Archaeological Excavation
Final Report

Bremore Castle
Balbriggan
Co. Dublin

Excavation Licence No.: 17E0302

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Abstract

This report describes the final results of an archaeological excavation, which was carried out under Licence No. 17E0302 at Bremore Castle, Balbriggan, Co. Dublin. Excavation of five trenches, concentrated within the walled garden, took place over 13 days between 14th July and 28th July 2017.

Bremore Castle which is a recorded monument (RMP: DU002-0002001-) and protected structure (RPS No.14), is located at the end of a lane off Drogheda Street (ITM 719709/ 764537) and to the west of the 19th century Drogheda-Dublin railway line.

The aim of excavation at Bremore Castle was to verify the nature of the anomalies on the geophysical survey, while engaging the community in archaeology. The site proved to be extensively disturbed with activity primarily dating to the post-medieval and modern period.

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1 Introduction

This report describes the final results of an archaeological excavation, which was carried out under Licence No. 17E0302 at Bremore Castle, Balbriggan, Co. Dublin. Excavation of five trenches, concentrated within the walled garden, took place over 13 days between 14th July and 28th July 2017.

The *Bremore Castle Big Dig 2017* was designed to address the research and knowledge gaps identified in the *Bremore Castle Conservation Plan* (2013); to assess the veracity of geophysical survey results undertaken by Target Surveys in 2011; to inform future restoration works of the walled garden by investigating the remains of possible garden features including paths, edging and possible tree planting pits, and to engage the local community with Bremore Castle.

2 Location & topography

Bremore Castle (ITM 719711/764570) is a 15th/16th century fortified house (DU002-002001-) and manor, coastally located on the northern outskirts of Balbriggan. It is situated within the townland of Bremore, west of the Dublin-Drogheda railway line. The site is within an undulating low-lying landscape that slopes gently towards the sea. To the north is an early-2000's housing estate and to the south is a 1970's school. The land to the east has been utilized for playing pitches, including a recently installed all-weather pitch.

The walled garden (ITM 719709/764537) is located to the south of the castle and north of the remains of St Molaga's Church (DU002-002002-) and graveyard (DU002-002003-). Defined by walls which have been subject to collapse and restoration, the interior of the walled garden relatively level, if somewhat overgrown currently, with occasional mounds of material and modern dump.

Fig.1: Site Location Map 1:100

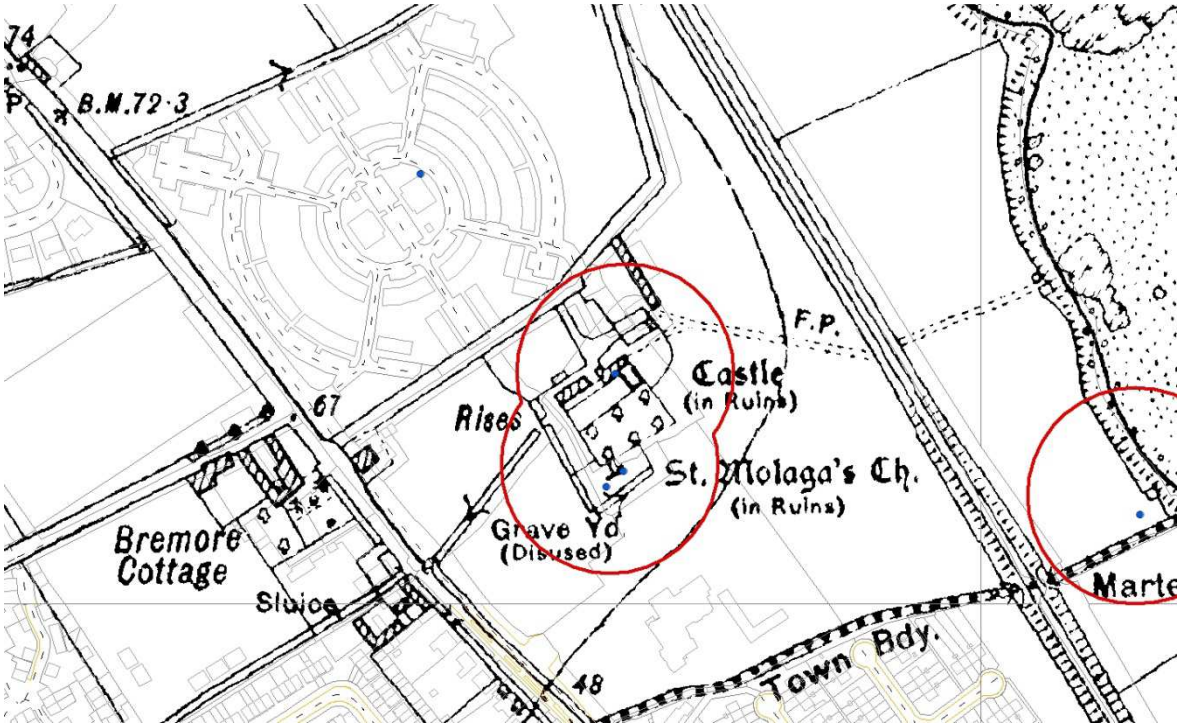

Fig. 2: Archaeological Constraint Map

Plate 1: Aerial Photograph, Google Earth, 2017

3 Historical and Archaeological Background (after Kelly & Colgan et al.)

St. Molaga's late medieval church was the manorial chapel associated with Bremore Castle. It purportedly lays upon the early monastic site of *Lann Beachaire*, founded in the seventh century by students of St David of Meniva, Wales. Legend has it that St Molaga introduced bee-keeping into Ireland from Wales and there is a strong tradition associated with bees in the locality.

Medieval Bremore is tied to the prominent Anglo-Norman family, of the Barnewalls. Reginald de Barnewall acquired lands in Bremore in the early fourteenth century and by the close of that century the Barnewalls were described as the lords of Bremore, Balrothery and Balbriggan.

An Inquisition of 1567 described the estate at Bremore as consisting of 'a castle, 8 messuages or buildings, a dovecote, 8 gardens and 132 acres'. This is the first documentary evidence for a castle on the lands. The Barnewalls were Confederate Catholics during the Cromwellian wars and the castle appears to have been subject to attack. A cannon ball was recovered during excavation in the field north of the castle (O'Carroll, 2009) and the *Civil Survey* of 1654 refers to Bremore as containing 'one burnt castle' (Simington, 1945).

Following the restoration of the monarchy, the Barnewalls regained the estate and the castle was refurbished. The decorated door lintel dated 1689, now within the graveyard may have been part of this work. Nearly a century later the castle was described by Cooper as

> 'rather a modern building with good limestone quoins, window frames, munnions &c…besides a number of Garden walls and such like inclosure still to be traced are the walls of a Chapel in wch. nothing is remarkable'.

Fig 3: Austin Cooper's 'a View of Bremore' 1783

The castle continued in ruinous condition until it was taken down in 1883. The 'arching' stone of the castle dated 1689 had been deposited 'within the remains of the old church' by the late 1830s when D'Alton visited. The ruins and surrounding lands were owned by a number of farming families before being acquired by Dublin County Council in 1984. The site is now part of Bremore Regional Park which is owned and managed by Fingal County Council and a training centre for traditional building skills.

The walled garden located south of the castle may have evolved from the bawn of an earlier castle. The nineteenth century cartographic evidence shows it as a 'cabbage garden' or 'potager' whose layout was dramatically changed to that of a typical Victorian walled garden and orchard layout.

Rebuilding Bremore castle (after Kelly & Colgan)

Rebuilding of Bremore Castle has been ongoing since the mid-1990s to an idealised version of a fortified house based mainly on the sketch of the western view of the castle made by Austin Cooper in 1783. The remaining reconstructed elements of the castle from the first floor upward are conjectural, based on designs by the consultant architect, David Newman Johnson. There is no architectural evidence for the appearance of the south, east and north facades. The Castle as reconstructed consists of a rectangular tower containing four stories of accommodation (c. 20.5m long and 9.5m wide) aligned north to south; there is a single storey kitchen wing attached at the northeastern corner and running in an east–west direction. The reconstruction details seem to have been based on surviving specimens from an appropriate era, such as Dunsoghly Castle in County Dublin (timber roof), Clara Castle in County Kilkenny (timber floor), and Athclare Castle in County Louth (vaulted masonry floor on wickerwork centering).

Clearance of the interior identified a series of rubble limestone walls thought to be later than the original construction phase.

Plate 2: Clearance of the interior facing south (site photographs Swan mid-1990s)

Plates 3 and 4: South façade of Bremore castle in 1985 (after Healy) and currently

3.1 Cartographic Evidence (after Bremore Castle Conservation Plan)

The earliest historical map showing Bremore Castle is the Down Survey Map of which portrays the castle as house with high gables surrounded by trees. The survey also shows Newhaven with five structures on Bremore Head and a large pier, this settlement is referred to in the Civil Survey as a fishing settlement. No upstanding features of the village survive today, however remnants of its long pier still endure.

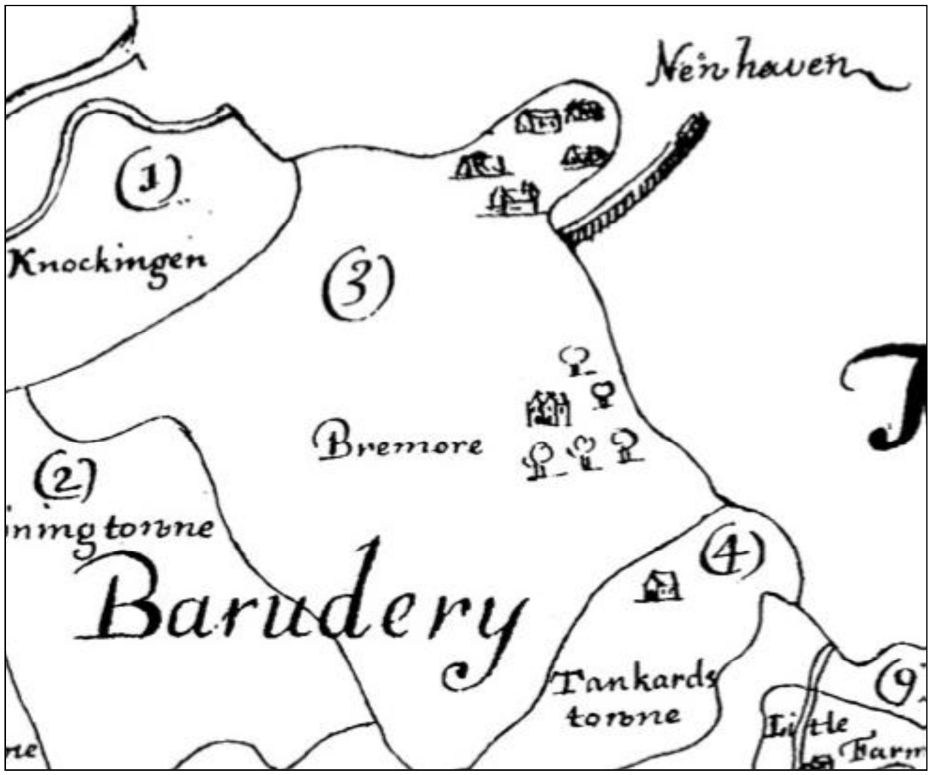

Fig. 4: Down Survey Map of 1655

Rocque's Map of 1760 (Fig. 5), is the earliest map that shows field divisions and property plots. There appears to be three access roads from the Drogheda Road into Bremore Castle lands. It is difficult to identify which of the structures depicted is the castle, there is an L-shaped structure but its return is at the southern end of the structure rather than at the northern end which is to be expected. The chapel is not indicated. It shows the site with no apparent enclosed garden or visible walling. The site at this time is segmented and trees and scrub shown occupying the area of ground that roughly corresponds with the site of the castle bawn/walled garden area and St. Molaga's Grave Yard.

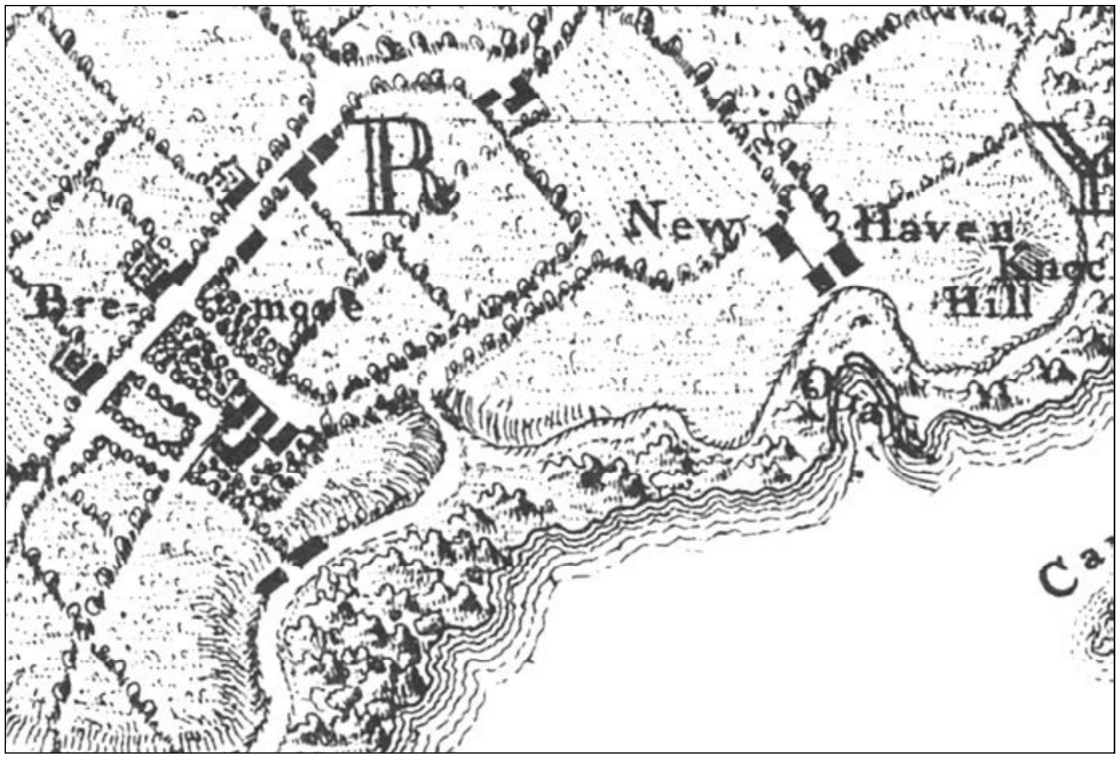

Figure 5: John Rocque, An Actual Survey of the County of Dublin, 1760

First Edition 6-Inch Ordnance Survey Map, 1837-43

The first edition Ordnance Survey six-inch map (Fig. 6) for this area was published in 1843. The access roads that were indicated on the previous map from the Drogheda road have been removed, indicating the lands to the west may have changed ownership. Access is gained solely from the laneway to the north and through a small courtyard which also led to a number of outbuildings to the west. To the east of these a Thrashing Machine is indicated. The L-shaped plan of Bremore Castle with its protruding eastern tower and the western extension can be deciphered; the main hall is shaded lighter suggesting that it may not have a roof. A structure on the northern side of the kitchen elevation is shown as a return. There is a large enclosed rectangular yard to the west of the castle, defined to the north by a long structure.

A rectangular walled area is shown immediately south/southeast of the castle buildings. No solid paths or entrance/exits are shown, yet there must obviously have been access into the area. The entire walled area is divided into nine cultivation plots that would have been used for crop rotation.

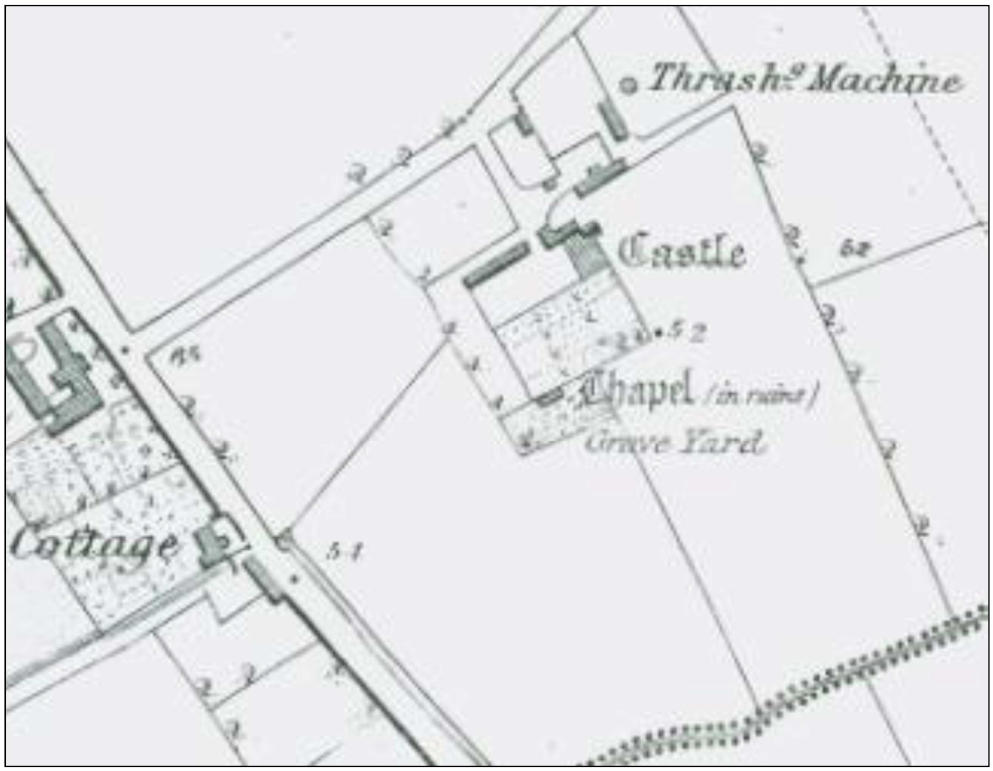

Fig. 6: First Edition 6 inch Ordnance Survey map, 1837-43

First Edition 25-Inch Ordnance Survey Map 1865

Few changes to the structures occurred in the intervening years between the first survey and the 25-inch 1865 revision (Fig. 7)

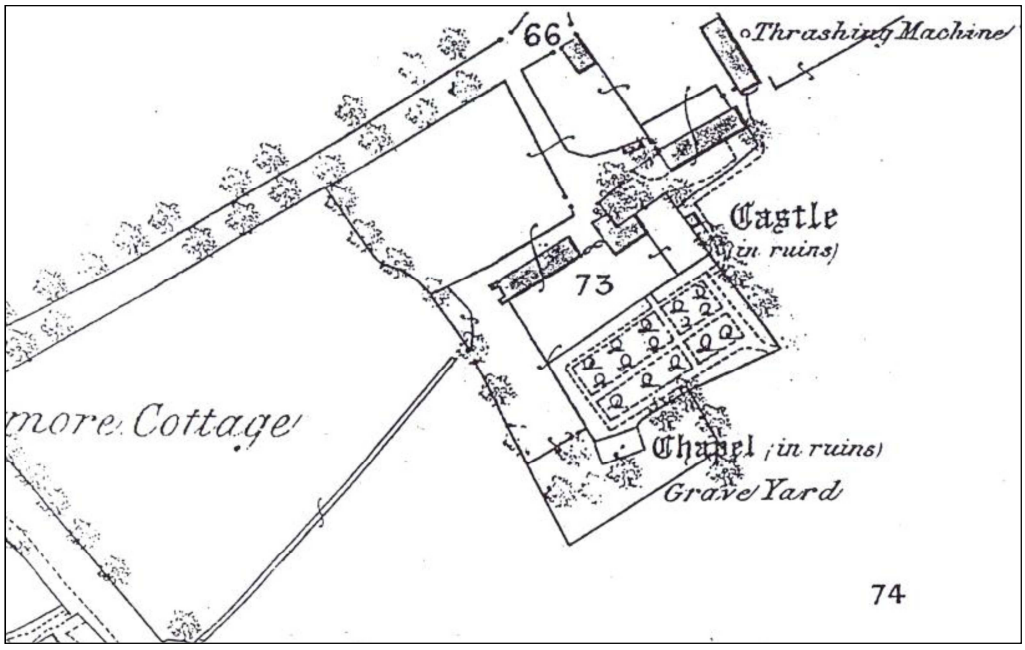

Fig. 7: 25-inch Ordnance Survey map, 1865

The map has a very detailed depiction of the walled garden. Its layout has changed considerably from the old nine plot layout of OS 1837-43. It is now a typical Victorian cross path layout of cultivation plots, each of different rectangular dimensions and with perimeter borders. The path system forms the boundaries of the plots and borders. The four plots are populated with fruit trees with the trees in the two north end plots appearing to be planted nearer the plot edges while the trees in the two south end plots are shown in more central planting positions.

Revised 6-Inch Ordnance Survey Map 1871 Revision

The 1871 6-inch revision shows (Fig. 8) that the layout of the structures on site has remained unchanged, however it revision shows two important changes. There is a wide path route shown at the northeast end connecting the walled garden with the yard and buildings to the southwest of the threshing machine. This is wide enough to be a gated access cart route into the walled garden and is more clearly shown on the later of the 25 inch 1865 maps. The area graveyard is slightly larger and is now is a sub- rectangular in shape with the western now incorporating a wider area.

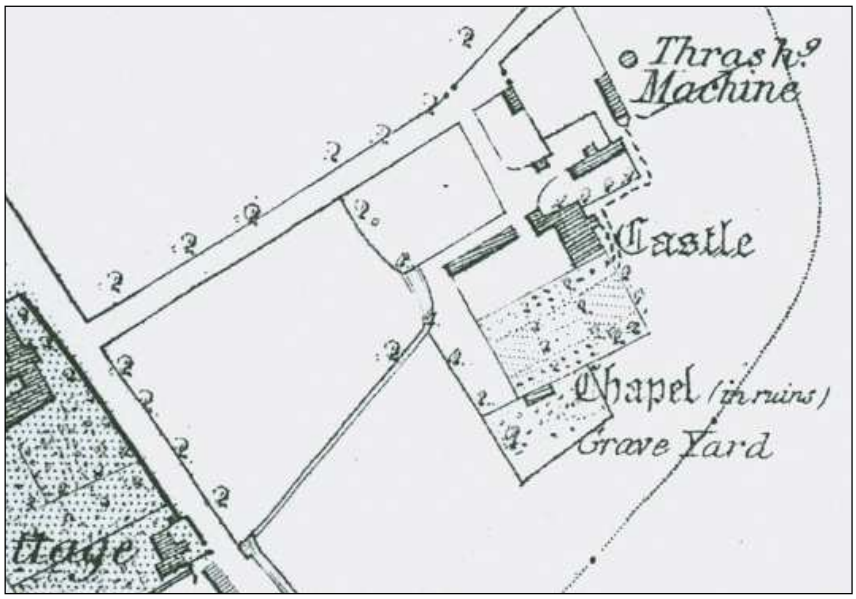

Fig.8: 6-inch Ordnance Survey map, 1871 revision

Revised 1937 25- Inch and 1906 6- Inch Ordnance Survey Maps

One hundred years later the revised 25-inch 1906 and 1937 6-inch OS survey (Fig. 9) shows that there had been little change in layout, but indicates the decline of the site. On the 1837 edition the western extension of the castle appears to have some form of roof as does the

northwest corner of the main castle structure, by 1937 there is none shown. There are breeches or entrances in the north-eastern, northern and western facades of the principal hall house structure. The rectangular graveyard was indicated as not being in use and the remains of St. Molaga's Church which is 'in ruins' and the southern wall and a short section of the eastern wall is indicated.

The farm structures in 1906 appear to have roofs but by 1937 there are none. The plan form of the castle and its thick walls are indicated. In the 1906 edition the garden paths are no longer shown, in the 1937 revision trees are still shown in the walled garden in an orchard layout.

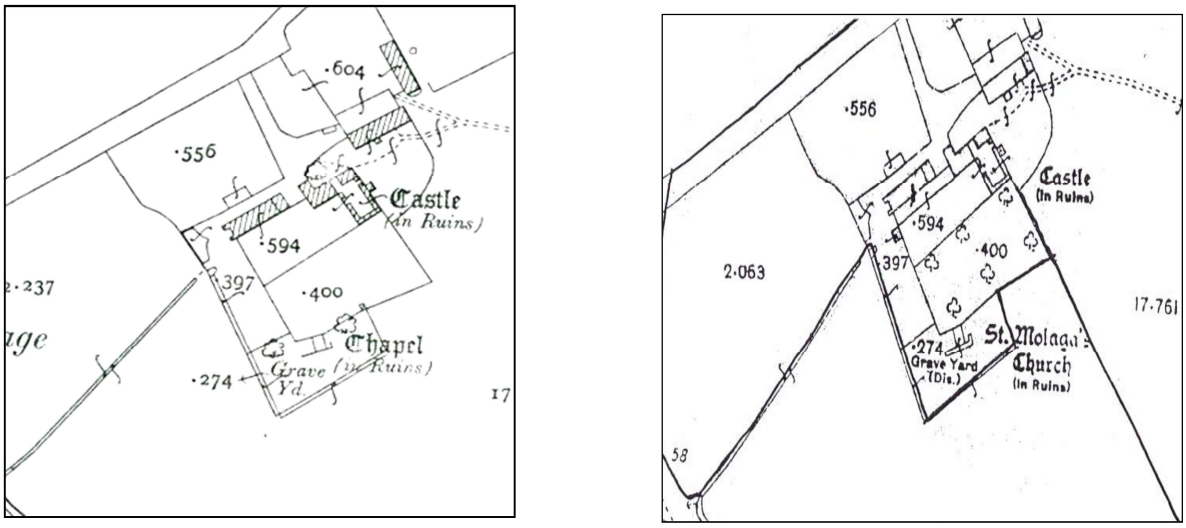

Fig. 9: Revised 1906 25-inch and 1937 6 inch Ordnance Survey maps

3.2 Previous excavations:

Several licensed archaeological investigations both internal external to the castle have been previously undertaken;

1995 (95E0183) Leo Swan undertook archaeological testing within Bremore Castle. Five trenches were opened within the three main compartments of the castle interior. Due to high levels of disturbance, no consistent evidence for original floor levels was recovered, although a series of walls were identified. Subsequent monitoring identified two stone built channels associated with a garderobe. Apart from some bone and much shell, including large quantities of whelk and limpet, together with 17th- to early 20th-century pottery, no archaeological deposits or artefacts were identified. No pottery datable to a period earlier than the 17th century was recovered.

1997 (95E0183 Ext) Archaeological Monitoring of the insertion of palisade fencing around the site was undertaken by D.L. Swan of Arch-Tech Ltd. No artefacts, objects or deposits of archaeological significance were noted.

2010 Eimear O'Connor of ADS Ltd produced an Archaeological Impact Report subsequent to reports of unauthorized works having taken place in 2009.

2001 (01E0311/01E0370) Pre-development testing was undertaken by Fin O'Carroll of CRDS Ltd, in advance of a large-scale housing development (4.5 ha.) north of Bremore Castle. Subsequent excavation uncovered a medieval field system was uncovered. This consisted of densely cultivated narrow plot that contained a number of separate furrow systems, running both parallel and perpendicular to the ditches, suggesting that it had been a defined area of cultivation from the medieval period onwards. The remnants of a path or laneway with two Elizabethan coins dating from 1601–2 was identified and nearer to the castle cobbling and pits containing a large amount of late medieval pottery a slate sundial, possibly unfinished, of late medieval date. The possible footprint of a small structure, of either medieval or early post-medieval date, was also exposed in the vicinity, between these two pits. The pottery from the site totalled approximately 4000 sherds. The majority of this pottery was late medieval in date, with a very large proportion of Leinster Cooking Ware. The assemblage included a broad sample of post-medieval wares, including ridge tiles of North Devon Ware which may have originally been attached to the castle. On the basis of a preliminary examination of the pottery, other associated finds and the evidence of excavation, there appears to have been intensive activity associated with the use of the castle in the late medieval period and extending into the early post-medieval period.

3.3. Geophysical Survey

Geophysical survey was undertaken by Target Survey (Licence no. 11R0038) as part of the *Bremore Conservation Plan*. The survey consisted of resistivity over three areas-within the walled garden (Area 1); immediately east of the castle (Area 2) and west of the sports fields (Area 3). The latter areas were characterized by weak trends, some high resistance and modern disturbance (Nicholls 2011, 10).

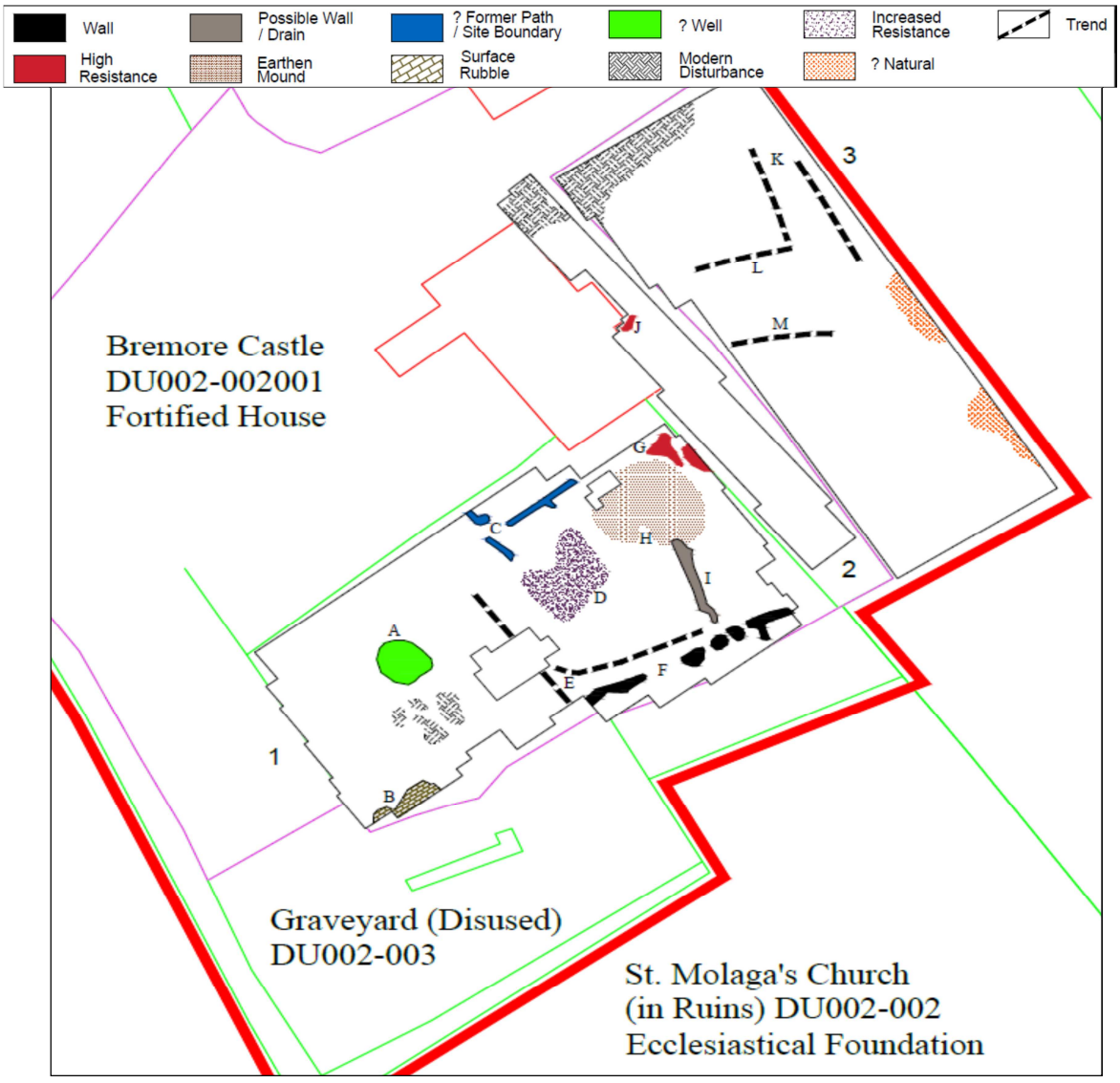

Fig. 10: Geophysical Survey results, Nicholls 2011

A concentration of anomalies suggesting remains associated with a possible medieval garden are apparent within Area 1. These include a potential well/water feature (A), possible pathways (C), linear trends/internal divisions (E) and part of the original garden wall (F). (Nicholls 2011, 13).

4 Archaeological Excavation

Based on the historical, anecdotal and geophysical survey evidence it was anticipated a well, possible farmyard, and features related to the layout of the nineteenth century garden walled garden would be identified during the excavation. The excavation took place over thirteen days between Friday 14th July and Friday 28th July 2017. A total of 96 volunteers participated.

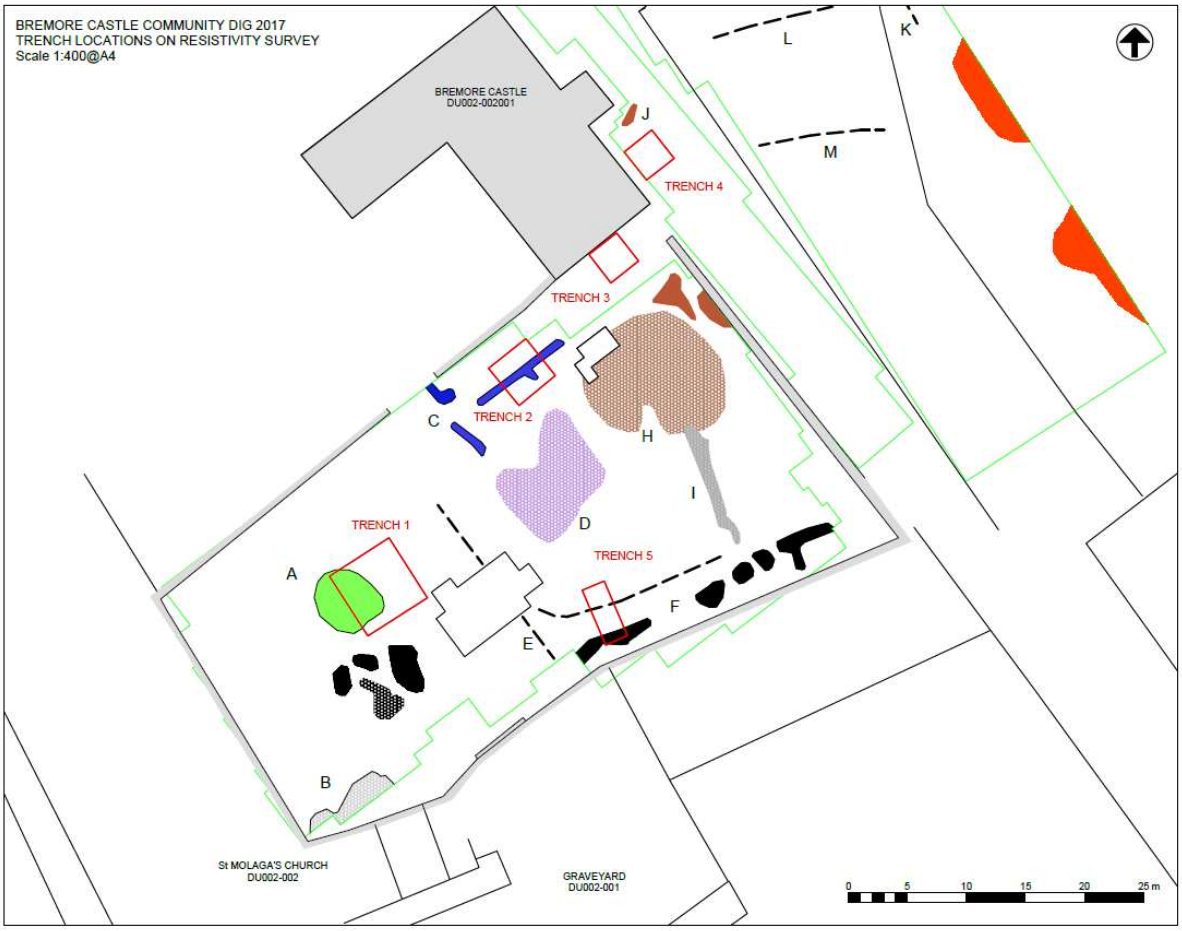

Fig. 11: Trench layout over geophysical resistance survey

Five trenches were opened as part of the excavation, four within the precinct of the walled garden and another (Trench 4) to the east of Bremore Castle. Trench 1 was located over a geophysical anomaly, interpreted as a possible well and measured 6m NS x 6m EW. Trench 1 was excavated to natural subsoil, a maximum depth of 0.55m.

Trench 2 was located c.15m east of Trench 1 and was situated over geophysical anomalies interpreted as possible garden pathways. Trench 2 measured 4m NS x 4m EW and was excavated to natural subsoil, a maximum depth of 0.40m.

Trench 3 measured 4m x 4m and was located in an area that geophysical survey had not been undertaken (due to the presence of scaffolding at the time of survey). Abutting the original remains of the south wall of Bremore Castle natural subsoil was located an average of 0.45m below present ground level.

Trench 4 was located c.1m east of the eastern wall of Bremore Castle. It was positioned to inform the possible future installation of a lift, within in area that had not yielded any results on the geophysical survey. Trench 4 measured 3m NS x 3m EW and was excavated to natural subsoil, a maximum depth of 0.40m.

An application for an additional trench to investigate geophysical anomalies close to the southern limit of the walled garden was approved during the excavation. Time allowed for Trench 5 to be excavated as 5m NS x 2m EW. Natural subsoil was identified 0.65m below the present ground surface.

4.1 Excavation Stratigraphy

The overall stratigraphy consisted of grey-yellow stony natural subsoil overlain by compact metalled surfaces, and post medieval to modern activity. A high level of modern disturbance was identified.

Trench 1

Natural subsoil was attained at 0.55m below ground level. It was overlain by a metalled surface (F18) that was truncated by a modern machine cut (F17); and a clay deposit (F16) truncated by the insertion of animal burials (F10, F13, F14, F15) and the modern machine cut.

Plate 5: Trench 1 post-excavation, facing north-west

Trench 1-Surfaces and Deposits:

Feature 18

This metalled surface would have extended over the entire trench but was heavily truncated to the west by modern disturbance. It survived over a maximum area of 6m NS x 5m EW. It consisted of a well-made compacted surface of rounded and sub-angular stones (0.04m-0.12m diam.; 0.03m-0.06m in thickness) packed into yellow clay subsoil. It presented as a consistent

surface but sloped noticeably from north to south with a drop of 0.14m over the 6m length of Trench 1. The surface was overlain by a rougher stony surface (F3) to the north and clay deposit (F16) over the remainder of the trench.

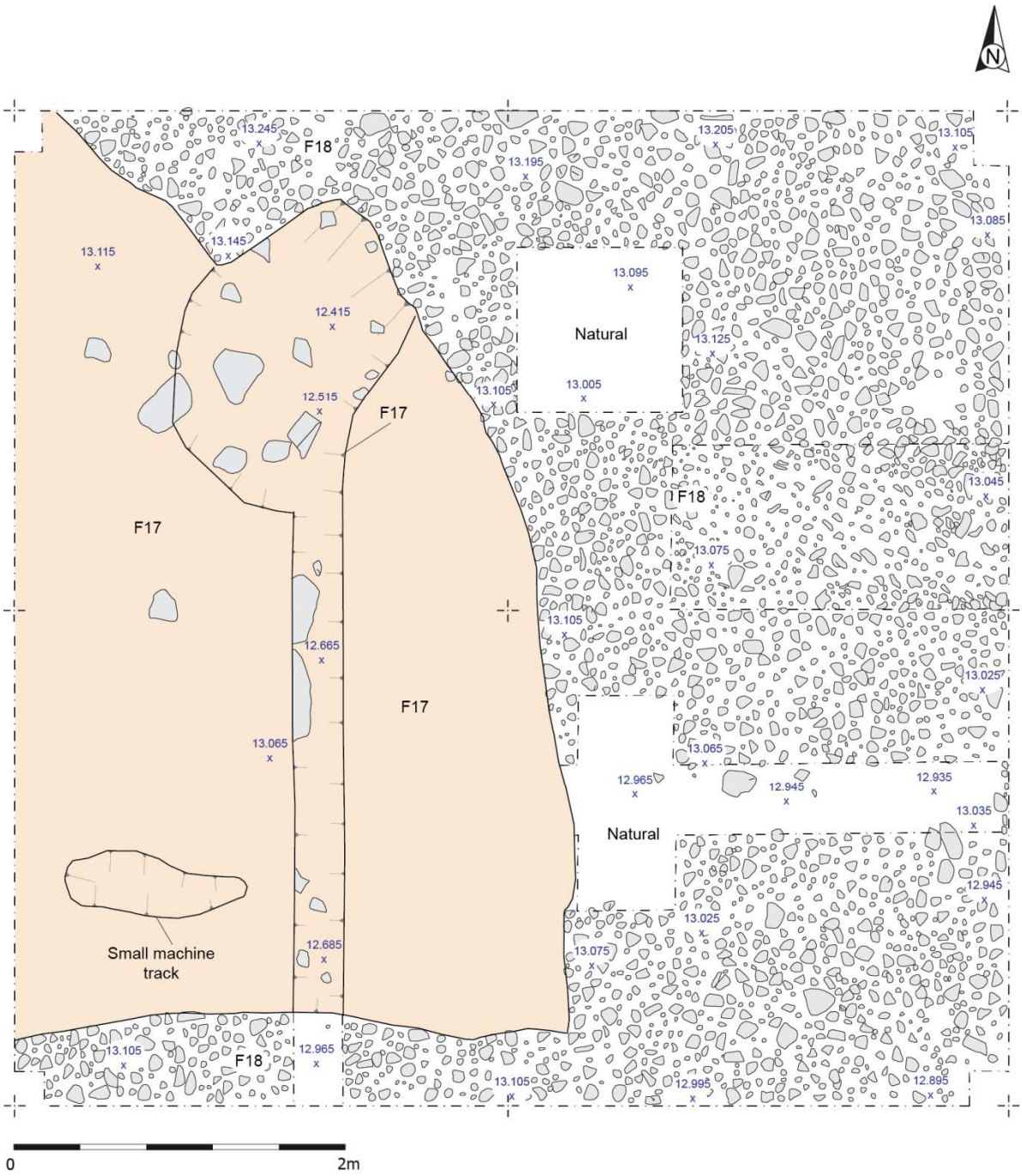

Fig. 12: Trench 1, Feature 17, Feature 18

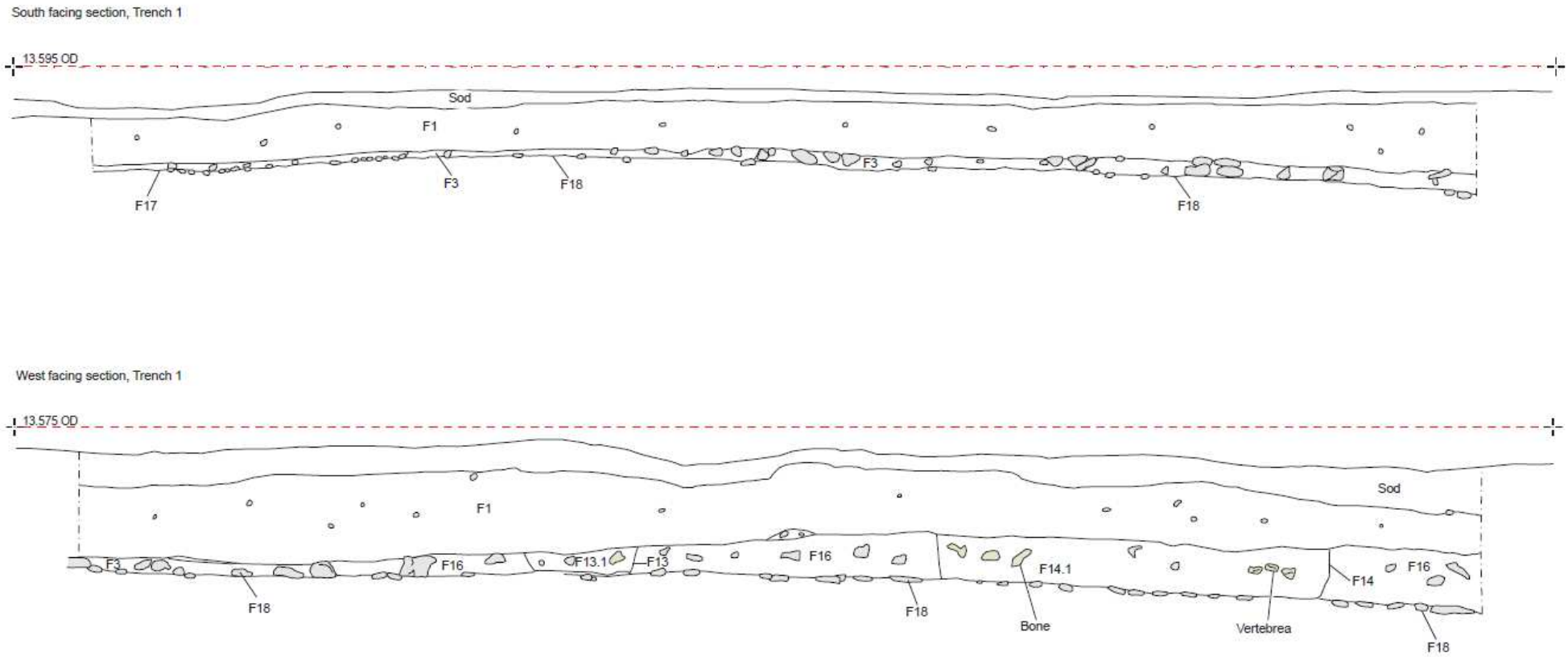

Fig. 13: South facing Section Trench 1; West facing section Trench 1

Plate 6: Feature 18, facing east

Feature 3

This was a rough metalled surface that extended 5.82m EW x 1.38m NS over the metalled surface F18. Feature 3 consisted of an irregular deposit of angular and sub-angular stones (0.04m-0.17m diam.; 0.04m-0.07m in thickness) compacted into a grey brown silt with inclusions of mortar fragments, brick and occasional roof slate. It was abutted to the south by clay deposit F16.

Feature 16

This irregular deposit consisted of a yellow-brown clayey silt with small to medium angular and sub-angular stone inclusions that extended over much of Trench 1 (6mEW x5.18m NS; 0.1m-0.28m in depth). It contained four sherds of dark glazed Buckley ware and a sherd of mottled ware dating to the late 17th-mid 18th centuries and animal bone including cattle, sheep, pig as well as horse and dog. Feature 16 was truncated by the insertion of four animal burials and a modern machine cut (F17).

Trench 1-Animal Burials:

A total of four animal burials (F10, F13, F14 and F15) were identified in the east of Trench 1.

Feature 10

Feature 10 was a shallow sub-rectangular cut (1.05mNS x 0.6mEW; 0.08m-0.1m in depth), aligned north-south, that contained a sheep carcass (refer Appendix 7) within a loose friable mid grey brown sandy silt fill. Two sherds of a 17th century black glazed storage jar and two sherds of modern pottery were associated with this burial.

Plate 7: F10 mid-excavation, facing east

Feature 13

Located approximately 0.3m east of Feature 10, this animal burial was aligned east-west. Contained within a shallow sub-rectangular cut (0.8m EW x 0.38m NS; 0.06m-0.1m in depth) was a canine carcass (refer Appendix 7) within friable grey brown sandy silt.

Feature 14

Extending beyond the eastern baulk of Trench 1 was the north-south aligned animal burial F14. Located c.1.2.m south of burial F13, this steep-sided cut (1.42m NS x 0.64m EW; 0.08m-

0.12m in depth) contained a sheep carcass within loose sandy silt. A fragment of clay pipe stem and modern pottery were recovered from this fill.

Plate 8: F14, post-excavation, facing east

Feature 15

Located 0.2m west of burial F14 and 1.06m south of F10, this shallow sub-rectangular cut (1.1m EW x 0.6m NS; 0.06-0.10m in depth) was aligned east-west. Feature 15 contained partial articulated remains of a single cow/ox carcass within friable grey brown sandy silt. There were two foetal or neonate sheep remains also recovered from the pit, probably disturbed by the insertion of the cow/ox burial (refer Appendix 7).

Trench 1-Modern truncation

Dominating the western half of the trench was a machine cut and backfill.

Feature 17

This sub-rectangular, irregular cut (5.6m NS x 3.42m EW; 0.26m-0.68m in depth-base not ascertained) was cut through the identified deposits and surfaces within Trench 1. It correlated with the geophysical anomaly identified as a possible well and the area known

locally as 'the pond' for its predisposition for waterlogging after rain. The feature was excavated to a maximum depth of almost 0.7m. Excavation ceased due to the instability of the fill and the fact water was beginning to seep up, possibly indicating the former site of a well/pond. The machine cut was backfilled with large field stones, a tree stump, brick and plastic in a peaty matrix. A single sherd of a later 18th century black glazed storage jar was recovered from this modern backfilling.

Plate 9: Feature 17 mid-ex, facing south

Feature 11

This was re-deposited mottled yellow-grey clayey sand that capped the back-filled machine cut F17. It extended for 5.6m Ns x 3.42m EW and measured from 0.14m to 0.22m in depth. Feature 11 contained modern pottery, a clay pipe stem fragment and a sherd of a 17th century black glazed jar.

Feature 1

Topsoil in Trench 1 consisted of a mid-grey brown sandy silty clay with occasional small stone inclusions. There were frequent fragments of crushed seashell indicating enrichment for garden/farm use. Topsoil measured from 0.14 to 0.22m in depth. A range of post-medieval pot was recovered alongside six sherds of medieval pottery including a fragment of Saintonge. Two fragments of clay pipe bowl bottle were identified, one an 18th century thin-

walled bowl and a 19th century coarse, thick-walled pipe; and window glass, brick, modern pot and animal bone.

Trench 2

Natural subsoil was attained at 0.4m below ground level. Overlying natural were deposits of garden soil (F12) and redeposited natural (F5) to either side of a pathway (F2, F6).

Plate 10: Trench 2 mid-excavation, facing south

Trench 2-Layers and Deposits:

Feature 12

Feature 12 was a rectilinear (2.9m EW x 1.4m NS; 0.04m-0.2m in depth) deposit of dark brown moderately compacted clayey silt that overlay natural subsoil, in the south-west quadrant of Trench 2. The deposit was interpreted as possible garden soil with shell, animal and modern pottery inclusions. Small concentrations of compacted small stones at the interface with natural subsoil may indicate disturbed metalling.

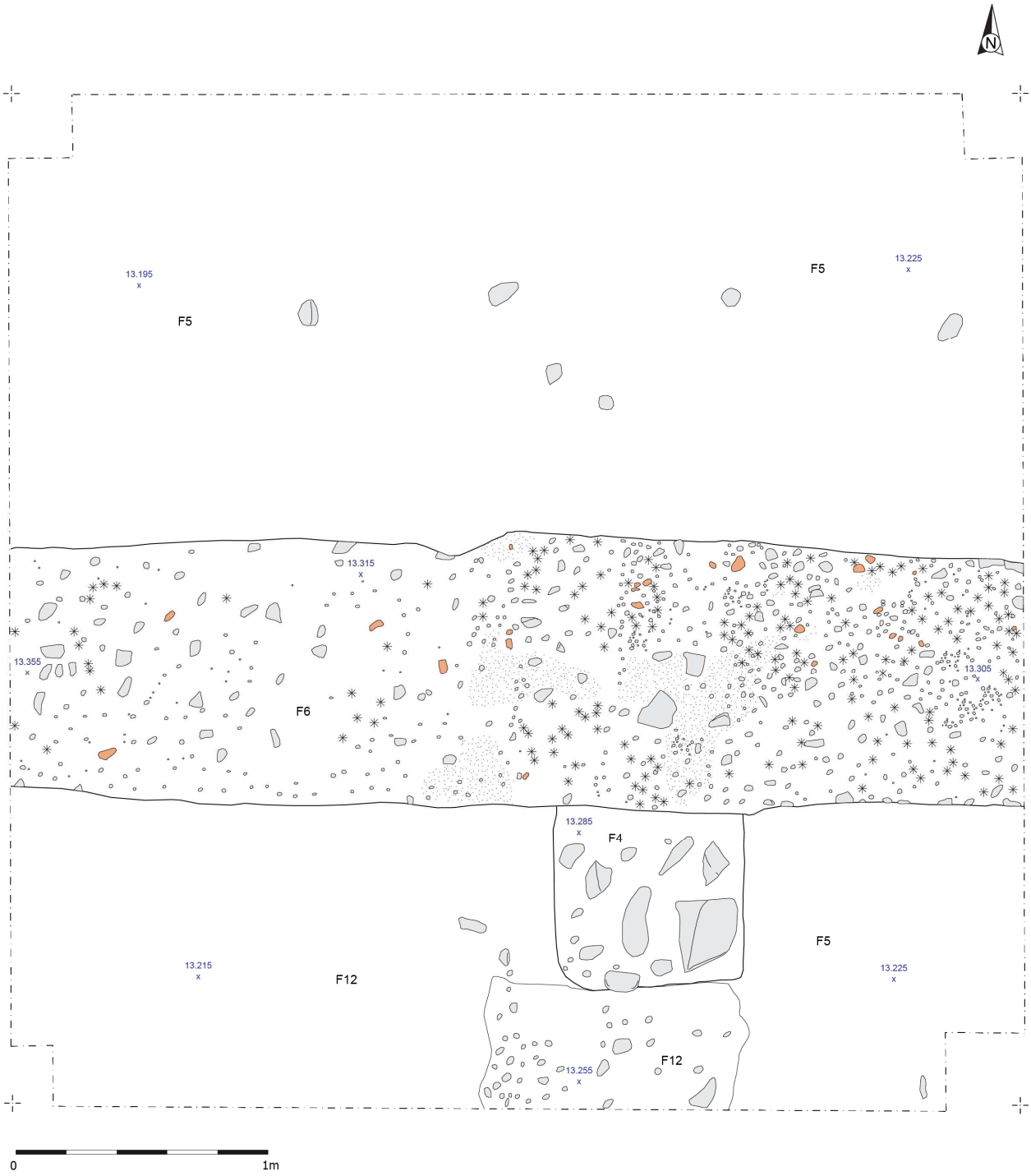

Fig. 14 Trench 2, post excavation plan

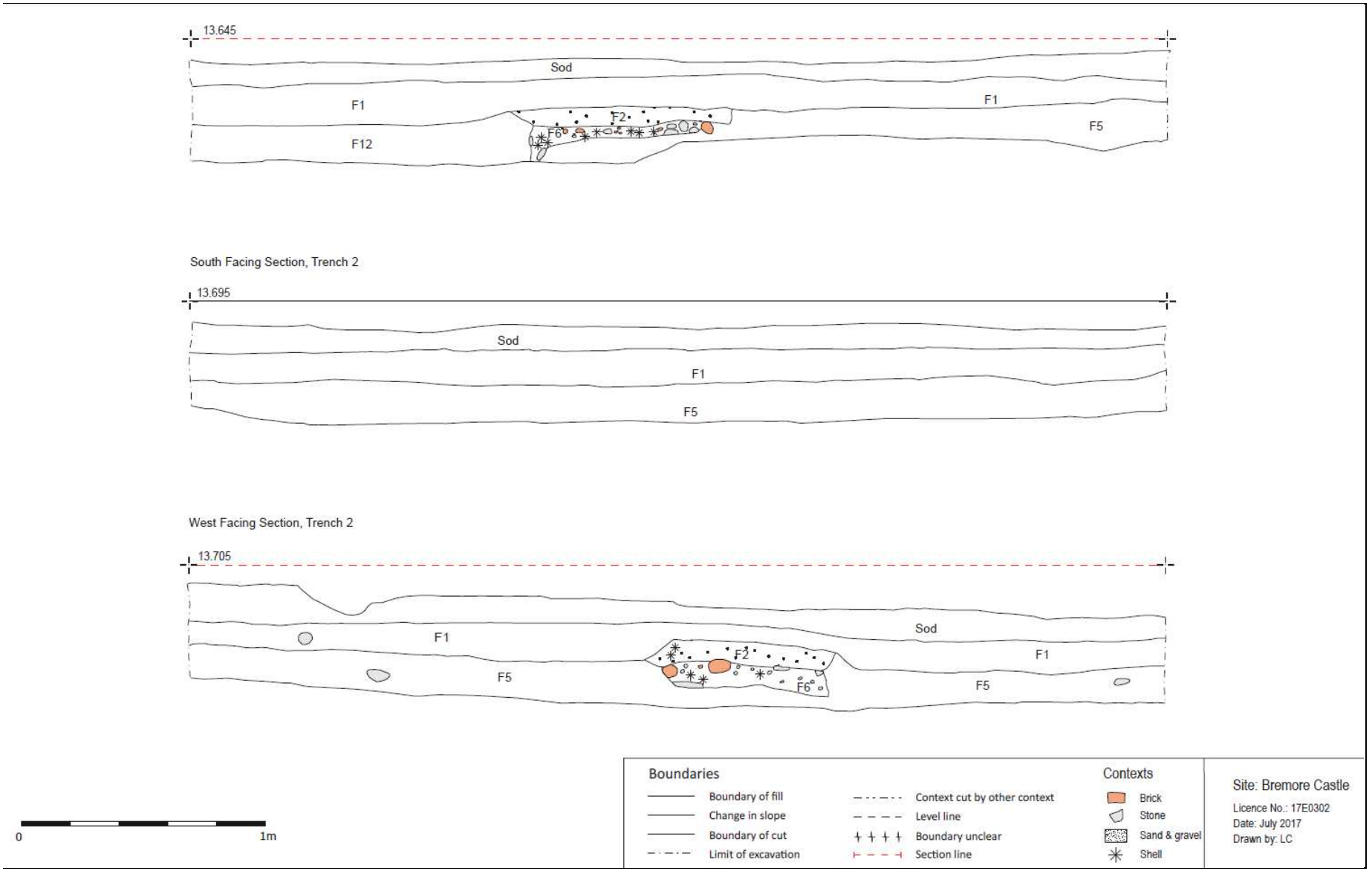

Fig.15: East, South and West Facing sections, Trench 2

Feature 5

Consisting of re-deposited yellow brown silty clay with occasional stone inclusions, this deposit overlay natural subsoil over the majority of Trench 2 (0.04m-0.2m in depth). Feature 5 contained an 18th/19th century Oswald Type 13G/14G clay pipe bowl and fragment of clay pipe stem and a handle and body sherd of a 17th century black glazed storage jar.

Plate 11: Path F2/F6, pre-excavation, facing east

Feature 6

Feature 6 was the basal layer of an east-west pathway that correlated with the geophysical anomaly, confirming the original interpretation. Consisting of compacted lime mortar, brick, shell, limestone and slate, 1.06m in width, 0.12m in thickness, cut into redeposited natural F5,

it was overlain by sandy gravelly deposit F2. Two sherds of mid-17th/mid-18th century slipware were recovered from this feature.

Feature 2

Directly overlying F6, Feature 2 consisted of very small gravel pebble, crushed shell and small stone (0.1m in depth) within friable sandy silt. It was exposed for 4m east-west within the trench and measured 1m in width. Modern pot, glass and brick were associated with F2.

Feature 4

Feature 4 consisted of modern disturbance, a square cut (0.74m EW x 0.7m NS) that contained concrete and limestone rubble, located south of path F2/F6. It was associated with a single sherd of medieval pottery.

Plate 12: F6 and F4, mid-excavation, facing east

Feature 1

Topsoil in Trench 2 consisted of a mid-grey brown sandy silty clay with occasional small stone inclusions. There were frequent fragments of crushed seashell indicating enrichment for garden/farm use. Topsoil measured from 0.16 to 0.24m in depth. A range of post-medieval

pot was recovered alongside two sherds of medieval pottery, clay pipe fragments, bottle and window glass, brick, modern pot and animal bone.

Trench 3

Natural subsoil was attained at 0.45m below ground level. It was cut by a large ditch (F26) with a single fill (F19). This was overlain by a redeposit (F7) which was truncated by deposits F9 and F8, both overlain by topsoil.

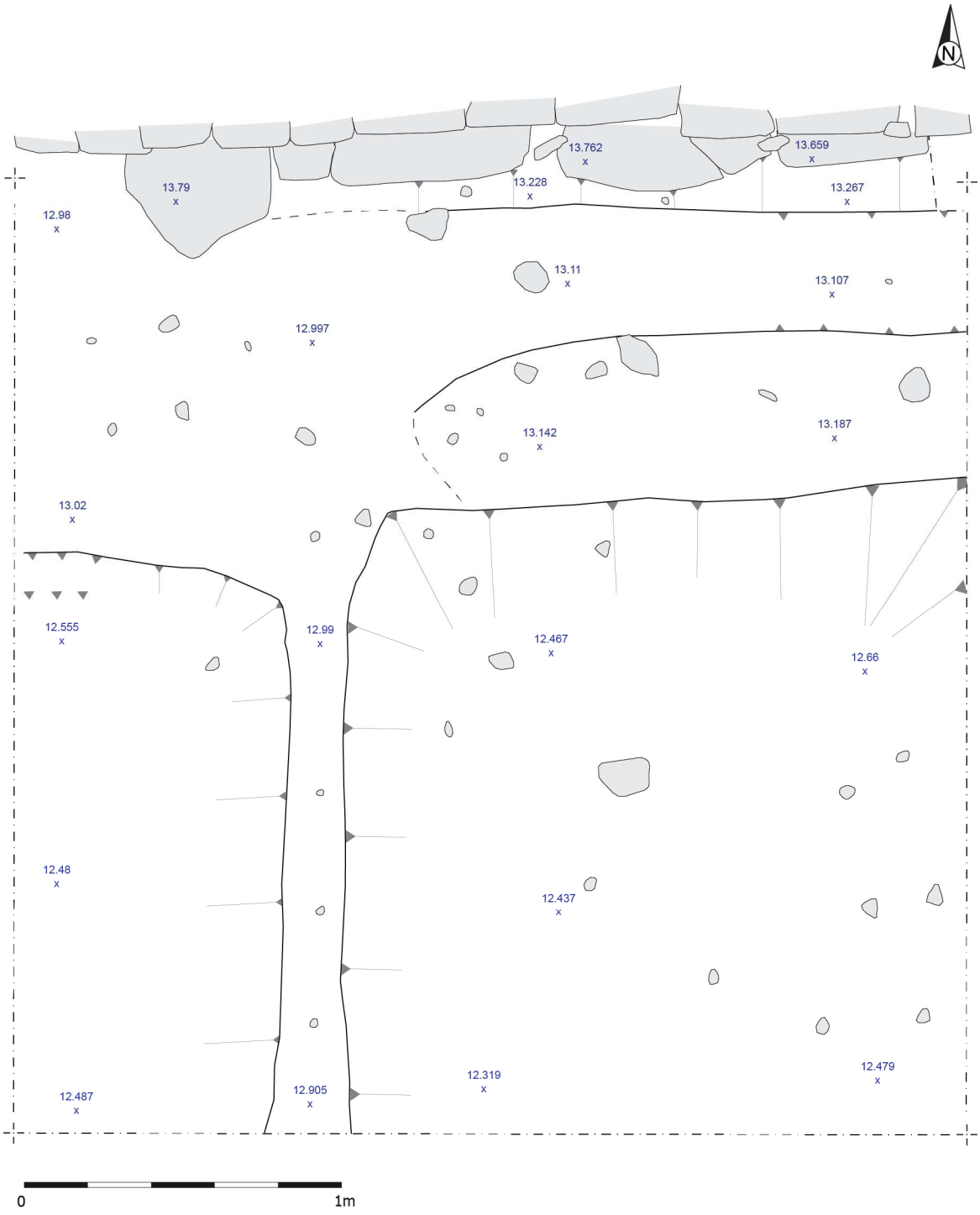

Fig. 18: Trench 3, post-excavation

Ditch:

Feature F26

Ditch cut; originally perceived as a single EW ditch this features had two cuts with a single (F19). Cut into natural subsoil the eastern cut was separated from the western by natural subsoil measuring 0.2m-0.25m in width. The eastern cut measured 1.9m EW x 1.97mNS and 0.7m in depth. It sloped down from the eastern baulk to its terminal where the base was slightly concave in section. The western cut measured 1.78m NS x 0.84m EW and 0.64m in max depth the base sloping down from the terminal westwards. This ditch or series of large pits was located 0.9m (E) - 1.2m (W) from the extant castle wall.

Plate 13: Feature 26, post excavation, facing south

Feature F19

Feature F19 extended across the southern extent of Trench 3 (4m EW x 2.8m NS) and filled ditch F26 (min. depth 0.26m –max. 0.7m). It consisted of dark brown sandy silty clay fill with frequent inclusions of angular and sub-angular stones (0.1-0.15m diam.); medium inclusions of mortar lumps, animal bone and shell. An extensive range of animal bone including cattle, sheep, pig, dog, cat, hare, rabbit, chicken, goose and duck was identified. Two sherds of medieval Dublin-type fine ware, four sherds of stoneware, occasional post-medieval pottery, lead window came; a fragment of red porphyry tile, iron nails and window glass were recovered from this feature.

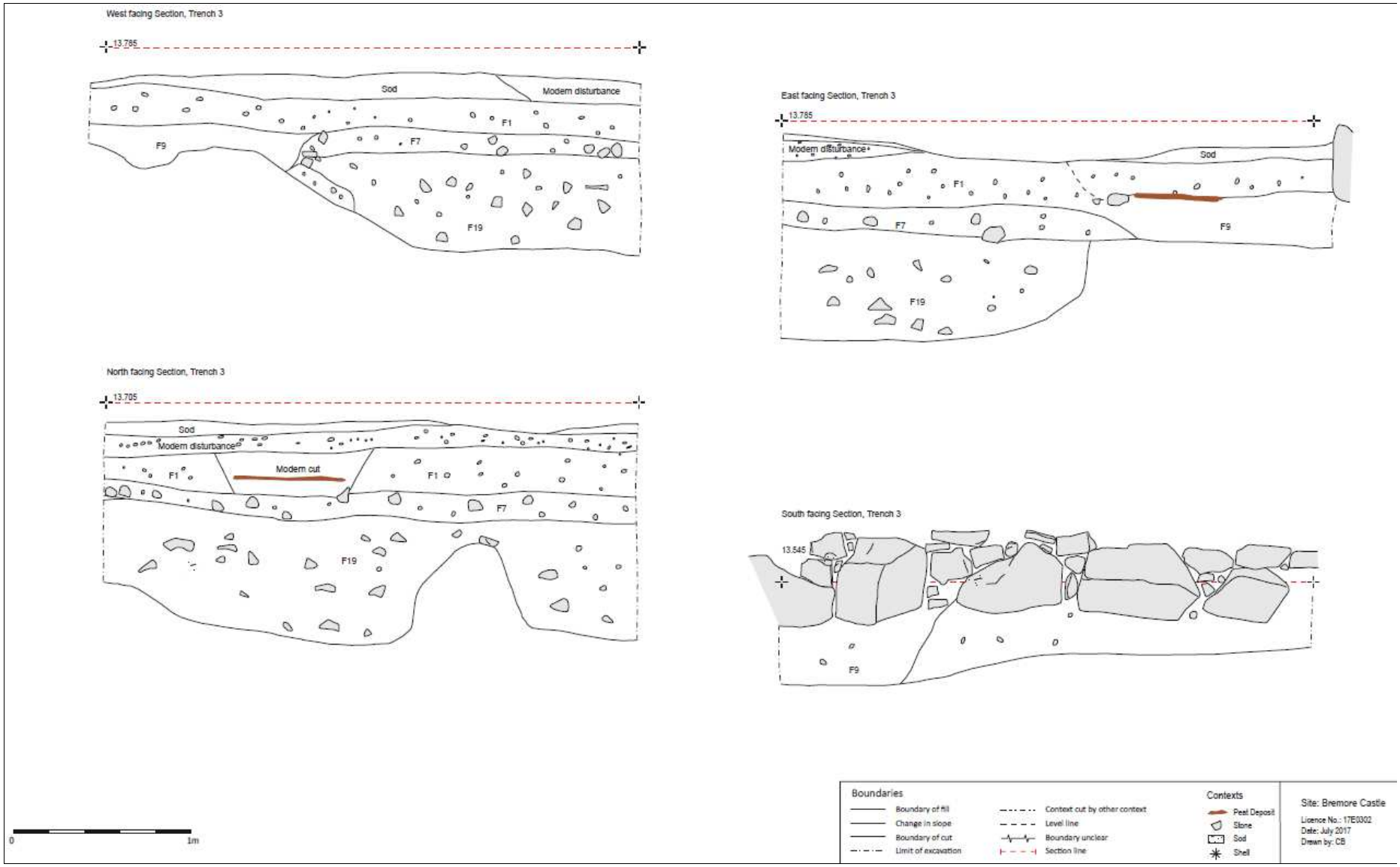

Fig.19: Sections, Trench 3

Trench 3-Layers and Deposits:

Feature 7

Located to towards the south of Trench 3, Feature 7 (4m EW x 2.45m NS; 0.12m-0.21m in depth) overlay ditch fill F19. Feature 7 consisted of very compact redeposited light orange brown clay with angular (0.05m-0.14m diam.) stone inclusions. Animal bone including cattle, sheep, cat, chicken and songbird were identified in this feature. A sherd of glazed medieval Dublin-type fineware, three sherds of Agate ware, the base of a Porcelain tea bowl and modern pottery; bottle glass and 16th century window glass fragments, copper alloy wire drawn pin and brick were recovered from this feature.

Feature 9

Located to the north of Trench 3, Feature appeared to cut the redeposited subsoil (F7). Feature 9 consisted of mottled dark brown orange fill within a relatively concave cut (1.4m EW x 0.33m NS; 0.12m-0.22m in depth) that expands into a more circular cut (1.2m NS; 0.32m in depth) westwards. Feature 9 was clayey and held water well. A few fragments of animal bone identified as rat and chicken (refer Appendix 7); fragments of 16th century window glass and one sherd of a mottled ware drinking vessel were recovered from this feature.

Plate 14: Feature 9, pot-excavation, facing west

Feature F8

Within Feature 9, this feature consisted of a dark brown silty deposit (0.7m EW x 0.5m NS; depth 0.05m-0.1m), centred on a large stone (0.3m diam.). It was associated with modern pot and glass.

Feature 1

Topsoil in Trench 3 consisted of a mid-grey brown sandy silty clay with occasional small stone inclusions. There were frequent fragments of crushed seashell indicating enrichment for garden/farm use. Topsoil averaged 0.25m depth and was disturbed to the south by modern building and planting activity. Medieval Dublin-type fine ware and Leinster Cooking ware; , post-medieval and modern pottery was recovered alongside lead shot, bottle and window glass, brick and animal bone.

Trench 4

Natural subsoil was attained at an average of 0.4 below ground level. Cut into were natural was a north-south drain (F21) that was overlain by a metalled surface (F20).

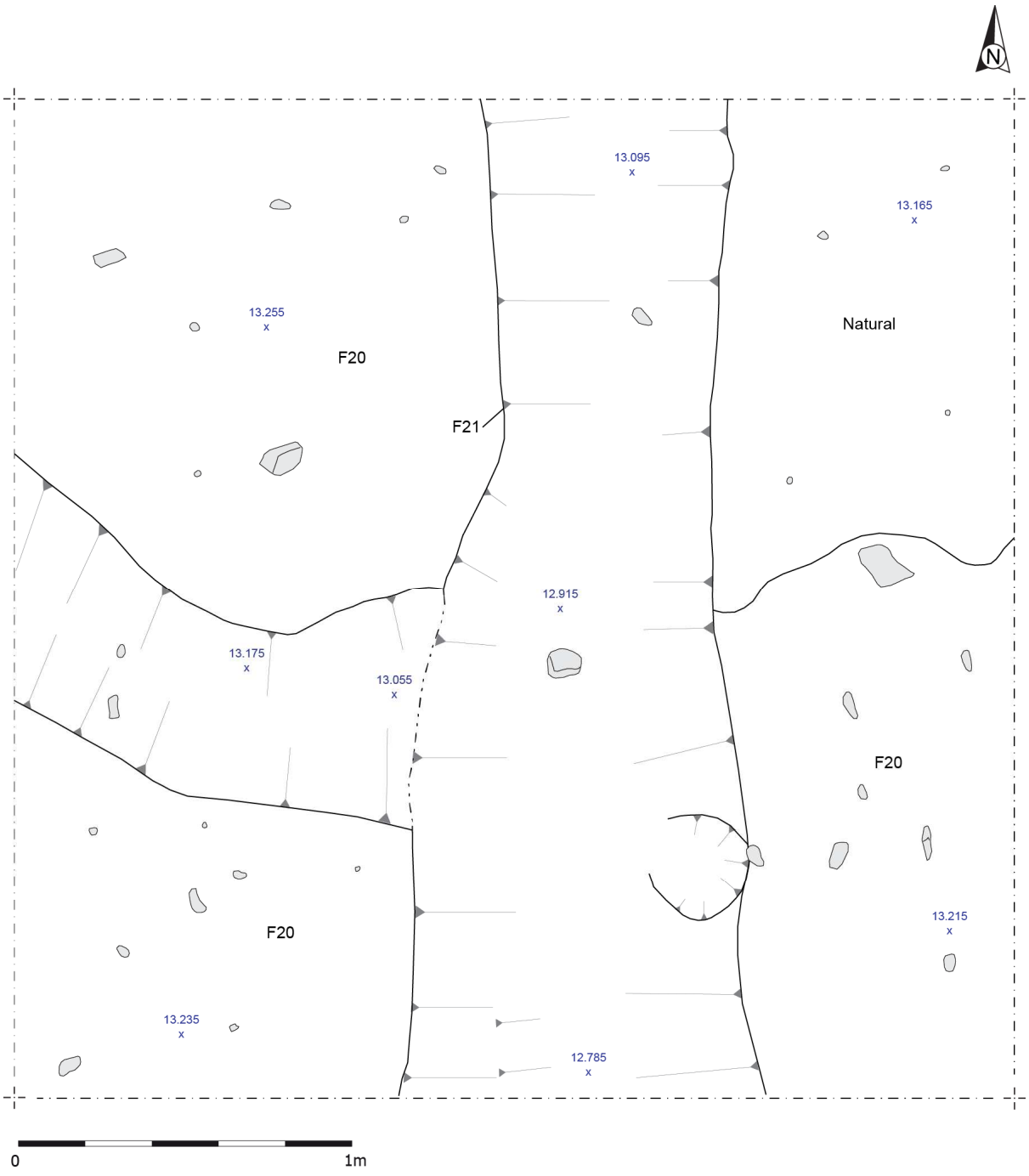

Fig.20: Trench 4, post-excavation.

Plate 15: Trench 4, Post-excavation, facing east

Trench 4-Drain:

Feature 21

Feature 21 was a post-medieval/early modern drain associated with the castle. This linear north-south drain (3m NS x 1.06m EW) deepened from north (0.06m) to south (0.38m), the cut from gently sloping to concave. Cut into natural subsoil the drain was filled with loose to moderately compact dark brown clayey silt. There were occasional inclusions of limestone rubble. A sherd of decorated Dublin-type ware from a jug was recovered from this drain.. Slate, glazed roof tile, shell, animal bone and brick were recovered from Feature 21. A soil sample (20l.) was taken for environmental analysis.

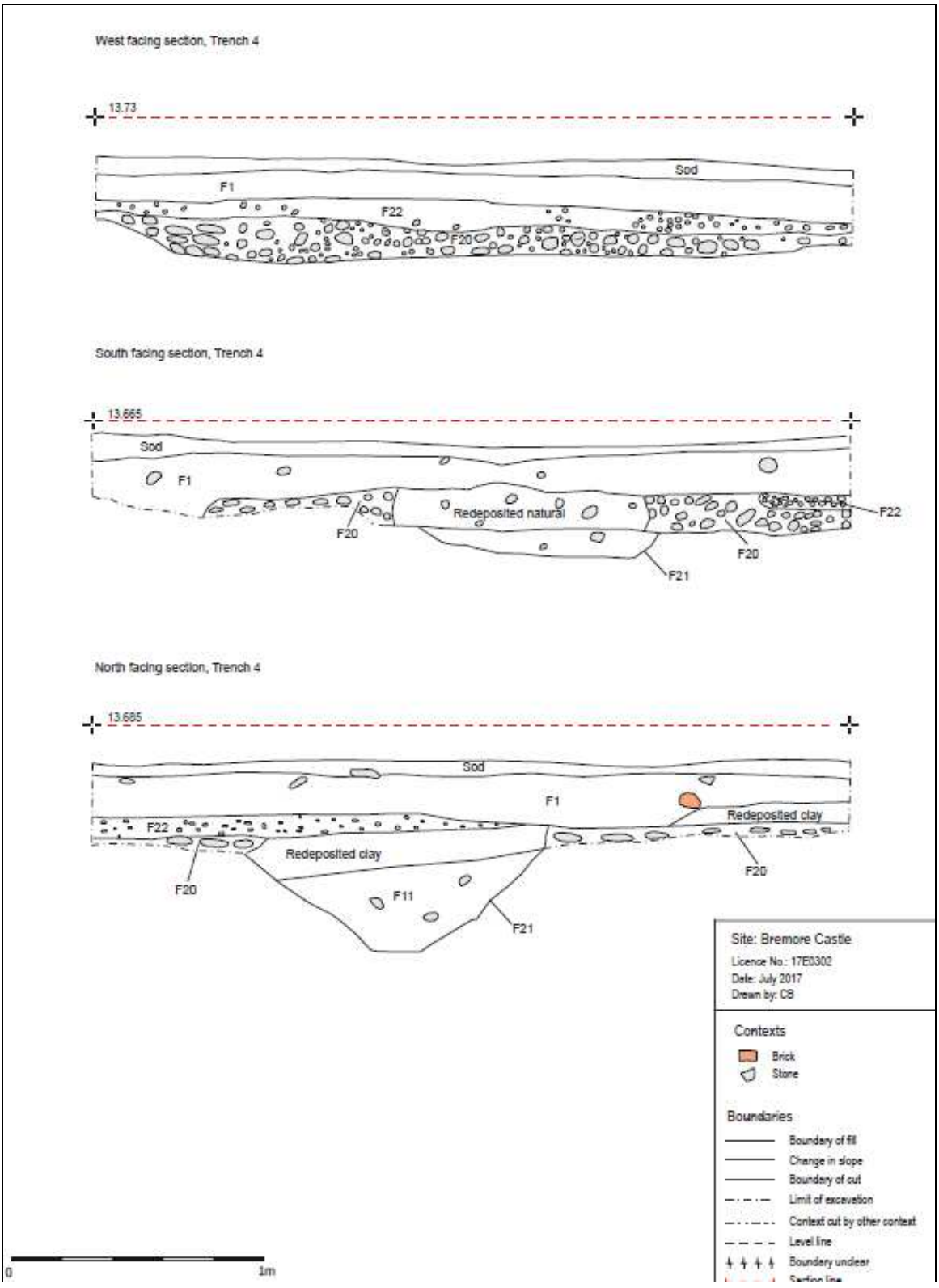

Fig. 21: West, south and north facing sections, Trench 4

Trench 4-metalled surfaces:

Feature 20

Feature 20 consisted of a metalled surface that extended over the entirety of the Trench 4 but was disturbed by modern drainage. It consisted of heavily compacted small rounded stones and mortar set into grey brown clay. The surface was well- preserved to east of trench, becoming more disturbed westwards, due to truncation by an east-west drain. Feature 22 surface overlay the north-south drain (F21) and natural subsoil.

Feature 22

Feature 22 (3m NS x 2.1m EW; 0.04m-0.12m in thickness) was confined to the eastern quadrant of Trench 4 and consisted of a deposit of small pebbles stones, gravel and shell in a loose grey sandy silt. It was interpreted as an attempt to resurface metalled surface F22.

Plate 16: Feature 22, facing south

Feature 1

Topsoil in Trench 4 consisted of a dark brown orange silty clay with occasional small stone inclusions. Topsoil measured from 0.12m to 0.26m in depth and included frequent modern detritus.

Plate 17: Brian with a North Devon ware roof tile in Trench 4

Trench 5

Natural subsoil was attained at an average of 0.65 below ground level. A metalled surface (F24) set into natural subsoil was overlain by redeposit (F25) and a deposit of large stones (F23).

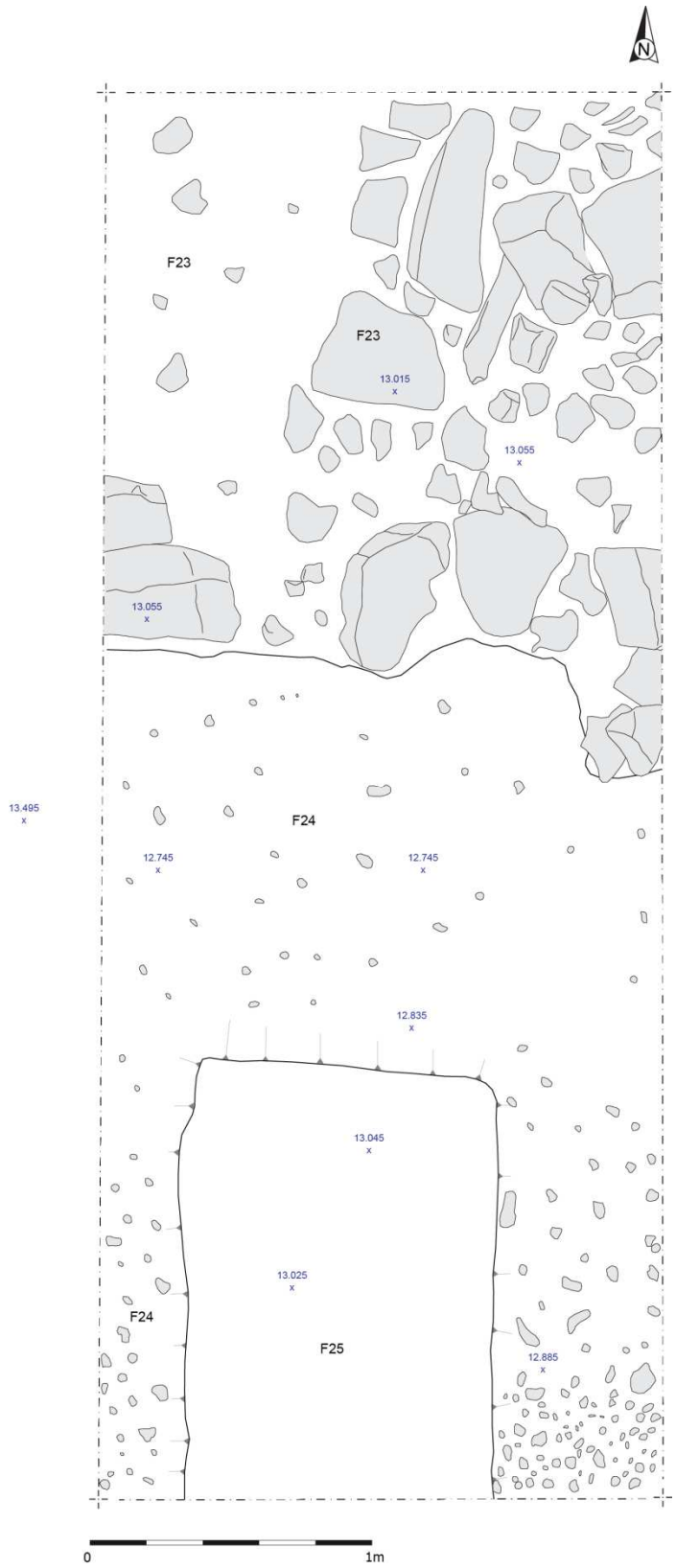

Fig. 22: Trench 5, post-excavation

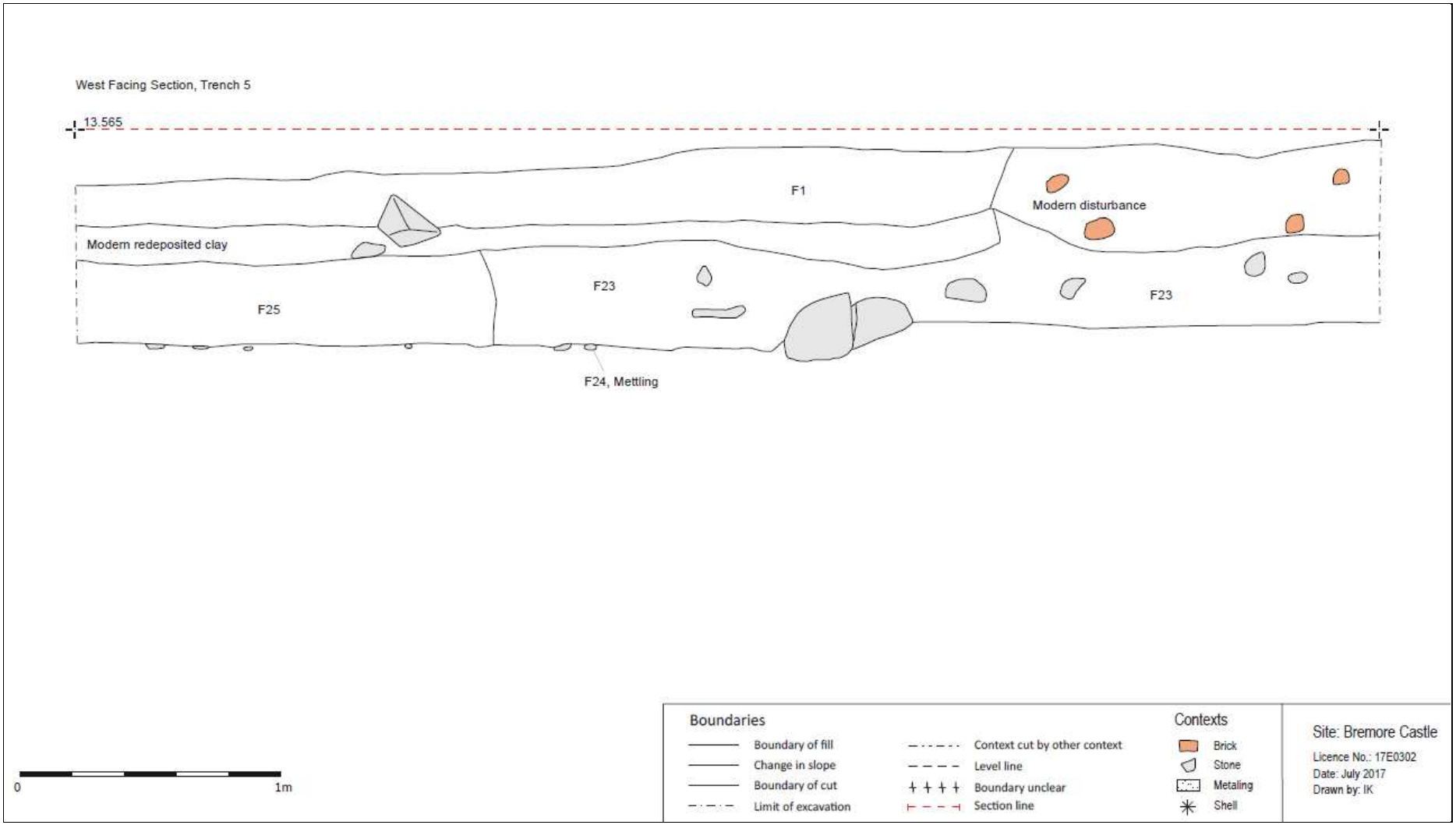

Fig.23: West facing section, Trench 5

Plate 18: Trench 5, facing south

Feature 24

Set into natural subsoil, the metalled surface consisted of compacted rounded and angular stones (0.01-0.12m diam.). Feature 24 was very similar to the metalling (F180 in Trench 1, indicating an extensive surface.

Feature 25

Overlying the metalled surface (F24) to the south, Feature 25 consisted of sterile moderately compact redeposited orange brown silty clay (2.58m Ns x 2m EW; 0.28-0.36m in depth).

Feature 23

Located to the south of Trench 5, was stone tumble, Feature 23. This deposit of large mostly rounded stones (average 0.2m diam.) within mid-brown loose silty clay matrix. Given its proximity to the original wall of the garden (since rebuilt in the 1990s) the tumble does not appear to be wall collapse, as there was no mortar of apparent working of the stone

Feature 1

Topsoil in Trench 5 consisted of a grey-brown friable silty clay with small stone inclusions that measured from 0.2 to 0.5m in depth. There was a lot of modern disturbance due to the nearby re-building of the garden wall.

4.2. Samples & Finds

The environmental sampling strategy was in consultation with Dr Meriel McClatchie. The high level of disturbance mitigated against comprehensive soil sampling. Two samples (20l. each) were taken from stratified contexts (F19 fill of ditch F26 and the fill of drain F21). Animal bone and shell were retrieved from all features and layers. All layers and features of all trenches and a significant proportion of topsoil were dry-sieved. Artefacts from all layers and features were retrieved. Those from stratified layers and features and of medieval date from topsoil were processed, labelled and registered on site.

Plate 19: Ted and Phil washing samples and finds

Archaeobotanical Samples

Two 20 litre bulk samples were taken from stratified contexts F19 and F21, processed and analysed by David Stone. The seed assemblage proved small, charred and in relatively poor condition. Free threshing wheat, and a single grain each of barley and oat along with a small quantity of arable weeds, were recovered from ditch fill F19. Similarly the drain F21 produced badly preserved charred wheat grain. However there was a high level of uncharred plant material including elderberry, nettle and fat hen, perhaps associated with later activity. A seed from each assemblage was submitted for radiocarbon dating.

Animal Bone Samples

The sampling methodology for bone was to hand-retrieve all bone from all features and layers. Additional retrieval was from dry sieving of the layers. The animal bone was analysed by Siobhan Duffy. A total of 1,569 bones were examined, 508 of which related to stratified features. Although in general good condition the animal bones were highly fragmented. The range of body-parts identified indicates the assemblage is the result of the disposal of domestic refuse, representing kitchen, waster, butchery waster and the remains of household animals (Duffy, Appendix 7).

Sea shell Samples

A total of 15 samples of seashell were recovered. The majority of the samples are oyster shell but there were also crustacean shells identified.

Artefacts

A total of 111 artefacts were registered. This can be divided into pottery (87); clay pipe (9) and stone (2). Metal finds were divided into iron (7), copper alloy (2) and lead (4).

Plate 20: Chinese Porcelain, mid-17th-mid 18th century

A ceramic group of 87 pieces was analysed by Rosanne Meenan. The majority of the pottery from Bremore Castle was recovered from topsoil and dated mainly from the 17th and early

18th century. Typical of the period the range of vessels included table ware-jugs, drinking vessel, a dish-and food-processing represented by storage jars. The presence of Chinese porcelain in the assemblage suggests a site of some status. A total of 14 sherds of medieval pottery were identified, mostly in disturbed contexts and reflect other assemblages in the Dublin region (Meenan, Appendix 6).

A total of 4 bowl fragment and 19 stem fragments form clay pipes were analysed by Siobhan Duffy. The earliest evidence for smoking on site was two stem fragments of 17th century date recovered form topsoil in Trench 2. A bowl from the same context stamped with a crowned L dated to the 19th century (Duffy, Appendix 5).

A total of 15 small finds were analysed by Siobhan Duffy. Unusual among the finds was a triangular fragment of red porphyry tile (17E0302:19:14). More readily associated with the Roman empire, and medieval cathedrals, the fragment of thin tile was indicative of high status and may have formed a decorative element within the main house.
Personal items were limited. A copper alloy pin was retrieved from trench 3. Pins such as these were used in large numbers as dress or hair accessories. The type found At Bremore was common in the 16th/17th centuries but continued in use into the 19th century (Duffy, Appendix 4).

Plate 21: Brendan finding the copper alloy pin (17E0302:7:5).

Windows

Trench 3 was located beneath the original round headed loop window. Four fragments of potash glass were recovered from beneath the window and are likely to date to the 16th century. Subsequent evidence for glazing was recovered in the form of high-lime, low alkali glass, two fragments of which had a lead shadow and mainly belongs to the 17th century (Moran, Appendix 3). The glass was set in lead window came, some of which survived in Trench 3. Two different types of came were identified reflecting the earlier and later glazing.

Plate 22: Window came fragment (17E0302:19:6). The junction indicates rectangular panes.

Archiving

All digital photographs are indexed. A total of twenty-three plans and section drawings have been scanned. Both have been saved to the Heritage file on the Fingal County Council mainframe. The paper archive is currently with the director and will be scanned and copied for deposition in the both the Fingal Local Studies Archive, Swords and the Collections Resource Centre. The artefacts will be deposited in the national Museum of Ireland's Collections Resource Centre.

5 Discussion

The focus of the *Bremore Castle Big Dig 2017* was to verify the nature of the anomalies on the 2011 geophysical survey, inform future construction works and to engage the community with the monument and its surrounding archaeology. The level of natural subsoil across the site was attained; the presence of a hitherto unknown ditch was discovered, and the nature and extent of post-medieval and modern disturbance was recorded.

Early Bremore

In fair Bremore he worshiped God and cared his flocks & bees…..And prayed for blessings on the land, Molaga of Bremore (William Day, 1935, www.duchas.ie)

Bremore is traditionally the site where St Mologa founded a church in the seventh century. Lann Beachaire or the Church of the Bee keeper was associated with two different saints, *Mo-laga* or *Mo-Lucé* and *Mo-Domnóc* both of whom were students of St David in Wales (Duffy 1997; MacShamhráin 2004). Churches of this period were laid out according to a specific schema, defined by large ditches. Geophysical survey did not indicate the presence of such ditches in the surrounds of the castle and nothing to indicate early medieval occupation was identified during the excavation.

Historical records indicate the lands were acquired by the Barnewalls in fourteenth century and although there may have been an earlier castle at Bremore from this time, there is no clear evidence of this. A total of fourteen sherds of medieval pottery mainly 13th/14th century in date were recovered mainly from topsoil, which reflects that recovered in the medieval field systems identified in the field immediately north of Bremore Castle (O'Carroll 2003).

Fortified House

Geophysical survey was not undertaken adjacent to the southern wall of Bremore Castle due to the presence of scaffolding there at the time. Although survey had been undertaken next to the eastern façade of the castle, no anomalies were identified. Therefore Trenches 3 and 4 were position to the south and east of the original remnants of Bremore Castle to investigate these areas.

Fig 24: Down Survey Barony map c.1655

In the late sixteenth century there was move from the compact, tall vertical tower house to the more capacious, better lit fortified house. Usually three storeys high with an attic over a half basement, each storey was carried on a wooden floor, with the windows arranged symmetrically in rows. The roofs of fortified houses were distinctive with many small gables and large numbers of chimneys. Internally there were more rooms due to an increased desire for privacy and each chamber generally had a fireplace. A practical change was also seen in the new toilet arrangements. The garderobe-a seat placed over a chute built into the walls- of the tower houses were dispensed with in favour of the chamber pot, which meant waste could be emptied further away from the fortified houses leading to an altogether more pleasant ambience. However despite this comfort, defence was still an issue, with gun loops, projecting towers and angle turrets incorporated to guard against attack in turbulent late 16th/early 17th century Ireland.

The fortified house at Bremore is thought to have been under construction by 1546 since a bridal mantelpiece tree, part of the hall chimney piece, which annunciates the marriage of James Barnewall to Margaret Lawrence, took place around that year (Johnson 2007, 249-260). The window loop in the south wall has also been identified as sixteenth century in date. Likewise the coat of arms described by Cooper as being within the pediment of the western door of the castle represents the Barnewall and Dowdall families and would provide a date range of the door between 1567 and 1606, a period within which the marriage of John Barnewall to Eleanor Dowdall occurred and when it is likely that building improvement works were undertaken (Kelly & Colgan et al. 2013, 29).

The Civil Survey of 1654 records Bremore as containing 'one burnt castle, with a great barn and eight tenetments' (Simington 1945). However there was no evidence for burning in any of the trenches opened. The Down Survey map of the same period(Fig ??/) shows the house at Bremore and by 1664 the Hearth Money Roll records two hearths belonging to James Barnewall at Bremore, which may refer to a newly refurbished castle. Similarly Burnscourt Castle Co. Tipperary, a fortified house first occupied in 1641 was recorded as having been burnt either by Cromwell or Lady Everard in 1649, showed no evidence of burning upon excavation, leading the author to conclude it had been cleared subsequently (Cleary 2005).

Trench 3 uncovered the foundation of the southern wall of Bremore Castle which consists of single course of large (0.6m diam.) water rolled boulders set into natural subsoil, interspersed with smaller (0.15m-0.25m) unmortared stones. Immediately adjacent was an irregular cut and occasional area of peaty backfill which indicate disturbance, probably due to planting in this area. Between 0.9m-1.2m south of the wall was the ditch (F26). Despite there being at least two cuts meaning they could be adjacent large pits, this feature was filled with the same material (F19) which was capped by a compact redeposited clay (F7).

The mix of material recovered from the fill of this ditch feature including window glass and came indicating reglazing in the 17th century; iron nails associated with carpentry and flooring; and a range of pottery dating from both the medieval period and the 1650s to the 1730s. It also contained a wide range of animal bone indicative of domestic consumption from beef and pork to goose, chicken and duck. The radiocarbon date taken form a single wheat grain returned a date range of AD 1483-1641 indicates that the ditch feature was backfilled during a similar period to the construction/early use of the fortified house at Bremore.

A review of excavations at fortified houses showed that drainage, particularly sub-floor drains such as those identified in Rathfarnham and Portumna castles were integrated into the construction of these houses. A north-south drain was identified in Trench 4, just over 2m east of the extant wall of the fortified house. An examination of the inside of the eastern flanking tower identified two openings at ground level, one in the south wall. It was thought that although not in exact alignment it was possible that drainage from the eastern tower may be linked with that unearthed during excavation. However radiocarbon dating of a grain from the drain returned a date range relating to the 18th/19th century (refer Appendix7).

Bawn to Walled Garden

Fortified houses were usually situated within a courtyard or bawn wall and it has been suggested that the walled garden, given its position, may occupy the site of the former bawn (Conservation Plan 2013, 74). Excavation in Trenches 1 and 5 identified a metalled surface set into natural subsoil that appeared to extend across the current walled garden. Such a surface appears to have been disturbed in Trench 2 by later garden activity. Pottery recovered from above the metalled surface, especially in Trench 1, indicates that this surface was in place at least by the early 1600s. Metalling was also identified in Trench 4 which is outside the current walled garden but indicates that Bremore Castle may have been surrounded by a considerable yard surface. The possible resurfacing (F22) of the metalled surface in the east of this trench may relate to the installation of a wide path depicted here on the 1871 Ordnance Survey map, which extended from the north-eastern end of the walled garden connecting it to a yard and buildings associated with a threshing machine.

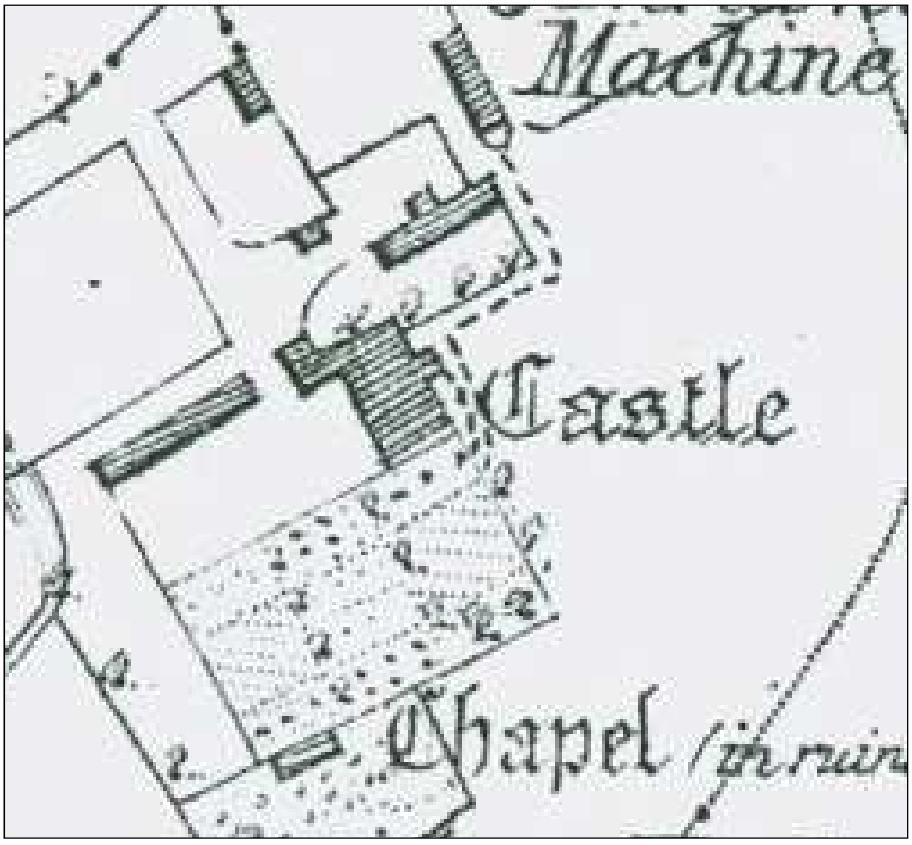

Fig. 25: 1871 Ordnance Survey Map

The cartographic evidence didn't show a defined bawn. Indeed the area corresponding with the walled garden area is depicted with trees and scrub on the 1760 map. By the late 1830s there is a walled garden in place with internal plot divisions which by the 1860s has been laid out with a typical Victorian cross path layout populated with trees. The 2011 geophysical survey had picked up on the possible survival of one of these paths c.5m south of the

northern garden wall and the existence of this pathway (F2/F6) was confirmed during excavation in Trench 2.

Gardens associated with fortified houses were primarily functional rather than ornamental and Bremore castle's nineteenth century walled garden continued this tradition, being initially characterised as a 'potager' or vegetable garden before transforming into a walled orchard. In the light of the four animal burials uncovered during the archaeological investigations it is interesting to note that buried animal carcasses were a feature of old orchard sites (ibid 77).

Occupation

Historical evidence records that Bremore Castle had attacked and burnt during the Confederate wars of the 1640s; probably rebuilt in the in the early 1650s and ceased to have been a principal residence by the early 1700s. No archaeological evidence for burning was uncovered in any of the trenches. The castle was still occupied in 1736 when a Captain McCullough was besieged there over a tenancy dispute and there was an exchange of shots to and from the castle. The recovery of a lead ball from Trench 3 may give some weight to this account but as documentary evidence, however further analysis showed that the lead shot, probably for a small pistol had never been fired.

The castle was ruinous in the late 1770s. However the occupant at Bremore Castle in 1833 was John King and the castle lands were farmed by the King family into the next century. The walled garden was laid out in the nineteenth century when the castle had been 'taken down' so the Kings must have lived in one of the other buildings depicted, Dalton making reference to 'the farmhouse' in 1844. Local knowledge is that during the walled garden was used for cattle and livestock prior to its acquisition by Fingal County Council.

The archaeological evidence does not always tally with the historical evidence. There is no evidence of burning or attack; no architectural evidence for rebuilding although it is likely window in the south wall of the Castle was reglazed at least twice in the 16th and 17th centuries and the walled garden wasn't medieval but a yard from the early 1600s until the 19th century. Bremore Castle and lands seem to have been predominantly used as a rural farm and orchard but there were glimpses of the wealth and status of the Barnewall family in the 16th and 17th centuries, evident in the artefacts and animal bones recovered-a house with decorated mantlepieces and floor tile of red porphyry, drinking tea from Chinese porcelain and roasting boar.

6 Conclusions

The excavation established the presence of a previously unknown ditch close to the surviving southern wall of Bremore Castle. Backfilled in the seventeenth century it may have been contemporary with the metalled surface which extended throughout what is now the walled garden. The veracity of the geophysical survey was confirmed in the unearthing of the indicated Victorian pathway and the interpretation of a feature as a well was clarified as a modern machine cut.

In contrast to previous investigations where had found 'no pottery dateable to earlier than the seventeenth century was recovered' (Swan 1995), numerous sherd of 12th-15th medieval pottery, including a basal sherd of the imported Saintonge, was recorded during this excavation. It was distributed throughout the site with slight concentrations within Trenches 1 and 3, although generally within the disturbed topsoil. The presence of such pottery indicates medieval activity at the site similar to that uncovered in the fields to the north (O'Carroll 2009), but as yet no definitively high medieval features.

Plate 23: Bremore Big Dig 2017 participants fill Trench 3

An important aim of the *Bremore Castle Big Dig 2017* was to engage the wider public with an archaeological monument that has been inaccessible as a building site for decades. A total of 96 volunteers took part, 48% from the immediate locality and also included people from the wider Fingal area; members of the new communities; family groups; several tourists; Fingal County Council staff members; the Fingal Mayor and two Councillors; members of the Fingal Volunteer Centre, members of other community archaeology groups, several heritage professionals and students.

Bremore Big Dig 2017 succeeded in its aims of engaging the local community with Bremore Castle; addressing knowledge gaps identified in the Bremore Castle Conservation Plan and informing future works.

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Christine Baker MA MSc MIAI

12 March 2019

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Appendix 1-Feature Register

Feature #	Trench	Description	Dimensions	Over	Under	Artefacts
1	T1-T5	Topsoil: loose mid-grey brown silty sand with medium fragments of crushed seashell and occasional small stone. Enriched for garden/farm use. Cut by modern machine cut in T1	0.08min - 0.32m max	everyt hing	Sod	13 medieval sherds pot (6-T1; 2-T2; 5-T3); 43 sherds post-medieval pot; 324 sherds modern pot; 1 lead came (T3); 3 tiles 0T2; T3; T4); clay pipe bowl and stem frags (T1 & T2); slate 9T1; T2. T4); Glass (T1-t4 (29 bottle/ 71 Window T3)
2	2	Deposit of gravel pebble, shell and small stone directly over pathway F6. Linear aligned EW exposed for 4m and 1m In width. Consists of very friable sandy silt with small pebbles and crushed shell inclusions	4m EW x 1m NS; 0.02m-0.1m in thickness	F6	F1	1 sherd modern pot, brick and 1 frag glass bottle
3	1	Rough metalled surface. Extends over 5.82m EW x 1.38m NS, this irregular surface consists of angular and sub-angular stones (max. 0.17m diam. min. 0.04m diam.) compacted into a grey brown silt with inclusions of mortar fragments, brick and occasional roof slate	5.82m EW x 1.38m NS; 0.04-0.07m thickness	F18/co ntemp orary with f16	F1	
4	2	Modern disturbance-square cut revealed concrete and limestone rubble located south of pathway F2/F6	0.74m EW x 0.7m NS	Natura l	F1	1 sherd medieval pottery and 1 fragment window glass associated
5	2	Redeposited clay; compact yellow brown silty clay with occasional stone. Contained clay pipe and post medieval pot. Probably used to level garden	4m x4m ; 0.04-0.2m depth	Natura l	F1	Bowl, stem frag clay pipe and rim post med pot, brick
6	2	Pathway; 19th linear EW pathway within walled garden. Consists of compacted lime mortar, brick, shell, limestone and slate,, cut into redeposited natural F5 and covered by sandy gravelly deposit F2	4mEw x 1.06m NS; 0.04m-0.12m in depth	F5/nat ural	F2	2 sherds slipware;

7	3	Redeposited subsoil consisting of very compact light orange brown clay with angular (0.05m-0.14m diam.) stone inclusions.	4m EW x 1.4m-2.45m NS; 0.12m to 0.21m depth	F19	F1	1 rim sherd glazed medieval pot; 3 sherds post-med pot; 1 copper alloy wire drawn pin; bottle and window glass fragments; modern pot, brick
8	3	Dark brown silty deposit of large compaction, centred on large stone (0.3m diam.)	0.7m EW x 0.5m NS; 0.05m-0.1m in depth	F9	F1	Modern pot, bottle and window glass
9	3	Mottled dark brown orange fill that appear within a relatively concave cut for 1.4m EW from eastern baulk before expanding out to a more circular cut. It is clayey with small stone inclusions and holds water well.	4m EW x 0.33m-1.3m NS; 0.12m-0.32m in depth	Natural	F1	1 body sherd post medieval pottery
10	1	Animal Burial; Shallow sub-rectangular cut, aligned NS containing a sheep carcass within a loose friable mid grey brown sandy silt fill. One of four animal burials in south-east of Trench 1	1.05mNS x 0.6mEW; 0.08m-0.1m in depth	F18 but cuts F16	F1	2 sherds of post med pot; 2 sherds of modern pot
11	1	Redeposited orange brown clay with occasional small stone inclusion	5.6m NS x 3.42m EW; 0.14-0.22m in depth	F17	Sod	1 sherd of possible Cistercian ware; clay pipe stem; modern pot
12	2	metalled surface-remnants of F4				
13	1	Animal burial: Shallow sub-rectangular cut, aligned EW, containing a canine carcass with friable grey brown sandy silt. Located 0.3m east of Pit F10	0.8m EW x 0.38m NS; 0.06m-0.1m in depth	F18	F1	1 sherd modern pot

14	1	Animal Burial: Steep-sided cut, aligned NS containing a sheep carcass within loose sandy silt. Located 1.2m south of F13; only half the pit excavated as extended beyond the E limit of excavation	1.42m NS x 0.64m; 0.08m-0.12m in depth	F18	F1	1 sherd of modern pot and 1 frag clay pipe
15	1	Animal burial; Shallow sub-rectangular cut, aligned EW containing a calf carcass within friable grey brown sandy silt. There were foetal remains associated with the calf indicating it was pregnant. Located 1.06m south of F13, 0.7m south of F10 and 0.2m west of F14	1.1m EW x 0.6m NS; 0.06-0.10m in depth	F18	F1	
16	1	Rough clay resurfacing/consolidation layer; Irregular layer consisting of yellow brown clayey silt with small/medium sub/angular stone inclusions, fragments of roof slate and building. Contemporary with F3 rough metalled yard surface.	6m NS x 5.18m EW; 0.1m-0.28m in depth	F18	F1	Three sherds of possible Cistercian ware; 1 blackware and 1 post med;
17	1	Modern machine cut: Sub-rectangular, irregular cut backfilled with peat/large field stones with large tree stump, brick and plastic. Modern machine cut and filled in possible 'pond' area-water table high here	5.6m NS x 3.42m EW; 0.26m-0.68m in depth-base not ascertained.			
18	1	Metalled surface; Truncated post medieval metalled surface that extends for 6m NS and 5m EW. It consists of a well-made compacted surface of rounded and sub-angular stones (0.04m-0.12m diam.) packed into yellow clay subsoil. A very consistent surface but slopes from north to south with a drop of 0.14m over 6m length of T1	6mNS x 5mEw; 0.03-0.06m thickness	Natural	F3/F16	Brick

19	3	Dark brown sandy silty clay fill with frequent inclusions of angular and sub-angular stones (0.1-0.15m diam.); medium inclusions of mortar lumps and animal bone.	4m EW x 2.8m NS, min depth 0.26m max 0.7m	Natural cut F26	F7	Four sherds medieval pottery; Four sherds of stone ware; 2 post med; 2 window came; 1 glazed roof tile; 1 polished floor tile; 4 iron nails; 4 iron objects
20	4	Metalled surface disturbed by drainage. Heavily compacted small rounded stones and mortar set into grey brown clay. Surface is well- preserved to east of trench, becoming more disturbed westwards, due to truncation by an EW drain. The surface overlie NS drain f21 and natural subsoil.	3m NS x 3mEW	F21/ Natural	F22	
21	4	Post-medieval/early modern drain associated with the castle. This linear NS drain deepened from north to south, the cut from gently sloping to concave. Cut into natural subsoil the drain is filled with loose to moderately compact dark brown clayey silt. Includes limestone rubble. Slate, glazed roof tile, shell and animal bone, brick. SOIL SAMPLE	3m NS x 1.06m EW ; 0.06m to 0.38m in depth	Natural	F20	1 frag glazed roof tile; 1 sherd medieval pot
22	4	Deposit of gravel and shell. Possible attempt to resurface metalled surface F22; this was a deposit of small pebble stones and shell in loose grey sandy silt.	3m NS x 2.1m EW; 0.04m-0.12m depth	F20	F1	
23	5	Stone tumble in clayey; deposit of large, mostly rounded stones (average 0.2m diam.) Within a mid-brown loose silty clay matrix. Does not appear to be wall collapse-no mortar- potential store of stone?	2.1m NS x 2m EW; 0.18m-0.4m in depth	F24	F1	1 Rim sherd blackware post medieval
24	5	Metalled surface that consisted of compacted rounded and angular stones (0.01-0.12m diam.) set into natural. Very similar to metalling in Trench 1 F18	3m Ns x 2m EW	Natural	F25	

25	5	Redeposited orange brown silty clay deposit of medium compaction, sterile	2.58m Ns x 2m EW; 0.28-0.36m in depth	F24		
26	3	Ditch cut; originally perceived as a single EW ditch this features had two cuts with one fill F19. Cut into natural subsoil the eastern cut was separated from the western by natural subsoil measuring 0.2m-0.25m in width. The eastern cut measured 1.9m EW x 1.97mNS and 0.7m in depth. It sloped down from the eastern baulk to its terminal where the base was slightly concave in section. the western cut measured 1.78m NS x 0.84m EW and 0.64m in max depth the base sloping down from the terminal westwards		Natural	F19	

Appendix 2

Analysis of non-wood plant macro-remains
by David Stone BA (University College Dublin), Mst. (Oxford University)

Environmental Sampling Strategy:

An environmental sampling strategy was implemented at Bremore Castle in consultation with Dr. Meriel McClatchie. Due to the highly disturbed nature of deposits onsite a comprehensive soil sampling strategy was not possible. Two 20L bulk soil samples were taken from stratified contexts for plant macro investigation. Both originated from liner features, F19 the single fill of ditch F26, and the fill of a north-south running drain F21 (Baker, 2017).

Trench 3: Feature 26 (Filled by F19):

This ditch or series of large pits was located 0.9m (E) - 1.2m (W) from the extant castle wall. Feature F26 was filled by a single fill F19. This deposit extended across the southern extent of Trench 3 (4m EW x 2.8m NS x min. depth 0.26m –max. 0.7m). It consisted of dark brown sandy silty clay with frequent inclusions of angular and sub-angular stones (0.1-0.15m diam.), medium inclusions of mortar lumps, animal bone and shell. Medieval pottery, sherds of stoneware, occasional post-medieval pottery, fragments of tile, iron nails and glass were all recovered from this feature (Baker, 2017). A soil sample (20l.) was taken for environmental analysis.

Trench 4: Feature 21:

Feature 21 was a post-medieval/early modern drain associated with the castle. This linear north-south drain (3m NS x 1.06m EW) deepened from north (0.06m) to south (0.38m), the cut from gently sloping to concave. Cut into natural subsoil the drain was filled with loose to moderately compact dark brown clayey silt with occasional inclusions of limestone rubble slate, glazed roof tile, shell, animal bone and brick. A soil sample (20l.) was taken for environmental analysis (Baker, 2017).

Processing of Soil Samples:

Samples were processed by David Stone using the flotation method, one of the most important methodological developments in archaeobotanical research worldwide (Ford, 1988; Wagner, 1988; Wright, 2005). The aim of using the flotation method is the recovery of seeds, animal bone and other small cultural remains which are overlooked or lost during the normal soil screening processes on archaeological sites. It is a simple, inexpensive procedure, easily implemented and modified to suit specific excavation requirements (Wright, 2005, 20). Bulk soil samples were placed in a Sarif-type flotation tank system and gently agitated using water. This process separates the botanical remains

from the soil matrix, which then flots to the top and can be poured off and collected. This 'flot' was collected using 250um mesh material and hung to dry naturally before being bagged and catalogued.

Plant-remains: Extraction and Identification:

Examination of the flot residues was carried out using a stereo-microscope with magnification from x6.3 to x50. The archaeobotanical material extracted were classified according to morphology (shape and size) and then identified by comparison to reference material of modern seed diaspores and the illustrations and pictures from various seed key publications (Stace, 2010; Cappers and Bekker, 2013; Gale and Cutler, 2000; Martin and Barkley, 1973; Clapham *et al*., 1962; Anderberg 1994; Beijerinck 1947; Berggren 1969; 1981; Katz *et al.* 1965; Neef *et al*., 2012). All botanical and common names follow the order and nomenclature of Stace's (2010) *New Flora of the British Isles* (Third edition). When referring to specific deposits, the term 'F' refers to feature number.

Preservation of Material:

Preservation is one of the most prominent constraints on archaeobotanical analysis and research, and is paramount to understand the processes of preservation of plant remains on archaeological sites as it directly determines what kind of plant remains may be found (Moffett, 2011: 347). Plant remains are preserved in two different states in the linear features, charred and uncharred. The vast majority of archaeobotanical material at Bremore Castle was preserved by charring. Carbonised or charred plant remains are found on most Irish occupation sites, mainly due to their survival in most types of soil conditions. Charring occurs when plant remains are burned under reducing conditions transforming the plant material from a carbon-based compound to a skeleton of pure carbon with occasionally residual starches, lipids and DNA and is related to several factors, such as temperature of the fire, length of exposure, moisture content and type of fuel used (Jacomet, 2007: 2387; Turney et al., 2005: 930). Archaeobotanical assemblages after burning are therefore likely to comprise species with more resilient seeds with a low probability that the overall charred assemblage composition bears direct relationship to the original specie proportionality or diversity (Colledge and Conolly, 2014: 194).

Archaeobotanical Analysis:

Ditch Feature F26/F19:

26 seeds were extracted and identified from F19, comprising of cereal and weed species.

- Economic Plants:

Cereal remains are often recovered in small quantities from Irish archaeological sites. The majority of cereal grains in F19 were extremely badly preserved and fragmentary, consisting of approximately thirteen grains indeterminate to genus or species (Cerealis). Five grains of possible free threshing wheat (cf. *Triticum turgidum/aestivum/durum* variety) were identified in the sample. Barley (*Hordeum* sp.) was represented by a single grain with its shape (angular grain, flat sided in cross-section with longitudinal ridges) suggesting it was of the hulled variety. A single grain, classified as Poaceae some morphological characteristics of *Avena* sp. (Oat) but its poor preservation and small size did not allow a positive identification. No chaff was identified during the analysis of the sample to identify cereals to a species level.

• Weed Species:

A small quantity of arable weeds such as *Rumex* sp. (Dock) and *Vicia* spp. (Vetch) were present. These were represented by a single seed per specimen. These species may have entered the assemblage through inadvertent collection and charring with the cereal grains.

Linear Feature F21:

Sample F21 contained 12 seeds in total consisting of charred economic plants and uncharred fruit and weed seeds. Eight of the seeds took the form of charred cereal grains with the remaining four consisting of uncharred weed and fruit seeds.

- Economic Plants:

In the sample from F21, a small quantity of possible free-threshing wheat (cf. *Triticum turgidum/aestivum/durum* variety) was identified. This took the form of badly preserved and fragmented charred grains. No chaff was identified during the analysis to identify cereals to a species level.

- Uncharred Seeds:

25% of seeds present in F21 were uncharred, showing exceptional preservation. This included two *Sambucus nigra* (Elderberry), and a single *Urtica urens* (Nettle) and *Chenopodium album* (Fat Hen) seed. It can be very difficult to establish the provenance of uncharred plant remains from archaeological deposits. Archaeobotanists' experience has been that uncharred wood and seeds are generally not preserved in aerated, moist soils, and that they are only poorly preserved in aerated, dry soils (Miksicek, 1987). Where uncharred seeds are recorded in archaeological deposits, seeds of elderberries can be ubiquitous. This has been attributed to their extreme durability, which means they are often presumed to be contemporary with the original deposits as they are protected from decomposition by their tough outer testa, allowing them to survive even in sands and gravels that were otherwise sterile. However, caution should be exercised, as this durability allows them to be re-

worked into other deposits, thought not to be autochthonous. Similar issues arise when dealing with uncharred fat hen seeds – such seeds are often thought to have been introduced by rodent disturbances (Miller, 1989). Due to the disturbed nature of Bremore Castle deposits, these uncharred seeds may be contemporary with the deposits excavated, but it is also possible that they are later.

Species		Sample	
Botanical Name	**Common Name**	**F19**	**F21**
Charred Macro-remains			
Poaceae (Grass Family)			
cf. *Triticum turgidum/aestivum/durum* L.	cf. Free-threshing wheat	5	4
cf. *Triticum* sp. (Fragments)	cf. Wheat Frags	13	-
Cerealia	Indeterminate Cereal	3	4
Hordeum vulgare L. (Hulled)	Barley	1	-
Danthonia sp. DC	Heath-Grass	1	-
Poaceae	Meadow-grasses	1	-
Fabaceae (Pea Family)			
Vicia sp. L.	Vetches	1	-
Polygonaceae (Knotweed Family)			
Rumex sp.	Dock	1	-
Total Charred Seeds		**26**	**8**
Uncharred Macro-remains			
Urticaceae (Nettle Family)			
Urtica dioica L.	Stinging Nettle	-	1
Amaranthaceae (Goosefoot Family)			
Chenopodium album L.	Fat-hen	-	1
Caprifoliaceae (Honeysuckle Family)			
Sambucus nigra L.	Elderberry	-	2
Total Uncharred Seeds		-	**4**
Total		**26**	**12**

Discussion:

Examined deposits from Bremore Castle produced an impoverished assemblage that represents a small percentage of the likely plant remains utilised at the site. The archaeobotanical analysis of F19 and F21 deposits produced some evidence for cereals. Charred Wheat, Barley and possible Oat were identified in the samples, having most likely been burnt during drying activities associated with processing or storage, or during the preparation of foodstuffs. Unfortunately, the small quantity of cereals within the samples make analysis on the relative importance of each cereal type impossible.

The cereal types present are however consistent with other castle excavations such as Trim (Hayden, 2000) and Barryscourt (Pollock, 2017), but in much smaller quantities at Bremore.

Sample F19 provided some insight into the range of weeds and wild species that would have been growing around the site or brought onto the site with cereals. However, because charred assemblages tend to contain species with more resilient seeds, there is a low probability that the charred assemblage composition bears direct relationship to original species proportionality or diversity (Van der Veen, 2007: 977; Colledge and Conolly, 2014: 194). The presence of uncharred fruits in F21 (Elderberry, Nettle and Goosefoots) may represent later intrusions that have been reworked into the deposit or entered through bioturbation. Recent developments in archaeological science has enabled the ability to carry out 14C AMS dating on single cereal grains from archaeobotanical assemblages. This may support the main aim of the Bremore Castle excavation to investigate anomalies discovered during geophysics by providing dates for excavated features.

Recommendation for retention:

It is recommended by the author that the plant macro-remains from the Bremore Castle site should be retained for any further analysis that may be carried out in the future. Archaeological activity in Ireland has increased over the last decade resulting in many sites being examined on a single-site basis, with little time for investigation of wider regional or temporal patterns. Investigations of this kind in the future may utilise new scientific analyses on previously excavated material, including further radiocarbon dating and isotope analyses. More intensive radiocarbon dating of these deposits may be required at a future date, perhaps as part of a larger research project. Charred grains are ideal for radiocarbon dating, as they are more likely to produce narrow date ranges when compared with longer-lived species such as wood charcoal. The retention of charred material from Bremore Castle may benefit from future developments in archaeological science or further research and should be retained.

Storage requirements:

The charred remains from Bremore Castle require relatively little storage space. Charred remains are stable and do not usually require additional conservation when stored in an appropriate manner. It is suggested that the charred remains are stored in well-labelled hard-cased vials (supplied by author).

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Appendix 3

The Glass from Bremore Castle (17E0302)
By Jo Moran

The 2017 excavations at Bremore Castle recovered 97 fragments of window glass. The glass has been visually examined and separated into groups based on form and diagnostic features. Four of the fragments are opaque potash glass, probably late medieval, and the remainder are post-medieval. All fragments are 'white' glass, with a tint, in shades ranging from light to dark green, olive green, and blue/green. Eleven fragments were recovered from the topsoil in Trenches 1 and 2, the remainder came from Trench 3, located against the south wall of the castle, which includes a sixteenth century ope.

Late medieval glass

Medieval window glass is generally potash glass (also known as forest glass), and it is very prone to corrosion and pitting because of the alkalinity of the wood ash used to it. The glass was trimmed into shape using a 'grozing' iron, which gave the edges a 'nibbled' appearance.

Potash glass fragment 17E0302:7:8 is opaque with silver brown surface weathering and two grozed edge. Three other opaque fragments from Feature 9 appear to be potash glass without any diagnostic features. All four are likely to date to the sixteenth century.

Post-medieval glass

In the late sixteenth century glass-making went through a lot of changes. Glass became thinner (1-3mm thick), harder and less prone to corrosion. The new glass was greenish, containing less potash but higher concentrations of lime, and is referred to as a high-lime, low-alkali glass (HLLA) (Paynter 2011, 27). Glass of this type was manufactured in England following the arrival of Continental glassmakers in the late sixteenth century. One of these glassmakers, Jean Carré, obtained monopoly rights to glass production in England and Ireland in 1567 (Paynter, 2011, 27).

A bluer "mixed alkali" glass became popular during the eighteenth and nineteenth centuries. This is translucent with very little surface weathering; some fragments have slight surface iridescence. The blue tint is from the use of kelp as a flux during glassmaking.

There are 58 fragments of HLLA glass in the assemblage, and 34 fragments of "mixed alkali". The HLLA glass is thin, translucent glass (1.2-2mm), with slight brown/gold weathering on the edges and

many small bubbles. Some of the fragments with a yellow/green tint are almost opaque with a cream and brown patina and a laminating surface. Two of these fragments have diamond cut edges and a lead shadow; the shadow shows they were installed in a window frame for some time. This glass cannot be dated closely, but most was manufactured in the late sixteenth/ seventeenth century.
Two "mixed alkali" edge fragments appear to be cylinder glass, but the fragments are too small to be certain.

Archaeological evidence suggests that cylinder glass (or broad glass) was the most common type in Ireland in the seventeenth century, made in Ireland and also imported. It was in common use in Ireland until the late eighteenth century (Roche, 1999, 63).

Crown glass does not appear to have been made in Ireland until the eighteenth century. Imported crown glass for windows was introduced by the end of the seventeenth century, and crown glass remained popular to the middle of the nineteenth century (Roche, 1999, 63).

Discussion

The potash glass fragment with 'grozed' edges is likely to have formed part of the original glazing of the castle.
Four fragments of HLLA glass (probably late sixteenth/seventeenth century) were recovered from ditch fill F19 in Trench 3. Redeposited subsoil F7 overlying ditch F26 and fill F19 included 1 fragment of potash glass (late medieval), 10 fragments of HLLA glass and 8 fragments of 'mixed alkali' (probably eighteenth century) glass.
The HLLA glass from F7 includes one fragment with a lead shadow, and thus certainly used in a window. The 'mixed alkali' glass includes two edge fragments probably discarded during glazing because the thickened edge would not fit easily into a came. The glass from levelling layer F7 may represent reglazing at the castle, but not before the late 17th century.
A soldered lead lattice fragment, of milled cames, was recovered from context F19 (17E0302:19:6). This had framed a rectangular quarry. The diamond-shaped quarry was generally superseded by the rectangular quarry in secular buildings during the seventeenth century. Unfortunately the Bremore Castle glass fragments are too small to indicate the shape of the quarry.

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Excav. No.	Context	Find no.	Material	Simple name	Description	Dimensions	No of fragments
17E0302:1:1	1	1	glass	window glass	white glass with a yellow/ green tint, translucent with slight surface weathering.	30 x 11 x 1.5 to 19 x 1 x 1.5mm	4
17E0302:1:2	1	2	glass	window glass	4 fragments of white glass with a yellow/green tint and brown surface corrosion, 2 fragments of white glass with a blue/green tint	21 x 11 x 1.5mm - 11 x 6 x 1mm	6
17E0302:1:4	1	4	glass	window glass	white glass with a yellow/green tint and slight brown surface corrosion	21 x 15 x 1.1mm	1
17E0302:4:6	4	6	glass	window glass	white glass with gold surface weathering	13 x 10 x 1.1mm	1
17E0302:5:7	5	7	glass	window glass	white glass with a blue/green tint	16 x 12 x 1mm	1
17E0302:7:8	7	8	glass	window glass	1 fragment of potash glass with 2 grozed edge, 8 fragments of white glass with a blue/green tint (including two edge fragments), 10 fragments of white glass with a yellow green tint.	42 x 27 x 2mm to 16 x 10 x 1.2mm	19

17E0302:8:9	8	9	glass	window glass	2 frgaments of white glass with a yellow green tint, 2 fragments of white kelp glass with a blue/green tint		4
17E0302:9:10	9	10	glass	window glass	22 fragments of white"mixed alkali" kelp glass with a blue/green tint, , 31 fragments of white glass with a yellow/green tint, 2 with a diamond a lead shadow, 3 fragments of white glass with a green tint, opaque due to brown weathering.	varying from 63 x 28 x 2mm to 10 x 9 x 1mm	60
17E0302:19:11	19	11	glass	window glass	white glass with a yellow/green tint, brown weathering and surface laminating.	33 x 21 x 1.2mm- 16 x 11 x 1mm	4

Appendix 4

Small Finds: Stone & Metal
By Siobhan Duffy, BSc MA

Introduction

The small finds recovered during the 2017 season of excavations at Bremore Castle (License 17E0302) numbered fifteen in total and included objects of stone (2), lead (4), iron (7) and copper alloy (2). With just one exception, all were recovered from Trench 3, and eleven formed an assemblage from a single ditch feature (Baker 2017). The remaining four objects were recovered from a redeposited layer, overlying this feature, or from topsoil levels (*ibid*.). This report examines these finds, with a view to understanding their presence at the site and their relationship to the post-medieval occupation of the site. For the purposes of this report, the finds are grouped firstly by parent material, and then according to find type.

Stone Finds

Tile

A near triangular fragment of red porphyry tile (17E0302:19:14; Fig. 1) was recovered from the fill of a post-medieval feature (F26) in Trench 3. Porphyry is a very hard igneous rock, greatly prized since Roman times, both for its decorative looks and its durability. It was mined and used extensively by the Romans in both its green and red/purple forms (Lynn 1984, 19). Red/purple porphyry was particularly highly regarded due to its colour, and used only for imperial purposes (*ibid*.; Bradford 2018). Sourced from a single mine in Egypt (Mons Porphyrites), it was first discovered by Romans in the early first century AD, and mined until the fourth or fifth century (Peacock & Maxfield 1999, 642; Lynn 1984, 19). The location of this mine was only rediscovered in 1820s, and all red porphyry used in the interim of these dates is regarded as being re-used from Roman sites (Bradford 2018).

Porphyry was used extensively in Rome and Constantinople, but to a much lesser extent elsewhere in the Empire (Palmer 2011). This would have increased the difficulty in obtaining it in post-Roman times, thus ensuring it retained its high status. In medieval times, porphyry – and red porphyry in particular - is primarily associated with ecclesiastical sites, and was used in floors of some of the principal churches in England, such as Westminster Abbey and Canterbury Cathedral (Lynn 1984, 24). It was also used as panels in portable altars (*ibid*., 25). It has been suggested that green and red porphyry may have been primarily imported by pilgrims to Rome (Lynn 1984, 26; McNamee 2016), although there may also have been a specialised trade in scavenged porphyry (*ibid*.). Recorded instances of these exotic forms of porphyry in Ireland are rare. While the green porphyry (originally from Laconia in Greece) is known from a number of archaeological excavations, there are only two

known instances of red porphyry recovered in this country (McNamee 2016).

Fig.1. Red Porphyry fragment 17E0302:19:14.

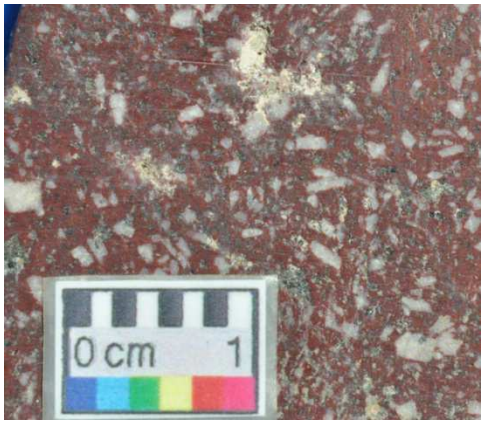

Fig.2. Detail of porphyry, showing scratch marks.

The fragment from Bremore is from a thin tile, and may have originally formed part of a mosaic floor or other decorative panelling in a Roman Imperial building. No original edging survives, so that the original size of the tile is unknown. One surface is matte, with few visible markings, while the other surface appears polished with visible striations (Fig. 2). Unlike striations noted on porphyry from Armagh, relating to the cutting of the tiles (Lynn 1984, 19), the marks on the Bremore fragment are not parallel, with converging and perpendicular scratches present. As such, they are more likely to result from polishing the stone with an abrasive material or tool.

It is uncertain as to what function the tile may have had in its secondary use at Bremore, or at what point it was imported into the country. It may have formed a decorative element within the main house, although the presence of a nearby church site must also be considered, given the ecclesiastical associations of red porphyry.

Stone sphere

A small, near spherical stone, c. 24mm in diameter (17E0302:19:19; Fig. 3), was recovered from the same post-medieval feature as the porphyry tile. No distinguishable tool or wear marks could be observed, and the smoothness of the stone may be the result of water-rolling, although some patches of slight burnishing are visible. Stones of similar shape and size have been recovered from excavations elsewhere in Ireland (McCutcheon 1997, 405-406). While these have sometimes been interpreted as pot boilers (*ibid*.), the example from Bremore shows no signs of being heat-affected and is

Fig.3. Stone 17E0302:19:19

probably too small to have been effective for this purpose. It may have functioned as a small slingshot, although in the absence of other evidence such an interpretation is purely speculative.

Metal Finds

Button

Archaeological and historical sources indicate that buttons were used on clothing from at least medieval times, and metal buttons are known from medieval excavations (White 2005, 50). Nonetheless, they are not considered to have been in common usage until the post-medieval era from which time they diversified in form and use (*ibid*.). In the eighteenth and nineteenth centuries, industrial production of metal (usually copper alloy) buttons flourished, particularly in Birmingham, England (*ibid*., 50-51).

Part of a copper alloy button was recovered from topsoil in Trench 2 (17E0302:1:1; Fig. 4). This consists of the back of a composite button; the front would have been formed by a separate piece of metal, crimped or soldered in place. The back is convex, with a central, rectangular hole to allow for a wire shank. This is closest to a Type 6 button in South's typology (Noel Hume 1969, 91), suggesting an eighteenth-century date. The dates ascribed by South are not definitive, however, as they relate to the occupation dates for the sites on which the typology is based and may not include the full date-range for a specific button-type (White 2005, 50). In size, it is consistent with a coat button (*ibid*., 57).

Fig.4. Button 17E0302:1:1

Pin

A complete copper alloy wire-drawn pin with a wire-wound head (17E0302:7:5; Fig. 5) was recovered from a redeposited layer in Trench 3. Copper alloy pins were used in large numbers as dress and hair accessories in medieval and post-medieval times and have been recovered in large quantities on excavations (Egan & Pritchard 1991, 298). The common use of such pins over a long period of time makes it difficult to assign a date to them. The head on the Bremore example is similar to Caple's Type B – a type which became common in the sixteenth and seventeenth centuries (Caple 1991), but continued into the nineteenth century (Cox 1996, 57).

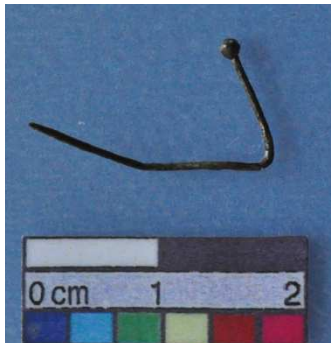

Fig.5. Wire pin 17E0302:7:5

Lead Shot

A small, spherical lead bullet (17E0302:1:2; Fig. 6) was recovered from topsoil levels in Trench 3. Post-depositional accretions largely mask any features on the bullet: a closely cut-off sprue is visible, marking where the top of the bullet lay in the mould, although little could be seen of the mould-line itself. With a diameter of just 11.4mm, it is of a particularly small size, below that of official military sizes (Hennessy 2004, 529). However, bullets of a similar size were recovered from post-medieval levels in Limerick and Galway (Wiggins 2016, 387; Hennessy 2004, 528). It is most likely to have belonged to a small gun such as a pistol, although whether for military or civil use is uncertain. There is no evidence on the bullet to suggest it was ever fired, and it is more likely to have been lost prior to being loaded into a weapon.

Fig.6. Lead shot 17E0302:1:2

Lead Window Came

Three fragments of lead window came were recovered from Trench 3. Although greatly twisted and distorted, the characteristic H-profile is visible. This allowed each came to hold two panes of glass within central gutters, or webs, a necessity for windows prior to the development of large glass panes (Strobl 2002). One of the cames (17E0302:19:6; Fig. 7) incorporates a soldered junction, representing the meeting point of four separate glass panes. This is cruciform in shape, indicating rectangular rather than diamond-shaped panes.

Fig.7. Window came fragment 17E0302:19:6, with soldered junction.

Fig.8. Detail of came 17E0302:19:6 showing reeding from milling process.

Raised transverse ridges, known as reeding, visible along the base of the gutters of all three fragments (Fig. 8), indicates the use of lead mills with grooved wheels during the manufacturing process (Strobl 2002). This procedure is thought to have been introduced in the sixteenth century, but may not have

been commonplace until the seventeenth (Egan 2005, 351). While one of the cames (17E0302:19:1) has a reeding count of 10 per 10mm, the other two (17E0302:1:3 and 17E0302:19:6) have much lower counts, at 4 per 10mm where the base of the gutter was visible. This may indicate the latter two are of an earlier date (Strobl 2002), although the only thing we can be certain of, is that at least two different mills were used to produce the cames recorded. This in turn suggests two different sources for the cames, and it is likely they represent at least two separate occasions of window construction and/or repair associated with Bremore Castle.

Nails

Seven items, recovered from post-medieval feature F19/F26 in Trench 3, were identified as nails or probable nails. Four of the nails were complete enough to identify to type, and belonged to three nail categories, based on the typology used at Swords Castle (Duffy 2017) and that of Ford & Walsh (1987).

Fig.9. Woodworking nails from F19

Two nails (17E0302:19:7; 17E0302:19:8) corresponded to Type I (Duffy 2017), identified as unspecialised carpentry nails used in structural woodworking and corresponding to Ford & Walsh Type A. The other two nails represented Type II and Type IV (*ibid*), corresponding to Ford & Walsh Types B and E respectively. Of these, the former is considered to have also been used in structural woodworking, but with the head designed to be visible in the finished structure or fitting. The latter resembles modern floor brads and may have had a similar use.

The remaining three objects were too incomplete to identify further, and were identified as possible nails from a radiograph. Of these, one (17E0302:19:11) had a notably robust shank suggesting a larger than usual nail. The others comprised a partial shank (17E0302:19:10), and a possible fragmented nail head (17E0302:19:12).

Conclusion

Some fifteen objects recovered during the 2017 excavations at Bremore Castle, were classed as 'Small Finds'. These consisted of both stone and metal artefacts, and included items relating to the main structure, personal dress, and possible conflict.

Most notably, the assemblage of finds from post-medieval feature, F26, predominantly related to the structure of the building itself. The nails recovered indicated a variety of uses, in essential structural features, visible fittings, and floorboards. Lead came fragments attest to the use of paned windows,

some of which had rectangular panes. These are consistent in date with the post-medieval fortified house, and may represent initial construction work, or later repairs.

The unusual find of a fragment of porphyry tile may have been used within the house for decorative purposes. The rarity of red porphyry, the difficulty in obtaining it, and its associations with imperial Rome are all indicative of higher status of the site. Whether its presence at Bremore Castle represents secondary or tertiary use of the tile, it would have formed part of a statement piece – either in the house itself, or in the nearby church.

Items of personal use were recovered from unstratified or mixed levels, and may represent stray losses. Both the button and pin are generic in form and difficult to date, although likely to be seventeenth-to-nineteenth century in origin.

The discovery of a round lead bullet may hint at conflict in the immediate area. This probably represents shot for a small pistol, although it is unlikely to have ever been fired. A small, smooth, rounded stone may also represent a small missile, although identification of this remains uncertain.

Overall, then, the finds assemblage is consistent with the post-medieval fortified structure, and its presence as a centre of local wealth and power.

Catalogue

Find No.	Location	Find Type	Description	Date
17E0302:1:1	Trench 2	Button	Cu Alloy. Convex back of button. Projections either side of central rectangular hole may be cast spurs. Low boss around perforation on inner (concave) face. South Type 6.D. 21.5mm; Th. 1mm; Perforation 2.2 x 1.2mm	18th – 19th C.
17E0302:1:2	Trench 3	Shot	Lead. Sub-spherical lead shot. Sprue cut off close to bullet. Slight mould-line visible near sprue; not visible elsewhere. Slightly flattened facet at c.90 degrees from sprue Diam. 11.4 x 11mm (0.438 x 0.453 inches) Weight 8g	Post-medieval – early modern
17E0302:1:3	Trench 3	Came	Lead. Short length of window came with H-cross section. Reeding visible along open channel: 4 per 10mm. L. 35.1mm; W. web 1.5mm; Flange L: 9.6mm	Post-medieval

Find No.	Location	Find Type	Description	Date
17E0302:7:5	Trench 3	Pin	Cu Alloy. Complete wire-drawn pin with wire-wound head. Bent in two places - forming near chevron. Shaft protrudes very slightly beyond head. Head is pinched to form near sphere, but with winding still visible. L (if straight) 27mm; D. (shank) 5mm; D. (head) 1.4mm	Post-medieval – early modern
17E0302:19:1	Trench 3	Came	Lead. Length of lead came bent into U-shape & twisted towards one end. H-cross-section. Reeding visible at base of channel: 10 per 10mm. L. (if straight) 110mm; Flange L. 12mm; W web 2.6mm	Post-medieval
17E0302:19:6	Trench 3	Came	Lead. Length of lead came in two fragments -bent slightly. H- cross-section; cruciform junction at one end, where two cames soldered. Reeding visible at base of channel: 4 per 10mm L. 76.5mm; Flange L 6.6 – 10.6mm; W. web 2.4mm.	Post-medieval
17E0302:19:7	Trench 3	Nail	Iron. Large, heavy wrought-iron nail with rectangular cross-section & flat oval head. Ford and Walsh Type A. L. 69.4mm; Shank 9 x 6.7mm; Head 19 x 11.5mm	Post-medieval
17E0302:19:8	Trench 3	Nail	Iron. Heavy wrought-iron nail with rectangular cross-section & flat oval head; heavy encrustations. Ford and Walsh Type A. L (from x-ray) 56.2mm; Shank 9 x 8.3mm; Head 22.8 x 14mm	Post-medieval
17E0302:19:9	Trench 3	Nail	Iron. Incomplete wrought-iron nail - identified from x-ray. Heavy corrosion and encrustations. Domed oval head. Probable Ford & Walsh Type B. Dimensions from x-ray. L. 30mm; Shank 5.2mm; Head 12.5mm	Post-medieval
17E0302:19:10	Trench 3	Nail	Iron. From x-ray, partial narrow shank. Probable nail. L. 44.8mm; Shank. 4.8mm (from x-ray)	Post-medieval

Find No.	Location	Find Type	Description	Date
17E0302:19:11	Trench 3	Object / Nail	Iron. L-shaped object; heavily encrusted with corrosion products. X-ray suggests possible shank of large nail. Dimensions from x-ray L. 55.6mm / 72mm if straight; Shank 11mm	Post-medieval
17E0302:19:12	Trench 3	Object / Nail	Iron. Fragmented - small iron fragment in 4 fragments. Possible head of nail. Almost completely corroded. Dimensions not possible.	Post-medieval
17E0302:19:13	Trench 3	Nail	Iron. Possible small nail/brad with narrow, rectangular shank. Head forms L with shank. Badly corroded and fragmenting. Ford & Walsh type E. L (from x-ray) 33.6mm; Shank (from x-ray) 3.4mm; Head 7.3 x 4.7mm	Post-medieval
17E0302:19:14	Trench 3	Tile	Stone. Near-triangular fragment of red porphyry. Upper and lower surfaces are original - both finished to a smooth surface; polished on upper surface. Broken edges elsewhere. L. 58.8mm; W 41mm; Th. 6.6mm (c. 0.25 inch)	(Roman) / Medieval - Post-medieval
17E0302:19:19	Trench 3	Stone	Stone. Small, near spherical stone. No visible striations/ polishing marks. Slight burnishing in places. D. 24.1 x 23 x 20.7 mm	Unknown

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Appendix 5

Small Finds: Clay Pipes
By Siobhan Duffy, BSc MA

Introduction

A total of 4 bowl fragments and 19 stem fragments from clay pipes were recovered during the 2017 season of excavations at Bremore Castle (Excavation Licence 17E0302). These included a single complete bowl, with the remaining bowl fragments representing 30% or less of a bowl. All pipe fragments were recovered from Trenches 1 and 2, while only three fragments (including the complete bowl) were recovered from stratified levels. The bowls were dated according to the typologies of Oswald (1975) and Ayto (1987), although it is noted that these are of greater use for pre-nineteenth century pipes. Bore diameters of all recovered stem fragments were assessed where possible, and the results are presented below.

History

The tobacco plant is native to the Americas, where it was traditionally used for medicinal and ritual purposes (Ayto 1987, 4). It was introduced to Europe by returning settlers and soldiers, who had adopted its use from contact with local tribes, and there are early references to smoking in Britain in 1573 (Oswald 1975, 3-4). Its introduction into Ireland is considered to have occurred at a slightly later date, c.1588 (Norton & Lane 2007, 435).

Smoking quickly gained in popularity, and a clay pipe manufacturing industry was already well established in London by 1619 (Oswald 1975, 8). Ireland may have been reliant on British imports of pipes early on, from centres such as Bristol (Jackson *et al* 1983, 3), but an indigenous pipe-making industry certainly existed from the mid-seventeenth century (Norton & Lane 2007, 436), when pipe-makers are recorded in Dublin and Waterford (Norton 2013, 32). While imports continued to be traded from England and the Netherlands, until at least the mid-nineteenth century (Jackson *et al* 1983, 36), the domestic industry would have provided the majority of the population with the means of smoking throughout the nineteenth century.

Bowls

A single complete bowl (17E0302:5:1; Fig. 1) was recovered from redeposited material in Trench 2 (Baker 2017). While this did not identify directly with any of the pipe-forms in Oswald's general typography, it had some similarities to Types 13G or 14G (Oswald 1975, Fig.3). It is likely to be a variation in form, local to its place of

*Fig.1. Complete bowl 17E0302:5:*1

manufacture. No maker's mark or other decoration was present, but the form of the bowl and the spur suggests a later eighteenth or early nineteenth century date.

One of the smaller fragments of pipe-bowl (17E0302:1:62), recovered from topsoil, may be of eighteenth century date, from its visible morphology. The remaining two bowl fragments are more likely of nineteenth century date.

Maker's marks

A stamped maker's mark was identified on one bowl fragment (17E0302:1:64; Fig. 2). This took the form of a small, oval cartouche containing a crowned 'L', and placed upside down on the bowl. The small size of the stamp suggests the die used was probably designed for marking pedestals or spurs, rather than sides of bowls.

Fig.2. Maker's mark on 17E0302:1:64

The crowned 'L' is a commonly found mark on pipes recovered from Irish excavations, and originated as a maker's mark in the Dutch pipe-making centre of Gouda in the seventeenth century. Little is known of its very early history, but from 1730 it was owned by the de Licht family of pipe-merchants (Duco 2004). It is suggested, however, that this was in fact a means of allowing their pipe-making relative Franz Verzijl to secure a second mark for lesser quality pipes, something not permitted at that time under Guild rules (*ibid*.).

From the mid-eighteenth century, changes in Guild rules meant that pipe-makers could own a second mark, and the 'Crowned L' mark became associated with the Verzijl name. It continued to be used as a secondary mark for the rest of the eighteenth- and throughout the nineteenth-century, first by the Verzijl and later by the Stromman & Van der Want dynasty (*ibid*.). This meant it was used for a lower grade of pipes, largely destined for export; such pipes were rarely made by the owner's workshop but were outsourced to smaller workshops, and secondary marks appear on a variety of pipe shapes and styles (*ibid*.). The situation of the 'Crowned L' mark in Ireland is even more confusing: the high esteem in which pipes from Gouda were held, and the familiarity with the 'Crowned L' mark led to its being copied as a mark on Irish-made pipes in the later nineteenth century (Norton 1997, 183; Norton 2004, 445). Further to this, 'Irish style' pipes bearing the mark on the rear of the bowl appear to have been produced in Gouda in the later nineteenth century, to cater for what was probably a lucrative market (Duco 2004; Lane 1995, 105). It is difficult, then to be certain of the origin of fragmented bowls bearing this mark. However, the mark on the Bremore example is clear and finely drawn, suggestive of a Dutch origin for the die, rather than an Irish copy.

Stems

Stem-bore Diameter

Studies in America indicate a correlation between the diameter of the stem bore-hole and the age of the clay pipe. In general, the larger the diameter, the older the pipe; this provides a general date-range for stems, while more precise dates were found to be consistent only for the period 1680-1760 (Noël Hume 1969, 298-300). Nineteenth century pipes, in particular, show a wide variation in the bore diameters of their stems, as with their general design. Most of the pipes from Bremore Castle were recovered from unstratified levels, and in line with previous studies, only diameters of greater than 3mm were considered dateable, and likely to be seventeenth century in origin (Duffy 2016; Noël Hume 1969, 298).

Bore diameters were measured for all stems recovered at Bremore Castle, with a complete diameter. The results ranged from 1.7-3.2 mm, with 17 (almost 90%) stems having bore diameters of 1.7-2.2mm (corresponding to 4/64" - 6/64"). These fall within the range noted elsewhere for nineteenth century pipes (Duffy 2016), and as such could not be assigned to a particular period. Two stem fragments, however, (17E0302:1:75; 17E0302:1:79), recorded bore diameters of 3mm and 3.2mm (8/64") respectively, suggesting they are of probable seventeenth century date. Both of these were recovered from Trench 2, close to the building.

Mouthpieces

Mouthpieces were present on two stem fragments (17E0302:1:70; 17E0302:1:75). Both were straight-ended, with the end of the stem finished to the same degree as the stem itself.

Decorated Stems

Only one stem (17E0302:1:65; Fig. 3) bore any identifiable decoration or mark. This consisted of a repeating roller-stamped design, applied by rolling the stem on a die or stamp. The resulting design forms a band wrapping itself around the stem, in either single transverse bands, or repeating spirals along the length. Such designs occur on pipes from both the eighteenth and nineteenth centuries (Norton 2004, 442-446; Higgins 2009, 43; Oswald 1975, 32-33). The Bremore Castle example took the form of alternative bands with circles or clubs in high relief, running in a spiral around the stem.

Fig.3. Decorated Stem 17E0302:1:65

Conclusion

The small collection of clay pipe fragments recovered from topsoil and sub-topsoil levels at Bremore Castle represents evidence of smoking from the seventeenth, eighteenth and nineteenth centuries. The earliest evidence is represented by two stem fragments from Trench 2, the wider bore-diameters of which are indicative of a seventeenth century date. One fragment from a bowl was identified as eighteenth century in date, while the only complete bowl, and a fragment of decorated stem are most likely later eighteenth or early nineteenth century in date. The remaining two bowl fragments are nineteenth century in date.

Due to the variation in stem-bores during the nineteenth century, it was not possible to assign any of the remaining stems to a century. It is possible, however, that some stems with bore diameters of less than 3mm may also date to the seventeenth or eighteenth centuries.

There was little evidence for the origins of the pipes. A single maker's mark on one fragment indicates a likely nineteenth century import, associated with the Dutch pipe-manufacturing centre of Gouda. Dutch pipes were a highly regarded, and in later times much copied, commodity, and imports such as this suggests a degree of affluence.

The small nature of the collection, and the association of the majority of pipe fragments with unstratified levels, meant that no further conclusions in relation to activities at Bremore Castle could be drawn.

Clay Pipe Catalogue

Find No.	Location	Find Type	Description	Date
17E0302:1:62	Trench 1	Bowl	Fragment of finely made, thin-walled pipe bowl - thinning towards rim. No milling; rim cut obliquely to bowl. No decoration or maker's mark present.	18th C
17E0302:1:63	Trench 1	Bowl	Small fragment of coarse, thick-walled pipe, with staining on interior.	19th C
17E0302:1:64	Trench 2	Bowl	Fragment from rear of thin-walled pipe bowl. Milling at rim in form of parallel vertical lines. Small stamp on bowl comprising of an oval cartouche with crowned 'L', stamped upside down. Size suggests die designed for a heel-stamp. Heavy tobacco staining on interior. Paring evident on outside of bowl, unpolished appearance.	19th C
17E0302:1:65	Trench 1	Stem	Decorated. Stem fragment with roller-stamped decoration running spirally around stem. Decoration consists of alternate bands with circles or clubs/clover in relief. Bore D: 1.8mm (5/64″)	18th/19th C
17E0302:1:66	Trench 1	Stem	Large diameter stem fragment; refits with 17E0302:1:67. Bore D: 2.1mm (5/64″)	
17E0302:1:67	Trench 1	Stem	Large diameter stem fragment; refits with 17E0302:1:66 - same stem. Bore D: 2mm (5/64″)	
17E0302:1:68	Trench 1	Stem	Fragment of large diameter, oval stem. Bore D: 2mm (5/64″)	
17E0302:1:69	Trench 1	Stem	Fragment of slender stem. Bore D: 1.8mm (5/64″)	
17E0302:1:70	Trench 1	Stem	Fragment of slender, oval stem. Partial, straight-ended original mouthpiece present. Bore D: 2.1mm (5/64″)	
17E0302:1:71	Trench 1	Stem	Fragment of slender stem. Bore D: 1.9mm (5/64″)	
17E0302:1:72	Trench 1	Stem	Small fragment stem; incomplete diameter	
17E0302:1:73	Trench 2	Stem	Fragment of oval stem with spur at junction with bowl; mould line evident on spur; uneven, narrow base on spur. No maker's mark present.Bore D: 1.9mm (5/64″)	

Find No.	Location	Find Type	Description	Date
17E0302:1:74	Trench 2	Stem	Fragment of slender stem, broken off at junction with bowl - spur may have been broken off. Beige/cream coloured clay. Bore D: 1.9mm (5/64″)	
17E0302:1:75	Trench 2	Stem	Fragment of stem with straight-ended original mouthpiece; larger bore than other stems. Bore D. 3.2mm (8/64″)	17th C
17E0302:1:76	Trench 2	Stem	Fragment of very slender stem; very smooth finish to surface. Bore D: 1.9mm (5/64″)	
17E0302:1:77	Trench 2	Stem	Fragment of slender stem. Bore D: 1.8mm (5/64″)	
17E0302:1:78	Trench 2	Stem	Fragment of slender, oval stem. Bore D: 2mm (5/64″)	
17E0302:1:79	Trench 2	Stem	Short fragment of oval stem Bore D. 3.0mm (8/64″)	17th C
17E0302:1:80	Trench 2	Stem	Short fragment of slender stem; narrow bore is offset close to one edge. Bore D: 1.7mm (4/64″)	
17E0302:5:1	Trench 2	Bowl	Complete bowl; finely made; small-size and thin-walled; spur with uneven base and mould-line present; Rim cut perpendicular to upright bowl; no decoration or maker's mark evident. Closest in typology to Oswald Type 13G/14G. H: 29.5mm; D: 22 x 18.2mm; H Spur: 5mm; D. Spur: 4.4 x 4mm. D Bore: 1.8mm (5/64″)	18th/19th C
17E0302:5:2	Trench 2	Stem	Short fragment of stem. Bore D: 2.2mm (6/64″)	
17E0302:11:2	Trench 1	Stem	Fragment of large diameter, oval stem; broken off at junction with bowl. Bore D: 1.7mm (4/64″)	
17E0302:14:1	Trench 1	Stem	Fragment of stem. Bore D: 2.1mm (5/64″)	

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Appendix 6

Report on Ceramics from Bremore Castle
By Rosanne Meenan

A ceramic group of 87 pieces from excavations at Bremore Castle was presented for analysis. This comprised potsherds and two pieces of roof tile. The bulk of the material was post-medieval – mainly 17th and early 18th century – in date with fourteen sherds of medieval pottery.

The sherd count table below indicates the minimum number of vessels represented (MVR) which is based on the presence of differently shaped and decorated rims, handles and bases

Ware	**Sherd no**	**MVR**	**vessels**
Agate ware	3		
Black drinking	11		
Blackglazed ware (coal measure)	19	3	2 storage vessels, 1 jar
Bristol/Staffordshire type	6	2	1 cup, 1 dish
Dublin-type fine ware	5	1	1 jug (id. by handle)
Dublin-type ware	6		
English (?) medieval	1		
Frechen stoneware	3	1	1 jug (id. by base)
Ham Green	1		
Leinster cooking ware	1		
Mottled ware	11	1	1 drinking vessel
North Devon gravel free	2		
North Devon graveltempered	2		
North Devon graveltempered roof tile	1	1	1 roof tile
Porcelain (Chinese)	3	2	1 tea bowl, 1 plate
Saintonge	1		
Slipware (English)	1		
Staffordshire (?)	2		
Unglazed roof tile	1		
Westerwald	3		
Yellow ware	4	1	1 drug jar
Total	**87**	**12**	

Medieval pottery

Fourteen sherds of medieval pottery were present in the assemblage. Eleven of these were wheel-thrown and green-glazed and were produced in Dublin. One sherd (7:1), made in Dublin-type fine ware (McCutcheon 78), came from an undecorated handle and a body sherd, also in Dublin-type fine ware, was decorated with an applied, notched vertical strip. Sherd no (21:1), in Dublin-type ware, was decorated with a triangular knob which may have been part of an applied thumbed strip or else an individual triangular-shaped pellet. The remaining glazed sherds were undecorated. There was one body sherd of Leinster cooking ware (1:13) and there were two English imports, one of them a body sherd of Ham Green (1:6) and the other was an unidentified ware (1:4). There was one body sherd of green-glazed Saintonge (1:5).

Post-medieval pottery

The remainder of the pottery was post-medieval in date and could be dated almost entirely to the mid-17th to the mid-18th century.

Agate ware

This ware is made by folding together wedges of different colours of clay and then cutting out or throwing the vessel in such a way that the different colours can see seen under the glaze. These table wares were mainly made in the mid-late 18th century.

Black drinking vessels

Black-glazed drinking vessels, many of them straight-sided, were particularly popular in the later years of the 17th century. They were produced in many centres in England and it is difficult to distinguish the products from the different kiln sites. They can vary in quality with many of them having very glossy black glazes on both surfaces. The sherds in this collection were undiagnostic and fragmentary. Excavations at South Castle St, Liverpool produced evidence which suggested that the popularity of fine blackglazed drinking vessels declined at the beginning of the 18th century (Phillpot 85)

Blackglazed wares (coal measure clays)

These black glazed wares were manufactured in the north-west of England and north-east Wales, the best known area of production being Buckley which exported into Ireland. The coal measure clay in these areas produced excellent quality highly-fired wares and there were also sources of lead suitable

for glazing. The vessels were imported into Ireland during the 17th and 18th centuries and are found regularly on archaeological excavations of the period, particularly along the east coast. Two storage vessels were present in this assemblage, one (17:1) which probably dated to a slightly later period in the mid-18th century as evidenced by its heavy squared rim. The rim of a globular jar (11:1) was also present. This had the purple/brown surfaces and uneven black glaze typical of 17th century wares.

Bristol/Staffordshire slipware

Two vessels of this ware were identified. The cup rim (1:32) did not feature any decoration. Four sherds of the same plate/dish were decorated with feathered dark brown slip. The pieces were too small to be able to suggest a date other than mid-17th-mid-18th centuries.

Rhenish stonewares

A Frechen stoneware jug was identified by a base sherd (19:5). Frechen stoneware was produced from the middle of the 16th century but the bulk of the exports into the British Isles took place from the beginning of the 17th century (Hurst *et al* 218); closer dating of individual jugs can be carried out on a stylistic basis if a complete profile of the vessel is present but this was not the case in this assemblage. There were no diagnostic sherds of Westerwald stoneware but the straight-sided body sherds would have originated in one or more mugs, probably dating to the early 18th century (Jennings 123).

Mottled ware

One drinking vessel was identified by three rim sherds. Mottled ware was in production from approx. 1680-1750 and is a common find on excavation sites dating to this period.

North Devon wares

There was a piece of north Devon roof tile (1:60) in the assemblage. Otherwise the sherds from this assemblage were undiagnostic and fragmentary.

Porcelain (Chinese)

The presence of Chinese porcelain in the assemblage suggests a site of some status. The tea bowl base (7:?) and the fragment of polychrome plate (1:?) decorated with a lady's head painted in red with black hair and foliage in the background are consistent I date with the other wares in the assemblage.

English?

One (1:49) of the three sherds of English origin was a fragment of slipware that was possibly made in the Staffordshire potteries. Two other sherds were glazed on the exterior only with glossy black glaze; they came from a small globular vessel whose function was unknown.

Unglazed

There was one fragment of a possible roof tile (pantile?) (1:81); it showed a very slight curve and was unglazed and may have come from a pantile.

Yellow ware

One drug jar was recognised in this small group of four sherds.

Discussion

This was a small assemblage of fourteen sherds. The range of wares is typical of other assemblages in the Dublin region. The sherds all came from contexts with later pottery.

The post-medieval elements of this assemblage can all fit into a time span ranging from the second half of the 17th century until approximately the middle of the 18th century. These are all wares typical of the period just before the potteries of Staffordshire began to flood the market with industrially produced vessels that gradually replaced handmade vessels.

The date range fits in with the occupation of the castle up to the 1730s.

The range of vessel types present is mixed with both table and food-processing forms, the latter represented by storage vessels in blackglazed ware. Milk pans that would have represented evidence for diary processing were not recognised in the assemblage. Glazed red earthenwares which would illustrate lower status table wares and food processing were not present.

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Excav. No.	Context	Find no.	Simple name	Part	Object	Material	Description
17E0302:7:2	7	2	unidentified	body	Agate ware	Ceramic	
17E0302:7:3	7	3	unidentified	body	Agate ware	Ceramic	
17E0302:7:4	7	4	unidentified	frag	Agate ware	Ceramic	
17E0302:1:31	1	31	cup	base	B/S slipware	Ceramic	
17E0302:1:32	1	32	cup	rim	B/S slipware	Ceramic	
17E0302:6:1	6	1	dish	body	B/S slipware	Ceramic	feathered brown slip
17E0302:6:2	6	2	dish	body	B/S slipware	Ceramic	feathered brown slip
17E0302:1:55	1	55	dish	body	B/S slipware	Ceramic	feathered dark brown slip
17E0302:1:56	1	56	dish	body	B/S slipware	Ceramic	dark brown trailed slip
17E0302:1:20	1	20	drinking vessel	body	Black drinking ware	Ceramic	
17E0302:1:27	1	27	drinking vessel	body	Black drinking ware	Ceramic	
17E0302:1:28	1	28	drinking vessel	body	Black drinking ware	Ceramic	
17E0302:1:25	1	25	drinking vessel	body	Black drinking ware	Ceramic	
17E0302:1:29	1	29	drinking vessel	body	Black drinking ware	Ceramic	
17E0302:1:39	1	39	drinking vessel	frag	Black drinking ware	Ceramic	
17E0302:1:40	1	40	drinking vessel	frag	Black drinking ware	Ceramic	
17E0302:1:41	1	41	drinking vessel	frag	Black drinking ware	Ceramic	
17E0302:1:42	1	42	drinking vessel	frag	Black drinking ware	Ceramic	
17E0302:1:44	1	44	drinking vessel	body	Black drinking ware	Ceramic	
17E0302:1:45	1	45	drinking vessel	body	Black drinking ware	Ceramic	
17E0302:1:17	1	17	storage jar	body	Blackglazed (cm)	Ceramic	same vessel storage jar c. 1700
17E030:21:18	1	18	storage jar	body	Blackglazed (cm)	Ceramic	same vessel
17E0302:1:23	1	23	storage jar	body	Blackglazed (cm)	Ceramic	same vessel
17E0302:1:22	1	22	storage jar	body	Blackglazed (cm)	Ceramic	same vessel
17E0302:1:19	1	19	storage jar	body	Blackglazed (cm)	Ceramic	same vessel
17E0302:1:24	1	24	storage jar	body	Blackglazed (cm)	Ceramic	same vessel
17E0302:1:21	1	21	storage jar	base	Blackglazed (cm)	Ceramic	same vessel

17E0302:1:26	1	26	storage jar	body	Blackglazed (cm)	Ceramic	same vessel
17E0302:10:1	10	1	storage jar	body	Blackglazed (cm)	Ceramic	purple brown glaze on the interior. 17th century
17E0302:10:2	10	2	storage jar	base	Blackglazed (cm)	Ceramic	purple brown glaze on the interior. 17th century
17E0302:1:59	1	59	storage jar	body	Blackglazed (cm)	Ceramic	
17E0302:16:1	16	1	storage jar	body	Blackglazed (cm)	Ceramic	
17E0302:5:3	5	3	storage jar	handle	Blackglazed (cm)	Ceramic	buff-coloured fabric. Horizontal handle
17E0302:5:4	5	4	storage jar	body	Blackglazed (cm)	Ceramic	
17E0302:17:1	17	1	storage jar	rim	Blackglazed (cm)	Ceramic	heavy squared rim. Possibly later in the 18th century
17E00302:16:2	16	2	storage jar	base	Blackglazed (cm)	Ceramic	
17E00302:16:3	16	3	storage jar	body	Blackglazed (cm)	Ceramic	thin walled
17E00302:16:4	16	4	storage jar	body	Blackglazed (cm)	Ceramic	thin walled
17E0302:11:1	11	1	jar	rim	Blackglazed (cm)	Ceramic	globular jar with rim diameter of 15cms. Everted rim with patchy black glaze over a purple/brown surface. 17th century
17E0302:19:2	19	2	jug	body	Dublin-type fine ware	Ceramic	
17E0302:19:3	19	3	jug	body	Dublin-type fine ware	Ceramic	
17E0302:7:1	7	1	jug	handle	Dublin-type fine ware	Ceramic	no sign of decoration on the handle
17E0302:1:14	1	14	jug	body	Dublin-type fine ware	Ceramic	notched vertical applied strip
17E0302:1:15	1	15	jug	body	Dublin-type fine ware	Ceramic	
17E0302:1:11	1	11	jug	body	Dublin-type ware	Ceramic	
17E0302:1:12	1	12	jug	body	Dublin-type ware	Ceramic	

17E0302:21:1	21	1	jug	body	Dublin-type ware	Ceramic	applied dec. Either a single knob or part of applied thumbed band.
17E0302:1:7	1	7	jug	body	Dublin-type ware	Ceramic	fragments
17E0302:1:9	1	9	jug	body	Dublin-type ware	Ceramic	fragments
17E0302:1:10	1	10	jug	body	Dublin-type ware	Ceramic	fragments
17E0302:1:4	1	4	bowl?	body	English	Ceramic	an unidentified English import?
17E0302:19:16	19	16	jug	body	Frechen	Ceramic	
17E0302:19:17	19	18	jug	body	Frechen	Ceramic	
17E0302:19:5	19	5	jug	base	Frechen	Ceramic	
17E0302:1:6	1	6	jug	body	Ham Green?	Ceramic	
17E0302:1:13	1	13	cooking vessel	body	Leinster cooking ware	Ceramic	
17E0302:1:46	1	46	drinking vessel	base	Mottled ware	Ceramic	
17E0302:1:47	1	47	drinking vessel	rim	Mottled ware	Ceramic	
17E0302:1:48	1	48	drinking vessel	rim	Mottled ware	Ceramic	
17E0302:1:51	1	51	drinking vessel	body	Mottled ware	Ceramic	
17E0302:1:52	1	52	drinking vessel	rim	Mottled ware	Ceramic	
17E0302:1:53	1	53	drinking vessel	body	Mottled ware	Ceramic	
17E0302:1:54	1	54	drinking vessel	body	Mottled ware	Ceramic	
17E0302:1:57	1	57	drinking vessel	rim	Mottled ware	Ceramic	
17E0302:1:58	1	58	drinking vessel	frag	Mottled ware	Ceramic	
17E00302:16:5	16	5	drinking vessel	body	Mottled ware	Ceramic	
17E0302:9:1	9	1	drinking vessel	body	Mottled ware	Ceramic	
17E0302:1:50	1	50	unidentified	body	North Devon g.f.ware	Ceramic	
17E0302:19:18	19	17	unidentified	body	North Devon g.f.ware	Ceramic	
17E0302:1:16	1	16	unidentified	frag	North Devon g.t.	Ceramic	
17E0302:1:60	1	60	roof tile	edge	North Devon g.t.	Ceramic	no sign of glaze on this sherd
17E0302:1:8	1	8	unidentified	body	North Devon g.t.	Ceramic	

17E0302:7:?	7	?	tea bowl	base	Porcelain (Chinese)	Ceramic	
17E0302:1:?	1	?	unidentified	frag	Porcelain (Chinese)	Ceramic	some blue paint
17E0302:1:?	1	?	plate	base	Porcelain (Chinese)	Ceramic	polychrome with lady's head painted in red with black hair and some foliage in background. No number on the sherd
17E0302:1:5	1	5	jug	body	Saintonge	Ceramic	medieval
17E0302:1:49	1	49	unidentified	frag	Slipware (English)	Ceramic	
17E0302:19:4	19	4	unidentified	body	Staffordshire?	Ceramic	fine red earthenware unglazed interior and dark brown very smooth even glazed on ext.
17E0302:19:15	19	15	unidentified	body	Staffordshire?	Ceramic	fine red earthenware unglazed interior and dark brown very smooth even glazed on ext. This is a small globular form, similar to a cup but the interior is unglazed.
17E0302:1:81	1	81	roof tile	body	Roof tile	Ceramic	unglazed red earthenware. Very slight curve
17E0302:1:43	1	43	drinking vessel	body	Westerwald	Ceramic	No sign of cobalt. Rilling at base
17E0302:1:35	1	35	mug?	body	Westerwald	Ceramic	rilling
17E0302:1:36	1	36	mug?	body	Westerwald	Ceramic	cobalt within a band
17E0302:1:37	1	37	drug jar	rim	Yellow ware	Ceramic	
17E0302:1:38	1	38	drug jar	body	Yellow ware	Ceramic	
17E0302:1:33	1	33	unidentified	body	Yellow ware	Ceramic	dark yellow-brown glaze
17E0302:1:34	1	34	unidentified	body	Yellow ware	Ceramic	dark yellow-brown glaze

Appendix 7

Radiocarbon Dating

UBANo	Sample ID	Material Type	^{14}C Age	±	F14C	±
UBA-37371	F19	Triticum	330	25	0.9597	0.0030
UBA-37372	F21	Triticum	139	28	0.9828	0.0034

Christine Baker
Fingal County Council
Main St
Swords, Co. Dublim
Ireland
VAT No. IE9509807N
Customer No. 2111888

^{14}CHRONO Centre
Queens University Belfast
42 Fitzwilliam Street
Belfast BT9 6AX
Northern Ireland

Radiocarbon Date Certificate

Laboratory Identification: UBA-37371
Date of Measurement: 2018-04-30
Site: Bremore Castle
Sample ID: F19
Material Dated: seed or nutshell
Pretreatment: Acid Only
Submitted by: Christine Baker

Conventional ^{14}C Age:	330±25 BP
	using AMS
Fraction corrected	δ^{13}C

Christine Baker
Fingal County Council
Main St
Swords, Co. Dublim
Ireland
VAT No. IE9509807N
Customer No. 2111888

14CHRONO Centre
Queens University Belfast
42 Fitzwilliam Street
Belfast BT9 6AX
Northern Ireland

Radiocarbon Date Certificate

Laboratory Identification:	UBA-37372
Date of Measurement:	2018-04-30
Site:	Bremore Castle
Sample ID:	F21
Material Dated:	seed or nutshell
Pretreatment:	Acid Only
Submitted by:	Christine Baker

Conventional ^{14}C Age:	139±28 BP using AMS
Fraction corrected	$\delta^{13}C$

Information about radiocarbon calibration

RADIOCARBON CALIBRATION PROGRAM*
CALIB REV7.0.0

*To be used in conjunction with:
Stuiver, M., and Reimer, P.J., 1993, Radiocarbon, 35, 215-230.
Annotated results (text) - -
Export file - c14res.csv

37371
UBA-37371
Radiocarbon Age BP 330 +/- 25
Calibration data set: intcal13.14c # Reimer et al. 2013

% area enclosed	cal AD age ranges	relative area under probability distribution
68.3 (1 sigma)	cal AD 1499- 1504	0.034
	1512- 1529	0.171
	1543- 1601	0.594
	1616- 1634	0.201
95.4 (2 sigma)	cal AD 1483- 1641	1.000

37372
UBA-37372
Radiocarbon Age BP 139 +/- 28
Calibration data set: intcal13.14c # Reimer et al. 2013

% area enclosed	cal AD age ranges	relative area under probability distribution
68.3 (1 sigma)	cal AD 1680- 1697	0.137
	1724- 1764	0.282
	1801- 1815	0.107
	1834- 1878	0.297
	1916- 1939	0.177
95.4 (2 sigma)	cal AD 1670- 1712	0.172
	1716- 1779	0.276
	1798- 1891	0.388
	1909- 1943	0.164

References for calibration datasets:
Reimer PJ, Bard E, Bayliss A, Beck JW, Blackwell PG, Bronk Ramsey C, Buck CE Cheng H, Edwards RL, Friedrich M, Grootes PM, Guilderson TP, Haflidason H, Hajdas I, HattÃ© C, Heaton TJ, Hogg AG, Hughen KA, Kaiser KF, Kromer B, Manning SW, Niu M, Reimer RW, Richards DA, Scott EM, Southon JR, Turney CSM, van der Plicht J.
IntCal13 and MARINE13 radiocarbon age calibration curves 0-50000 years calBP
Radiocarbon 55(4). DOI: 10.2458/azu_js_rc.55.16947

Comments:
* This standard deviation (error) includes a lab error multiplier.
** 1 sigma = square root of (sample std. dev.^2 + curve std. dev.^2)
** 2 sigma = 2 x square root of (sample std. dev.^2 + curve std. dev.^2)
where ^2 = quantity squared.
[ ] = calibrated range impinges on end of calibration data set
0* represents a "negative" age BP
1955* or 1960* denote influence of nuclear testing C-14

NOTE: Cal ages and ranges are rounded to the nearest year which may be too precise in many instances. Users are advised to round results to the nearest 10 yr for samples with standard deviation in the radiocarbon age greater than 50 yr.

Appendix 8

Animal Bone Report
By Siobhan Duffy BSc MA

Introduction

This report presents an analysis of the animal bone assemblage recovered from excavations carried out in July 2017 at Bremore Castle, Balbriggan, Co. Dublin (Excavation Licence 17E0302), under the direction of Christine Baker. This Excavation formed part of a Community Archaeology Programme run by Fingal County Council and involved the excavation of five discrete areas (Trenches 1-5), four of which lay within a walled garden adjoining the southern wall of the reconstructed castle (Baker 2017). Features and deposits uncovered were identified as dating from the post-medieval to modern eras (*ibid*). Animal bone was collected both from hand-collection and dry-sieving, with this latter performed on an ongoing basis across the site, throughout the excavation (author's own notes).

The phasing used throughout this report is based on three main activity phases identified at the site (Baker 2017). The earliest of these (post-medieval) is considered contemporary with occupation of the castle, with later phases (17th/18th Century and 19th/20th Century) relating to subsequent use and/or occupation of the site (*ibid*.). In addition to this, the presence of articulated remains of animals, relating to the 19th/20th Century is treated as a distinct phase, and discussed separate to the main analysis. Finally, the animal bone recovered from unstratified levels (topsoil and modern disturbance) was examined; while the results from this do not form part of the main analysis, their usefulness as a supplementary source of information is considered.

Features with animal bone analysed in this report are listed below.

	Trench 1	Trench 2	Trench 3	Trench 4	Trench 5
Post-medieval	F18		F19.F26		
17th/18th Century	F16	F5	F7	F21	
19th/20th Century	F13; F15	F2; F4	F8; F9		
Farm Burials	F10; F13; F14; F15				
Unstratified	F1; F11	F1	F1	F1	F1

Table 1: Features from which animal bone was recovered.

Methodology

Mammal and bird bones were examined for species and element identification, age, sex, post-depositional changes, butchery and other modifications, gnawing, non-metric traits, and pathologies. All data were recorded in an MS Excel spreadsheet.

Identification

Bone fragments were examined and identified to skeletal element and species where possible. Identification was carried out with the use of bone atlases (Schmid 1972; Hillson 1992, and Hillson 2005 for mammals; Cohen & Serjeantson 1996; Bochenski & Tomek. 2009; Tomek & Bochenski 2000, and Tomek & Bochenski. 2009, for birds), the bird osteological collection of the National Museum of Ireland, and the author's own reference collection. Internet resources were also consulted where appropriate (Rochester 2010-2018 for small mammal/bird; Archaeological Fish Resource for fish).

Where it was not possible to identify an element to species level, broader categories were used, either at order level, e.g passerine, rodent, carnivore, or at an even broader level, e.g. cow-sized mammal, sheep-sized mammal, cat-sized mammal, small mammal, and bird. With the exception of the atlas, axis and sacrum, all vertebrae and ribs were only identified to a size category. This was partly due to difficulties in identification of these elements to a particular species, and partly to negate any biases they would introduce into quantification data due to their higher frequency within the skeleton and a greater tendency to fragment. For similar reasons, carpals, tarsals and sesamoids (other than the astragalus and calcaneus) were only identified to size categories.

The skeletal elements of sheep and goats are notoriously difficult to distinguish (Boessneck 1969, 331; Noddle 1994, 118), with the notable exception of horncores. Where possible post-cranial remains were identified as sheep or goat, following the criteria of Boessneck (1969), with the remaining bones classed as 'ovicaprid'. Considering the uncertainty surrounding criteria used to distinguish between the dentition of sheep and goats (Zeder & Pilaar 2010), mandibles, maxillae and loose teeth were consistently identified as 'ovicaprid'.

The Domestic Goose and Greylag Goose are the one species (*Anser anser*), and as such cannot be identified from skeletal remains. Where *A. anser* has been identified it has been referred to as 'Goose' throughout. Other goose species referred to as 'Goose species' if not identified to species level or by its genus name if this has been identified. In the same way, the Domestic Duck and the wild Mallard (*Anas platyrhynchos*) cannot be readily distinguished, and the term 'Duck' is used in this case.

Bone fragments that could not be reliably identified to element were classed as 'unidentified'.

Animals are referred to by their common names throughout the text, but are recorded by genus name (or an abbreviated version thereof) in the database. A complete list of the common and scientific names of species identified at the site is given in Appendix A.

Quantification

There has been much debate over what method of quantification provides a best estimation of the original proportions and relative importance of animals at a site (O'Connor 2003, 132): the principal methods used being Number of Identified Specimens (NISP); Minimum Number of Individuals (MNI); bone weight; and a restricted version of the NISP. No method is ideal, and use of one or more will depend on the assemblage and research aims of a particular project.

As a direct count of the fragments present, NISP is the most straightforward method of quantification, and was the principal method used for analysis of the assemblage. In order to counter some of the potential biases of overestimation from fragmentation, it was decided to count only rib fragments containing part of the rib-head and vertebral fragments with part of the centrum. Articulated remains can also pose a problem, and while bones of articulated and semi-articulated remains were counted separately, it was recorded that these belonged to a single individual. Where bones were fragmented during excavation or the cleaning process, these were refitted where possible and considered a single element. If fragmentation was pre-excavation, fragments were counted as separate elements.

MNI estimations (i.e. the minimum number of animals required to account for all bones present) were used as considered appropriate. It is recognised that these estimations lack mathematical integrity for further quantitative analysis (O'Connor 2001, 706), and are problematic when considering consumer-based sites (O'Connor 2003, 134) or partially excavated sites. With this in mind, MNI was used primarily to consider smaller animals recovered. Calculation of MNI took into account the side of the animal present, but not any indication of age.

Sexing

Identification of sex is generally restricted to a small number of elements, and is dependent on the presence of these elements in the assemblage. In the present study, sheep/goats were sexed according to horncore morphology, male pigs were identified by the presence and morphology of canine teeth, and male dogs were identified by the presence of a baculum. Female birds were identified by the presence of medullary bone in longbones (notably the femur and tibiotarsus of the hind-limb).

Ageing

Age-at-death was estimated from the fusion status of the epiphyseal ends of longbones in mammals, following Silver (1969), with additional information for cats following Walker (1982, in Amorosi 1989, 117) and Curgy (1965 in Amorosi 1989, 117), and the ossification of longbone ends in birds (porous, unossified ends were considered juvenile). In addition, where no articular ends were present but an element was obviously juvenile from its size, development and porosity, it was considered to be juvenile. Dental eruption and wear patterns were recorded for mandibular teeth following Grant (1982) for cattle, sheep and pigs, and Bull & Payne (1982) for pig eruption. Mandibular wear patterns for the main domestic species were correlated with the mandibular wear scores of O'Connor (2003, 160).

Measurements

Measurements were taken where possible on all non-pathological, fully developed bones, following the guidelines of von den Driesch (1976). Measurements up to 15cm were taken with a vernier callipers (to 0.1mm precision) and an osteometric board was used for larger measurements (to 0.5mm prescision). Withers heights for the main domestic species were calculated following coefficients as cited in von den Driesch & Boessneck (1974), and Harcourt (1974) for dogs.

Results

A total of 1,562 bone fragments from mammals and birds were recovered at Bremore Castle. Articulated remains of four farm animals were recovered in addition to this total. In all, some 16 stratified features and layers, and two unstratified layers/deposits yielded animal bone. Within the assemblage, 1,057 fragments recovered from the unstratified levels were excluded from the main analysis and omitted from the final NISP.

Of the remaining 505 fragments (excluding the articulated remains and fish), 202 (40%) were identifiable to element and species or species-group, with a further 57 (11%) identifiable to element and size-category. Fragmented ribs and vertebrae were deemed non-countable and these comprised some 24% of the overall assemblage, while the remaining 25% could not be identified to a specific element. The NISP (Number of Identified Specimens), as used in the analysis hereafter, refers to bone identified to taxonomic species, order level, or size category from phased contexts. Where a sub-category of this NISP is used (e.g. bird species only), this is stated in the text.

Condition of the Bone

Weathering and Erosion

Overall the bone was in good condition. Post-depositional factors such as soil erosion and root damage were generally mild where present. It was noted that root etching was only a significant factor in Trench 3, where over 50% of bone recovered showed some level of surface damage by root action. There was little evidence of weathering on the bone, with only six bone fragments showing signs of exposure (five of these were from topsoil, the sixth from a modern level) and none above Stage 1 in Behrensmeyer's classification (Lyman 1994, 355). This suggests bones were not exposed to the elements for any length of time, if at all, prior to deposition.

Fragmentation

Overall the assemblage was highly fragmented, with nearly 80% of the bones examined consisting of elements that were only a quarter complete or less. This level of fragmentation was reasonably consistent across all Trenches and Phases. A lesser degree of fragmentation was recorded in Trench 5, but the small number of bones from this trench makes the significance of this uncertain. Some 6% of identified bones were complete, although these were primarily teeth and the compact bones of the feet. In contrast, only two longbones from stratified levels were complete. A further nine longbones from topsoil were complete, although six of these were dog metapodia, and probably associated with the articulated remains (F13). Over 60% of the assemblage showed some excavation damage; while this is a fairly high level, it was noted that damage observed was often minor. In addition, in excess of

80% of bones had been broken in antiquity, rising to 93.3% in post-medieval levels. This suggests that, while recent damage was a factor, the degree of fragmentation recorded probably relates more to food preparation, damage done during initial waste disposal or secondary disturbance of the ground in the past.

Gnawing

Gnawing by carnivores or rodents was present on 2% of bone (Appendix C), indicating a time lapse between initial disposal of the bone and its final deposition. Evidence of scavenging by rodents was rare, with gnawing recorded on a single bone recovered from topsoil (Fig.1). All other gnaw-marks were attributed to dogs, although in one instance a cat may have been responsible. While this provides some secondary evidence for the presence of dogs at the site, the low levels recorded suggest that scavenging was not a significant factor on site (although the removal of entire bones from the site cannot be discounted). This would fit with the lack of weathering present, indicating bone was not exposed to surface disposal prior to deposition within features.

Within the post-medieval phase, the level of gnawing was slightly higher (at 3% of bone), and was present on all the main food animals. Unusually, of the three large domesticates, pig showed least incidence of gnawing. Pig bone is generally considered to be more palatable to dogs due to its higher grease content (Albarella & Davis 1996, 32). The low numbers of bone present make interpretation of this difficult: it may be due to disposal decisions at the site, or the removal of bone from the site by scavengers.

Fig.1. Rodent gnawing on a bone fragment from topsoil.

Fig.2. Charring from open flame on a Post-medieval pig mandible.

Burning

There was little evidence of burning in the assemblage, with only ten bone fragments exhibiting any degree of burning, amounting to less than 1% of the assemblage. Of these, just one bone fragment was fully calcined, and this was recovered from topsoil. A single, partly calcined bone was recovered from each of the stratified phases, suggesting disposal by fire. All were very small fragments,

however, and the evidence suggests that burning was not a major part of disposal methods at the site (or, at least, in the vicinity of the excavated areas).

Two bones recovered from the post-medieval feature F26/F19, with localised areas of charring, are perhaps more interesting. One was a premolar tooth from a dog, in which only the roots and lower part of the crown showed evidence of low-level contact with open flames. This pattern indicates the tooth was no longer within the jawbone when it was exposed to fire – although whether it was lost during life or after death cannot be determined.

The second case was a pig mandible, showing the opposite pattern: the teeth are scorched on the crowns, with the surrounding bone also affected (Fig.2). Moreover, the more distal molar teeth are less affected. This pattern indicates the jaw still had flesh attached when exposed to open fire, and was almost certainly still attached to the cranium at that time. The roasting of a whole, or partial, pig is a likely scenario in this case.

Species Presence and Abundance

A total of 10 different mammal and 8 bird species were identified from the animal bone assemblage, although not all of these were identified to species level. The assemblage is dominated by the main domestic animals (cattle, sheep/goat and pig), comprising some 65% of the NISP from stratified levels. If cattle-sized and sheep-sized bone is taken into account, this figure rises to 84% of NISP. However, this is not consistent across the three phases. Levels are highest in the post-medieval phase, where combined they form 71% of the NISP (87% with the relevant size categories). In the 19th/20th Century, on the other hand, the main species make up just 27% of NISP. This may not be significant, however, as the numbers are very low for this later phase (NISP=15). In general there is a sharp drop-off in the numbers of bone collected from phases later than the post-medieval period: this may reflect a dwindling use of the area over time, or changes in use and disposal patterns.

Post-medieval

Cattle are the most frequent in this phase, accounting for 40% of the NISP respectively (Fig.3). When size categories are excluded from the NISP, this level rises to 49%. This is consistent with information from other sites in Ireland, where cattle retain a dominant position in the food economy throughout post-medieval times. In particular, it is close to that seen in some urban post-medieval levels such as Kilkenny (Duffy 2010; McQuade 2006) and Galway (Murray 2004).

Sheep/goats were second in abundance, comprising some 18% NISP. This again is comparable with the expected pattern, although at a lower level than seen elsewhere, where sheep/goat are typically 25-30% of NISP (e.g. Duffy 2010; Murray 2004; Beglane 2005). Pigs, the third most abundant species,

comprise some 13% NISP. While this is considered higher than average for post-medieval times, it compares well with sites where pigs are thought to have been reared on site (Duffy 2010; Murphy 2007; McCarthy 1997).

All other mammal species were present at very low numbers. Somewhat surprisingly, cat was the next most abundant (3% NISP). However, this still consisted of just five elements, from at least two individuals. Lagomorphs were next most abundant, with two bones from rabbits (possibly from a single individual) and one from a hare. Dog and horse were each represented by a single bone. The horse bone was recovered from within the metalled surface in Trench 1: the only post-medieval bone from outside Trench 3.

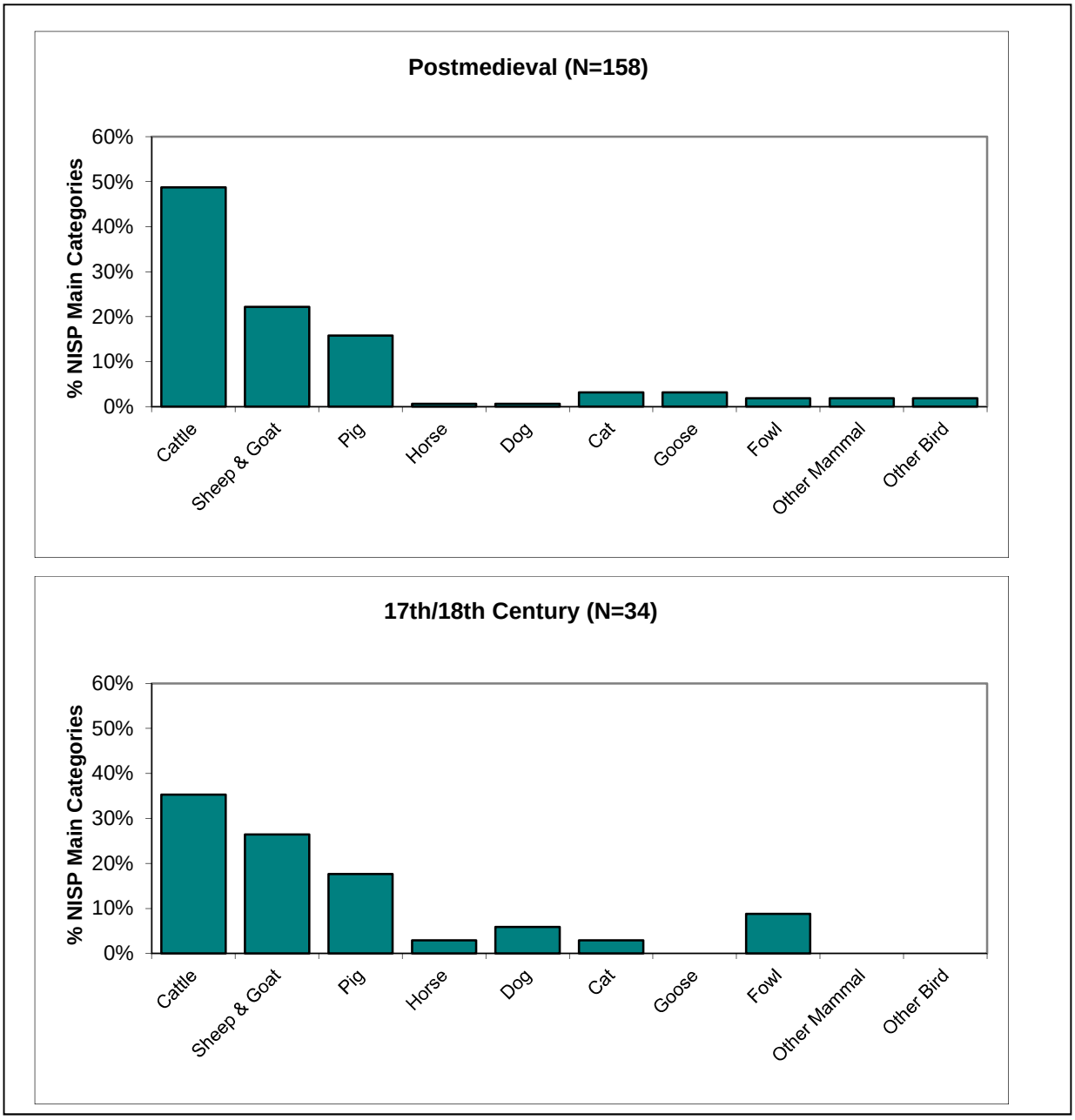

Fig.3. Relative Species Abundance for the post-medieval & 17th/18th Century phases.

Birds were present in very low numbers in the assemblage, comprising just 6% of the post-medieval NISP, from four species. This is consistent with sites elsewhere in Ireland from that period, with a notable exception from Galway (Hamilton-Dyer 2004), where bird levels reach 31% of the overall post-medieval NISP. As the numbers are so low, in order to assess the relative abundance of specific birds, these were calculated separately, relative to the Bird NISP (Fig.4).

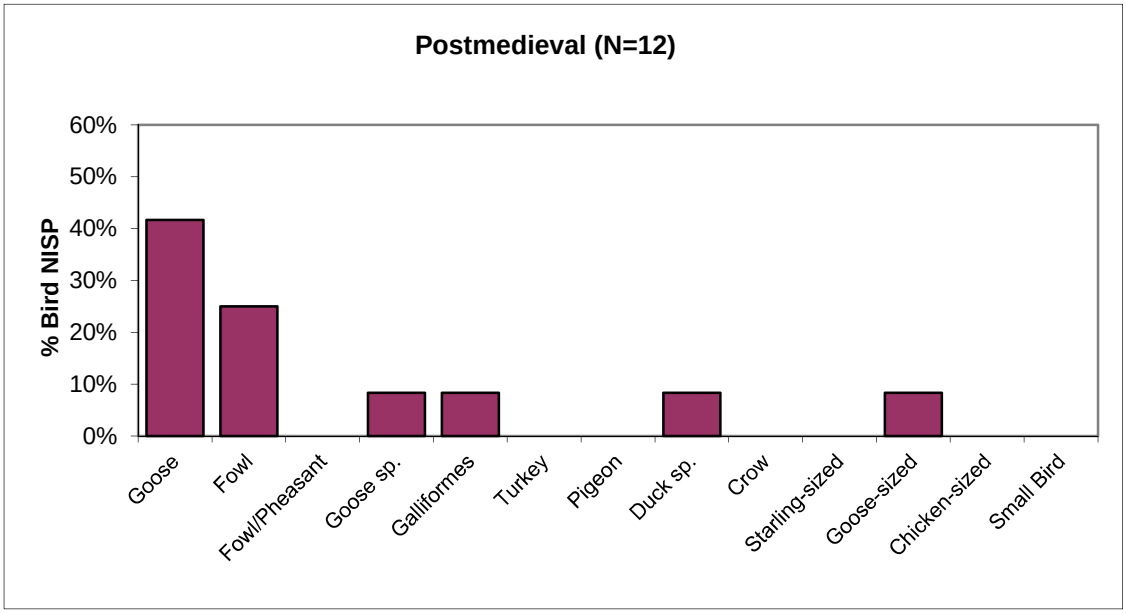

Fig.4. Relative Species Abundance (Bird species only) for the post-medieval phase.

Goose was the most abundant, comprising some 42% of identified bird bones, while domestic fowl accounted for 25% of bird NISP. This is the opposite to the usual pattern for post-medieval sites, where fowl gains importance over goose through medieval and post-medieval times (e.g. Duffy 2010; McQuade 2006; McCarthy 1997; Hamilton-Dyer 2004). The numbers recovered at Bremore Castle are very low, however, making it difficult to attach significance to this pattern, while disposal methods at the site may also be a factor. Nonetheless, it was noted that bones recovered from Dublin's town moat showed a similar ratio of goose to fowl from post-medieval levels as that seen at Bremore (Hamilton-Dyer 1997).

Wild species of birds were present at very low levels, with a single bone from each of a smaller goose species, and a wild duck species of the genus *Aytha*, most likely Tufted Duck (*Aytha fuligula*).

17th/18th Century

Cattle were also the most abundant species identified in this later phase, while the ratio between the next two most abundant species – sheep/goat and pig – was closer to the expected pattern than that from the post-medieval phase. However, numbers are very low for this phase, and little can be read

into these patterns as a result. Moreover, sheep/goat bones tended to be more fragmented than pig bones, and if this is taken into consideration their relative abundances would be near equal.

The other mammal species identified (horse, dog, cat) were present at very low numbers, while bird species present were confined to domestic fowl, and one wild bird species of a size with a small wader.

19th/20th Century

Only 15 bones were recovered from this phase, excluding the farm burials, which are dealt with separately. Within this small collection, six species were identified, with wild species such as rat and woodpigeon present in the same numbers as cattle. Indeed, sheep/goat and cat were the only species represented by more than one element. As a result, no further quantitative analysis was possible for this phase.

Cattle

Skeletal Representation

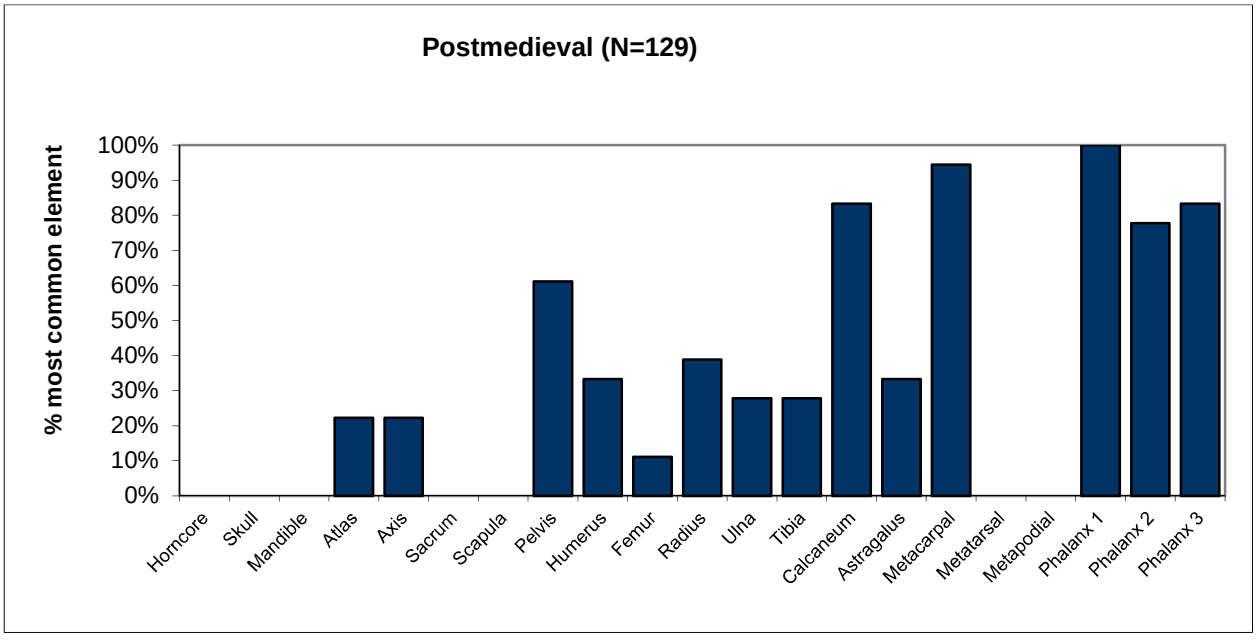

Fig.5. Skeletal Representation for Cattle for the post-medieval phase, excluding loose teeth.

Most parts of the cattle skeleton are represented in the post-medieval assemblage (Fig.5), but with a noticeable lack of skull and horncore fragments. Indeed, only one loose upper tooth, and three small fragments from a cow-sized skull, hint at the presence of complete skulls. The fragile nature of the skull means that it fragments quite readily, so that it would be expected to be over-represented in the assemblage, relative to its actual presence. Perhaps even more significant is the absence of metatarsals

in this phase: these are perhaps the most robust bones in the cattle skeleton, less given to fragmentation and readily identifiable. Adding significance to this absence, the corresponding bone in the forelimb, the metacarpal, is represented by similar numbers to many of the other limb-bones.

The presence of mandibles, upper neck vertebrae and foot bones suggests that at least some whole carcasses were present at the site, and that some primary butchery took place there. One potential explanation for the absence of skulls and metatarsals, may be the removal of hides at the site for transport to tanneries. In such instances, the upper skull and horns are generally left attached (Serjeantson 1989; Albarella 2003), with the horns being sent on to a horner's workshop. Similarly, the strong nature of the metatarsals, and the relatively straightness of the bone, made them a good choice as a manufacturing raw material, and they may have been removed from the site for this purpose.

The best represented element is the prime meat-bearing humerus, followed by the pelvis. However, both these generally show higher degrees of fragmentation, and this is the case here with no single specimens accounting for more than 25% of the whole element. When fragmentation is taken into account, the lower limb-bones increase in relative importance, showing a greater presence of moderate and low meat-bearing parts of the carcass. In contrast, the highest meat-bearing bone, the femur is only present at low levels, especially when considered relative to the humerus or even the other bones of the hindlimb. The scapula is also underrepresented in the collection, especially when fragmentation is accounted for. In both cases, this may indicate the removal of prime meat-bearing cuts from the site, although their disposal at a different location at the site cannot be ruled out.

The assemblage sizes from the later phases were too small for conclusive assessment of skeletal representation (in the 19th/20th Century phase, cattle are represented by a single ulna). It was noted, however, that moderate or low meat-bearing bones were also well represented in the 17th/18th Century collection, again with a notable absence of metatarsals. However, it is impossible to attach any significance to this due to the low numbers involved.

Ageing

No mandibles with cheek teeth in-situ were present in the assemblage, while a single loose third molar from post-medieval levels was from an elderly animal using O'Connor's Wear Stages.

Examination of the fusion state of bones from post-medieval levels suggests that cattle were generally over 3 years old when slaughtered (Fig.6), with a lesser, secondary peak at 1-1.5 years of age. All of the early fusing elements present were fused, suggesting a lack of veal in the diet, although it was noted that one of the unfused late-fusing elements was from a very young animal based on size and development of the bone. Optimum age-of-slaughter for cattle is considered to be 2-3 years (Murphy

2007, 371), and the presence of older animals (especially some over 3.5 years of age) may represent older cows or oxen from a herd. Equally, the killing of yearlings suggests the removal of male animals from the herd. There is no evidence for slaughter of animals at the optimal slaughter age, this may also suggest a dairy, rather than beef herd, or these animals may have been removed from the site and sent to market. Unfortunately, the small numbers involved make it difficult to form a conclusive interpretation.

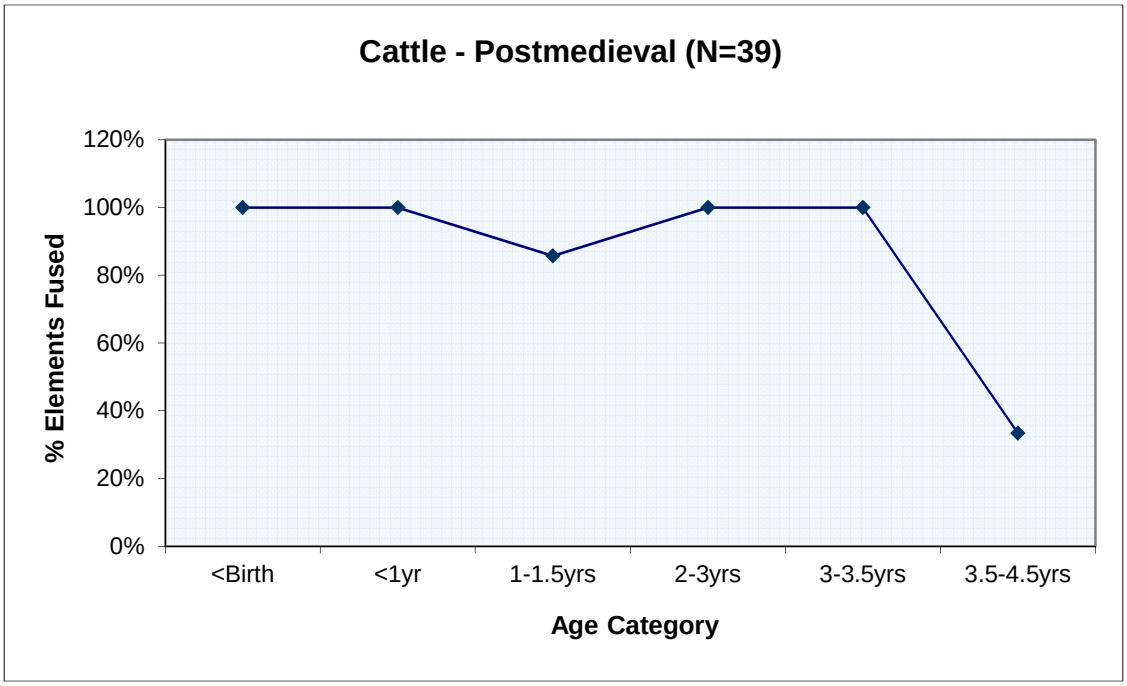

Fig.6. Fusion data for post-medieval cattle, showing proportion of fused elements.

Few bones from later phases were available for examination of bone-fusion. Those examined from the 17th/18th Century indicated slaughter ages of 2-4.5 years. However, as this is drawn from just four bones, no pattern was discernible.

Sexing

No data for sexing was available for cattle bones within the assemblage.

Size

Few complete bones were present, but measurements were taken on bones where possible and are given in Appendix G. No complete longbones were available for withers heights calculations.

Butchery

Butchery marks were noted on 22% of bone elements from the post-medieval phase (Appendix C). These were primarily related to the dismemberment of carcasses with cleavers or large knives. A lighter knife-cut on a single pelvis probably relate to the removal of flesh from the bone, while one tibia had been split lengthways to extract marrow.

The evidence from both cattle and cattle-sized bones is consistent with the standard pattern of butchery from medieval times onwards, associated with the establishment of a standardised butchery craft or industry (O'Connor 1982, 16; Wilson 1996, 60). This consisted of initial removal of the skull at the upper neck, followed by splitting of the carcass into sides, then jointing of each side (O'Connor 1982, 16). The axial splitting of an atlas suggests that, at Bremore, the skull was sometimes removed at the base of the skull rather than the more usual atlas-axis joint. Chopmarks on a mandible, meanwhile, are consistent with the separation of this from the upper cranium. This would fit with the removal of the crania along with hides, while retaining the mandible would allow for extraction of the tongue.

Butchery marks on pelves are consistent with the removal of the hindlimb at the hip joint, and separation of the sides of the hip from the sacrum. In the forelimb, all butchery marks are consistent with the separation of the limb at the elbow. Significantly, identified humeri are predominantly from the distal end and butchery indicates that this was separated from the rest of the humerus, remaining attached to the radius and ulna. This closely resembles the modern-day butchery pattern to produce a shin or 'shank' of meat. This is a much lower meat-bearing joint than the upper humerus, and reduces even further the presence of any prime meat-bearing joints at the site.

Butchery marks on the hindlimb elements indicate separation of the lower part of the limb at the hock. This involves chopping through the distal tibia and the ankle bones (calcaneum, astragalus and tarsals). The only butchery evident in the 17th/18th Century phase also reflects this disjointing. Such a chop would ensure a lack of damage to the metatarsal, and fits with the salvaging of this bone for manufacturing purposes.

Pathology

Pathological changes were evident in five (6.5%) cattle bones from post-medieval levels, with a further six bones recovered from Unstratified levels also identified with pathologies (see Appendix H). Although proportionately higher than expected, the numbers involved are very small, and none of the pathologies identified could be regarded as significantly impacting on the animal.

All pathologies from post-medieval features related to joints, and are more likely to be age-related than suggestive of general poor health. Osteochondritis dissecans was identified on two distal tibia: this is associated with cartilaginous damage within a joint, resulting from excess stress on that joint (Brothwell 1995, 219). Two of the other pathologies noted involved two pelves, one with mild exotoses at the acetabulum, the other with some eburnation at the hip-joint (Fig.7). While both of these are symptoms of osteoarthritis, the absence of other symptomatic evidence in either case discounts such a conclusion. In both cases, it may simply indicate natural wear at the joint in older age. Likewise, the expanded lateral facet on a proximal metacarpal suggests excess strain on the joint, either from work or old age.

In addition to the above, there was one instance of fusion of cattle tarsals. This involved the fusion of a navicular-cuboid with the lower tarsals (Fig.8), usually indicative of spavin. This condition is more typical of horses, but is also known in cattle used for traction (Baker & Brothwell 1984, 117). It results from trauma or strain on the joint, although a genetic predisposition may also be a factor (*ibid.*, 118). In the present case, as no other pathological changes to the bones were noted, the precise aetiology of the condition, or what it would have meant for the animal, could not be inferred.

The only non-joint related pathology from post-medieval levels involved a cattle-sized rib with a well-healed fracture.

No pathologies were present on 17th/18th Century or 19th/20th Century bones. Pathologies associated with the Farm Burials, and from Topsoil are dealt with in the relevant sections of this report.

Fig.7. Pelvis, showing area of eburnation on acetabulum *Fig.8. Fused tarsals, representing a possible case of Spavin*

Sheep/Goat

The difficulties in distinguishing skeletal elements of sheep and goat have already been mentioned in the Methodology. Where possible the two species were separated, although in most cases this could

not be done. No elements could be positively identified as goat, and it is likely that all the sheep/goat elements are from sheep, and they are treated as such for the purposes of this analysis.

Skeletal Representation

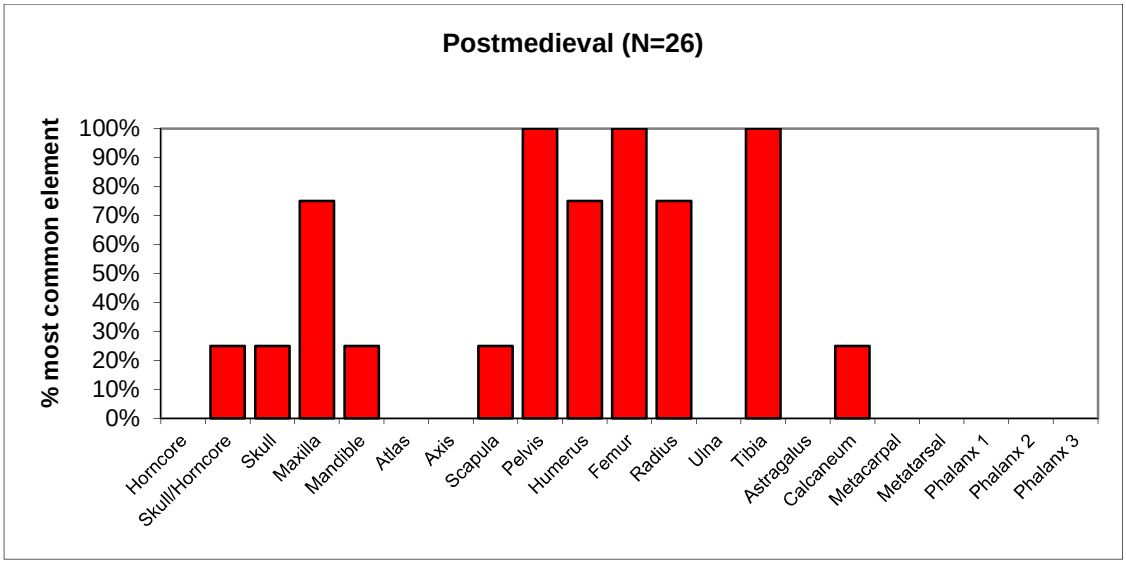

Fig.9. Skeletal Representation for sheep/goat for the post-medieval phase, excluding loose teeth.

The main meat-bearing bones of the skeleton are all represented in the post-medieval assemblage (Fig.9). However, the lower bones of both fore- and hindlimb are absent, even though these generally have a good survival rate. With the exception of the upper and lower parts of the jaw, skull and horncores are also under-represented, especially when their tendency to fragment is considered. As with cattle, this may be explained by the removal of hides, horncores and lower limbs for industrial use elsewhere. However, there is also an absence of sheep-sized vertebrae from this phase, and the pattern may represent the presence of specific cuts of meat rather than entire carcasses at the site. Disposal practices at the site may also be a factor, and this along with the low numbers involved make it difficult to draw any concrete conclusions.

The 17th/18th sample of sheep/goat bones consists of just 9 bones; too small for any further quantitative analysis. With the exception of the radius all the main meat bearing bones are, once again, represented, and the pattern bears a resemblance to that of the post-medieval phase.

The 19th/20th Century phase contained only a single metacarpal and two loose teeth from sheep/goat (excluding the Farm Burials).

Ageing

No mandibles with in-situ teeth were available for Mandibular Wear Analysis. Three loose, lower molars from post-medieval features were from younger adult and mid-adult animals, (O'Connor Wear Stages A1 and A2).

Fusion Age	Element	Fused	Unfused	% Fused	Total N
10months	Humerus (D)	1		100%	1
	Radius (P)	1		100%	1
Total 10 months		2			2
2.5-3y	Calcaneum (P)		1	0%	1
Total 2.5-3 years			1		1
3-3.5y	Tibia (P)		1	0%	1
Total 3-3.5 years			1		1
Grand Total		2	2		4

Table 2. Fusion data for post-medieval sheep/goats, showing proportion of fused elements.

There was little fusion data available. In the post-medieval phase early fusing elements were all fused, while all late-fusing elements were unfused (Table 2). This suggests animals between 10 months and 3 years, but as only four bones were available for fusion analysis, this may not be representative of the site. Elsewhere in Ireland, a peak of slaughter between 12 months and 3 years is considered indicative of exploitation of sheep for hides rather than wool (Murphy, 2007, 319).

In the 17th/18th Century collection, the only bone with fusion data was from an animal over 10 months of age, while in the 19th/20th Century phase one bone was from an animal over 18 months.

Sexing

No horncores were complete enough to be sexed on morphological grounds.

Size

Measurements were taken where possible on all ovicaprid bones and are given in Appendix G. Only one complete limb-bone was available from stratified levels (excluding articulated burials) for the calculation of withers heights. This was from the 19th/20th Century and gave a withers' height of 58.92cm, following Teichert's method (von den Driesch & Boessneck 1974). This is similar to the heights obtained for the articulated burials, and medieval and post-medieval levels in Kilkenny City (Duffy 2010), suggesting improved breeds were not present at the site.

Butchery

Only 6% of post-medieval ovicaprid bones (i.e. just 2 bones) showed signs of butchery. These were both radii and, in both cases, chopmarks relating to disjointing of the forelimb were recorded. While one indicated separation of upper and mid- forelimb at the elbow joint, the second suggested the separation of the mid- and lower forelimb.

In contrast, the only butchery mark recorded on 17th/18th Century bones was a cutmark, relating to removal of flesh rather than disjointing of a carcass. No butchery was evident on sheep/goat bones from the 19th/20th Century levels.

Pathology

Two sheep/goat bones recovered from post-medieval feature F19/F26 showed signs of pathology, (Appendix H). Both were cases of periostitis, involving infection of the outer covering of the bone. These were characterised by the presence of areas of grey, woven bone, indicating the infection was active at time of death. However, additional, smoother plaques of bone suggest some healing had taken place and infection may have been of a chronic rather than acute nature. It is not possible to know the full extent of the infection (especially as post-depositional factors such as abrasion may cause loss of information), or to determine the extent to which this would have affected the animal.

Pathologies relating to the articulated burials, and Unstratified levels are dealt with in the relevant sections within this report.

Pig

Skeletal Representation

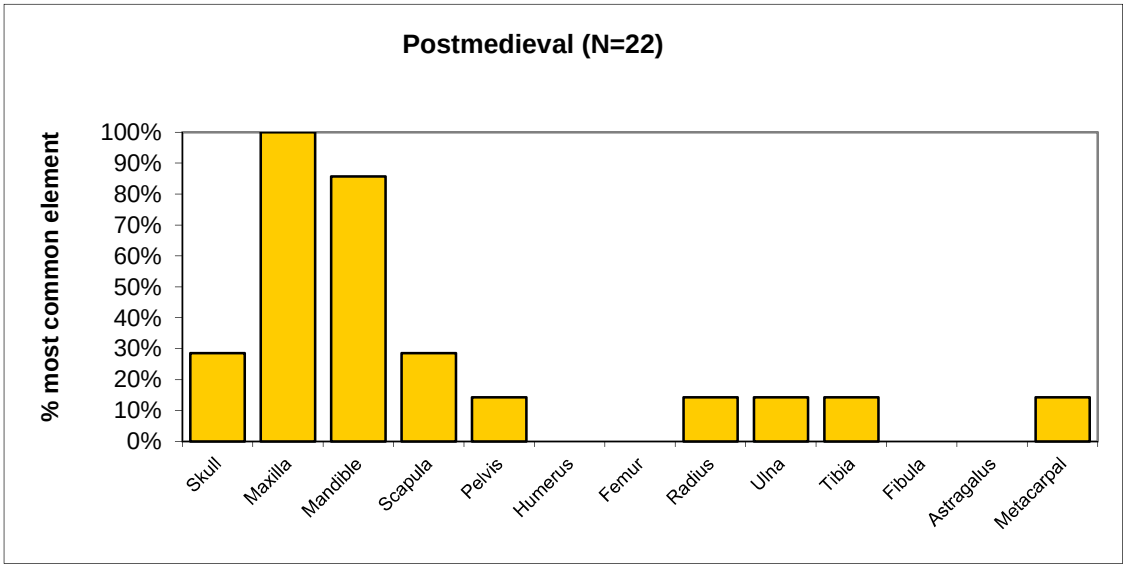

Fig.10. Skeletal Representation for pigs, for the post-medieval phase, excluding loose teeth.

Examination of the pig bones present in the post-medieval phase show an over-representation of maxillae and mandibles, which cannot be accounted for by fragmentation alone (Fig.10). Other bones occur at low levels, and show a relatively even distribution of the moderate meat-bearing parts of the pig. The prime meat joints of the upper limbs are notably absent, although the shoulder is well represented. However, the numbers are very low (totalling just 25 for the phase), and the pattern may not be representative of the presence of pigs at the site. Pig heads are, of course, a meat-portion in and of themselves, but one would expect a greater number of skull fragments apart from the maxillae. In addition, evidence of roasting over an open flame on one mandible would suggest a whole carcass rather than just the head. It is possible that the assemblage represents a selection of certain parts of the pig carcass, with the valuable prime meat-bearing elements, as well as the poorer feet and brain-containing cranium being removed from the site and consumed elsewhere. A second possibility to be considered, is the actions of scavengers in removing elements from the site. As mentioned earlier, pig bones showed less evidence of scavenging at the site, although usually considered to be selected for by dogs, due to their higher grease content. This may have skewed the skeletal representation at the site towards the less palatable jaw, over the longbones. However, it is not possibly to theorise further with any degree of confidence, due to the low numbers involved.

The 17th/18th Century assemblage contained just six pig bones from a single feature (F16), with the main limb-bones represented except for the tibia. No pig bone was recovered from 19th/20th Century levels.

Ageing

Only three mandibles were available for age profiling, all from post-medieval levels. These were from a young adult and 2 middle-aged adults (O'Connor Wear Stages A1 and A2).

Only three elements from the post-medieval phase were available for fusion data (Table 3). These were from at least one animal, older than 2 years, and younger than 3.5 years. This fits with the toothwear data, and is broadly consistent with the optimal age for killing pigs (McCormick 1997, 831).

All four specimens from the 17th/18th Century phase, with fusion data, were from a neonate – probably from a single individual. This may represent a stillbirth or be evidence of suckling pig being consumed. The absence of other high-status foods in this phase may lend more weight to the former explanation.

Fusion Age	**Element**	**Fused**	**Unfused**	**% Fused**	**Total N**
2 years	Tibia (D)	1		100%	1
	Metacarpal (D)	1		100%	1
Total 2 years		2			2
3-3.5 years	Ulna (P)		1	0%	1
Total 3-3.5 years			1		1
Grand Total		3	1		4

Table 3. Fusion data for post-medieval pigs, showing proportion of fused elements.

Sexing

Canine teeth present in the assemblage were all male, while the tooth socket for a canine on a mandible indicated this too was from a male. However, numbers were very low, consisting of a single maxilla and a single loose canine from a younger animal. It was also noted that two other maxillae and another mandible were of comparable size with those identified as male, and were probably also male. A high proportion of males indicates the acquisition of animals for food rather than the on-site breeding of animals. However, numbers present were very small and may not be representative of the overall assemblage.

Size

There were no complete, adult pig bones from stratified levels, and no withers' height calculations could be obtained. Measurements were taken where possible, and are recorded in Appendix G.

Butchery

No evidence of butchery was present on pig bones from stratified levels.

Pathology

Only one possible pathology was recorded on identified pig bones: this was on a maxilla from post-medieval feature F19. This maxilla displayed a loss of bone from the buccal side of the molar teeth, resulting in exposure of the tooth roots in this area. The burnished appearance of the roots suggest that this probably occurred ante-mortem, and suggests the presence of gingivitis leading to loss of bone around the alveolar cavity. This may be reflective of the habit of feeding leftover food to pigs, and it has been noted that pigs often exhibit similar dental pathologies to humans as a result (Davies 2005, 82).

Horse

Only two elements identified as horse were recovered from stratified levels. Both of these were calcanei, one each from post-medieval and 17th/18th phases in Trench 1. That from the post-medieval phase had some evidence of gnawing by a dog at one end. No further information was available.

Dog

Dog was represented by a single loose tooth from post-medieval features, and a loose tooth and a femur from 17th/18th Century levels. This last was fused at both ends, indicating an animal at least 18 months old.

No bones were sufficiently complete for height analysis, although measurements were taken where possible and are included in Appendix G.

No butchery was noted on any dog bones.

No pathologies were identified on dog bones from stratified levels (excluding articulated remains).

Cat

Cat remains were present in all stratified phases, but all within Trench 3. Cats were best represented in the post-medieval phase, with tibia, ulna and metatarsal bones present. From the presence of two left tibia, these represent at least two individual cats.

In the 17th/18th Century phase, cats are represented by a single loose tooth, while in the 19th/20th Century phase, a fragment of skull and a radius were recovered.

Fusion evidence suggests the cat remains from post-medieval levels were older than 11 months, and younger than 18 months at time of death. This may or may not represent a single animal (elements used for fusion date give an MNI of 1). The radius recovered from 19th/20th Century levels was older than 11 months at time of death.

No butchery was evident on any of the bones. This, and the very low numbers present suggest that the remains represent household cats, probably kept to control the rodent population.

No pathologies were noted on any of the bones present. Measurements were taken where possible (Appendix G).

Rabbit & Hare

Lagomorphs (hares and rabbits) were recovered from post-medieval levels, although in very low numbers. The hare remains are almost certainly those of the Irish hare, a subspecies of the mountain hare (*Lepus timidus*). This is the only native Irish species, and although introductions of the brown hare are known from the 19th century, sightings of brown hares remain localised even today (Fairley 2001, 283; 305). It would be highly unlikely for brown hare remains to be recovered from any pre-19th century features on a site. Rabbit bones are those of the European rabbit, a native of Spain, introduced to Ireland in the late 12th century as a source of both meat and fur (Fairley 2001, 252; McCormick 1991, 49).

Hare is represented by a single bone, a radius from an adult animal. Rabbit was only slightly better represented, with two bones (ulna and tibia). No fusion data was available for the tibia; the ulna, however, was fused indicating an adult animal.

No butchery marks were present on any of the lagomorph bones identified. No pathological changes were identified. Measurements were taken where possible and are included in Appendix G.

Rodents

The only other mammal remains identified from stratified levels was a single rat tibia from 19th/20th Century levels in Trench 3. It is uncertain whether this belongs to the black rat (*Rattus rattus*) or the brown rat (*Rattus norvegicus*). The latter was accidently introduced into Ireland in the 18th century, supplanting the black rat (Fairley 2001, 327-328). The tibia recovered at Bremore Castle was from an adult animal. Measurements were taken and are included in Appendix G.

Domestic Fowl

Domestic fowl were present in all stratified phases, albeit at very low numbers. Just three bones were recovered from each of post-medieval and 17th/18th Century levels; all of these were larger limb bones. A single coracoid was recovered from the 19th/20th Century phase.

Where articular ends of bones were present, these all had ossified ends, indicating they belonged to adult individuals. However, a radius from a younger animal was recovered from 19th/20th Century levels and is likely to be that of domestic fowl, although development and preservation of the bone did not allow for conclusive identification beyond 'chicken-sized'.

Medullary bone was evident in both of the tibiotarsi from the post-medieval phase, indicating these were from laying females. No femora or tibiotarsi were recovered from the other phases.

Measurements were taken on all bones where possible and are presented in Appendix G.

No butchery was evident on any of the fowl bones.

Pathology

One possible pathological condition was noted, on a tarsometatarsus from 17th/18th Century levels. Mild exotoses were recorded around the margin of the proximal articular surface, where the bone would have articulated with the tibiotarsus. No other changes, symptomatic of joint disease, were present. The changes noted may indicate soft tissue trauma at the joint, or may be age-related.

Goose

Goose bones from stratified levels were confined to the post-medieval phase. A total of five bones were recovered, from at least two individuals. A partial synsacrum from a goose species was also recovered, and may be that of *Anser anser*, but could not be conclusively identified to species level.

Where the articular ends of bones survived, these were all ossified, indicating adult animals. No medullary bone was present in the single tibiotarsus identified. No medullary bone was noted in any of the other bones, suggesting no laying females were present.

No butchery was noted on either bone, nor were any pathologies recorded.

No bones were complete enough to allow for measurements to be taken.

Other Birds

Duck

A single coracoid from a wild duck species was recovered from post-medieval levels in Trench 3. This was tentatively identified as the Tufted Duck, *Aytha fuligula*, common to Ireland and well-regarded as a food source in the past (Anderson 2008, 77).

Pigeon

A single ulna from a woodpigeon, *Columba palumbus*, was recovered from 19th/20th Century levels. The articular end present was fully ossified, indicating an adult animal. All possible measurements were taken and are included in Appendix G.

Other Birds

A partial radius recovered from 17th/18th Century levels could not be positively identified, but its size and form suggested it may be from a small wader or large passerine.

Fish

Three fish bones were recovered from post-medieval levels. Only one of these could be positively identified to family level, and was from a member of the Gadidae family, almost certainly Cod, *Gadus morrhua*. The other two bones were also from large sea-fish, probably also Cod.

Unstratified Bone

Animal bone recovered from unstratified levels (i.e. topsoil, and an area of machine disturbance) was examined to investigate what supplementary information it could provide relating to use and consumption of animals at Bremore Castle.

Considerably more bone was recovered from unstratified levels than recorded for stratified phases: some 68% of the total fragments collected (excluding the articulated farm burials) were from unstratified levels. Trench 1 yielded a much greater level of unstratified bone than any of the other trenches. This is unsurprising, as Trench 1 contained more than double the area of the next largest Trench (Baker 2017). Less easy to understand, was the sharp drop-off in numbers of unstratified bone between Trenches 2 and 3: these were both the same area in size, yet Topsoil in Trench 3 contained only c.20% of the amount of bone in Trench 2. Nor was the difference in bone quantities reflective of the stratified levels; Trench 3 was considerably richer in faunal remains overall relative to Trench 2. As bones quantities per area were similar for Trenches 1 and 2, and for Trenches 3-5, this may reflect the level of disturbance and reworking of the soil over time.

Species Present

A wider range of species was recovered from Topsoil levels across the site than from any single stratified phase. A total of 15 mammal and bird species, and two species of fish, were recovered (this compares with 12 species recovered from post-medieval levels). Species present largely reflect species recorded from the lower, stratified levels, but with an additional four species present only in topsoil levels (see Appendix B). Nonetheless, there was little similarity between unstratified and stratified

levels in any of the Trenches. This is, perhaps, to be expected, as Topsoil by its nature contains a mixture of bone disturbed from lower levels and bone brought in from outside the site in the form of manure or external soil.

It was only in Trench 1 that any definite relationship between the bone recovered from Topsoil and that from underlying features was conclusive. In this case, bone from the articulated remains of farm animals had been disturbed and a quantity of associated bone was recovered from the surrounding topsoil. This can be seen in the higher quantities of cattle, sheep/goat and dog bones recovered from the topsoil. Many of the bones consisted of the smaller foot bones, and loose teeth, while in some cases fragments of larger bones could be refitted with bones from the articulated remains. It was also noted that the high number of fowl and fowl-sized bones recovered in Trench 2, may represent just two individuals and may point to further farm-related burials at the site. The presence of skull fragments, and build-up of medullary bone in femora and tibiotarsi (hence laying hens) suggests that the remains are more likely to have been buried as complete birds rather than food waste.

Rare Species

Rare and wild species, are perhaps less likely to form part of a manuring collection. However, some, such as the rat, rook, and starling-sized bird identified in the unstratified collection, may be incidental deaths at the site. Two turkey bones recovered may have arrived at the site in manure, but may also relate to earlier activity at the site (turkey was introduced to Britain in the 16th Century, and was probably in Ireland shortly after this (Anderson 2008, 296)).

Of greater archaeological significance was the presence of a single fragment of antler beam, recovered from Topsoil in Trench 2. This represented a small fragment from the lower part of the beam, above the pedicle. It is possible it was taken from a shed antler and may not indicate the presence of deer carcasses at the site. The beam had been sawn through the upper part of the coronet, and again just below the brow tine. This corresponds with a typical portioning of an antler for the purposes of craftworking, e.g. comb manufacturing (McGregor 1985, 68), and almost certainly represents waste material from such use. The use of antler for manufacturing purposes declined during later medieval times, being replaced by an increased reliance on bone at this time (McGregor 1989, 113-115). It is unlikely, then, that the antler fragment represents activity at Bremore Castle during its occupation, but rather it may be indicative of activities carried out in the vicinity of the site in earlier times.

Pathologies

A number of pathologies were noted on bones recovered from unstratified levels. These were largely confined to the main domesticates (cattle and sheep/goat), with just one pathology recorded for dog.

Small areas of woven bone were identified on a mandible, pelvis and humerus of cattle, suggesting the presence of active infection at the time of death. The mandible also showed evidence of some joint degeneration, with expansion of the articular condyle and eburnation. Evidence of active infection was also present on a fragment of scapula of sheep/goat. Evidence of healed and healing infections were present on both a sheep/goat and cattle rib fragment. In all cases, the areas were localised, and fragmentation of the bone did not allow for any greater interpretation of the underlying cause.

A proximal cattle phalange displayed a lesion on the proximal articulation reminiscent of osteochondritis dissecans, and this may indicate trauma or excess strain on the joint. Pathological changes to an ulna from a sheep/goat included expansion of the lateral and medial facets, with exotoses on the medial margin. Such changes are indicative of some joint degeneration, either from stress or trauma, or relating to old age.

A single phalanx from a dog had an area of eburnation on the proximal articular surface, also suggesting some joint degeneration. No other associated changes were noted on the bone. As this was recovered from Trench 1, it may be related to the articulated remains (F13), but this is not certain.

A loose cattle incisor, and one loose molar from a sheep/goat had pathological changes to their roots, possibly the result of nutritional deficiencies.

A fragment of cattle pelvis with notably thin cortical bone is likely to have been disturbed from the articulated cattle remains (F15). Two cattle vertebrae are also likely to relate to the articulated remains.

Farm Burials

The articulated remains of cow/ox, sheep and dog were uncovered as discrete burials within the eastern half of Trench 1 (Baker 2017). These were each buried in a shallow pit, one of which extended into the eastern baulk (*ibid.*). None of the burials was complete, due to later disturbance in the area, and skeletal elements present are shown diagrammatically in Appendix D.

Cattle

The partial, articulated remains of a single cow/ox were recovered from the pit F15. Disarticulated remains of at least two foetal or neonate sheep were also recovered during excavation of this pit; these may have been disturbed by the cow/ox burial. The cattle remains were noted on-site as very fragile, with a tendency to fragment on excavation (I. Kinch pers. comm.). As a result, bones recovered were

very fragmentary, and less completed than from any of the other burials. In particular, the articular ends of bones had a very low survival rate. This loss of skeletal components was not solely due to the difficulty of recovery by excavation, however, as it was noted that some fragments of bone recovered from the surrounding topsoil could be refitted with the fragmentary articulated remains or were almost certainly related to it due to presence of a pathological condition.

Age, Sex and Size

Little ageing data was available, but the tooth eruption evidence and fusion of limb-bones present indicated an animal between 1-2.5 years in age. If phalanges recovered from Topsoil, almost certainly disturbed from the burial, are considered then the age-band can be tightened to 1-2 years in age.

Skeletal features that would allow for sexing of the animal were not present. Likewise, no limb-bones were complete, and a withers' height could not be calculated.

Pathologies

All the bones recovered had notably thin cortical bone (Fig.11), and was considerably less dense than would be expected, suggesting a mineral deficiency (Baker & Brothwell 1980, 47). Conditions that involve these changes to bones, such as osteoporosis or osteomalacia, are usually the result of poor grazing land, or an over-reliance on hay for food, but they may also be the result of parasitic enteritis (*ibid.*, 51-53; Krupski et al 1945). The presence of lesions in the articular surfaces of both scapula (Fig.12), and a metatarsal, are indicative of developmental anomalies and suggest the possibility of an underlying genetic or congenital condition that left the animal susceptible to the later mineral deficiency. One rib fragment showed signs of an earlier fracture, unsurprising given the low density of the bone, while woven bone on the same rib indicated an infection was ongoing at time of death. To what extent this contributed to the eventual demise of the animal remains uncertain. Certainly, the animal is likely to have been in a weakened state for some time, thus reducing its ability to heal or fight off infection.

Fig.11. Humerus from F15 (on right) showing thinness of cortical bone compared to a more normal cattle humerus.

Fig.12. Lesion in scapula of F15, indicating a developmental anomaly.

Sheep

The articulated remains of two sheep were present in two separate pits (F10 and F14; hereafter referred to as Sheep 1 and Sheep 2, for convenience). The latter extended into the eastern baulk of Trench 1, so that complete excavation was not possible. In particular, many of the limb-bones, shoulder and skull were almost completely absent. Sheep 1 had a greater degree of completion in the surviving skeleton, although here too the skull was largely absent (Appendix D). The animals were identified as sheep from the morphology of surviving portions of skull and metapodia.

In addition to the above, a number of disarticulated sheep/goat bones were recovered with the cow/ox burial. These comprised the main bones of the fore- and hindlimbs, one rib and one vertebra from at least two foetal or neonate animals. While they could not be conclusively identified to species, these are also likely to be those of sheep rather than goat. A number of disarticulated foetal/neonate bones from sheep/goat were also recovered from Topsoil in this area and may be associated.

Age, Sex and Size

Toothwear evidence form the mandibles indicate that both animals were adult, but not elderly (O'Connor Wear Stage A2), and were probably of a similar age at time of death. Fusion data on surviving longbones reinforces this: Sheep 1 was at least 3.5 years of age, while Sheep 2 was at least 2.5 years. Surviving vertebrae suggest the latter may have been 4-5 years of age.

The disarticulated bones recovered from F15 were determined as late foetal or neonate from the developments of the bones, and the presence of laterally unfused metapodia (these generally fuse before birth).

The survival of a partial horncore on Sheep 1 indicates that this was a female. The horncore-bearing part of the horncore was not present for Sheep 2, and sex could not be determined.

A number of limb-bones were available for withers' height calculations for Sheep 1; these gave a height range of 56.60 – 61.78 cm, using Teichert's co-efficient (von den Driesch & Boessneck 1974). This highlights the difficulty of using such calculations as absolute or precise representations of an animal's height. It was noted that both ends of this range were outliers (See Appendix G), with the remaining measurements giving a much closer range of 60.2 – 60.77 cm, which may be a more accurate estimation. Available measurements for Sheep 2 were more limited, being confined to the three surviving metapodia (Appendix G). These gave a height range of 61.71 – 63.14cm using Teichert's co-efficient (von den Driesch & Boessneck 1974). This suggests a slightly taller animal than Sheep 1, but whether this is indicative of sex, breed or normal variation could not be determined.

Pathologies

No clear pathology was identified on Sheep 1. However, a small, circular perforation was present on one distal condyle of a phalanx (Fig.13). Both the rounded edge on the perforation, and a slight expansion of the condylar margin adjacent to it indicate a pre-mortem origin for this, although the possible cause of such a lesion is unknown. No other pathological changes were noted on the bone, and the adjoining 2nd phalanx was not present for comparison.

Fig.13. Circular perforation on phalanx of Sheep 1.

Fig.14. Osteochondritis dissecans on the left metacarpal and capitate of Sheep 2.

In the case of Sheep 2, pathological changes were identified on a number of bones. Evidence of infection of the periosteum was present on both mandibles and the sternum. This was not extensive in either case, but was active at time of death and may have contributed to such. Evidence of excess stress to joints was also identified. In particular, lesions consistent with osteochondritis dissecans

were present on the distal end of the left metacarpal, and the adjoining surface of the capitate (Fig.14) – indicating strain or trauma to the lower forelimb. Pronounced asymmetry of the metatarsals, and new bone growth on the pelvis, also suggest excess stress or weight on the joints. Lastly the development of open, reticulated bone at both articular ends may point to the presence of infectious arthropathy. With the exception of the infections, these changes may relate to the age of the animal, or the terrain in which it lived and are unlikely to be related to its death.

Dog

The articulated remains of a dog were present in a pit close to that of Sheep 2. This was the most complete of the skeletons excavated (Appendix D), with all but the smaller bones of the feet, tail and the fragile skull, present – if not complete. In addition, a large proportion of the skull fragments, loose teeth, metapodia, tarsals, phalanges and other fragments identified as dog from topsoil in Trench 1 are very probably from the buried animal. Indeed, fragments of both left and right pelves recovered from the topsoil were easily refitted with the articulated remains.

Age, Sex and Size

All the surviving articular ends were fused, indicating an animal of at least 18 months.

The presence of a baculum, a sesamoid bone found in the penes of carnivores, indicated that this was a male dog.

Element	Length mm	Withers Height cm (after Koudelka 1885)	Withers Height cm (after Harcourt 1974)
Tibia R	190	55.48	55.48
Tibia L	195	56.94	56.94
Femur R	182.5	54.93	62.05
Humerus R	162	54.59	55.57
Humerus L	162	54.59	55.57

Table 4. Withers' Height estimation for articulated remains of dog, F13.

The withers' height of the animal was determined from measurements of complete long-bones, using the coefficients of both Koudelka, and Harcourt (as given in von den Driesch & Boessneck 1974). As with the sheep estimations, these provided a size range, rather than a precise height (Table 4). While Harcourt's coefficients are generally favoured, this gave the wider height range at 55.48 – 62.05cm, with an average of 57.1cm. Meanwhile the method of Koudelka gave a height range of 54.59-56.94cm,

with an average of 55.3cm. The femur measurement can be considered somewhat of an outlier under Harcourt's method, and if this is discounted the height range is 55.48-56.94cm, much closer to that obtained under Koudelka's method. This suggests the dog was similar in height to a modern Labrador, Rough Collie or Irish Water Spaniel (Sutton 1996; www.ikc.ie/). It was somewhat larger than the more common farm dogs in the 19th and 20th centuries: the Border Collie and Wheaten Terrier (*ibid.*).

Pathologies

A shallow lesion, consistent with osteochondritis dissecans, was present on the distal articulation of both tibiae. This is usually seen as reflective of trauma to the joint, causing damage to the cartilage and thus separation of a small portion of the underlying bone from the articular facet (Brothwell 1995, 219). The underlying cause of such trauma is uncertain, but the condition is common in large dogs (Baker & Brothwell 1984, 129).

Fig.15. Metacarpals of dog, showing morphological changes due to infection.

Fig. 16 Ulna & Radius of dog, showing proliferation of grey woven bone, indicative of infection

Extensive areas of grey, woven bone and remodelled bone were present on the bones of the left forelimb (metacarpals, radius, ulna, humerus; Fig.14). This is indicative of an advanced infection of the outer surface of the bone (osteoperiostitis), probably resulting from an external injury that allowed pathogen infiltration into the blood system, and the outer surface of the bone (Baker & Brothwell 1984, 62). No trauma is evident on any of the bones, suggesting the initial injury may have been to soft-tissue, rather than a fracture – e.g. a deep cut or puncture wound. The absence of carpals

and phalanges, however, means the true extent of the infection is unknown, and the possibility of a fracture or other trauma to the paw cannot be ruled out.

The extent of woven bone, and the level of evident remodelling increases towards the distal limb, suggesting the injury is most likely to have occurred in the paw, with the infection spreading upwards through the limb, and reaching the distal humerus by the time of death. By this time, the effects of the infection would probably have been widespread, causing increasing pain and lameness to the animal.

While it is easy to ascribe neglect in such cases, and judge the situation from a modern-day perspective, it must be remembered that antibiotics may not have been available to treat the condition. In addition, an injury such as a puncture wound would not easily have been noticed in a working dog, until the infection had already set in.

Discussion

Animal bone assemblages ultimately represent waste products deposited at a site, and can provide information about the diet, and hence the social status, of the former inhabitants, and of the activities carried out at the site in relation to animals and waste disposal.

Diet and Economy

The dietary habits of a household with a higher socio-economic status may be expected to include larger quantities and a wider variety of meats than one of lower social standing; both to meet the day-to-day requirements of an extended household and allow for more public displays of status in the form of feasting and hosting of important guests. Food waste from such a lifestyle should typically include a wide range of species, high quality meats and cuts, and evidence for higher meat consumption (Ashby 2002, 39). In zooarchaeological terms, this incorporates an examination of the number and diversity of species present, the parts of the animal carcass consumed, the age of food-animals, and the health of the animals. Utilisation of a carcass and methods of cooking may also be a factor.

Species Range and Abundance

The post-medieval assemblage suggests that cattle were undoubtedly the main source of meat at that time, comprising some 40% of the identified bones. The dominance of beef in the diet is even greater when meat yield of cattle over the smaller domesticates is considered. Sheep and pigs were of secondary importance, and while pigs may have formed a greater part of the diet than seen on some other post-medieval sites (e.g. McCormick 1984; McCormick & Murphy 1997; Murray 2004; McQuade

2006), sheep were of less importance than often seen. There is some evidence to suggest that relative abundance of pigs is higher on high status sites (Ashby 2002, 41). However, levels at Bremore are still within the expected range, and lower than both cattle and sheep. The low numbers involved in the assemblage can also cause differences between relative abundances to appear exaggerated. In particular, less abundant animals can appear of greater importance than they perhaps should be.

Domestic fowl and geese appear to have constituted a very minor part of the diet at Bremore. Geese were better represented than fowl, although here too, the low numbers involved may be a factor. It is uncertain whether the geese bones recorded are those of domestic or wild birds, and geese may have been kept at the castle along with fowl. The presence of laying hens in the assemblage indicates that fowl were probably kept to provide the household with eggs, as much as a ready meat source.

Despite the presence of a dovecote at the castle in 1567 (Baker 2017, 3), no domestic pigeon was identified in the assemblage. Documentary evidence suggests consumption of domestic pigeons could be very high – at one 16th century estate in England, over 1,000 pigeons were consumed in one six-month period (Emmison 1964, 42). There is nothing to suggest that this is unusual for such a household, and even allowing for a much smaller pigeon stock, the complete absence of any evidence for consumption of pigeon in the Bremore assemblage is unusual. This may be due to the localised nature of the assemblage, or the assemblage examined may postdate the keeping of pigeons at the site.

Consumption of wild species is regarded as an indication of higher status within society, and restrictions on access to wild game were still a factor in post-medieval times. The presence of hare, rabbit, and some wild bird species (duck, goose) indicate the inhabitants of Bremore had such access, although the low abundance suggests that these were probably not a regular occurrence at the dinner table. None of the more elite species are present, such as deer or the more status-associated birds – although in the 19th Century Tufted Duck was well regarded as a foodstuff (Anderson 2008, 77).

Likewise, seafood does not appear to have formed a significant part of the diet, despite the castle's proximity to the coast. Fishbones recovered consisted of larger bones from large seafish (most likely Cod).

The 17th/18th Century bone assemblage is dominated by the main domestic food animals, with a notable absence of wild species, and also a lack of goose. However, this collection is very small and may not be representative of the original situation.

Carcass Utilisation and Cooking Methods

The presence of some high-meat bearing bones, notably for sheep, is indicative of a household with some degree of affluence (Pigiére *et al* 2004, 241). However, the evidence also points to other lesser cuts, such as ox-tongue and feet also being consumed (Gervase Markham writing in the early 17th

Century offers a recipe for neat's foot stew (1615; 1986 ed., 82), neat being an older name for cattle). Added to this, there is an emphasis on moderate meat-bearing bones for cattle: a closer look at the butchery evidence indicates the high level of humeri recorded is associated with the moderate shin or shank joint, rather than the prime shoulder cut as may be initially indicated. An overabundance of head elements of pigs, suggests pigshead may have been more commonly consumed than other, more meat-rich parts of the carcass. As with cattle, there is a general lack of prime meat joints in the case of pigs.

It is likely that cattle, at least, were slaughtered and butchered at the site, perhaps drawn from the estate's own herd. Sheep may also have been reared on the estate, although these appear to have been slaughtered at a different location. It is interesting, then, that the highest meat-bearing joints of cattle were absent from the site, suggesting they were consumed elsewhere.

The splitting of bones along the long axis is indicative of marrow extraction and generally associated with a lower status diet (Ashby 2002, 45). Some bones split in this way were noted at the site, but this level of carcass utilisation does not appear to have been the usual. Bones were more frequently broken transversely than lengthways, consistent with their use in stews, or for stocks and broths. Medieval and post-medieval sources indicate that joints were usually broken into smaller parts prior to boiling (Brears 2008, 147; Markham 1615 (1986 ed.), 74). Boiling is less time consuming and does not require the constant attention of roasting over an open fire (Brears 2008, 303). Outside of affluent households who could afford the extra time or help necessary, roasting would probably be a rare occurrence, reserved for special occasions. At Bremore, there is evidence for the roasting of a boar, probably as a complete carcass. This may have been a rare or singular event, although as Brears points out, roasting in front of an open fire if done properly leaves no trace on the bone (2008, 306) and as such may be underestimated in an assemblage.

Age & Health of Animals

High status sites are generally associated with the consumption of younger animals (Pigiére *et al* 2004, 242; Ashby 2002, 42). While no very young individuals were identified from the post-medieval phase at Bremore, there is evidence to suggest that some cattle and sheep were consumed in their prime. Cattle were predominantly over three years of age when slaughtered, suggesting their use was primarily for secondary produce such as milk or draught-work. The presence of some younger individuals is consistent with the presence of a site herd, from which younger male animals could be culled for household consumption.

Sheep appear to have been killed at 1-3 years of age, considered indicative of an economy based on hides rather than wool (Murphy 2007, 379). The low numbers available for analysis means it is

uncertain if sheep were also bred at the site: this is likely, although they appear to have been processed elsewhere.

Pigs appear to have been slaughtered as full-grown adults, and the lack of identified females and both older and younger individuals suggests these were not bred at the site, but were brought in specifically for food. The procurement of prime animals suggests a higher level of buying power, although it is uncertain if entire animals or individual joints were bought. Pigs may also have arrived at the site as payment in kind for rent – documentary sources indicate that the provision of food animals as part payment for rents and other obligations was still part of life in post-medieval Ireland (Curtis 1941, 151). Some neonate pig was recovered from the 17th/18th Century phase, although this may represent a stillbirth rather than the procurement of suckling pig, suggesting that by this time pigs were being reared at the site.

All pathologies identified in post-medieval cattle bones related to joint degeneration, often associated with older individuals and the use of animals for traction. This is consistent with the consumption of older animals at the site, as suggested by the age-profile data. Few pathologies were identified in sheep: however, those identified were infectious in nature indicating animals selected for consumption were not always in top condition. This suggests a lower level of affluence, although it could also be regarded as pragmatism in culling individuals from a herd. The only pathology identified in pig remains related to poor oral hygiene as a result of diet, and this is unlikely to have affected the overall condition of the animal. No pathologies were recorded on bone from the later stratified levels.

Site Activities

The range of species and body-parts identified at Bremore Castle indicates the assemblage is the result of the disposal of domestic refuse, representing kitchen waste, butchery waste and the remains of household animals.

There is little evidence that food refuse was disposed of by fire, while a lack of weathering suggests that food or kitchen waste was not exposed on the ground surface prior to deposition. This latter is in contrast to evidence from urban sites, which suggests that food waste was often initially disposed of in rubbish heaps and prone to scavenging by dogs and cats (Duffy 2010; Duffy 2011). However, the assemblage from Bremore does not appear to represent a primary disposal site. There was no evidence to suggest soft tissue attachment on bones at time of deposition, and the presence of individual, skeletally isolated bones from smaller animals – particularly non-food animals such as cat – indicates that remains were fully skeletised and disarticulated at the time of their final deposition. Nonetheless, taphonomic changes to bone from the post-medieval assemblage was largely consistent,

suggesting bones may have been redeposited from same source and, as such, be broadly contemporary.

As already mentioned, few fish bones were recovered at the site and those recovered were generally cranial bones from larger sea-fish. This lack of fish is particularly notable when one considers the the Barnewalls of Bramore were awarded all 'tithes of fish' from the area during the later 16th Century (D'Alton 1838, 479-480). A lack of smaller fishbones on a site is often considered a problem of either retrieval, preservation, or both. In the case of Bremore, however, dry-sieving was carried out across the site throughout the excavation, suggesting retrieval issues are not enough to account for the lack. Preservation may have played some part, although the post-medieval bone was generally well preserved, and fish vertebrae should have a better survival rate than the fragile cranial bones (no fish vertebrae were recovered at the site). The lack of evidence for consumption of fish may represent conscious dietary decisions, but a more plausible explanation is that disposal activities at the site may be cause. In this scenario, two possibilities can be considered. Firstly, the assemblage represents a specific deposition, with table-scraps deposited elsewhere or removed off-site (or fully consumed) by scavengers. Secondly, if the assemblage represents a secondary deposition, smaller bones may not have been collected along with the main deposit and remained instead in the original deposition site. This would not be confined to fish, and it is notable also that the hare and rabbit bones recovered consisted of the larger longbones. In either of these possibilities, or indeed a combination of them, it is likely that smaller species of mammal, bird, and all species of fish are under-represented in the present assemblage.

The only evidence of craft-working at the site was the presence of a modified fragment of antler in topsoil levels. However, this is unlikely to be coeval with the occupation of the castle, relating instead to earlier activity either at the site or in the wider vicinity.

The animal-based industries of leather- and horn-working are characterised by deposits of horncores, skull fragments and foot bones; as partial skulls and feet were left attached to animals skins, making them easier to identify at market, and to facilitate stretching them during processing (Serjeantson 1989; Albarella 2003). In contrast, these elements are largely absent from the Bremore Castle assemblage, suggesting that hides and horns of cattle and sheep, and possibly skins of pigs, were removed to another location for processing. The more robust bones of the lower limbs of both cattle and sheep, favoured for manufacturing, may also have been removed for this purpose.

Conclusion

A total of 1,569 bones were examined from excavations carried out at Bremore Castle, Balbriggan during 2017, 508 of which related to stratified features. The earliest phase at the site related to the post-medieval occupation of the castle and was represented by 505 bones of mammals and birds, of which 259 could be identified to element and species or species group/size. Very low quantities of bones were recovered from later phases, and were insufficient for any detailed inferences or conclusions to be drawn. The articulated remains of four individual animals from a later period, were also examined.

Beef was the principal meat in the diet, supplemented by both mutton and pork. Meat was derived from adult animals, and while some prime individuals were consumed there was no evidence for the consumption of very young animals. The use of prime animals as a food source suggests a degree of affluence, as does the inclusion of wild animals in the diet. However, older animals may have formed a greater part of the overall diet, and the levels of game species present suggests that these were occasional rather than regular additions to the diet. Boiling appears to have been the main method of cooking, and while animals were sometimes roasted, this was probably also occasional. Overall, the assemblage suggests a moderate degree of affluence, but with a more modest lifestyle than what may be expected at a castle site. However, the importance of smaller mammals, birds and fish in the diet may be underestimated in the assemblage, due to scavenging and/or disposal methods employed at the castle.

Cattle were probably reared at the site, with an emphasis on dairy produce and traction over beef. Hides, horns and some lower limb-bones appear to have been sold on for industrial use. The better cuts of meat may also have been sold, or consumed elsewhere. Sheep may also have been kept on the estate, bred for hides rather than wool. As with cattle, hides, horns and some limb-bones were used elsewhere for manufacturing purposes. Pigs are likely to have arrived at the site as adults, rather than bred at the castle, and brought in for food purposes. Domestic fowl would have provided both meat and eggs to the household, and along with geese were probably reared at the castle.

As with all small assemblages, there are difficulties in forming anything like definite conclusions. This is particularly true where the assemblage is derived from a small area or few features. While the analysis presented here is that indicated by the assemblage, there is no certainty that the bone deposits examined are typical of the overall waste disposal activities at the site, or represent the entire range of diet and activities at the castle.

At a much later stage in its history, the western half of the walled garden was used to bury farm animals. The articulated, but partial remains of two adult sheep, a yearling cow/ox and an adult dog were recovered, while disarticulated neonate bones suggests that stillborn sheep/goat may also have

been buried there. Possible evidence for the burial of entire fowl in a separate Trench (T2) suggests the area used for such burials may have extended throughout the central part of the garden. Of the burials recovered, the cow/ox showed evidence of an advanced mineral deficiency that affected all the bones of the skeleton and probably contributed to its death. The dog was suffering from an ongoing infection in its left fore-limb at the time of death. This was probably the result of trauma to the paw, causing infection to spread to the bone and spread throughout the limb, and may well have contributed to his death. No potential cause of death for the two sheep was distinguished, although one showed evidence of a low-level infection. However, many conditions leave no traces on the bones, especially if these are acute. Nonetheless, it can be assumed that the cause of death was of a nature to make them unpalatable for consumption.

These burials are of likely 19th or early 20th Century date. Their burial probably post-dates the use of the area as a cabbage garden, and are more likely to coincide with its use as an orchard (Baker 2017, 8). The area would then have been occupied by the King family (*ibid*., 37), and the census evidence for the start of the 20th Century indicates that at that time cattle, horses, pigs and fowl were all kept at the castle by the Kings (www.census.nationalarchives.ie/). Sheep would not be housed, and were therefore not mentioned.

Examination of the animal bone recovered from topsoil levels across the site found that it was very mixed in nature. There was some obvious disturbance from soil immediately below it, although groundworks and manuring for the purposes of gardening were probably the greater contributor to the bones recovered. The topsoil collection did, however, yield the only evidence of craftworking in the vicinity of the site, in the form of a modified antler fragment. This was also the only instance of deer, while other rare species were also recovered from topsoil. The presence of bone fragments attributable to the animal burials in Trench 1, provides an argument for preliminary examination of topsoil bone on archaeological sites, especially where there is a possibility of burials (human rather than animal) in the vicinity.

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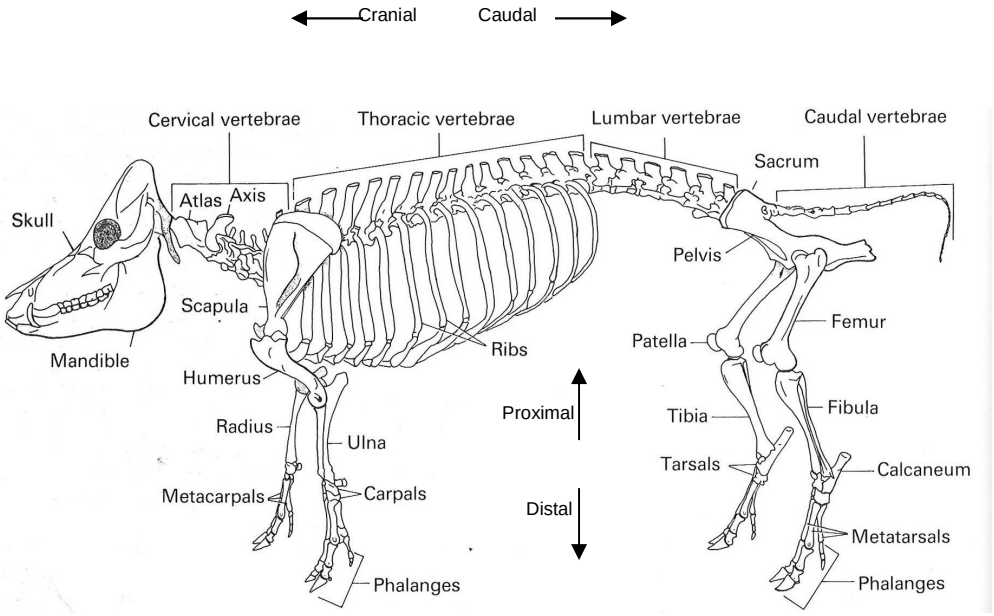
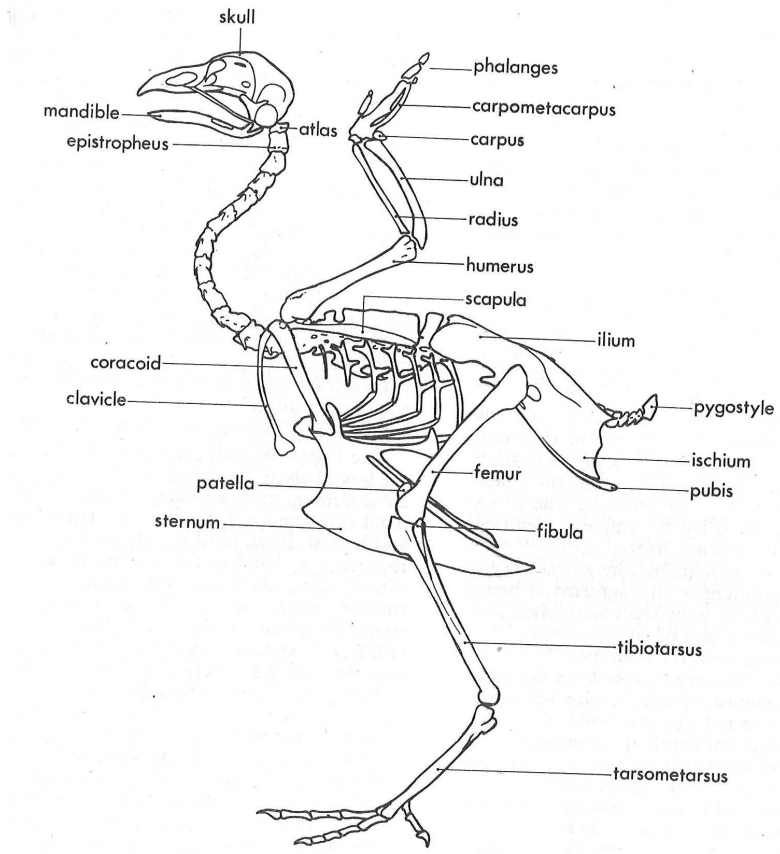
Skeletal Diagrams showing the principal bones for mammals and birds



Skeleton of Pig (Davis 1987).



Skeleton of Chicken (O'Connor 1982).

Species referred to in the text

Order	Family	Latin Name	Common Name
Artiodactyla	Bovidae	*Bos taurus*	Domestic Cattle
		Ovis aries	Domestic Sheep
		Capra hircus	Domestic Goat
	Suidae	*Sus scrofa*	Domestic Pig
	Cervidae		Deer species
Perissodactyla	Equidae	*Equus caballus*	Domestic Horse
Carnivora	Canidae	*Canis familiaris*	Domestic Dog
	Felidae	*Felis catus*	Domestic Cat
Lagomorpha	Leporidae	*Oryctolagus cuniculus*	Rabbit
		Lepus timidus hibernicus	Irish Hare
Rodentia	Muridae	*Rattus*	Rat species
Galliformes	Phasianidae	*Gallus gallus*	Domestic Fowl
	Meleagrididae	*Meleagris gallopavo*	Turkey
Anseriformes	Anatidae	*Anser anser*	Greylag/Domestic Goose
		Aytha fuligula	Tufted Duck
Columbiformes	Columbidae	*Columba palumbus*	Woodpigeon
Passeriformes			Songbirds
	Corvidae	*Corvus frugilegus*	Rook
	Sturnidae	*Sturnus vulgaris*	Starling
Charadriiformes			Waders
Anacanthini	Gadidae	*Gadus morrhua*	Cod

NISP Data

	Post-medieval			17th/18th Century			19th/20th Century			
Species	**NISP**	**%NISP**	**MNI**	**NISP**	**%NISP**	**MNI**	**NISP**	**%NISP**	**MNI**	**Total**
Cattle	77	40%	6	12	23%	2	1	7%	1	90
Sheep & Goat	35	18%	4	9	17%	2	3	20%	1	47
Pig	25	13%	4	6	12%	1				31
Horse	1	1%	1	1	2%	1				2
Dog	1	1%	1	2	4%	1				3
Cat	5	3%	2	1	2%	1	3	20%	1	9
Deer										0
Hare	1	1%	1							1
Rabbit	2	1%	1							2
Rat							1	7%	1	1
Goose	5	3%	2							5
Fowl	3	2%	2	3	6%	2	1	7%	1	7
Fowl/Pheasant										0
Goose sp.	1	1%								1
Galliformes	1	1%								1
Turkey										0
Pigeon							1	7%	1	1
Duck sp.	1	1%	1							1
Crow										0
Passerine										0
Cattle-sized	16	8%		1	2%		2	13%		19
Sheep-sized	16	8%		15	29%		1	7%		32
Cat-sized	1	1%		1	2%					2
Small Mammal							1	7%		1
Goose-sized	1	1%								1
Chicken-sized							1	7%		1
Small Bird				1	2%					1
Fish Gadidae	1			0			0			1
Total	192	100%		52	100%		15	100%		259

Total No. Fragments (excluding Fish)	505
NISP Total	259
% Total Id to Species	39.4%
% Total Id to Species Group	0.6%
% Total Id to Size Class	11.3%
% Total Non-countable	24.0%
% Total Unidentified	25.0%
Total Fish	3

NISP – Bird

	Postmedieval		17th/18th Century		19th/20th Century		
Species	**NISP**	**%NISP**	**NISP**	**%NISP**	**NISP**	**%NISP**	**Total**
Goose	5	42%					5
Fowl	3	25%	3	75%	1	33%	7
Fowl/Pheasant							0
Goose sp.	1	8%					1
Galliformes	1	8%					1
Turkey							0
Pigeon					1	33%	1
Duck sp.	1	8%					1
Crow							0
Starling-sized							0
Goose-sized	1	8%					1
Chicken-sized					1	33%	1
Small Bird			1	25%			1
Total	12	100%	4	100%	3	100%	19

NISP-Unstratified Levels

	Trench 1		Trench 2		Trench 3		Trench 4		Trench 5		Total	
Species	**NISP**	**%NISP**	**NISP**	**%NISP**	**NISP**	**%NISP**	**NISP**	**%NISP**	**NISP**	**%NISP**	**NISP**	**%NISP**
Cattle	79	19.4%	8	6.5%	6	21.4%	11	57.9%	6	27.3%	110	18.3%

Sheep & Goat	95	23.3%	21	16.9%	9	32.1%	5	26.3%	6	27.3%	136	22.6%
Pig	20	4.9%	3	2.4%	2	7.1%	1	5.3%	2	9.1%	28	4.7%
Horse		0.0%		0.0%		0.0%		0.0%	1	4.5%	1	0.2%
Dog	42	10.3%	3	2.4%		0.0%		0.0%	1	4.5%	46	7.7%
Cat		0.0%		0.0%	2	7.1%		0.0%		0.0%	2	0.3%
Deer		0.0%	1	0.8%		0.0%		0.0%		0.0%	1	0.2%
Hare		0.0%		0.0%		0.0%		0.0%		0.0%		
Rabbit	1	0.2%		0.0%		0.0%		0.0%		0.0%	1	0.2%
Rat		0.0%	1	0.8%		0.0%		0.0%		0.0%	1	0.2%
Goose	1	0.2%		0.0%		0.0%		0.0%		0.0%	1	0.2%
Fowl	4	1.0%	32	25.8%	2	7.1%		0.0%		0.0%	38	6.3%
Fowl/Pheasant		0.0%	1	0.8%		0.0%		0.0%		0.0%	1	0.2%
Goose sp.	1	0.2%		0.0%		0.0%		0.0%		0.0%	1	0.2%
Galliformes	1	0.2%	7	5.6%		0.0%		0.0%	1	4.5%	9	1.5%
Turkey	1	0.2%		0.0%		0.0%		0.0%	1	4.5%	2	0.3%
Pigeon		0.0%		0.0%		0.0%		0.0%		0.0%		
Duck sp.		0.0%		0.0%		0.0%		0.0%		0.0%		
Crow	1	0.2%		0.0%	1	3.6%		0.0%		0.0%	2	0.3%
Passerine		0.0%	1	0.8%		0.0%		0.0%		0.0%	1	0.2%
Cattle-sized	50	12.3%	4	3.2%	1	3.6%	2	10.5%	2	9.1%	59	9.8%
Sheep-sized	109	26.7%	4	3.2%	1	3.6%		0.0%	2	9.1%	116	19.3%
Cat-sized		0.0%	4	3.2%	3	10.7%		0.0%		0.0%	7	1.2%
Small Mammal		0.0%		0.0%		0.0%		0.0%		0.0%		
Goose-sized	1	0.2%		0.0%		0.0%		0.0%		0.0%	1	0.2%
Chicken-sized	2	0.5%	34	27.4%	1	3.6%		0.0%		0.0%	37	6.2%
Small Bird		0.0%		0.0%		0.0%		0.0%		0.0%		
Total	408	100.0%	124	100.0%	28	100.0%	19	100.0%	22	100.0%	601	100.0%

Taphonomy Weathering

Weathering stage	Post-medieval	17th/18th C	19th/20th C		Unstratified		Total	
	N	N	N	%	N	%	N	%
0	372	82	23		629		1106	
0-1			1	3.6%	5	0.5%	6	0.4%
No Data	18	5	4		423		450	
Total	**390**	**87**	**28**	**100.0%**	**1057**	**100.0%**	**1562**	**100.0%**

Taphonomy-Post Deposition

	Post-medieval		17th/18th C		19th/20th C		Unstratified		Overall	
	N	%	N	%	N	%	N	%	N	%
Cracking	3	0.8%	1	1.1%	3	10.7%	16	1.5%	23	1.5%
Root Etching	230	59.0%	7	8.0%	1	3.6%	23	2.2%	261	16.7%
Discolouration	57	14.6%	46	52.9%	0	0.0%	82	7.8%	185	11.8%
Soil Erosion		0.0%		0.0%		0.0%	2	0.2%	2	0.1%
Abrasion	387	99.2%	61	70.1%	21	75.0%	355	33.6%	824	52.8%
Accretions	2	0.5%	2	2.3%	0	0.0%	4	0.4%	8	0.5%
Flaking	0	0.0%	1	1.1%	0	0.0%	0	0.0%	1	0.1%
Mineralised/ Petrification	1	0.3%	0	0.0%	0	0.0%	0	0.0%	1	0.1%
None	0	0.0%	3	3.4%	5	17.9%	629	59.5%	637	40.8%
Total frags	**390**	**100.0%**	**87**	**100.0%**	**28**	**100.0%**	**1057**	**100.0%**	**1562**	**100.0%**

Taphonomy-Fragmentation

	Post-medieval		17th/18th C		19th/20th C		Unstratified		Overall	
	N	%	N	%	N	%	N	%	N	%
Complete	12	3.1%	2	2.3%	3	11.5%	61	7.5%	78	5.9%
Fresh Breaks	262	67.2%	70	80.5%	4	15.4%	501	61.8%	837	63.7%
Old Breaks	364	93.3%	67	77.0%	20	76.9%	606	74.7%	1057	80.4%

No data	0	0.0%	0	0.0%	2	7.7%	246	30.3%	248	18.9%
Total	390	100.0%	87	100.0%	28	107.7%	1057	130.3%	1562	118.9%
Total with data	**390**		**87**	**100.0%**	**26**	**100.0%**	**811**	**100.0%**	**1314**	**100.0%**

Proportion	**Post-medieval**		**17th-18th C**		**19th-20th C**		**Unstratified**		**Overall**	
Element Present	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
<25%	141	71%	24	52%	10	53%	154	51%	329	58%
25-50%	23	12%	12	26%	5	26%	58	19%	98	17%
50-75%	17	9%	8	17%	1	5%	22	7%	48	8%
75-100%	17	9%	2	4%	3	16%	70	23%	93	16%
No Data	192	97%	41	89%	9	47%	753	248%	995	175%
Grand Total	390	197%	87	189%	28	147%	1057	348%	1562	275%
Total with data	**198**	**100%**	**46**	**100%**	**19**	**100%**	**304**	**100%**	**567**	**100%**

Proportion	**Post-medieval**		**17th-18th C**		**19th-20th C**		**Unstratified**		**Overall**	
Element Present	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
<25%	218	79%	43	67%	14	61%	676	79%	951	78%
25-50%	25	9%	11	17%	5	22%	62	7%	103	8%
50-75%	17	6%	8	13%	1	4%	34	4%	60	5%
75-100%	17	6%	2	3%	3	13%	87	10%	109	9%
No Data	113	41%	23	36%	5	22%	198	23%	339	28%
Total	390		87		28		1057		1562	
Total with data	**277**	**100%**	**64**	**100%**	**23**	**100%**	**859**	**100%**	**1223**	**100%**

Proportion	**Axial**		**Compact**		**Longbone**		**Other**	**Tooth**	**Verte/Rib**	**No info**	**Grand Total**
Element Present	**N**	**%**	**N**	**%**	**N**	**%**					
<25%	276	92.9%	13	13.5%	141	56.6%	483	1	32	5	951

25-50%	11	3.7%	12	12.5%	52	20.9%		1	17	10	103
50-75%	5	1.7%	18	18.8%	19	7.6%			16	2	50
75-100%	5	1.7%	53	55.2%	37	14.9%			14		109
No Data	2					0.0%		111	226		339
Total	299		96		249	100.0%	483	113	305	17	1562
Total with Data	**297**	**100.0%**	**96**	**100.0%**	**249**	**100.0%**					

Longbone Data	**Post-medieval**		**17th-18th C**		**19th-20th C**		**Unstratified**		**Overall**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Epiphysis only	3	5.4%	2	9.1%	0	0.0%	14	9.1%	19	8.1%
With epiphysis	26	46.4%	9	40.9%	3	75.0%	90	58.4%	128	54.2%
Complete	1	1.8%	3	13.6%	1	25.0%	17	11.0%	22	9.3%
Incl Proximal 33%	28	50.0%	11	50.0%	2	50.0%	80	51.9%	121	51.3%
Incl Distal 33%	31	55.4%	14	63.6%	4	100.0%	93	60.4%	142	60.2%

Portion Bone	**Trench 1**		**Trench 2**		**Trench 3**		**Trench 4**		**Trench 5**		**(blank)**	**Total**
<25%	485	80%	165	77%	268	77%	18	72%	14	56%	1	951
25-50%	33	5%	21	10%	39	11%	3	12%	7	28%		103
	2	0%		0%		0%		0%		0%		2
50-75%	25	4%	12	6%	18	5%	2	8%	1	4%		58
75-100%	65	11%	17	8%	22	6%	2	8%	3	12%		109
No Data	146		46		129		8		10			339
Total	756		261		476		33		35		1	1562
Total with Data	**610**	**100%**	**215**	**100%**	**347**	**100%**	**25**	**100%**	**25**	**100%**	**1**	**1223**

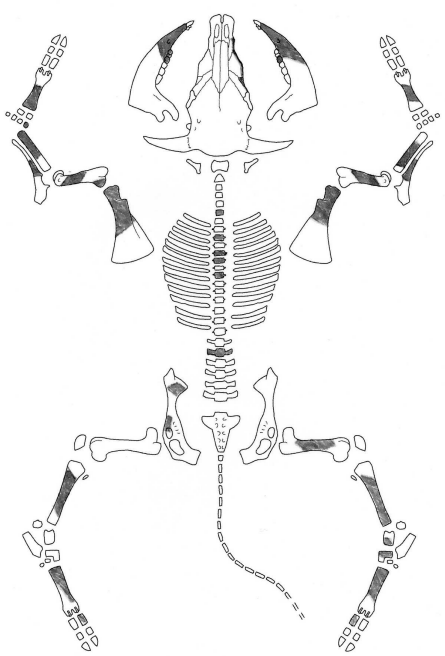
Taphonomy- Gnawing

Species	Carnivore	%	Rodent	%	Ungnawed	%	Total N
Cattle	14	7%		0%	186	93%	200
Sheep/Goat	5	3%	1	1%	161	96%	167
Sheep		0%		0%	16	100%	16
Pig	3	5%		0%	56	95%	59
Horse	1	33%		0%	2	67%	3
Dog		0%		0%	49	100%	49
Cat		0%		0%	11	100%	11
Deer		0%		0%	1	100%	1
Hare		0%		0%	1	100%	1
Rabbit		0%		0%	3	100%	3
Rat		0%		0%	2	100%	2
Goose		0%		0%	6	100%	6
Fowl		0%		0%	45	100%	45
Fowl/Pheasant		0%		0%	1	100%	1
Goose sp.		0%		0%	2	100%	2
Duck sp.		0%		0%	1	100%	1
Galliformes		0%		0%	10	100%	10
Turkey		0%		0%	2	100%	2
Pigeon		0%		0%	1	100%	1
Crow sp.		0%		0%	2	100%	2
Passerine		0%		0%	1	100%	1
Cow-size	1	1%		0%	77	99%	78
Sheep-size		0%		0%	148	100%	148
Cat-size		0%		0%	9	100%	9
Small Mammal		0%		0%	1	100%	1
Goose-size		0%		0%	2	100%	2
Chicken-size		0%		0%	38	100%	38
Small Bird		0%		0%	1	100%	1
Non-countable	2	1%		0%	217	99%	219
Unidentified		0%		0%	483	100%	483
Grand Total	**26**	**2%**	**1**	**0%**	**1535**	**98%**	**1562**

Burning

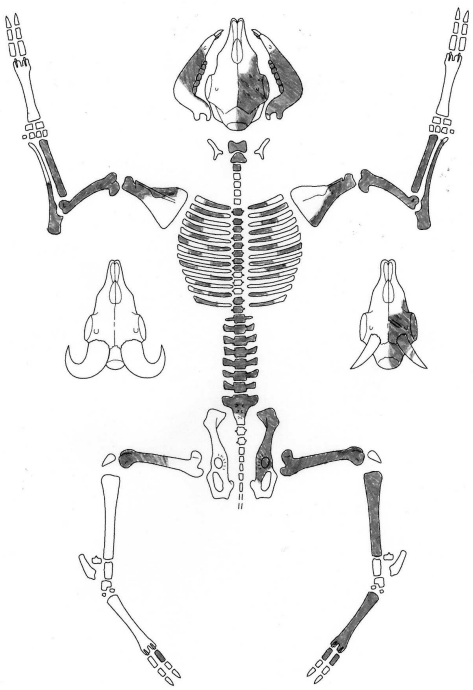
	Post-medieval	17th/18th C	19th/20th C	Unstratified	Total	
					N	%
Singed				1	3	0.2%
Charred	2			2	2	0.1%
Partly Calcined	1	1	1	1	4	0.3%
Fully Calcined				1	1	0.1%
Unburnt	387	86	27	1052	1552	99.4%
Total	**390**	**87**	**28**	**1057**	**1562**	**100.0%**

17E0302 Bremore Castle; F15, Trench 1 ***Bos taurus***



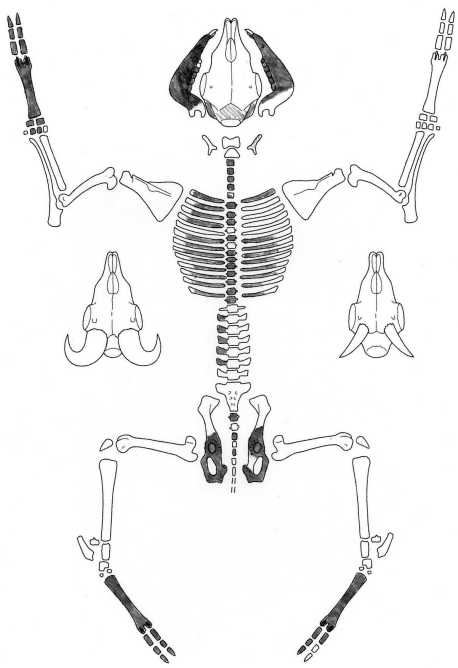
Background diagram: Courtureau, M. 2013, after Helmer, D. 1987. http://www.archeozoo.org/ archeozootheque/

17E0302 Bremore Castle; F10, Trench 1 ***Ovis aries (Sheep 1)***



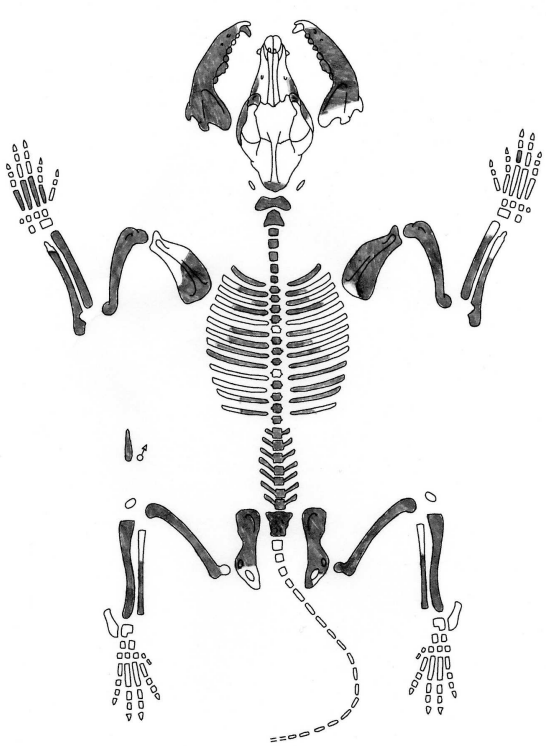
Background diagram: Courtureau, M. 2013, after Helmer, D. 1987. http://www.archeozoo.org/ archeozootheque/

17E0302 Bremore Castle; F14, Trench 1 ***Ovis aries (Sheep 2)***



Background diagram: Courtureau, M. 2013, after Helmer, D. 1987. http://www.archeozoo.org/ archeozootheque/

17E0302 Bremore Castle; F13, Trench 1 ***Canis familiaris***



Background diagram: Courtureau, M. 2013, after Helmer, D. 1987. http://www.archeozoo.org/ archeozootheque/

Skeletal Representation

Cattle *(Excluding loose teeth)*

Element	Post-medieval		17th-18th C		19th-20th C		Total
	N	% Humerus	N	% Humerus	N	%	
Horncore		0%		0%			0
Skull		0%		0%			0
Mandible	3	27%	1	50%			4
Atlas	2	18%		0%			2
Axis	1	9%		0%			1
Sacrum	1	9%		0%			1
Scapula	3	27%		0%			3
Pelvis	10	91%		0%			10
Humerus	11	100%	2	100%			13
Femur	2	18%	2	100%			4
Radius	6	55%	1	50%			7
Ulna	4	36%	1	50%	1		6
Tibia	4	36%	1	50%			5
Calcaneum	3	27%		0%			3
Astragalus	3	27%	1	50%			4
Metacarpal	5	45%	2	100%			7
Metatarsal		0%		0%			0
Metapodial		0%	1	50%			1
Phalanx 1	7	64%		0%			7
Phalanx 2	4	36%		0%			4
Phalanx 3	5	45%		0%			5
Tooth - Incisor		0%		0%			0
Tooth - Premolar	1	9%		0%			1
Tooth - Molar	2	18%		0%			2
Tooth		0%		0%			0
Cattle Total	**77**		**12**		**1**		**90**

Cattle-Sized

Element	Post-medieval	17th-18th C	19th-20th C	Total
Vertebra - Thoracic	1			1
Vertebra - Lumbar			1	1
Hyoid	2			2
Rib	3			3
Carpal			1	1
Tarsal	1			1
Skull	3			3
Mandible	1			1
Scapula	5	1		6
Total	16	1	2	19

Sheep/Goat *(Excluding loose teeth)*

Element	Postmedieval		17th-18th C		19th-20th C		Total
	N	% Tibia	N	% Tibia	N	% Metacarpal	
Horncore		0%		0%		0%	3
Skull/Horncore	1	25%		0%		0%	1
Skull	1	25%		0%		0%	10
Maxilla	3	75%		0%		0%	5
Mandible	1	25%	1	25%		0%	7
Atlas		0%	1	25%		0%	2
Axis		0%		0%		0%	2
Scapula	1	25%		0%		0%	6
Pelvis	4	100%	1	25%		0%	18
Humerus	3	75%	1	25%		0%	11
Femur	4	100%	1	25%		0%	7
Radius	3	75%		0%		0%	11
Ulna		0%		0%		0%	3
Tibia	4	100%	4	100%		0%	16
Astragalus		0%		0%		0%	3
Calcaneum	1	25%		0%		0%	4
Metacarpal		0%		0%	1	100%	5
Metatarsal		0%		0%		0%	6
Phalanx 1		0%		0%		0%	6
Phalanx 2		0%		0%		0%	2
Phalanx 3		0%		0%		0%	1
Tooth - Incisor		0%		0%	2	200%	9
Tooth - Canine		0%		0%		0%	3
Tooth - Premolar		0%		0%		0%	8
Tooth - Molar	9	225%		0%		0%	34
Total	35		9		3		183

Pig

Element	Postmedieval		17th-18th C		Total
	N	% maxilla	N	%	
Skull	2	29%		0%	7
Maxilla	7	100%		0%	10
Mandible	6	86%		0%	8
Scapula	2	29%	1	100%	3
Pelvis	1	14%		0%	1
Humerus		0%	1	100%	2
Femur		0%	1	100%	1
Radius	1	14%	1	100%	5
Ulna	1	14%	1	100%	2
Tibia	1	14%		0%	4
Fibula		0%	1	100%	1
Astragalus		0%		0%	1
Metacarpal	1	14%		0%	2
Tooth - Incisor	1	14%		0%	3
Tooth - Canine	1	14%		0%	2

Tooth - Premolar	1	14%		0%	2
Tooth - Molar		0%		0%	5
Total	25		6		59

Dog

Element	Postmedieval NISP	17th-18th C NISP	Total
Femur		1	1
Tooth - Canine		1	1
Tooth - Premolar	1		1
Total	1	2	3

Cat

Element	Postmed NISP	17th-18th C NISP	19th-20th C NISP	Total
Skull			1	1
Radius			1	1
Ulna	1			1
Tibia	3			3
Metatarsal III	1			1
Tooth - Premolar		1		1
Total	5	1	2	8

Horse

Element	Postmed NISP	17th-18th C NISP	Total
Calcaneum	1	1	2
Total	1	1	2

Rabbit

Element	Postmed NISP	Total
Ulna	1	1
Tibia	1	1
Total	2	2

Hare

Element	Postmed NISP	Total
Radius	1	1
Total	1	1

Rat

Element	19th-20th C NISP	Total

Tibia	1	2
Total	1	2

Cat-Sized

Element	Postmed NISP	17th-18th C NISP	Total
Ulna		1	1
Metatarsal	1		1
Total	1	1	9

Small Mammal

Element	**19th C** NISP	**Total**
Rib	1	1
Total	2	1

Deer Sp.

Element	**Unstratified**	**Total**
Antler	1	1
Total	1	1

Domestic Fowl

Element	**Postmedieval** NISP	**17th-18th C** NISP	**19th-20th C** NISP	**Total**
Coracoid			1	1
Humerus	1			1
Tibiotarsus	2			2
Tarsometatarsus		3		3
Gallus Total	3	3	1	7

Galliformes

Element	**Postmedieval**	**Total**
Ulna	1	1
Galliformes Total	1	10

Domestic/Wild Goose

Element	**Postmedieval**	**Total**
Mandible	1	1
Coracoid	2	2
Radius	1	1
Tibiotarsus	1	1
Anser Total	5	5

Anseriformes

Element	**Postmedieval**	**Total**
Ulna	1	1
Anseriformes Total	1	2

Wild Duck spp.

Element	Postmedieval	Total
Coracoid	1	1
Anatidae Total	1	1

WoodPigeon

Element	19th-20th C	Total
Ulna	1	1
Columba Total	1	1

Songbird/Passerine

Element	17th-18th C	Total
Radius	1	1
Small Bird Total	1	1

Fowl-sized

Element	19th-20th C	Grand Total
Radius	1	1
Fowl-sized Total	1	1

Goose-sized

Element	Postmedieval	Total
Synsacrum	1	1
Goose-sized Total	1	1

Ageing

Cattle Fusion

Post-Medieval

Fusion Age	Element	Fused	Unfused	% Fused	Total
Pre-birth	Metacarpal (P)	4		100%	4
	Metatarsal (P)				
	Phalanx 1 (D)	5		100%	5
	Phalanx 2 (D)	4		100%	4
	Total	13			13
06m	Atlas (A)	2		100%	2
	Axis (A)	1		100%	1
	Total	3			3
07-10m	Pelvis (P)	2		100%	2
	Total	2			2
12-18m	Humerus (D)	3		100%	3
	Radius (P)	1		100%	1
	Total	4			4
18m	Phalanx 1 (P)	4	2	67%	6
	Phalanx 2 (P)	4		100%	4
	Total	8	2		10
2-2.5y	Metacarpal (D)	1		100%	1
	Tibia (D)	2		100%	2
	Total	3			3
3-3.5y	Calcaneum (P)	1		100%	1
	Total	1		100%	1
3.5-4y	Femur (D)**		1	0%	1
	Radius (P)	1		100%	1
	Tibia (P)		1	0%	1
	Ulna (P)				
	Total	1	2		3
Grand Total		38	4		42

17th/18th Century

Fusion Age	Element	Fused	Unfused	% Fused	Total
Pre-birth	Metacarpal (P)	1		100%	1
	Total	1			1
2-2.5y	Metacarpal (D)	1		100%	1
	Total	1			1
2-3y	Metapodial (D)		1	0%	1
	Total		1	0%	1
3.5-4y	Femur (D)**		1	0%	1
	Total		1		1
Grand Total		2	2		4

Sheep/Goat Tooth wear

O'Connor stage	Post-medieval	Total
A1	2	2
A2	1	1
Grand Total	3	3

Phase	Feature	Trench	Species	Element	NISP	dp4/m3	P4	M1	M2	M3	O'Connor stage
Post-medieval	19	3	O/C	Molar	1					a	A1
Post-medieval	19	3	O/C	Molar	1				g		
Post-medieval	19	3	O/C	Molar	1					c	A2
Post-medieval	19	3	O/C	Molar	1					a	A1
Post-medieval	19	3	O/C	Molar	1				f		
Post-medieval	19	3	O/C	Molar	1				f		
Post-medieval	19	3	O/C	Molar	1				d		
Unstratified	1	1	O/C	Molar	1			h			
Unstratified	1	1	O/C	Molar	1				f		
Unstratified	1	2	O/C	Molar	1				h		
Unstratified	1	2	O/C	Molar	1				f		
Unstratified	1	3	O/C	Molar	1			g			

Sheep/Gopat Fusion

Post-medieval

Fusion Age	Element	Fused	Unfused	% Fused	Total N
10m	Humerus (D)	1		100%	1
	Radius (P)	1		100%	1
	Total	2			2
2.5-3y	Calcaneum (P)		1	0%	1
	Total		1		1
3-3.5y	Tibia (P)		1	0%	1
	Total		1		1
Grand Total		2	2		4

17th/18th Century

Fusion Age	Element	Fused	Unfused	% Fused	Total N
10m	Humerus (D)	1		100%	1
	Total	1			1
Grand Total		1			1

19th/20th Century

Fusion Age	Element	Fused	Unfused	% Fused	Total N
Pre-birth	Metacarpal (P)	1		100%	1
	Total	1			1
18-24m	Metacarpal (D)	1		100%	1
	Total	1			1
Grand Total		2			2

Pig Toothwear

Phase	Feature	Trench	Species	Element	NISP	dp4/m3	P4	M1	M2	M3	O'Connor stage
Post-medieval	19	3	SUS	Mandible	1					a	A1
Post-medieval	19	3	SUS	Premolar	1		a				
Post-medieval	19	3	SUS	Mandible	1			k	h	d	A2
Post-medieval	19	3	SUS	Mandible	1			e	a		
Post-medieval	19	3	SUS	Mandible	1					b	A2
Unstratified	1	1	SUS	Mandible	1				e		
Unstratified	1	1	SUS	Molar	1				N/C		
Unstratified	1	1	SUS	Mandible	1		b	g			
Unstratified	1	2	SUS	Molar	1	g/h					
Unstratified	1	2	SUS	Molar	1				V		

Pig Fusion

Post-medieval

Fusion Age	Element	Fused	Unfused	% Fused	Total N
Pre-birth	Metacarpal (P)	1		100%	1

	Total	1			1
2 years	Tibia (D)	1		100%	1
	Metacarpal (D)	1		100%	1
	Total	2			2
3-3.5y	Ulna (P)		1	0%	1
	3-3.5y Total		1		1
Grand Total		3	1		4

17th/18th Century

Fusion Age	Element	Fused	Unfused	% Fused	Total N
1y	Humerus (D)		1	0%	1
	Radius (P)		1	0%	1
	Scapula (D)		1	0%	1
	Total		3		3
3.5y	Femur (D)		1	0%	1
	Humerus (P)		1	0%	1
	Total		2		2
Grand Total			5		5

Neonate	Scapula (D)
17th/18thC	*Humerus (P)
	*Humerus (D)
	Femur (D)
	Radius (P)

*Single Element

Dog Fusion

17th/18th Century

Fusion Age	Element	Fused	Unfused	% Fused	Total N
18 months	Femur (D)	1		100%	1
	Femur (P)	1		100%	1
	Total	2			2
Grand Total		2			2

Other mammal fusion

Cat Fusion Data

Fusion Age (after Curgy 1965)	Element	Post-medieval			19th-20th C		
		Fused	Unfused	Total	Fused	Unfused	Total
11-18m	Tibia (P)	1	2	3			
	Total	1	2	3			
11-20m	Radius (D)				1		1
	Total				1		1
c.14m	Metatarsal (D)						
	Total						
Grand Total		2	2	4	1		1

Rabbit Fusion Data

		Post-medieval		
Fusion Age	Element	Fused	Unfused	Total N
Unknown	Ulna (P) Ulna (P)	1		1
	Total	1		1
Grand Total		1		1

Hare Fusion Data

		Post-medieval		
Fusion Age	Element	Fused	Unfused	Total N
Unknown	Radius (P)	1		1
	Total	1		1
Grand Total		1		1

Rat Fusion Data

		19th-20th C		
Fusion Age	Element	Fused	Unfused	Total N
Unknown	Tibia (D) Tibia (P)	1		1
	Total	1		1
Grand Total		1		1

Patholgies

Id.	Feature #	Sample #	Trench #	Phase	Species	Element	Side	Quantity	Pathology	Pathology Description
BR0513	19	20	3	Post-medieval	BOS	MC	R	1	Joint Degeneration	Lateral proximal articulation appears shallow but expanded to lateral; possible additional bone growth on posterior to compensate for shallowness but uncertain due to preservation. May be due to extra strain on joint from young age.
BR0486	19	20	3	Post-medieval	BOS	PEL	R	1	Joint Degeneration	Slight exotoses on outer ischial margin of acetabulum; extra bone growth at fusion point of 3 bones in centre acetabulum, wih overhanging margin. Changes to bone associated with joint degeneration, but not significant. Due to excess loading, soft tissue damage or old age.
BR0557	19	21	3	Post-medieval	BOS	PEL	L	1	Joint Degeneration	Area of eburnation on articular surface of acetabulum - no other visual changes to joint. Presence of eburnation indicates degradation of synovial fluid in joint.
BR0511	19	20	3	Post-medieval	COW-SZ	TARS	L	1	Joint Degeneration	Part navicular-cuboid of Bos - fused with lower tarsals, but no evidence of other pathological changes, or degeneration of joint. Possible case of spavin.
BR0571	19	21	3	Post-medieval	BOS	TIB	L	1	Joint Degeneration	Irregular shallow depression with pitted base is indicative of osteochondritis dissecans, resulting from stress/trauma to the joint causing damage to cartilage & underlying bone.
BR0572	19	21	3	Post-medieval	BOS	TIB	L	1	Joint Degeneration	Irregular shallow depression with pitted base is indicative of osteochondritis dissecans, resulting from stress/trauma to the joint causing damage to cartilage & underlying bone.
BR0530	19	20	3	Post-medieval	N/C	N/C	U	1	Trauma	Fragment of cow-size rib - lateral expansion of bone at discrete point suggests well-healed fracture.
AB4	15	15	1	Farm Burials	BOS	MC	L	1	Developmental	Cortical bone notably thin and low in density; some pitting close to margin of proximal facet. Expansion of proximal facet, with wider space at junction of two metacarpals also at proximal end, indicative of developmental anomaly. Muscle attachment points under-developed but noticeably rough close to proximal margin of shaft.
AB4	15	15	1	Farm Burials	BOS	MT	R	1	Developmental	Cortical bone notably thin and low in density. Deep, linear cleft remains at junction of the 2 metatarsals, on proximal facet - suggests incomplete fusion of bones at this end. Mid-line junction also pronounced as linear indent on posterior. Suggests developmental anomaly.

AB4	15	15	1	Farm Burials	BOS	MT	L	1	Developmental	Crack along mid-line on posterior - suggests weakness at joint: incomplete fusion of two metatarsals. Cortical bone notably thin and low in density..
AB4	15	15	1	Farm Burials	BOS	SCAP	L	1	Developmental	Cortical bone notably thin and lacking in density; irregular crescent-shaped cleft/lesion in centre of glenoid fossa, with pitting to dorsal and medial of this. Possible developmental anomaly.
AB4	15	15	1	Farm Burials	BOS	SCAP	R	1	Developmental	Cortical bone notably thin and lacking in density; irregular crescent-shaped cleft/lesion in centre of glenoid fossa, with pitting to dorsal and medial of this. Possible developmental anomaly.
AB4	15	15	1	Farm Burials	BOS	TIB	L	1	Joint Degeneration	Part epiphysis only; large irregular shallow depression with pitted base - suggestive of osteochondritis dissecans but expansive, with proliferation of trabecular bone with reticulated nature towards lateral.
AB4	15	15	1	Farm Burials	BOS	AST	R	1	Nutritional	Cortical bone notably thin and low in density. Triangular depression with pitted base and pitting around margin on distal articular surface, towards dorsal. Irregular, expansive shallow depression with pitted bas on distal surface. Partial area of open-mesh reticulated bone on dorsal surface.
AB4	15	15	1	Farm Burials	BOS	CARP	L	1	Nutritional	Scaphoid. Bone is notably light.
AB4	15	15	1	Farm Burials	BOS	CE	A	1	Nutritional	Includes unfused caudal epiphyseal plate; bone notably low in density.
AB4	15	15	1	Farm Burials	BOS	FEM	R	1	Nutritional	Cortical bone is very thin and lacking in density. Articular ends not present, so quality of trabecular bone is unknown. Suggests mineral deficiency resulting in osteoporosis.
AB4	15	15	1	Farm Burials	BOS	FEM	U	3	Nutritional	Small frags shaft. Cortical bone very thin and low in density.
AB4	15	15	1	Farm Burials	BOS	FEM	U	1	Nutritional	Cortical bone notably thin and low in density.
AB4	15	15	1	Farm Burials	BOS	HUM	R	1	Nutritional	Cortical bone notably thin and lacking in density. Mid-shaft posterior muscle attachment point presents as a roughened, elliptical depression - may reflect overall weakness.
AB4	15	15	1	Farm Burials	BOS	HUM	R	1	Nutritional	Cortical bone very thin & lacking in density.
AB4	15	15	1	Farm Burials	BOS	HUM	L	1	Nutritional	Cortical bone notably thin and lacking in density. Mid-shaft posterior muscle attachment point presents as a roughened, elliptical depression - may reflect overall weakness.

AB4	15	15	1	Farm Burials	BOS	HUM	L	1	Nutritional	Bone is very thin and lacking in density.
AB4	15	15	1	Farm Burials	BOS	Lu	A	1	Nutritional	Frag neural arch.Bone appears very light.
AB4	15	15	1	Farm Burials	BOS	MAND	L	1	Nutritional	dp2, dp3 present; P3 developing in crypt. Increased porosity of bone at gum-line, with exposure of roots of teeth. Cortical bone is very thin & low in density.
AB4	15	15	1	Farm Burials	BOS	MAND	R	1	Nutritional	dp4 present; Ca in crypt. Increased porosity of bone at gum-line; cortical bone is very low in density.
AB4	15	15	1	Farm Burials	BOS	MAX	R	1	Nutritional	Part maxilla. Bone is notably thin and lacking in density.
AB4	15	15	1	Farm Burials	BOS	MC	R	1	Nutritional	Cortical bone very thin & lacking in density.
AB4	15	15	1	Farm Burials	BOS	PEL	L	1	Nutritional	2 frags of iliac head; bone notably low in density. Pitting and striations on auricular surface.
AB4	15	15	1	Farm Burials	BOS	PEL	L	1	Nutritional	Part iliac portion of acetabulum; pitting around margin of acetabulum.
AB4	15	15	1	Farm Burials	BOS	PEL	U	7	Nutritional	Smaller frags pelvis. Bone notably low in density.
AB4	15	15	1	Farm Burials	BOS	PH1	U	1	Nutritional	Cortical bone notably thin and low in density.
AB4	15	15	1	Farm Burials	BOS	PH1	U	1	Nutritional	Bone is notably light.
AB4	15	15	1	Farm Burials	BOS	RAD	R	1	Nutritional	Cortical bone notably very thin and low in density, with poorly formed muscle attachment points.
AB4	15	15	1	Farm Burials	BOS	RAD	L	1	Nutritional	Cortical bone very thin & lacking in density.
AB4	15	15	1	Farm Burials	BOS	RAD	L	1	Nutritional	Bone is very thin and lacking in density.
AB4	15	15	1	Farm Burials	BOS	SCAP	U	5	Nutritional	Smaller fragments of blade & spine. Bone is notably thin and lacking in density.
AB4	15	15	1	Farm Burials	BOS	SKU	R	1	Nutritional	Part Pre-maxilla / horny pad. Cortical bone is very thin and lacking in density.
AB4	15	15	1	Farm Burials	BOS	SKU	R	1	Nutritional	Part Zygomatic / lower orbit. Bone is notably thin, and lacking in density; increased porosity at margin of orbit.
AB4	15	15	1	Farm Burials	BOS	TARS	R	1	Nutritional	Navicular-cuboid. Irregular area of pitting on proximal articular surface matches with that on astragalus. Shallow linear cleft on distal surface at junction line of navicular & cuboid. Bone is notably light.
AB4	15	15	1	Farm	BOS	TH	A	1	Nutritional	Bone is notably low in density.

				Burials						
AB4	15	15	1	Farm Burials	BOS	TH	A	1	Nutritional	In 3 frags, including unfused caudal plate. Bone very low in density. Pitting present on facets.
AB4	15	15	1	Farm Burials	BOS	TH	A	1	Nutritional	Including unfused caudal plate. Bone very low in density. Pitting present on cranial facets.
AB4	15	15	1	Farm Burials	BOS	TH	A	2	Nutritional	Bone is very low in density.
AB4	15	15	1	Farm Burials	BOS	TH	A	3	Nutritional	Frags neural arch/spine. Bone appears very light.
AB4	15	15	1	Farm Burials	BOS	TIB	R	1	Nutritional	Cortical bone very thin & lacking in density.
AB4	15	15	1	Farm Burials	BOS	TIB	R	1	Nutritional	Cortical bone very thin & lacking in density.Pitting along medial margin and from medial malleolus towards centre of facet.
AB4	15	15	1	Farm Burials	BOS	TIB	L	1	Nutritional	Cortical bone very thin & lacking in density.
AB4	15	15	1	Farm Burials	BOS	TIB	R	1	Nutritional	Bone very thin and low in density. Pitting along posterior margin.
AB4	15	15	1	Farm Burials	BOS	ULNA	R	1	Nutritional	Cortical bone very thin & lacking in density.
AB4	15	15	1	Farm Burials	BOS	ULNA	L	1	Nutritional	Cortical bone very thin & lacking in density.
AB4	15	15	1	Farm Burials	BOS	VERT	A	1	Nutritional	Centrum only; Includes unfused cranial & caudal plates. Bone very low in density.
AB4	15	15	1	Farm Burials	BOS	VERT	A	3	Nutritional	Centra only. Bone very low in density.
AB4	15	15	1	Farm Burials	BOS	VERT	A	1	Nutritional	Part caudal epiphyseal plate only. Bone low in density.
AB4	15	15	1	Farm Burials	BOS	VERT	A	5	Nutritional	Frags centra. Bone appears very light
AB4	15	15	1	Farm Burials	BOS	VERT	A	1	Nutritional	Frag cranial plate only. Bone appears very light.
AB4	15	15	1	Farm Burials	BOS	VERT	A	1	Nutritional	Fragment centrum. Bone appears very light.
AB4	15	15	1	Farm Burials	BOS	VERT	A	4	Nutritional	Frags centra: articular surfaces only. Bone appears very light.
AB4	15	15	1	Farm Burials	BOS	VERT	A	4	Nutritional	Small frags. Bone appears very light.

AB4	15	15	1	Farm Burials	BOS	RIB	R	1	Trauma; Infection	Gross proliferation of bone at break towards cranial end; area of grey woven bone to distal of this with bulbous expansion of bone. Infection due to trauma/fracture. Extent unknown due to break.
BR0329	1	7	5	Unstratified	BOS	HUM	U	1	Infection	Bone surface abraded away over much of fragment. Where remaining there's evidence of area of smoothened, striated bone suggestive of mild infection that had undergone healing at time of death. Original extent of lesion uncertain due to level of abrasion on surface.
BR0318	1	6	3	Unstratified	N/C	N/C		1	Infection	Part cattle rib; smoothened plaque of bone suggests healed infection.
BR0306	1	6	3	Unstratified	BOS	PEL	L	1	Infection	Small discrete areas of woven bone, on lateral side of iliac head, indicate the presence of an active non-specific infection at time of death. A high level of canid gnawing and tooth-scrape marks on this surface means original extent of woven bone may not be evident- close examination of the bone suggests it extended ventrally from remaining areas
BR0044	1	1	1	Unstratified	BOS	MAND	R	1	Infection; Joint Degeneration	Slight expansion on lateral half of mandibular condyle, with area of roughened spicule-like bone on mesial of lateral margin. Small areas of eburnation along distal margin towards medial, & exposed trabecular-like bone along distal line suggest some form of joint disease, but symptoms appear mild. Area of woven bone along distal edge of vertical ramus is suggestive of non-specific infection, active at death.
BR0335	1	7	5	Unstratified	BOS	PH1	U	1	Joint Degeneration	Oval depression on proximal articulation, near plantar edge of mid-line furrow; pitting to plantar of this. Depression has sharp to overhanging edge on 3 sides, rounded edge on side with pitting; base of depression is relatively smooth.Small size and uncertain aetiology of depression - may be non-pathological lesion or similar to osteochondritis dissecans. No other changes to bone, although incompleteness & abrasion of edges may have eroded evidence away.
BR0175	1	2	1	Unstratified	COW-SZ	CE	A	1	Nutritional	As with some other Bos bone from F1 T1, this appears very low in density - probably connected to Bos burial, F15.
BR0298	1	6	3	Unstratified	BOS	IS	U	1	Nutritional	Irregular, wrinkled and pitted appearance of root, especially on labial side may be suggestive of nutritional deficiencies during development.
BR0154	1	2	1	Unstratified	BOS	PEL	R	1	Nutritional	Thinness of cortical bone and lightness is very similar to that seen in Bos Burial F15 - likely to be related to this burial. Mineral deficiency, leading to osteoporosis.
BR0179	1	2	1	Unstratified	COW-SZ	VERTE	U	4	Nutritional	Fragments centra only; bone appears very light..

Id.	Feature #	Sample #	Trench #	Phase	Species	Element	Side	Quantity	Pathology	Pathology Description
BR0061	1	1	1	Unstratified	O/C	SCAP	L	1	Infection	Woven bone along side/base of spine on dorsal surface. Appearance suggests healing of infection had begun at time of death
BR0082	1	1	1	Unstratified	O/C	ULNA	L	1	Joint Degeneration	Expansion of lateral facet with some exotoses and some expansion along medial margin, suggestive of stress on joint or old-age. Exposed of trabecular-like bone on articular surface appears not to be taphonomic and may be indicative of joint disease.
BR0262	1	5	2	Unstratified	O/C	MO	L	1	Infection	Loose upper M1; worn. Even, light build-up of calculus on all sides; bone growth on roots may indicate infection.
BR0377	13	13	1	Farm Burials	OVIS	MC	R	1	Non-pathological?	Irregular, shallow depression on proximal articular surface - possible non-pathological lesion. Recovered with dog burial, but not associated with.
BR0568	19	21	3	Post-medieval	O/C	FEM	R	1	Infection	Smooth plaques of grey woven bone, part healed on surface - ongoing chronic mild infection, with some healing prior to death.
BR0570	19	21	3	Post-medieval	O/C	RAD	R	1	Infection	Small area grey woven bone in this area with smoother plaques of woven bone on anterior surface, suggesting some healing had occurred. Extent & nature of this masked by level of root etching.
AB1	10	12	1	Farm Burials	OVIS	PH1	U	1	Unknown	Small, circular perforation on distal condyle - rounded edge & slight change in condyle margin at this point, suggesting pre-mortem, but no other pathological changes to bone. May be taphonomic?
AB2	14	14	1	Farm Burials	OVIS	CARP	L	4	Joint Degeneration	capitate; os crochu; lunate & triquetrum. Elongate shallow depression on distal surface capitate with uneven, part pitted base. Possibly mild osteochondritis dissecans.
AB2	14	14	1	Farm Burials	OVIS	MC	L	1	Joint Degeneration	Slight damage to proximal end. Elongate shallow depression on proximal surface with some pitting on base and margin of facet, otherwise roughened base. Corresponds with depression on carpal. Osteochondritis dissecans.
AB2	14	14	1	Farm Burials	OVIS	MT	L	1	Joint Degeneration	Reticulated appearance to bone on proximal surface and distal anterior surface of diaphysis. Very slight expansion of lateral proximal facet. No other evidence of joint deterioration or other evidence for infection. See also RHS MT. Pronounced assymetry in proximal shaft.

AB2	14	14	1	Farm Burials	OVIS	MT	R	1	Joint Degeneration	Reticulated appearance to bone on proximal surface and distal anterior surface of diaphysis. Small, smooth-walled, D-shaped lesion on proximal facet at posterior. No other evidence of joint deterioration or other evidence for infection. See also LHS MT. Pronounced assymetry in proximal shaft.
AB2	14	14	1	Farm Burials	OVIS	MAND	L	1	Infection	Near complete; P4-M3 present. Mild calculus on all sides. Discrete patches of woven bone on lingual surface of horizontal ramus (abrasion may mask full extent). Pronounced roughened area of bone along attachment for masseter muscles.
AB2	14	14	1	Farm Burials	OVIS	MAND	R	1	Infection	Part vertical ramus missing; P2-M3 present; Mild calculus on all sides. Discrete patches of woven bone on lingual surface horiz ramus & distal to alveolus M3, with area healed woven bone below gum line at M1 on lingual side.
AB2	14	14	1	Farm Burials	OVIS	PH3	U	1	Joint Degeneration	Left of pair. Increase of thin, porous, reticulated bone on dorsal surface - similar to that at distal metatarsals.
AB2	14	14	1	Farm Burials	OVIS	STER	A	3	Infection	3 segments of sternum; pitting close to unfused ends; small areas of grey woven bone on 2 segments.
AB2	14	14	1	Farm Burials	OVIS	PEL	U	1	Stress/Trauma	Small fragment - dorsal margin of iliac head; small bony spicules on medial surface - ossification of soft tissue at attachment point.
BR0177	1	2	1	Unstratified	N/C	N/C	U	1	Infection	Frag sheep-sized rib; small area of woven bone on ventral surface - evidence of infection. Some evidence of healing.
Id.	Feature #	Sample #	Trench #	Phase	Species	Element	Side	Quantity	Pathology	Pathology Description
BR0456	19	20	3	Post-medieval	SUS	MAX	R	1	Dental	Loss of alveolar bone at buccal side of molar teeth. Exposed roots of M1 have a worn, almost polished feel & appearance - suggests resorption of bone occurred during life - possibly due to dietary habits.

Dog

Id.	Feature #	Sample #	Trench #	Phase	Species	Element	Side	Quantity	Pathology	Pathology Description
BR0681	1	28	1	Unstratified	CANIS	PH1	U	1	Joint Degeneration	Small area of eburnation on proximal articular surface - no other noticeable pathological changes.
AB3	13	13	1	Farm Burials	CANIS	TIB	R	1	Joint Degeneration: Trauma	Shallow depression with pitted base on distal articulation - suggestive of osteochondritis dissecans. Also irregular shallow depressions on lateral margin of proximal end with exposed trabecular-like bone - possibly indicates damage to soft tissue in this area.

AB3	13	13	1	Farm Burials	CANIS	TIB	L	1	Joint Degeneration; Trauma	Shallow depression with pitted base on distal articulation - osteochondritis dissecans. Small similar lesion on lateral margin proximal end - poss damage to soft tissue in this area.
AB3	13	13	1	Farm Burials	CANIS	HUM	L	1	Infection	Pronounced attachment points for tendons/ligaments. Irregular plaques of grey woven bone at distal end - medial & posterio-lateral sides. Expansion of margins at posterior distal. Pitted appearance around supracondylar fossa - anterior.
AB3	13	13	1	Farm Burials	CANIS	RAD	L	1	Infection	Extensive plaques of grey woven bone, especially along attachment scar of ulna and towards distal end. Distal end modified by new bone with pitted appearance.
AB3	13	13	1	Farm Burials	CANIS	ULNA	L	1	Infection	Extensive plaques of grey woven bone. Slight expansion of margins of facets.
AB3	13	13	1	Farm Burials	CANIS	MCII	L	1	Infection	Extensive areas of grey woven bone esp dorsal surface, with some areas smoother and striated bone suggesting some healing and remodelling had occurred. Some expansion of mid-shaft.
AB3	13	13	1	Farm Burials	CANIS	MCIII	L	1	Infection	Extensive plaques of grey woven bone and remodelled smoother bone, especially towards distal.
AB3	13	13	1	Farm Burials	CANIS	MCIV	L	1	Infection	Areas of grey woven bone & larger areas of striated bone and smoother plaques indicating healing/remodelling of bone - especially on dorsal surface.
AB3	13	13	1	Farm Burials	CANIS	MCV	L	1	Infection	Irregular plaques of grey woven bone on shaft.

Chicken

Id.	Feature #	Sample #	Trench #	Phase	Species	Element	Side	Quantity	Pathology	Pathology Description
BR0783	7	32	3	17th/18th C	GALLUS	TMT	L	1	Joint Degeneration	Development of exotoses around margin of attachment for metatarsal suggests older animal / damage to joint. No other visible evidence of joint disease.