (0.03g) Corylus avellana nutshell (0.04g)
055	014	Corylus cf avellana charcoal (0.02g)