

Norwich Castle Keep Excavations 2018

Post-Excavation Assessment and Updated Project Design

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Contents

List of Figures.....	vi
List of Plates.....	vi
List of Tables.....	vi
Summary.....	ix
Acknowledgements.....	x
1 INTRODUCTION.....	1
1.1 Background to the Project.....	1
1.2 Methodology.....	1
1.3 Natural Geology and Topography.....	1
1.4 Artificial Topography.....	2
1.5 Previous Archaeological and Survey Works.....	2
1.6 Archaeological Background.....	2
1.7 Original Research Aims and Objectives.....	4
1.8 Project Scope.....	5
1.9 Fieldwork Methodology.....	5
1.10 Boreholes.....	6
1.11 Assessment Methodology.....	6
2 FACTUAL DATA: STRATIGRAPHY.....	7
2.1 General.....	7
2.2 Area 1.....	9
2.3 Area 2.....	10
2.4 Area 3.....	10
2.5 Trial Pits A, B and C.....	10
2.6 Period 0.....	10
2.7 Period 1: Late Anglo-Saxon.....	11
2.8 Period 2: Norman to medieval (c.1067-1250).....	11
2.9 Period 3: c.1250 to c.1538.....	12
2.10 Period 3/4.....	13
2.11 Period 4: c.1538-c.1790.....	13
2.12 Period 4/5.....	13
2.13 Period 5: c.1792-2018.....	13
3 FACTUAL DATA: ARTEFACTS.....	14

3.1	General.....	14
3.2	Pottery <i>by Sue Anderson</i>	14
3.3	Pottery (ENF143655 external) <i>by Sue Anderson</i>	15
3.4	Ceramic Building Material <i>by Sue Anderson</i>	15
3.5	Ceramic Building Material (ENF143655 external) <i>by Sue Anderson</i>	16
3.6	Mortar <i>by Heather Wallis</i>	16
3.7	Small Finds <i>by Chris Howard-Davis</i>	16
3.8	Glass <i>by Heather Wallis</i>	18
3.9	Metal-working debris <i>by Heather Wallis</i>	18
3.10	Struck flint <i>by Heather Wallis</i>	18
3.11	Stone <i>by Neil Moss</i>	18
3.12	Human Skeletal Remains (ENF 143286, internal) <i>by Natasha Dodwell</i>	19
3.13	Human Skeletal Remains (ENF143655, external) <i>by Sue Anderson</i>	19
4	FACTUAL DATA: FAUNAL AND ENVIRONMENTAL EVIDENCE.....	21
4.1	Animal bone <i>by Hayley Foster</i>	21
4.2	Fish Remains <i>by Rebecca Nicholson</i>	22
4.3	Environmental Samples <i>by Rachel Fosberry</i>	23
4.4	Marine Mollusca <i>by Carole Fletcher</i>	23
5	STATEMENT OF POTENTIAL	24
5.1	Stratigraphy	24
5.2	Pottery.....	26
5.3	Ceramic Building Material	26
5.4	Small Finds.....	27
5.5	Metal-working debris.....	27
5.6	Struck flint	27
5.7	Glass.....	27
5.8	Stone.....	27
5.9	Human Skeletal Remains.....	27
5.10	Faunal Remains.....	27
5.11	Fish Remains.....	28
5.12	Environmental Samples	28
5.13	Marine Mollusca.....	28
5.14	Overall Potential.....	28
6	UPDATED PROJECT DESIGN	30
6.1	Revised research aims.....	30
6.2	Interfaces.....	32
6.3	Methods Statement.....	33

6.4	Report and Publication	35
6.5	Ownership and Archive	36
7	RESOURCES AND PROGRAMMING	37
7.1	Project Team Structure	37
7.2	Task List and Programme	37
8	BIBLIOGRAPHY.....	39
APPENDIX A: BOREHOLE SURVEY BY ELIZABETH STAFFORD		40
APPENDIX B: ARTEFACT ASSESSMENTS, INTERNAL EXCAVATIONS (ENF143286)		49
A.2	Pottery by Sue Anderson	49
A.3	Ceramic Building Material by Sue Anderson.....	54
A.4	Small Finds by Chris Howard-Davis.....	57
A.5	Metal-working debris by Heather Wallis	64
A.6	Struck flint by Heather Wallis	64
A.7	Glass by Heather Wallis.....	64
A.8	Stone by Neil Moss	64
A.9	Human Skeletal Remains by Natasha Dodwell.....	66
APPENDIX B FAUNAL AND ENVIRONMENTAL ASSESSMENTS: INTERNAL EXCAVATIONS (ENF143286) 67		
B.1	Faunal remains by Hayley Foster.....	67
B.2	Fish Remains by Rebecca Nicholson	75
B.3	Environmental Samples by Rachel Fosberry.....	77
B.4	Marine Mollusca by Carole Fletcher.....	83
APPENDIX C ARTEFACT ASSESSMENTS, EXTERNAL TEST PITS (ENF143655)		87
C.1	Pottery by Sue Anderson	87
C.2	Ceramic building material by Sue Anderson.....	88
C.3	Faunal Remains by Hayley Foster.....	88
C.4	Human Skeletal Remains by Sue Anderson	89
C.5	Scientific Dating.....	90
APPENDIX D RISK LOG.....		98
APPENDIX E HEALTH AND SAFETY		99
APPENDIX F OASIS REPORT FORM.....		100

List of Figures

Fig. 1	Site location
Fig. 2	Trench location plan
Fig. 3	Plan of pre-keep post-holes (Area 2)
Fig. 4	Section through mound deposits and footing for spine wall (Area 1 south)
Fig. 5	Section through occupation deposits (Area 1 south)

List of Plates

Plate 1	Area 1 North. Showing mortar floor surface. Looking east
Plate 2	Area 1 South. Showing occupation layers. Looking east
Plate 3	Area 2 cistern/cess pit. Looking south-east
Plate 4	Area 3 at end of excavation. Showing modern drainage trench and features cut into mound material. Looking west
Plate 5	Collated borehole data, showing the relative levels of each window sample (WS)

List of Tables

Table 1. Site records	7
Table 2. Site phasing	8
Table 3. Contexts and groups	8
Table 4. Quantification of finds	14
Table 5. Pottery quantification from the external test pits, by fabric	15
Table 6. Disarticulated human skeletal remains	19
Table 7. Number of bulk samples from each area by period	23
Table 8. Project team structure	37
Table 9. Task list for analysis	38
Table 10. Borehole results	48
Table 11. Pottery quantification by fabric	50
Table 12. Pottery by area and ceramic period	52
Table 13. Pottery by ceramic period and site period	52
Table 14. Cbm quantities by excavation area and context type	54
Table 15. Quantities of cbm forms	55
Table 16. Area 1 cbm quantities by period and form (fragment count)	56
Table 17. Area 2 cbm quantities by period and form (fragment count)	56
Table 18. Area 3 cbm quantities by period and form (fragment count)	57
Table 19: distribution of nails and probable nails	60
Table 20. Distribution of unidentifiable fragments	60
Table 21. Distribution of lead artefacts	61

Table 22. Worked bone objects for illustration	63
Table 23. Additional small finds.....	63
Table 24. Quantity of flint by period.....	64
Table 25. Summary of architectural stonework.....	66
Table 26. Disarticulated human skeletal remains	66
Table 27. Number of identifiable mammal remains (nisp) by period	69
Table 28. Number of identifiable specimens (nisp) and minimum number of individuals (mni) from period 2	69
Table 29. Number of identifiable specimens (nisp) from area 1 north and south (period 2)	69
Table 30. Number of identifiable specimens (nisp) from area 2 main area (period 2)	69
Table 31. Number of identifiable specimens (nisp) and minimum number of individuals (mni) from period 3	70
Table 32. Number of identifiable specimens (nisp) from area 1 north (period 3)	70
Table 33. Number of identifiable specimens (nisp) from area 3 main area (period 3)	71
Table 34. Number of identifiable specimens (nisp) and minimum number of individuals (mni) from period 3/4	71
Table 35. Number of identifiable specimens (nisp) from area 1 south (period 4)	71
Table 36. Number of identifiable specimens (nisp) from area 2 main area (period 4)	71
Table 37. Number of identifiable specimens (nisp) and minimum number of individuals (mni) from period 5	72
Table 38. Number of identifiable specimens (nisp) from area 1 north and south (period 5)	72
Table 39. Number of identifiable specimens (nisp) from area 2 main area and cistern (period 5)	72
Table 40. Number of identifiable specimens (nisp) from area 3 main area (period 5)	73
Table 41. Number of bulk samples by area and period	78
Table 42. Pottery quantification by fabric, external test pits.....	87
Table 43. Pottery by context with spotdates, external test pits	88
Table 44. Identifiable fragments by species	89
Table 45. Identifiable fragments by period.....	89
Table 46. Samples for radiocarbon dating	91

Summary

A research excavation was undertaken by Oxford Archaeology (OA) East within the Norman keep at Norwich Castle. The works, which were part of the Gateway to Medieval England project, largely funded by the Heritage Lottery Fund and managed by Norfolk Museums Service, excavated three areas within the keep totalling approximately one third of the total internal floor space. In addition to this, seven bore-holes were cored through the mound into the underlying natural, permitting archaeological recording of mound make-up material.

The results of the excavation have confirmed a two-phase construction for the mound, with the earlier, smaller mound of c.1067-1094 being located beneath the keep. Construction techniques used to increase the height and diameter of the mound in c. 1094-1122 correspond with evidence from earlier archaeological interventions with the creation of a ringwork that was largely made of chalk and then infilled with other soils.

Construction techniques for the exterior and interior walls of the keep varied, with footing trenches being identified for the north wall and spine wall, but not for the south, east or interior walls in the south-east compartment. Post-holes associated with some of the visible put-log holes were also recorded.

The base of a wall connecting the pier bases in the northern half of the keep was revealed. This formed a physical barrier between these two areas which had different uses throughout the early medieval period. In the northern area, a worn path was identified running from the north-east stairwell diagonally across an open space towards an opening in the central spine wall. To the south of the pier base divide, occupation deposits were identified including a substantial deposit of charcoal and some possible hearths.

In the south-east compartment of the keep the deposits excavated were of a very different nature, being mainly pits with fills of a cassy nature. The underpinning of one of the internal dividing walls was also identified.

In the south-west compartment no early medieval occupation deposits were present, suggesting that the medieval floor level was at a higher level than elsewhere. Medieval occupation layers had been removed by later truncation. Significantly, in this area a small line of post-holes was recorded which appear to post-date the construction of the extended mound but pre-date the construction of the stone keep.

Overall, the works have proved to be immensely informative on the construction of the mound and the keep as well as the early occupation of the structure. Later medieval and post-medieval remains were largely removed during the conversion of the keep into a museum in the late 19th century, although a scatter of evidence relating to these later phases was also recorded.

Acknowledgements

This project came about through the vision of Norfolk Museums Service to re-display the keep at Norwich Castle in its original form as a Norman keep. The project team at Norfolk Museum Service have been key in carrying this project forward and their contribution and support throughout the works is gratefully acknowledged. Particular thanks must go to Tim Pestell who led the archaeological input on behalf of the Museums Service: the author would particularly like to thank him for contributing to discussions on interpretation throughout the period of excavation.

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Norfolk Historic Environment Service, in particular David Robertson, provided the Brief for the works in collaboration with Tim Pestell and Will Fletcher (Historic England) and provided advice during the excavations.

Scientific advice was provided by Zoe Outram (Historic England Regional Science Advisor) along with specialists from Oxford Archaeology.

The site team from Oxford Archaeology East deserve special thanks for their hard work, dedication and interest in the project. Similarly, the post-excavation team deserve thanks for processing and assessing the artefactual and environmental assemblages from the excavations. Thanks are also due to the OA East geomatics team and to David Brown for producing the assessment illustrations. Project management and support was provided by Paul Spoerry and Elizabeth Popescu.

1 INTRODUCTION

1.1 Background to the Project

- 1.1.1 Norfolk Museums Service is undertaking a major refurbishment of Norwich Castle keep. The project is largely funded by the Heritage Lottery Fund in collaboration with several other sponsors. The *Gateway to Medieval England* project aims to reinstate the Norman floor levels of the keep and present the interior of the castle as it would have looked in the early 12th century.
- 1.1.2 Norwich Castle lies in the centre of the city (Fig. 1). The Norman keep is a Grade I listed building (List No. 1372724) and the area of the motte is a scheduled area (List No. 1004054). Prior to excavation works taking place, discussions were held between Norfolk Museums Service, Historic England and Norfolk Historic Environment Service: the outcome was to define three areas for excavation which would not only expedite the proposed redevelopment but would also serve as a research project which would inform on and advance the study of Norwich Castle's historic context, particularly in terms of its construction and use.
- 1.1.3 This project included works within the keep and test pits on top of the mound positioned outside the keep. These were recorded under different site numbers issued by Norfolk Historic Environment Service. Internal works were recorded under site code ENF143286 and the external test pits under ENF 143655.

1.2 Methodology

- 1.2.1 A Written Scheme of Investigation (WSI) was produced by Oxford Archaeology East to meet the requirements of a Brief for Excavation which was issued by Norfolk Historic Environment in collaboration with Historic England and Norfolk Museums Service. Excavation works were carried out between February and April 2018. These were undertaken in accordance with the Written Scheme of Investigation and following the *Chartered Institute for Archaeologists Standard and Guidance for Archaeological Excavation* (2014) and *East Anglian Archaeology Standards for Field Archaeology in the East of England* (Gurney 2003).
- 1.2.2 This assessment has been conducted in accordance with the principles identified in Historic England's guidance documents *Management of Research Projects in the Historic Environment*, specifically *The MoRPHE Project Manager's Guide* (2006) and *PPN3 Archaeological Excavation* (2008).

1.3 Natural Geology and Topography

- 1.3.1 Norwich Castle lies at the northern end of the Ber Street ridge, a Beeston chalk spur of high ground that runs into the city from the south. The chalk is overlain by Norwich crag, a Pleistocene deposit of sands, gravels and clay (<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>). The ground drops away to the north and east towards the River Wensum, and to the west towards the valley of the Great Cockey stream. Further details and schematic interpretations of the natural topography are presented in Shepherd Popescu 2009 (41-44, fig. 6.2).
- 1.3.2 Boreholes and trial shafts previously undertaken as part of the Castle Mall project and Castle redevelopment provided specific information on the site's natural geology and topography, showing the ground slopes to the east and west (Shepherd Popescu 2009, figs 3.2 and 3.3), with a gentler gradient along the top of the ridge from north to south (Shepherd Popescu 2009, fig 3.4). To the north the natural ground drops away sharply.

1.4 Artificial Topography

- 1.4.1 Norwich Castle mound stands at the end of the Ber Street ridge and artificially raises the ground level. The top of the present mound is relatively flat. The ground level to the south and west of the keep lies at approximately 32.80m OD, the museum floor level at c.32.20m OD and lies to the north and east of the keep at c.32.3m OD.
- 1.4.2 Within the keep the ground level is known to have changed over time. From c.1300 to 1886 the keep was used as a gaol. During this period deposits accumulated within the building to a level c.2m higher than the present ground level. When the gaol was converted to a museum in the latter years of the 19th century, approximately 2m of deposits were removed from the keep's interior.

1.5 Previous Archaeological and Survey Works

- 1.5.1 Previous excavations were undertaken within the keep in 1974 and 1986, the results of which (along with a summary of other earlier observations) have recently been published (Ayers 2016).
- 1.5.2 A further trench within the keep, along with excavations through the mound and other monitoring works, including areas adjacent to the exterior of the keep, were undertaken between 1999 and 2001 as part of a previous redevelopment of the Castle Museum (Wallis 2003; Wallis 2017).
- 1.5.3 Large scale excavation of Norwich Castle's baileys was undertaken between 1989 and 1991 ahead of the construction of Castle Mall shopping centre (Shepherd Popescu 2009).
- 1.5.4 As a result of these works a full history of the area beyond the motte has been explored, although archaeological knowledge relating to the construction of the mound and the keep, as well as the primary use of the keep, had been largely unexplored ahead of this project.
- 1.5.5 Various surveys of the surface fabric of the keep have been undertaken. The exterior of the building, which was refaced in the mid 19th century, was surveyed in 1999 (Whitmore 2000). At the same time the interior of the keep was subject to detailed survey. As part of the present project a further, more comprehensive, metric survey has been undertaken (Harris 2017).

1.6 Archaeological Background

- 1.6.1 The archaeological and historical background to Norwich Castle is fully detailed in the monograph on the Castle Mall development (Site 777N; Shepherd Popescu 2009). This includes details of all relevant NHER data and provides an overview of previous investigations relevant to the motte and its ditch. The 1986 excavation along with a comment on earlier investigation has been published (Ayers 2016) while the archaeological interventions which were part of the 1999-2001 redevelopment are summarised in Wallis 2003 and 2017. A brief summary is presented below.
- 1.6.2 It is possible that Roman and Middle Saxon activity lie buried below the castle mound, although no direct datable evidence for such has been found. The area of the castle was occupied during the Late Saxon period, when during the 10th century settlement in the area became established and expanded over a substantial area. This area lay in the core of Late Saxon burgh of Norwich. Domesday records that 98 properties were destroyed during the construction of the motte and its baileys. Some of these properties, along with churches and cemeteries, were identified and investigated during the Castle Mall excavations (Shepherd Popescu 2009). Other works around the perimeter of the mound have identified the presence of occupation layers and pits (Tench 1910; Wallis 2003, 2017; Penn 1998).

- 1.6.3 The Normans arrived in Norwich soon after the Conquest and quickly made their mark by radically altering the layout and appearance of the settlement, by creating a new market place and clearing properties for the construction of the cathedral, castle and its baileys.
- 1.6.4 It has long been presumed that the motte was constructed in two phases the first associated with a postulated timber tower (c.1067-1094) and the second, an enlarged motte associated with the masonry keep (c.1094-1122). This is supported by the results of recent excavations (Wallis 2003). The initial motte, located under the south-west corner of the present mound, occupied a much smaller area to a lower height. It is thought that the initial motte was c.45-65m in diameter with a possible upper level at c.26.5m, upon which a timber keep was probably constructed. The enlarged motte has a diameter of c.100-110m and was probably built to a height of c.31m. The motte was clearly a complex structure containing several constructional phases, along with evidence of timber formwork, soil horizons, hearths and structures (Wallis 2003).
- 1.6.5 Evidence for keep construction prior to these works was very limited and reliant on previous small scale interventions. A wide and deep flint banded footing had been identified both to the north and south of the east wall of the keep (Wallis 2003). The north wall shows signs of an early structural failure in the north-east corner of the keep. Elements of a wall extending between the pier bases may represent a low or sleeper wall (Ayers 2016, fig 2.1; Wallis 2013). Remains of the arcading used to support the upper floor had been changed during the life of the castle and these alterations may have been in response to specific documented events (*eg* the sieges of 1174 and 1217; Heslop 1994, 50-54).
- 1.6.6 Evidence for occupation deposits and activities of the 12th-14th centuries is sparse, although make-up dumps, pits, post-holes and hearths and mortared surfaces have been recorded (Wallis 2003). Finds include pottery, metalwork, fish, bird and animal bone. A few high-status artefacts, including a gold finger ring of early 13th-century date, have been recovered (Ayers 2016, 40).
- 1.6.7 The keep was utilised as a prison from the 14th century onwards, although very little is known about the late medieval and early post-medieval periods. Documentary evidence informs us that the Shirehouse was moved to an external building on the north side of the keep in 1579. It was later destroyed by fire and re-built in 1746. In 1792/3 John Soanes designed a new prison which occupied the interior of the keep along with an additional area to the east. This building was short lived and between 1822 and 1825, a building designed by Wilkins replaced this and created the radiating wings to the north and east of the keep which form the core of the present museum galleries. Details regarding the use of the castle as a gaol can be found in Arber 2009.
- 1.6.8 Burials associated with the prison are known to have been placed in a sequence of broadly chronological burial groups to the south (c.mid to late 17th century), west (c.18th century) and north-west (c.19th century) of the keep on top of the motte. These are likely to have included executed felons, with public hangings continuing here until 1867. The burials of 19th-century murderers lay in the northern area (spanning 1836-1886). Non-murderers would have been returned to their parishes for burial, with the exception of those whom the parish would have rejected (Shepherd Popescu 2009, 901). Any burials interred on the mound are therefore of considerable academic and osteoarchaeological interest.
- 1.6.9 Within deposits associated with the robber trench for the curtain wall, on the southern part of the mound, lay a group of mid to late 17th-century burials (6 adult ?males and a juvenile) that had been buried in three layers (Shepherd Popescu 2009, 778-780 and fig. 10.12). The human remains revealed a wide range of pathologies, including head wounds and trauma to

the lower legs that may relate to participation in a chain gang or may have resulted from leg irons (Shepherd Popescu 2009, 901).

1.7 Original Research Aims and Objectives

1.7.1 The overall aim of the excavations was to preserve by record the archaeological and structural evidence contained within the areas selected for investigation (Areas 1-3 and boreholes) and to investigate the origins, date, development, phasing, spatial organisation, character, function, status and significance or the revealed remains placing these in their local regional and national archaeological context.

1.7.2 Specific aims and research objectives were:

- to investigate the natural topography of the castle mound through examination of borehole data and its correlation with previous observations;
- to investigate Late Anglo-Saxon activity and its destruction by the castle through evidence from boreholes;
- to investigate the extent, depth and possible phasing of the Norman keep foundations and their relationship in the construction of the second mound;
- to examine the Early Norman construction deposits (first mound and timber tower) and if possible, determine its extent, height and date;
- to examine the contact horizon between the first and second motte (borehole data);
- to investigate Norman motte construction (enlarged motte), examine its constructional complexity and provide further dating evidence;
- to explore the possible presence of walls associated with pier bases sub-dividing both the north and south compartments;
- to examine evidence associated with the failure of the north-east corner of the keep and possible below ground remedial works;
- to characterise occupation and activity within the keep, specifically Norman floor and use deposits, with particular reference to their constructional character, duration and date;
- to examine and characterise surviving medieval features and deposits;
- to provide artefactual and ecofactual evidence relating to status, date and use of the keep. Information from previous excavations (Shepherd Popescu 2009; Ayers 2016; Wallis 2003) was expected to facilitate comparison between information directly associated with the keep and that from other areas of the mound and the expansive defended area of the castle baileys;
- to provide scientific dating evidence (*eg* charcoal) to help refine the dating of constructional phases;
- to contribute to castle studies at a local and national level;
- to examine any later medieval features that have survived truncation;
- to establish constructional duration for each phase;
- to examine any surviving post-medieval and/or prison-related features and deposits.

1.8 Project Scope

- 1.8.1 Data considered in this assessment relates to the 2018 excavations and boreholes undertaken at Norwich Castle as part of the *Gateway to Medieval England* project. Although previous excavations are referred to where appropriate, they do not form part of this assessment.
- 1.8.2 Three areas within the keep were subject to archaeological excavation (Fig. 2) with the intention to provide two open area quadrant excavations and one smaller investigatory trench. The location of the trenches was selected to reflect the needs of the upcoming redisplay of the keep. Consideration was also given to the location of previous excavations, specific research questions and the desire to leave substantial areas of the interior untouched, meaning that archaeological deposits would remain preserved *in situ*.
- 1.8.3 Area 1 occupied the north-east quadrant of the keep encompassing three previously excavated trenches (74/A, 74B and 86/C) and adjacent to the 1999-2001 excavations. The remains of two partially upstanding pier-bases lie within this area. Excavation was restricted by the presence of a staircase in the north-east corner. Two boreholes were located in this part of the site.
- 1.8.4 Area 2 occupied the south-west quadrant of the keep and included the substantial area excavated in 1986 (86/A). Excavation in the south-west corner was also restricted by a staircase and the present entranceway from the outside which needed to be maintained throughout the works. One borehole was sunk through the mound deposits in this area.
- 1.8.5 Area 3 was a smaller trench within the south-east chamber of the keep. One borehole was located within this area.
- 1.8.6 For all the areas the depth of excavation was to be limited. Excavation was intended to continue until all occupation layers had been removed, leaving *in-situ* layers and deposits interpreted as mound make up. The estimated depth of the layers for excavation was 0.5m. In practical terms this was not achieved across all areas. Mid-way through the excavation it became apparent that it would not be possible to excavate to this horizon in Area 1 with the necessary due care and diligence. Excavation therefore ceased in this area at a point where most occupation layers had been removed, but spreads of probable construction debris remained in place over mound make-up.
- 1.8.7 Any masonry elements revealed were not excavated or removed, as these formed part of the Grade 1 listed building. This resulted in some instances where the deposits could not be removed in strict stratigraphic sequence in order that the stability of the masonry elements could be maintained.
- 1.8.8 Additionally, three test pits were excavated outside the keep, to the south and west. The purpose of these was to investigate and remove any obstructions or human remains ahead of the drilling of boreholes.

1.9 Fieldwork Methodology

- 1.9.1 All works were carried out in accordance to the Written Scheme of investigation approved by Norfolk Historic Environment Service prior to commencement of works on site.
- 1.9.2 Internally the floor of the keep was made up of stone flags, originally laid when the keep was converted to a museum. Prior to archaeological works commencing, Norfolk Museums Service employed a specialist contractor to lift the stone slabs across the areas of excavation. Each slab was marked so that it could be re-laid in its original position if required.
- 1.9.3 All archaeological excavation was undertaken by hand. Spoil was removed from the keep by wheelbarrow, through the doorway in the south-west corner of the keep. A compound was

established to enclose the spoilheap adjacent to the west wall of the keep. The spoil was deposited on terram in such a manner that soils were not placed against the exterior walls of the building.

- 1.9.4 Hand excavation commenced with the removal of the bedding layer for the stone flag floor. This was followed by the removal of the backfill from all previous excavations in Areas 1 and 2, and the removal of the fill from the drainage runs which crossed Areas 1, 2 and 3.
- 1.9.5 There is no natural light within the keep and the available lighting was designed for museum display and inadequate for archaeological excavation, recording and photography. Additional artificial lighting was therefore provided by Oxford Archaeology.
- 1.9.6 As well as traditional colour digital and black and white negative photography, a series of time-lapse photographs recording the progress of works in Area 1 was undertaken. Photogrammetry was also used to record the masonry elements revealed during the excavation (see WSI for detailed methodology).
- 1.9.7 The areas of excavation were surveyed in onto the grid previously used for the geometric survey of the building (see WSI for detailed methodology).
- 1.9.8 A unique context number was issued for each element recorded and a written, drawn (plan and/or section) and photographic record made for each context (see WSI for detailed methodology). Plans were generally recorded at 1:20 and sections at 1:10.

1.10 Boreholes

- 1.10.1 Seven boreholes (Fig. 2) were drilled through the mound deposits in order to provide the project engineers with ground makeup data. Four of these were located within the keep; two within Area 1 excavations and one within each of Area 2 and Area 3 excavations, and three outside the keep, to the south and west of the building. Ground Engineering were appointed by Norfolk Museums Service to undertake the boreholes. The precise location of the boreholes was decided in collaboration with Oxford Archaeology in order that unexcavated archaeological deposits were not unnecessarily disturbed. In Areas 1 and 3, Oxford Archaeology undertook limited backfilling of excavated features in order to provide a level surface from which Ground Engineering could work. Externally three test pits were excavated in order to remove any obstacles or any possible human remains from the position of the boreholes.
- 1.10.2 The window samples (WS) from the boreholes were stored at Ground Engineering offices and were made available to Oxford Archaeology geomatics staff for logging (Appendix A).

1.11 Assessment Methodology

- 1.11.1 Details of the post-excavation finds and assessment methodologies is detailed in the WSI and the subsequent full assessment reports (see Appendices B and C). All of the information recorded on site was entered into an Access database and all of the site plans were digitised into a CAD drawing.
- 1.11.2 The pottery assemblage was spot-dated in order to feed into the stratigraphic assessment and hence provide a framework for the assessment of other material types.
- 1.11.3 Matrices for each area were compiled once the stratigraphic record had been checked. A framework of periods and phases was constructed using this information along with consideration of period and phase definitions from the Castle Mall excavations (Shepherd Popescu 2009) and the 1999-2001 excavations (Wallis 2003).

2 FACTUAL DATA: STRATIGRAPHY

2.1 General

2.1.1 The following stratigraphic records were created and are the subject of this assessment:

	ENF143286 (internal)	ENF143655 (external)	Total
Record type	Number	Number	
Contexts	320	50	370
Plans	53	5	58
Sections	42	3	45
Digital color archive photos*	649	45	694
Black and White negatives	252	31	283

*plus photogrammetry, time-lapse photographs and working shots

Table 1. Site records

2.1.2 On consideration of the stratigraphic matrices, the spot date information, historically known events and previous archaeological interventions it was decided that the period and phasing structure of the 1999-2001 works (Wallis 2003) was suitable for the assessment and analysis work of the present excavations. An additional benefit of this approach is the ease with which the two phases of works, undertaken 15 years apart, could be brought together at a future date.

2.1.3 The defined periods are:

Period	Sub-period	Dates	Definition/Events
0			Natural subsoil
1		10th to late 11th century 900-1067	Late Anglo-Saxon town
2		late 11th to early 13th century 1067-c.1250	Norman Castle: construction and use
	2.1	late 11th century 1067-c.1094	First motte and timber tower Siege of castle 1075
	2.2	late 11th to early 12th century c.1094 – c.1122	Enlarged mound, construction of stone keep and contemporary activity
	2.3	mid 12th to early 13th century c.1122-c.1250	Military use of castle Siege of castle 1215 Construction of barbican
3		mid 13th to mid 16th century (reformation) c.1250-1538	Decline of military use Establishment of gaol
	3.1	mid 13th century to 1345 c.1250-1345	Alteration to keep and decline in military use 1286-8 Edward I 're-building' of Great Hall
	3.2	1345 to mid 16th century 1345-1538	Transfer of Castle Fee to city. Use as gaol
4		mid 16th to late 18th century 1538-c.1790	Shirehouse moved to motte and refortification of defenses
	4.1	mid 16th to mid 17th century 1550-1650	Shirehouse built 1579
	4.2	mid 17th to late 18th century 1650-1792	Mid 17th-century refortification Shirehouse burnt 1746 and rebuilt
5		late 18th to 21st century 1792 - 2018	Rebuilding of gaols, conversion to museum, modern interventions
	5.1	late 18th century to early 19th century 1792-1822	Re-building of gaol by Soanes 1792/3
	5.2	early 19th to late 19th century 1822-1887	Re-building of gaol by Wilkins 1822-5 Re-facing of keep by Salvin 1833-1839
	5.3	late 19th century	Conversion to museum by Boardman

Period	Sub-period	Dates	Definition/Events
		1887-1894	
	5.4	20th century onwards 1895-2018	Life as a Museum Partial renewal of drainage in keep 1972 Excavation of test pits in keep 1974 Excavations in keep 1986 Redevelopment works 1999-2001

Table 2. Site phasing

- 2.1.4 All excavated contexts have been divided into groups of associated contemporary activity, and where possible each group has been assigned to one of the periods and sub-periods defined above. The definition of periods and sub-periods will not be re-defined during analysis. However, it is possible that some changes to the context groups will be necessary and it is anticipated that some alterations to the assignment of groups to period and sub-periods will be necessary as analysis proceeds.
- 2.1.5 At present, context numbers have not been assigned to the deposits identified through the boreholes, meaning that group numbers have yet to be issued to these deposits. These deposits are therefore not represented in the following tables, but are included in the area and period discussion and all other aspects of this assessment.
- 2.1.6 The number of groups and contexts assigned to each period and sub-period are shown below.

Period	ENF143286 (internal)		ENF143655 (external)	
	Number of Groups	Number of Contexts	Number of Groups	Number of Contexts
1				
2	1	29		
2.1			1	14
2.2	22	102		
2.3	5	19		
3	9	23		
3.1	1	2		
3.2	8	36		
3/4		12	2	7
4	2	6	1	6
4.1				
4.2	1	6		
4/5	1	5		
5	2	9	1	4
5.1				
5.2	1	1	3	6
5.3	8	41		
5.4	1	1	1	10
5.5	1	1		
Unstratified	1	10		3
Ungrouped	1	17		
Total	67	320	9	50

Table 3. Contexts and groups

- 2.1.7 This division into groups and periods has been based primarily on the stratigraphic sequence supported by the ceramic spot-dates. At present many of the spot dates fall into quite broad timeframes, but it is hoped that further analysis, possibly supported by scientific dating, will be able to narrow down the date range for particular contexts.

- 2.1.8 The stratigraphy encountered was reasonably straightforward, although the similarity in nature of some of the contexts presented some difficulties when defining individual layers, particularly in parts of Area 1.
- 2.1.9 In all areas there were some difficulties when interpreting and attempting to link contexts, due to physical barriers sub-dividing each area. These barriers included previous excavation trenches, upstanding medieval masonry and upstanding features of the present museum layout.
- 2.1.10 A summary by site area, outlining some of these issues and summarising the stratigraphic sequence is presented below, followed by a summary by period.

2.2 Area 1

- 2.2.1 Three of the upstanding pier bases in the north compartment of the keep lay within Area 1 (Fig. 2). On the lifting of the floor slabs it quickly became apparent that a low wall ran the length of the area between the pier bases and therefore physically separated the area into two (Area 1 North and Area 1 South). Further physical separation of stratigraphy was caused by late 19th-century drainage trenches and stanchions, the modern lift-shaft and the present staircase. This resulted in some issues with the correlation of deposits across these physical divides – in fact, in many cases it has not been able to correlate the deposits with confidence, meaning that separate stratigraphic sequences exist for some of these physically separate areas. Although this has not significantly affected the overall interpretation of events it does provide some limitations on detailed analysis.
- 2.2.2 Two boreholes were drilled through this area (WS3 and 4). Within these there was evidence for the underlying natural, the destruction of the Late Anglo-Saxon town and the mound make-up (see Appendix A).
- 2.2.3 The areas of deepest excavation were the re-excavated trenches 74/A, 74/B and 86/C along with a newly excavated sondage excavated against the spine wall to investigate its footings.
- 2.2.4 Hand excavation ceased in the main part of Area 1 North at a floor layer, which may have been one of the primary levels. In Area 1 South hand excavation ceased at the primary construction debris floor level.
- 2.2.5 Deposits to either side of the pier bases and linking 'sleeper' wall differed greatly in nature. Those to the north being made up of mortar debris and clean sandy silts (Plate 1). In comparison to the south there were large deposits of occupation debris or dumps of occupation material along with evidence of hearths (Plate 2, Fig. 5). Features relating to construction and repair of the keep structure, such as post-holes for scaffolding were recorded across the whole of this area.
- 2.2.6 Evidence for occupation was severely truncated by Boardman during the conversion to a museum, when c.2m of material was removed. The latest medieval layers within this area contained finds of 15th-century date.
- 2.2.7 Some evidence for later prison activity was recorded. This included pits and some structural evidence related to a prison cess pit adjacent to the east wall of the keep.
- 2.2.8 Not only did Boardman remove a 2m depth of deposits but his works also destroyed surprisingly large areas of archaeology around the base of the newly inserted stanchions and along the length of a number of drainage runs. Pits and old bore-holes were also recorded. It is thought that these were sunk prior to the conversion of the keep into a museum.

2.3 Area 2

- 2.3.1 Much of Area 2 was occupied by a previous archaeological trench 86/A. One borehole was located within the 1986 area of excavation (WS1) and this revealed evidence of the underlying natural, the destruction of the Late Saxon town and mound makeup deposits.
- 2.3.2 On the lifting of the floor slabs it was apparent that the majority of the area to the west of the 1986 excavation was occupied by a post-medieval brick-walled pit (Plate 3). The remainder of the western area was occupied by an operational staircase.
- 2.3.3 The only area containing untruncated archaeological features relating to the construction and use of the mound and keep were located within a limited area in the southern part of this quadrant. Here, mound deposits were located almost immediately below the floor slab. A series of post-holes which post-date the mound construction but pre-date the construction of the stone keep were a significant discovery (Fig. 3 and see below).

2.4 Area 3

- 2.4.1 This small area was further reduced in size, being physically divided into two by the presence of a modern (and still active) drain run. A late 19th-century pit and drain also occupied parts of this area.
- 2.4.2 One of the boreholes was located in this trench (WS2). This revealed the underlying natural, the destruction of the Late Anglo-Saxon town and mound makeup deposits.
- 2.4.3 This trench was excavated by hand until mound makeup deposits were reached. The sequence of construction relating to the north to south and east to west aligned dividing walls was investigated, the walls proving to be broadly contemporary with the construction of the exterior walls of the keep.
- 2.4.4 Other deposits in this area were distinctly different from elsewhere as they consisted primarily of intercutting medieval pits (Plate 4).

2.5 Trial Pits A, B and C

- 2.5.1 Located externally to the keep, each of the test pits was the site of a borehole (WSA-C). The natural subsoil was located in the base of these, above which was a deposit representing the Late Anglo-Saxon town. In Trench A, a human femur was recovered from the borehole at a depth of c.11-12m, within the underlying natural: this was radiocarbon dated to the Late Saxon period. An early feature (Late Saxon?) was also seen in this borehole.
- 2.5.2 Possible evidence for the early mound was present in Trench A, while Trenches B and C revealed chalk material of the type which is usually associated with the later, enlarge motte. Trench C excavations contained the remains of late medieval/early post-medieval human burials.
- 2.5.3 In all of the trial pits deposits associated with the 19th-century re-facing of the keep and demolition works associated with re-building of the gaol were recorded below modern surfaces.

2.6 Period 0

- 2.6.1 Natural was revealed in the base of all four of the internal boreholes and three of the external boreholes (Plate 5). The approximate level for the top of the underlying natural crag was between c.24.3m and c.26.7m OD.

2.7 Period 1: Late Anglo-Saxon

- 2.7.1 Evidence for the Late Anglo-Saxon occupation of the town was revealed within the boreholes. A dark layer of occupation material lay directly above the natural. This represents the Late Anglo-Saxon occupation and/or the destruction of the town at the time when the area was cleared of habitation and occupation ahead of the construction of the castle mound. The upper horizon of this deposit was recorded at between 25.2m OD and 26.7m OD. Underlying this horizon in Trench A, deposits were noted which probably represent a cut feature. Natural deposits below this feature were recorded at c.23.6m OD.

2.8 Period 2: Norman to medieval (c.1067-1250)

- 2.8.1 A large number of groups have been assigned this period representing both phases of construction of the mound, the construction of the stone keep and the early occupation of the keep. Twenty-nine context belonging to this period are 'ungrouped' (G29). This was largely due to problems of lack of physical relationships due to physical obstructions in the north-east of Area 1 and described above.

Period 2.1, first motte

- 2.8.2 This period was represented by deposits in Boreholes WS1, 2 and 3, where reasonably clean sandy material has been recorded. It is possible that a small depth of these deposits were present in WS4. It is notable that this type of material was not present in Boreholes B and C.
- 2.8.3 This supports the long-held view that the keep, with the exception of the north-east corner, was built on raised ground above the original smaller motte. The top of the deposits within the boreholes and interpreted as the first motte lay at approximately 29.9m OD (Borehole WS1), 27.3m OD (Borehole WS2), 28.2m (Borehole WS3) and 28.2m (Borehole WSA). Some mound deposits from the hand excavated part of Trenches A and B were provisionally assigned to this period due to material type, but this will need to be reviewed in the light of the borehole data.

Period 2.2, second motte and keep construction

- 2.8.4 The majority of contexts have been assigned to this sub-group, representing the construction of the enlarged motte with stone keep and contemporary activity. Evidence of the enlarged motte was recorded in all seven boreholes and across all excavation areas (eg Fig. 5, 3293-3297 and 3205). It was often notable by its clay and chalky content. Boreholes, along with deposits in Area 3, seem to indicate that a chalk ringwork may have constructed on the south and west sides of the mound. This would accord with similar evidence from earlier excavations on the east side of the mound (Wallis 2003).
- 2.8.5 One small group of post-holes in Area 2 (Fig. 3, 3251-3254 and 3256) were cut into the top of the extended mound but were sealed by a relatively thin deposit which also spread under the south wall of the keep. These are the only pre-keep structural features identified during this excavation and have been interpreted as a temporary fence or palisade. Of particular interest is the evidence from the plant remains from their fills, which indicates that elder bushes were growing in the immediate vicinity, potentially suggesting a period of hiatus between the completion of the second phase of the mound and the construction of the keep.
- 2.8.6 Construction cuts for the east and south walls of the keep were not observed, suggesting that the walls were built directly on the mound material. A construction cut was seen for the north wall, but here the stratigraphy is more complex due to repair work undertaken soon after initial construction. The spine wall (3298) sits within a construction cut (3204) above a stepped footing (3200, Fig. 4), but neither of the north or west wall of the south-east chamber were

placed within such cuts. Some of this variation is thought to reflect the underlying nature of the mound make-up deposits.

- 2.8.7 The central row of pier bases in the northern compartment (bisecting Area 1) were of the same build as a low sleeper wall which abutted the east keep wall and extended for the full width of the excavation. This appeared to lie within a shallow cut, but as the masonry features were left *in situ*, this was difficult to ascertain with certainty. This wall physically divided the northern compartment of the keep into two, and the rectangular pier bases supported the joists which carried the principal floor above.
- 2.8.8 Other features contemporary with the construction of the keep include post-holes, several of which lay opposite putt-log holes visible in the upstanding masonry. Other deposits include spreads of construction debris and trampled deposits which formed floor surfaces.

Period 2.3, early use of the keep

- 2.8.9 It was during this period that changes to the internal design within the keep occurred, including enlarging the pier bases to support a vaulted ceiling. These alterations have been observed in the architectural details. A few deposits of masonry rubble recorded during the excavations possibly represent damage earlier to the earlier pier bases, and it was through these destruction deposits that the footing trenches for the extended pier bases were cut. Other deposits of this period included make-up and internal surface layers. All of these were recorded in Area 1. Only one context relating to this sub-period was recorded elsewhere; in Area 2 part of an extended pier base was noted under the floor slabs, but further investigation of this was prohibited by the extant museum staircase.

2.9 Period 3: c.1250 to c.1538

- 2.9.1 Several deposits recorded in Area 1 showed evidence of *in-situ* burning, and a large pit containing a large block of masonry was also assigned to this period. Also assigned to this period are layers of occupation material including substantial deposits of dumped charcoal (Fig. 5, 3083 and 3055; Plate 2). These lay in Area 1 South and it is hoped that further analysis will allow these features to be assigned to one of the Period 3 sub-periods: as well as containing substantial quantities of charcoal, the relevant samples were rich in charcoal and fish bone, while other finds included a human tibia, various metal objects and a bone object. A pit or post-hole in Area 2 is also of this broad period.
- 2.9.2 **Period 3.1.** In the northern part of Area 1, a worn pathway (258) was identified running from the spiral staircase in the north-east corner of the keep diagonally across the space towards the doorway within the spine wall. It is likely that this path crossed the central pier base arcade to the west of the excavated area.
- 2.9.3 **Period 3.2.** Deposits in the northern part of Area 1 consisted of floors and bedding layers, along with a number of pit cuts, the pits being backfilled with similar material which made up the surrounding layers. A series of intercutting pits and occupation or floor levels were recorded in Area 3, along with the underpinning of the west wall of this south-eastern compartment. Although presently all assigned to this sub-period, it is hoped that further analysis may clarify the dating sequence which may see some of these features moved to a different sub-period.
- 2.9.4 It should be noted here that the deposits assigned to Period 3 were very different in each of the areas which were represented; those in Area 1 North were mainly floor surfaces or makeup levels, those in Area 1 south were made up of hearths and dumped occupation material and those in Area 3 were intercutting rubbish pit. The evidence suggests distinct zoning of activity within the keep basement during this period.

2.10 Period 3/4

- 2.10.1 Two pits in Area 2 contained finds of 16th-century date. One of these had been partially excavated in 1986 and is described as a 'robber' pit. This appears to indicate that the upstanding vaulted ceiling may have been demolished at this date, or had collapsed before this time.
- 2.10.2 External Trench C contained graveyard soils and burials. Radiocarbon dating of the human bone suggests a mid 15th- to mid 17th-century date for these features and deposits.

2.11 Period 4: c.1538-c.1790

- 2.11.1 Few features or deposits of this period are represented in the archaeological record largely due to the truncation of deposit which occurred when the castle was converted to a museum. A single pit in Area 1 and another in Area 3 may date to this period, along with small cut features recorded in the external trenches.

Period 4.2

- 2.11.2 The most easterly section of the wall which runs between the pier bases in Area 1 was located adjacent to a chute cut through the east wall of the keep which led to a brick-built cess pit. It is therefore thought that this surfacing of the wall and post-hole were perhaps associated with the prison buildings of this time.

2.12 Period 4/5

- 2.12.1 Located in Area 2 was a large cistern and/or cess pit (3074; Plate 3). The west wall of this was also the thickened west wall of the keep, while the south and east walls were constructed of brick and re-used stone. Only its lowest fill is thought to be contemporary with use.

2.13 Period 5: c.1792-2018

- 2.13.1 The groups within this period relate to the backfilling of the cess pit/cistern in Area 2 and levelling or old topsoil layers in the external trenches.

Period 5.2

- 2.13.2 Groups assigned to this sub-period all lay in the external trenches and represent the demolition of Soanes' gaol by Wilkins in the 1820s and the refacing of the keep by Salvin in the 1830s.

Period 5.3

- 2.13.3 All the groups of features assigned to this phase are related to the conversion of the gaol to a museum by Boardman. Interestingly the bases of a small number of pits containing boreholes were recorded. These are thought to be exploratory pits dug through the accumulated deposits ahead of conversion. The full extent of Boardman's stanchions which support the present main museum floor were revealed, as were works which included repair to the spine wall. The footings of the present staircases were seen, together with elements of the drainage system, all inserted by Boardman and still in use.

Period 5.4

- 2.13.4 This consists of modern levelling and surfaces which were recorded in the external trenches.
- 2.13.5 The contexts classed as **unstratified** were the soils backfilling previous excavations and the material which lay immediately below the stone floor of the keep.

3 FACTUAL DATA: ARTEFACTS

3.1 General

3.1.1 The following finds were recovered:

Material	ENF143286 (internal)		ENF143655 (External)	
	Number	Weight (kg)	Number	Weight (kg)
Pottery	3427	40.679	40	0.411
Ceramic Building Material	507	146.152	4	0.236
Stone	262	392.735	-	-
Metal Small Finds	290	-	-	-
Non-metal small finds	23	-	-	-
Animal bone				
Human remains	9	-	yes (left <i>in situ</i>)	-
Environmental Samples	66		-	-

Table 4. Quantification of finds

3.1.2 All of the assessments below relate to the excavations within the keep, except where indicated as ENF143655 External, which relate to the three test pits excavated outside of the keep.

3.2 Pottery by Sue Anderson

- 3.2.1 A total of 3427 sherds of pottery weighing 40.679kg was collected from 81 contexts. Only a small proportion of this assemblage is Late Saxon in date, the majority of it being Thetford-type ware. Small quantities of non-local Late Saxon wares are also present. Only two rims are present, both from possible lamps. This group, had it been in use in the castle itself, would have to date to the late 11th century. However, it is possible that some or all of this group came to the site with the soil and hardcore used to construct the mound.
- 3.2.2 The early medieval group is also relatively small. Local sand-tempered fabrics (EMW, EMWM, EMWT, GRCW) predominate, with few of the calcareous-tempered wares (YAR, EMWSS). The small quantity of Yarmouth-type ware is unusual for the city as it is normally the second most frequent early medieval ware from contemporary sites across the town. Only four rims are present, all of them simple everted types from jars.
- 3.2.3 The high medieval group makes up the largest proportion of the assemblage. Just under half of the group by sherd count comprises coarsewares of local manufacture, together with a few non-local greywares. The majority of coarsewares are typical Norwich 'LMU', although this incorporates a range of fine sandy to very fine sandy micaceous wares which were probably made at more than one production site. Whilst most probably came from Potter Heigham and Woodbastwick, where waste scatters have been found (Jennings 1981), it is possible that some came from further afield. Certainly there is at least one rim sherd which is more typical of Suffolk than Norfolk and has been recorded as WVCW.
- 3.2.4 Of the identifiable vessels, there are more jugs (40) than jars (37) in this assemblage, which is unusual, and there are very few other forms (5 bowls, 1 dripping dish, 1 handled jar or spouted pitcher). The jar forms suggest a spread across the whole medieval period, although there are slightly more developed forms than simple forms, suggesting an increase in use/disposal in the 13th/14th centuries. The coarseware jugs were supplemented by a large group of glazed jugs, particularly Grimston-type ware examples. Of the 755 vessels (this number may be too high due to the difficulty in determining individual vessels from non-joining body sherds), only 50 are identifiable as jugs and 18 as face jugs, although it is likely that most of the Grimston vessels were jugs. Another 13 jugs and a jar were identified in the 'Yarmouth-type' glazed ware group. Most of the other glazed wares are represented by body sherds only, but there is an unprovenanced jug rim and a jug rim and a handle in Saintonge ware. Other glazed wares were

limited to a few from Suffolk, Cambridgeshire and London, although further work on the small unprovenanced group may widen the catchment area.

- 3.2.5 Late medieval wares make up the second largest period group of the assemblage by sherd count. It is likely that some of the Grimston and Yarmouth-type glazed wares in this assemblage were contemporary with the LMT vessels and many were found in the same contexts. In particular, there are jugs with cordons, incised lines or combing, all of which appear to be more typical of the later period of Grimston ware production. However, only those vessels which contained substantial glazing internally have been included in the 'GRIL' fabric. Other late medieval wares include a few examples of vessels from the English Midlands and the near continent, particularly the Low Countries and Rhineland. In terms of forms, jugs are again the dominant type (25 examples), with a few bowls, pipkins, jars and mugs also present.
- 3.2.6 The post-medieval group is relatively small and much of it may be contemporary with the late medieval and transitional material, dating to the 16th century. Glazed redwares (GRE, SPEC, WNBC) dominate the group, and there are a few unglazed redwares (PMRW), along with whitewares (TGE) and slipwares (PMSW, STAF) from further afield. German stonewares and slipwares were the main imports of this period. Unusually for a post-medieval assemblage from the city, there are no Iron Glazed Blackware sherds, and the quantity of TGE is very small, which may also point to an early date, or perhaps short period of deposition, for the group.
- 3.2.7 Pottery of 18th/19th-century date was represented by only 30 sherds. These are dominated by English stonewares, most of which are pieces of large tankards. A fragment of a blackware bowl and two creamware plate rims are the only other identifiable forms in this group. One small sherd was unidentified but may be an unglazed fragment of LMT or YARG.
- 3.2.8 Included in the late medieval assemblage are at least two sherds which have been crudely formed into discs, probably for playing pieces. Both were unstratified (3006, backfill 1986), but could perhaps have been made by prisoners housed in the keep. Other vessels showed signs of wear which may suggest re-use as tools (perhaps for scratching graffiti) and one Grimston jug base fragment had a central hole drilled through the base and may have been re-used as a plantpot.

3.3 Pottery (ENF143655 external) by Sue Anderson

- 3.3.1 Forty sherds of pottery weighing 0.411kg were collected from four contexts. Table 5 shows the quantification by fabric; a summary catalogue by context is included in the archive.

Description	Fabric	Fabric date range	No	Wt/g	Eve	MNV
Thetford-type ware	THET	10th-11th c.	4	69	0.07	4
Early medieval ware	EMW	11th-12th c.	7	85	0.10	5
Local medieval unglazed	LMU	11th-14th c.	18	175	0.17	13
Grimston-type ware	GRIM	L.12th-14th c.	6	48		6
Yarmouth-type glazed wares	YARG	13th-15th c.	3	12		3
Late medieval and transitional	LMT	15th-16th c.	2	22		1

Table 5. Pottery quantification from the external test pits, by fabric

3.4 Ceramic Building Material by Sue Anderson

- 3.4.1 A total of 507 fragments of CBM was collected from 57 contexts.
- 3.4.2 A small quantity of post-medieval roofing material was recovered, with plain tiles occurring more frequently than pantiles. Most were recovered from cess pit 3074 in Area 2. Few

fragments had any distinguishing features, although four fragments had circular peg holes, and one of these had two holes close to the centre.

- 3.4.3 Several samples of late/post-medieval red bricks were recovered. Like the post-medieval roof tiles, the majority of these came from Area 2 cess pit 3074 and buried soils. This group was relatively homogenous, comprising fine sandy bricks with rounded pebble and flint inclusions with sizes ranging between 223–235mm x 108–114mm x 53–58mm, and several with diagonal skintling marks on the stretchers. The size, appearance and presence of these marks suggests a pre-19th-century date for this group, and they may be as early as the 16th century.
- 3.4.4 A few 19th-century bricks were also recovered, these ranging in size from 105–112mm wide and 63–68mm thick, but only one length was measurable (240mm). Several had white paint on header or stretcher surfaces and most of these were recovered from Area 1 (pit 3010 and features 3012, 3016, 3058). A few white-firing bricks of this period were also recovered, including pieces related to Stanchion 2 and a masonry floor support in Area 2. Also belonging to this period were a small piece of quarry floor tile from buried soil 3036 in Area 2, and two pieces of chimney pot from intrusion 3016 in Area 1.

3.5 Ceramic Building Material (ENF143655 external) *by Sue Anderson*

- 3.5.1 Four fragments of CBM (236g) were recovered from mixed deposit 4037. These comprised two small fragments of early brick, a fragment of medieval roof tile, and a fragment of medieval ?ridge tile (20mm thick, green glazed) covered in medium sandy buff-coloured mortar. The group represents demolition rubble of medieval date.
- 3.5.2 One small irregular fragment (21g) of fired clay in a medium sandy fabric with calcareous and clay pellet inclusions was recovered from context 4037. Its function is uncertain, but it could be a piece of CBM which has lost its original surfaces.

3.6 Mortar *by Heather Wallis*

- 3.6.1 A small quantity of mortar was recovered as bulk finds and five contexts were bulk sampled. Julian Munby (Head of Building Archaeology, Oxford Archaeology), Jon Gill (Building Archaeologist, Oxford Archaeology) and Tim Palmer (Aberystwyth University) were consulted regarding what information could be obtained from the mortar. Mortar itself is not datable and there are no local typologies (the only major study being that on the Tower of London). Information might be gained if mortar from the standing structure was investigated in a systematic way, but little can be gained from mortar incorporated in archaeological contexts. In the light of these communications no further assessment work was undertaken.

3.7 Small Finds *by Chris Howard-Davis*

Copper Alloy

- 3.7.1 Eighteen fragments of copper alloy, probably representing 17 artefacts, were examined. The group include one coin and one post-medieval token. Most of the other identifiable objects are personal objects including two buckles and two strap loops probably of a late medieval date. A medium-sized dress pin with a wound and crimped head, likely to be of very late medieval or early post-medieval date, was found in the same context as a relatively large aglet or lace chape. Other identifiable objects were confined to three nails.

Iron

- 3.7.2 In all, 256 fragments of ironwork, probably representing 223 artefacts, were examined. Apart from nails, discussed below, there were very few recognisable objects recovered.

3.7.3 A hand forged iron socketed arrowhead (SF 67) dating to the medieval period. The socket is conical and slightly tapering expanding into a roughly triangular-shape two wings head. Other identifiable artefacts include a small blade fragment (SF 134), a small fragment of scale-tang blade (SF 5) and a single small fragment of horseshoe (SF 9).

3.7.4 By far the largest group amongst the ironwork can be identified as nails. A total of 192 fragments were recorded, probably representing at least 177 nails. Most appear to come from medium-sized hand-forged nails suitable for use in carpentry rather than for joining major timbers.

Lead

3.7.5 A small group of 16 fragments of lead were recovered. Most, if not all, seem to derive from the use of metallic lead in building, made up of solidified drips of molten metal and offcuts of thin sheet. Three pieces could well be lead used to run-in and secure other objects. It is notable that much of the lead derives from Period 2.3 and Period 3 make-up layers, raising the possibility that it reflects the reclamation and recycling of lead originally used elsewhere.

Worked Animal Bone

3.7.6 Twenty-two fragments of worked bone were recorded, probably representing 21 objects. There is a small number of items associated with dress and personal appearance. There are three plain bone pins, items which are usually assumed to have been used in dress. Such pins are not chronologically sensitive, and thus cannot be assigned a date. A small and carefully-made cylindrical bead (SF189); although probably bone, its pale colour might suggest it to be ivory. It cannot be dated except from its context, but would not be out of place in the medieval period, being, perhaps, a rosary bead. A somewhat larger, and less well-finished item (SF 193) is clearly a slice through a bone shaft. It is, however, trimmed to give a roughly hexagonal outline, and thus could have been intended for use as a bead. Equally, its shape could be fortuitous, being an offcut from the production of a handle for a whittle-tanged tool.

3.7.7 Other classes of find are confined to two handles, both intended for whittle-tanged blades, but neither of particular quality or craftsmanship. There is also a single tuning peg (SF 204). These were in use over a long period, from the Roman period well into the post-medieval period (MacGregor 1985) and serve only to indicate the presence and use of a stringed instrument.

3.7.8 The assemblage also includes four examples of large bird bones (probably goose radii) which have been modified with an oblique cut across the shaft, to form what are usually identified as dip pens (see for instance MacGregor 1985, fig. 67g), although other uses have been discussed. These are not uncommon finds in Norwich (see also Margeson 1993) where they appear in contexts dated between the 14th and 16th century (*ibid*, 69). Obviously associated with literacy, it is not unreasonable to assume that they reflect the substantial level of administration required in the day-to-day running of a substantial high-status establishment.

3.7.9 The remainder of the worked bone is probably waste, being offcuts from the production of other bone objects. They fall into two groups from Period 3.2 pit group 225 (Area 3) and from Period 5.3 being rather similar mid-shaft fragments with a deep cut groove circling one end, and both are broken across the groove, suggesting perhaps that they are failed attempts to make plain handles. The two are sufficiently similar to suggest that they might be parts of the same object, although no obvious join was noted.

3.7.10 SFs 100, 192, 194, 195, 203 are also clearly closely related. All have one end trimmed to a square-sectioned projection or are detached square-sectioned fragments. Their purpose is not clear, but they lack the grooving and file marks, and the green discolouration typical of pinner's

bones, and thus this identification has been rejected. Three are from Period 3.2 pit group 225 (SFs 100, 192, 203; cxts 3115, 3127, and 3128 respectively) and two (SFs 194, 195) from the backfill of 1986 excavations.. A single small ring of bone, cut from a midshaft fragment (SF 191, again from Period 3.2 pit group 225) is also probably an offcut.

Glass

- 3.7.11 A single, well-preserved, translucent yellow glass bead (SF 188) was from Period 3 occupation debris. Medieval glass beads are not particularly common (Egan 1991), and its method of manufacture (wound/lamp work) does little to elucidate its dating. The fact that it appears to imitate amber could have some small significance.

3.8 Glass by Heather Wallis

- 3.8.1 A small quantity of glass was retrieved from the excavation totalling 38 fragments. All except for three pieces were retrieved from the backfill of the Period 5 cistern in Area 2. Two pieces were from a 19th-century exploratory pit and one was unstratified from cleaning layers.

3.9 Metal-working debris by Heather Wallis

- 3.9.1 Just seven fragments of slag weighing 0.39kg was retrieved from the excavations, five of these pieces came from Period 3 contexts in Area 1 the remaining two pieces from Period 2 context also in Area 1. Very small quantities of hammer-scale were also retrieved from the environmental samples.

3.10 Struck flint by Heather Wallis

- 3.10.1 The assemblage of struck flint was small totaling 75 pieces over half of which was found in Period 3 contexts. Most of the flint is the residue from building construction although no single group contained sufficient struck flint to suggest a deliberate building repair horizon.

3.11 Stone by Neil Moss

- 3.11.1 The worked stone assemblage comprises 262 pieces weighing 392.735kg, of which 156 pieces weighing 370.82kg has at least one worked face or diagnostic feature. The latter group was returned to Norwich Castle keep for assessment after the excavation works had been completed. Recording work was therefore undertaken with artificial light as there is no natural light in this part of the keep.
- 3.11.2 Each of these pieces of stone was issued with a unique identification number preceded by the letter code WS. An individual record sheet, including sketch was completed and a digital photo was taken of each piece. Details such as material, form, tooling and other diagnostic features were recorded on an Excel spreadsheet and are presented in the appendix.
- 3.11.3 Of the assemblage examined 154 were limestone architectural fragments the other two fragments being a piece of ?marble and a piece of chert. The architectural fragments consist of five different types of stone the most common being Caen (134 pieces). Others are Clipsham (8), Yorkstone (6), Barnac (4) and Quarr.
- 3.11.4 Overall there is a wide variation in weathering with some pieces showing severe weathering. Many pieces show heat-discolouration or 'pinking'. The tooling is predominantly diagonal boaster work typical of early medieval masonry. Occasionally heavier diagonal tooling is present, possibly from quarry work.

3.11.5 Twenty-one of the fragments show signs of being affected by heat, two appear to be sooted and three have evidence of a surface limewash. Four have been stained by cess. Twenty-five of the fragments show evidence of having been re-used.

3.12 Human Skeletal Remains (ENF 143286, internal) by *Natasha Dodwell*

3.12.1 A small number of human bones were recovered during the excavations. None were articulated and they all occurred as residual material in non-burial contexts. Details are presented below.

Context	Element	Sone	Age
3013	L. femur	Left prox. & mid shaft	Adult
	L. femur	Distal joint	Adult
	L. femur	l. head	Adult
	Lumbar vertebra	-	Adult
	2 nd left metacarpal	Ccomplete	Adult
3034	5 th right metatarsal	Complete	Adult
3083	L. tibia	Shaft & distal joint	Adult
3086	L. tibia	Complete	Older sub adult/young adult
	R. humerus	Mid shaft	Older subadult/adult

Table 6. Disarticulated human skeletal remains

3.12.2 The three fragments of left femur recovered from the backfill of a 17th-century or later pit (context 3013), although unfitting, are probably from the same limb. A single vertebra and metacarpal were also present in this deposit.

3.12.3 The remaining human bones were found within Period 3 deposits and probably indicate some residuality in these contexts.

3.13 Human Skeletal Remains (ENF143655, external) by *Sue Anderson*

3.13.1 Incomplete remains of at least two human skeletons were uncovered in Test Pit C, in the anticipated area of the prison cemetery. Most remained *in situ* but all were recorded on site and reburied during backfilling of the trench.

3.13.2 The bones were in good condition and some were complete. Articulated remains comprised two pairs of feet (upper 4034, lower 4035) and a third foot below those.

3.13.3 The bones that had been removed (4002) were a complete right tibia, the distal end and part of the shaft of a right femur, a right patella, most of a left innominate in three pieces, a complete sacrum, a complete ulna, a lower thoracic vertebra, a seventh cervical vertebra, and fragments of a right scapula. Apparently disarticulated bones still *in situ* comprised the distal end of a right humerus, at least two ribs, the left innominate and the head of a left humerus. Radiocarbon dating returned a result of cal AD 1470-1690 (88.8%).

3.13.4 The *in-situ* remains (4034) which could be seen comprised the lower ends of the tibiae (the upper parts of which were within the baulk and not exposed), both tali, the right navicular and all three cuneiforms, all five right metatarsals, the right hallucial phalanges, the left calcaneum, the left first cuneiform, the left first and second metatarsals, and the left distal hallucial phalanx and proximal phalanx of the second toe. The bones were large and possibly male (the first metatarsal measured 65mm long). The right second metatarsal was removed for radiocarbon dating and returned a date of cal AD 1450-1650 AD (95.4%), making both dated burials earlier than expected for this part of the cemetery.

3.13.5 The remains of (4035) visible in the section were all five right metatarsals, the left first to third metatarsals and two proximal phalanges. The bones were fairly small in comparison with (4034) (the first metatarsal was 56mm long) but relatively robust, and sex was indeterminate.

3.13.6 Part of the left foot of a sub-adult was visible below the left foot of (4035), with an unfused proximal epiphysis of the proximal hallucial phalanx.

4 FACTUAL DATA: FAUNAL AND ENVIRONMENTAL EVIDENCE

4.1 Animal bone *by Hayley Foster*

- 4.1.1 A large faunal assemblage was recovered from the excavations, amounting to 96kg of bone. Remains were retrieved via hand-collection and environmental residues, with sieving carried out on site for those contexts rich with small mammal, fish and bird bones. The assemblage comprises 1770 identifiable phased fragments. An additional 353 fragments were identified but were from unphased contexts, and are therefore not included in the overall NISP totals. The species represented include cattle (*Bos taurus*), sheep/goat (*Ovis/Capra*), horse (*Equus caballus*), pig (*Sus scrofa*), dog (*Canis familiaris*), cat (*Felis catus*), fallow deer (*Dama dama*), red deer (*Cervus elaphus*), rabbit (*Oryctolagus cuniculus*), mouse (*Mus musculus*), hare (*Lepus* sp.), shrew (*Sorex araneus*), fox (*Vulpes vulpex*), weasel (*Mustela nivalis*) and vole (*Microtus arvalis*).
- 4.1.2 The assemblage from Norwich Castle Keep was dominated by domesticates including cattle, sheep/goat and pig, with pigs been the most well represented taxa. A presence of wild species including fallow deer, red deer and rabbit also played a prominent role.
- 4.1.3 **Cattle** were well represented in all periods and there appear to be no significant biases in body part distribution as cranial elements, foot elements and meaty bones were recovered. This suggests that cattle were raised close by or brought to the castle site on the hoof. Dental wear data was minimal, although the limited evidence suggests the presence of young and older animals. Fusion data will need to be analysed to gain a better understanding of age at slaughter.
- 4.1.4 **Sheep/goat** were represented by 557 fragments with 51 of the fragments differentiated as sheep. No fragments could be classified as distinctly belonging to goat. Sheep/goat appear to have been slaughtered between 2 years of age and adulthood, however a trend in Period 3 shows a presence of lambs between birth and 5 months, suggesting that sheep/goat were reared close by.
- 4.1.5 **Pig** remains made up the highest percentage of fragments from the assemblage. Pigs are generally associated with high status assemblages and are exploited for meat. The ageing data suggests that pigs were slaughtered at around 17-27 months of age. The presence of young unfused, porous long bones may suggest consumption of suckling pig. This also suggests that it is likely that pigs were reared in a close proximity to the castle. Pigs were adaptable to most urban and rural environments, making them easy to rear. The noticeable decline in pig remains during Periods 4 and 5 is probably linked to the decrease in status of the castle and a shift in the economy and the reliance on pork as a primary dietary component.
- 4.1.6 **Equid** remains are scarce in the assemblage, with only two fragments identified as horse. As stated above the majority of the faunal remains are related to domestic food waste, and horse remains would not be expected to be disposed of within the castle keep.
- 4.1.7 Remains belonging to **cats** were found in three separate contexts (3038, 3088 and 3103), while **dogs** were found in nine separate contexts. The presence of a large dog was noted in context 3006, with a distinguishably sizeable atlas recovered, however this context was from an unphased backfill. Remains belonging to smaller dogs were also recovered suggesting canines were kept as pets. Cats would have been kept as pets, but to also catch vermin.
- 4.1.8 **Red deer** and **fallow deer** are present in small number in the assemblage. Fallow deer remains were heavily processed with chop marks present on long bones and a sawn tibia. Deer are a typical high-status medieval species as nobility were involved with the hunting of deer as a social activity and sport.

- 4.1.9 **Small mammals** are well represented in the assemblage, probably as a result of the diligent recovery techniques. Lagomorphs made up over 6% of the overall NISP. Rabbits are another species typically associated with the high-status medieval diet, as nobility were known to have kept rabbit warrens and obtained rabbits for both their meat and fur. Rodents, shrews and mustelids also had a small presence.
- 4.1.10 A single vertebra body from a **cetacean**, probably dolphin, was recovered from a Period 3.2 floor layer (3110). A fragment belonging to dolphin was previously recovered from the barbican well excavation (Moreno Garcia 2009). Documentary evidence has suggested that cetaceans were highly prized and considered the property of the king or nobility when washed up onshore (Gardiner 1997).
- 4.1.11 For the purposes of assessment, **bird** bones were not recorded to species, however bird bone consisted of 3.70kg and 1629 fragments from hand-collection. It should be noted that a variety of species were present including various galliforms and swan.
- 4.1.12 There was evidence of bone working on sheep/goat metapodials and pig fibulae. Bone pins were noted as were bones that were highly polished, probably in preparation for further craftworking. There was a lack of cattle horncores and deer antlers, indicating that horn and antler working was occurring elsewhere in the castle or market. Small numbers of worked antler and horn were recovered from previous excavations of the Castle Mall site (Albarella *et al.* 2009).
- 4.1.13 Signs of gnawing were evident on bones of various species, with cases of pathological changes in sheep remains.
- 4.1.14 Butchery marks were present on approximately 7% (over 100) of the recordable fragments, however as vertebrae (excluding the atlas and axis) and ribs were non-recordable, it should be noted that the vast majority of ribs showed evidence of cut and chop marks and vertebrae showed heavy longitudinal chop marks. Cervical vertebrae (C3) were noted with transverse chop marks resulting in the removal of the head. Ribs had cut and chop marks on both large and medium mammal ribs, evidence of both filleting of meat and division into joints of meat. Butchery marks were mostly the results of rapid dismemberment of animals for food preparation. Butchery was methodical and systematic, likely carried out by skilled butchers at the castle. The evidence suggests that animals were predominantly brought to site on hoof and butchered on site, however, in addition partially dressed carcasses could have been transported to the castle from the city market.

4.2 Fish Remains *by Rebecca Nicholson*

- 4.2.1 Fish remains were rapidly assessed from 53 samples and from 46 contexts, which represents the great majority of the recovered assemblage, with the Phase 3 occupation surfaces being especially rich in fish bones, most of which were in good or very good condition. The total assessed fish assemblage comprises an estimated 4500 bones, which includes around 800 hand collected fragments with the remainder deriving from the sorted portions of the residues of bulk soil samples. A large number of bones remain in the <5mm unsorted residues.
- 4.2.2 The hand collected material is unsurprisingly dominated by bones from larger fish, most commonly cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*) and ling (*Molva molva*), the last represented in several contexts only by vertebrae and a cleithrum which suggests the inclusion of dried stockfish, although butchery marks appear to be very scarce. Other species typically recovered in the sieved samples include large and smaller flatfish (*Plurionectidae* and *Scophthalmidae*), conger eel (*Conger conger*), herring (*Clupea harengus*), whiting (*Merlangius merlangus*), shark/ray (*Elasmobranchii*), mackerel (*Scomber scombrus*), sea bream (*Sparidae*) and possibly pollack (*Pollachius pollachius*) and torsk (*Brosme brosme*).

Freshwater and migratory species include pike (*Esox lucius*), eel (*Anguilla anguilla*), small cyprinid (*Cyprinidae*) and very occasionally salmon/trout (*Salmonidae*) and smelt (*Osmerus eperlanus*). The samples included much greater quantities of bones from the smaller species, in some cases with several hundred identifiable bones recovered from 10 litres of soil, and considerable quantities of bones from smaller fish additionally present in the unsorted residues.

- 4.2.3 Fish remains are especially abundant in Period 3 contexts including occupation surface 3025 in Area 1 South and make-up layer 3034 in Area 1 North as well as in surface/dump 3117, and pit fills 3114, 3127 and 3136, all of which are from Area 3 (main area, sub-period 2). Fill 3128 (from a pit in Area 3, main area) had a particularly rich fishbone assemblage more typical of an occupation deposit or pit fill deriving from kitchen waste (sample 55). There does not appear to be any clear variation in taxonomic composition between the various areas, although some of the largest fish were present in Area 1 South. The very rapid nature of the assessment means that patterning may become evident after more detailed recording.

4.3 Environmental Samples *by Rachel Fosberry*

- 4.3.1 Sixty-six bulk samples were taken from features within the excavated area inside the keep of Norwich Castle. Samples were taken from layers and deposits that date from the construction of the enlarged castle mound (Period 2.2), the occupation of the keep and internal changes (Period 2.3), the occupation of the keep from the mid-13th century to Reformation (Period 3), the continued use as a prison (Period 4) and the mid 18th-century use to present day (Period 5).

Period	2.2	2.3	3	3.1	3.2	3 or 4	5	0
Area 1	7	3	23	1	5			1
Area 2	7					3	1	
Area 3	2				14			

Table 7. Number of bulk samples from each area by period

- 4.3.2 The assessment sought to determine the presence of plant remains, their mode of preservation and whether they are of interpretable value with regard to domestic, agricultural and industrial activities, diet, economy and rubbish disposal.
- 4.3.3 The samples proved to be particularly productive with regard to cess material that is considered to relate to culinary and possible latrine waste. Small bones, mainly fish but also including small mammal and birds are abundant in several of the samples. Plant remains are relatively scarce, especially charred plant remains, but preservation of plants (and insects) through mineralisation occurs in several samples.

4.4 Marine Mollusca *by Carole Fletcher*

- 4.4.1 In total, 284 shells, weighing 2.567kg, were recovered, mainly from layers, pits, and post holes. No features, except context 4037, surface 3042 and grave 4038 contained enough shells to indicate one or more meals of oysters or whelks alone; however, they may have been combined with other foods. Most features produced low numbers of shells.
- 4.4.2 Throughout the assemblage, only three oyster shells show evidence of damage, in the form of a small 'U' or 'V'-shaped hole on the outer edge (usually) of the left valve. This damage is likely to have been caused by a knife during the opening or 'shucking' of the oyster, prior to its consumption.

5 STATEMENT OF POTENTIAL

5.1 Stratigraphy

5.1.1 The recent excavations form the most comprehensive exploration of the medieval and later deposits within Norwich Castle keep undertaken to date. These works have provided information on the structure of the mound, the construction of the stone keep and later alterations and aspects of use within the keep during the medieval period. One of the most striking aspects is the distinct spatial zoning of activities in different areas of the keep.

Boreholes

5.1.2 The retention of the intact borehole cores from the castle mound offers the potential for further detailed analytical work on the sediments which could include thin section micromorphological analysis. This may be coupled with additional stratigraphic analysis to link the sequences with data from area excavations within the keep and the test pits, as well as other interventions from previous archaeological investigations in the vicinity. It may be possible to model the original underlying topography, should sufficient spatial data be available.

Pre-mound deposits

5.1.3 Both the natural subsoil and deposits relating to the Late Saxon town were recorded in the boreholes. New information relating to the underlying natural can be added to that from previous exploratory works (Shepherd Popescu 2009; Wallis 2003), thereby providing a more accurate understanding of the natural contours underlying the castle mound and surrounding baileys.

5.1.4 It is unclear whether the Late Saxon material recorded represents *in-situ* deposits of the town, sealed below the mound, or whether this is destruction debris from the Late Saxon settlement that had been landscaped to form the lower construction horizon of the mound. This has implications for the underlying topography and the scale of the initial construction works.

Mound construction

5.1.5 Evidence for the initial mound was recorded in the boreholes, although some sandy deposits associated with the first mound were recorded in two of the external trenches. Examination of the comparative heights of these layers, and other similar deposits from earlier excavations and boreholes, should allow a better understanding of the shape, size and height of the initial mound construction.

5.1.6 Deposits from the extended mound were present within the excavated areas and the boreholes. It is known that the construction methods of this mound were complex (Wallis 2003) and initial similarity of deposits with those from the earlier excavations indicate that analysis and comparison of evidence should lead to a better understanding of construction methods across the monument. Consideration should also be given to the castle complex as a whole and the excavation and re-modelling of the other defensive features (Shepherd Popescu 2009).

Keep construction

5.1.7 The 'footings' of the keep walls were exposed for small parts of the north, east and south walls, as well as the spine wall and internal walls creating the south-east compartment. The differences in construction technique across the building were marked. The north wall and spine wall were built within a construction trench, the south wall and south-east compartment walls appeared to be built directly on top of mound material. These differences appear to

relate to difference in the underlying mound material and further examination of the mound make-up with relation to the construction techniques of the stone keep is necessary. Associated with this is the known failure of the north keep wall during construction. The re-recording and re-interpretation of a trench previously excavated in 1986 is critical in the understanding of this event. It should be noted that the banded footing recorded adjacent to the east wall of the keep in 1999-2001 was not encountered during this excavation, meaning that the full extent of these was not established.

- 5.1.8 A number of features thought to be associated with construction of the keep, such as post-holes and trampled floor surfaces were recorded. Close analysis of their stratigraphic location in relation to other layers may provide an understanding of construction sequence and methods.
- 5.1.9 Evidence of the internal arcading within the main north and south compartments was also recorded. Consideration of their footings, combined with archaeological evidence of some destruction and re-building, should be carefully considered within the framework of the sequence of events which has been identified through the study of the upstanding fabric of the keep. It has been suggested that damage was caused to the keep during the two known sieges and that the construction of the vaulted ceiling was in response to one of these events.
- 5.1.10 Repair was also undertaken to one of the walls forming the south-east compartment. Dating and examination of this along with the structural evidence in the upstanding wall would prove to be of interest.

Keep use

- 5.1.11 The majority of the excavation removed deposits relating to the use of the keep and activities taking place within it. As noted above one of the most striking features was the distinctive nature of the deposits within each different area. The north-east part of the keep appeared to have been kept relatively 'clean' and deposits here were mainly make-up layers and floor surfaces. A worn path was noted crossing from the north-east corner spiral staircase towards the doorway in the spine wall. Post-medieval and modern intrusions into these deposits have somewhat inhibited detailed interpretation but further analysis may allow physically isolated stratigraphic strands to be linked by phase. It is still uncertain why the north-east doorway is at a notably lower level than the rest of the keep floor, a situation which seems to have remained unchanged since the medieval period.
- 5.1.12 The southern part of the north compartment was markedly different with evidence here of occupation deposits and dumped material, including charcoal-rich deposits. Hearths were also recorded. The sequence of deposits here reflects that seen in adjacent 1999-2001 excavations and linking the stratigraphic sequence between these, along with study of the artefactual data would enhance the dataset and the understanding of types of activities represented by these deposits.
- 5.1.13 Evidence of activity within the south-east compartment is again remarkably distinct consisting of a number of intercutting pits and floor levels. Unpicking this complex stratigraphy (along with the repair to the west wall of this compartment) would be informative.
- 5.1.14 Overall comparison of floor levels throughout the keep should be studied. It is probable that the floor height was not level in the medieval period. As mentioned above the floor level in the north-east corner is low compared to that elsewhere, while all medieval floor levels have been removed at a later date in the south-west compartment suggesting that the medieval floor level would have been higher here. Overall comparison of these levels and the use and activities within the compartments will enhance our understanding of both the physical arrangement with the keep and how this related to the activities being undertaken.

Later mound deposits

- 5.1.15 It is unclear to which phase of the mound construction some of the deposits in the external trenches belong. Further analysis of this is therefore required to establish the date of these deposits.

Post-medieval gaols

- 5.1.16 Evidence relating to this period was scant but there is an opportunity to examine the evidence for surviving structures and the associated use of the keep's interior, in particular close to its east wall and in the south-west compartment. This evidence should be examined alongside that from earlier excavations (1974, 1999-2001), documentary evidence and that presented by the upstanding building. The date, use and disuse of one prison cistern/cess pit also requires further examination to understand its relationship in the building sequence of the gaols within the keep. A few possible pits of this period were also recorded but a closer examination of their location in relation to known prison structures would prove useful in their interpretation. Externally, layers of demolition debris associated with prison demolition and re-building along with debris associated with the mid 18th-century of the keep give some indication of the extent of these construction projects and the contemporary ground level at those times.

Prison burials

- 5.1.17 Burials were recorded in one of the external trenches which have been radiocarbon dated to the late medieval to post-medieval periods, with a potentially earlier start date than previously indicated for this part of the known prison burial ground. This evidence should be examined alongside that from a previous watching brief (1999-2001) and documentary evidence in order to try to establish the full extent and duration of the cemetery located to the west of the keep.

Conversion to a museum

- 5.1.18 It was known that, on conversion to a museum, c.2m of archaeological deposits were removed from within the keep however the excavation showed the extent of further damage caused at this time. Large footings for structural supports removed a significant area of archaeological deposits to a much greater depth and drainage trenches excavated. Interestingly some pits with boreholes in their base were revealed, indicating that Boardman had some knowledge of the presence of the central sleeper wall/pier bases in the northern compartment.

5.2 Pottery

- 5.2.1 The potential of the pottery assemblage is to provide evidence for dating and phasing of the site; pottery use, consumption and possibly manufacture; trade links both within and outside East Anglia; and status of the occupants. This will aid one of the main post-Roman pottery research aims for Norfolk, to revise the Norwich corpus and fabric series (Irving 2011, 37, EA5), and also aids with the development of our understanding of the relationship between Norwich and its hinterland, and the city's role as a centre of supply and demand (Medlycott 2011, 70).

5.3 Ceramic Building Material

- 5.3.1 This is the first CBM assemblage of reasonable size to have been studied from excavations within the castle keep. The potential of this assemblage is to provide information on the types of ceramic building material in use at the castle during the medieval to post-medieval periods. Medieval and post-medieval tile and brick form the bulk of this assemblage, with only three pieces identified as Roman.

5.4 Small Finds

Copper alloy and glass

- 5.4.1 The few recognisable objects will contribute in a limited manner, to the dating and any discussion of daily life on the site. It is, however, unlikely that they will sustain significant further analysis, beyond brief catalogue entries and a mention in the appropriate parts of any future report.

Iron and lead

- 5.4.2 The potential for further analysis is very limited, however the majority of the assemblage is from medieval contexts and may inform on activities being undertaken within the keep.

Worked animal bone

- 5.4.3 Although none of the objects can contribute significantly to any refinement of the dating for the site, several give some insight into the kinds of activity undertaken, especially during Period 3.2, when day to day objects were being lost, or discarded into pits. None will sustain significant further analysis, but brief catalogue entries should be prepared, including, where possible, an identification of the bone type, and a brief report, mentioning local comparators, should be compiled for inclusion in any future report.

5.5 Metal-working debris

- 5.5.1 The presence of this material should be noted in the report.

5.6 Struck flint

- 5.6.1 Little can be gained by further analysis of this assemblage.

5.7 Glass

- 5.7.1 The assemblage should be checked for diagnostic forms, but other than this little can be gained from further analysis of the glass.

5.8 Stone

- 5.8.1 The assemblage itself can add little to the understanding of stone use and construction technique in the keep. A few pieces have been identified as being of possible interest and it may be possible to identify their original location within the keep. The presence of stone chips in certain contexts may reflect periods of construction or repair.

5.9 Human Skeletal Remains

- 5.9.1 No further analysis is required on the remains themselves but the presence and dating of the human remains from the external trenches is significant in understanding the use of this area in the later medieval and post-medieval periods.

5.10 Faunal Remains

- 5.10.1 The faunal remains from Norwich Castle keep are of regional and national significance as they can provide important insight into diet, butchery practices, how food waste was disposed of and husbandry. The remains will shed further light on social status and add to the overall picture of life at Norwich Castle in addition to the previous zooarchaeological work conducted at the Castle Mall and other areas of the castle.

5.11 Fish Remains

- 5.11.1 The fish remains have very high potential to provide valuable information about fish consumption directly relating to the occupation of the castle from the mid 13th century to the Reformation, although more precise dating of the individual deposits would be required to maximise the potential of the assemblage to inform about the use of the keep during this period of its history.
- 5.11.2 While determining 'status' from food remains is not entirely straightforward, some larger fish such as salmon, pike, turbot and sturgeon were expensive items and so can be used as indicators of wealth. In this respect it should be noted that no remains of sturgeon have so far been seen in the assemblage and other 'status' items are not frequent, but some of the fish which are present (such as the larger flatfish and conger) are not typically food for the poor. Generally the variety of species appears unusually broad if it records food fed to prisoners.
- 5.11.3 The assemblage can usefully be compared to the very large collection of fish remains from Castle Mall Site 777N, where considerable differences in taxonomic composition were observed between the different phases of activity (Locker 2009). Superficially at least the taxonomic composition of the fish remains from the keep resemble those from Castle Mall.
- 5.11.4 Part of the proposed analysis will include an examination of the likely role of imported, stored fish and to examine the relative significance of locally caught versus imported or traded fish. The assemblage can usefully be compared to contemporary records of fish from other regions (superficially it appears distinctively different to assemblages from castles, urban and religious sites in the south of England, for example) and the evidence will be examined in the light of national trends (*cf.* Barrett *et al.* 2004).

5.12 Environmental Samples

- 5.12.1 The plant remains are reasonably well preserved and have potential to yield valuable data about diet and urban food supplies during the medieval and early post-medieval period in Norwich Castle, thus contributing to the research aims of this project. Further study of the selected samples will help to characterise deposits relating to occupation and activity within the keep and it is of particular relevance that contemporary plant assemblages from samples analysed from the excavations at Castle Mall will provide a comparison.
- 5.12.2 Initial results suggest similar findings in which the food plants that have been preserved are quite limited in density and diversity. There is little or even no evidence of more exotic food plants such as spices and nuts that would be expected from a high-status site in both the earlier period (Murphy 2009, 354) and throughout the continued occupation in the later medieval period. Murphy interprets assemblages that contain mineralised remains and are rich in fish bone such as these as sewage or latrine waste. The vast quantities of fish bone recovered from the keep would suggest that the deposits contain a significant sewage component.

5.13 Marine Mollusca

- 5.13.1 These remains have no potential for further analysis.

5.14 Overall Potential

- 5.14.1 The archaeological investigations have provided a wealth of new data which inform on the construction details of the castle mound and the stone keep. To date, few such earthworks and buildings have been investigated. This evidence, combined with that from previous investigations, provides a major contribution to the understanding of motte construction and

building techniques. There is particularly high potential for a more detailed understanding of the information derived from the boreholes, in relation to the impact of the castle on the Late Saxon town, the local topography and the constructional phases of the mound.

- 5.14.2 Over the years many discussions on the construction and internal arrangements of the keep have been put forward based on the architectural details of the upstanding building. It is now possible to support (or dispute) some of these theories with archaeological evidence.
- 5.14.3 Significant new light has been thrown onto the internal arrangements within the keep and the way in which that space was utilised. Investigations have shown a zoning of activities within the building, and a continuation of the differentiation of space through time. Clearly further examination and integration of the structural, stratigraphic, artefactual, faunal and environmental data will add detail to this newly emerging pattern. Such opportunity to investigate the daily functioning of a castle by archaeological excavation is extremely rare.
- 5.14.4 There is opportunity to explore the social and economic activity of this high-status building and its occupants. The faunal and environmental data are particularly significant. The faunal assemblage includes a range of both domestic and wild species, as well as an extraordinarily high quantity of fish bone. Analysis of the bird bone is also likely to yield informative results.
- 5.14.5 The pottery illustrates economic links and some of the other finds such as dip pens and beads illustrate status. Most will be gained from these assemblages by comparison with the previous interventions in and around the castle as well as other sites in Norwich.
- 5.14.6 Not only will the analysis inform on the detailed examination of life in Norwich Castle, it will also make a significant contribution to the study of Norman and early medieval castles across England. It can also provide interpretation information on the Norman keep which could be incorporated in the imminent re-display works and for the future.
- 5.14.7 It should not be forgotten that Norwich keep was never fully abandoned and has remained in use, albeit at times in a ruinous condition, throughout its lifetime. Although evidence for its later medieval and post-medieval use as a gaol had largely been truncated, the small amount of recorded evidence for this period can be added to the on-going study of Norwich gaol through an extended period of prison reform.

6 UPDATED PROJECT DESIGN

6.1 Revised research aims

6.1.1 A summary of the project's original research objectives (RO) were stated in the previous section and detailed in the Written Scheme of Investigation. Following the assessment of the structural, artefactual, faunal and environmental data it is now possible to identify areas where further analysis should produce useful results. The original project objectives have been revised, reformulated and re-expressed to emphasise the particular areas which can successfully be addressed in the proposed analysis

RO 1) to increase understanding of the natural and pre-Castle topography of the area.

6.1.2 Previous excavations at Castle Mall and under the Castle mound have allowed a model of the natural topography to be constructed. Evidence from the boreholes from the present works can be utilised to enhance and add detail to this developing picture.

RO 2) to identify the nature of the Late Anglo-Saxon activity below the mound and its destruction.

6.1.3 It is probable that a Late Anglo-Saxon features were identified in one of the boreholes. This detail can be added to our existing knowledge of the Late Saxon town.

RO 3) to examine the built structure of the mound and compare with information recorded in previous excavations.

6.1.4 There was clear evidence to continue to support the theory of a two-phase mound construction, the phases being differentiated by the type of material used in the mound construction. Evidence for the first phase mound was present in the boreholes and similar materials were identified in the external trenches. Second phase mound material was seen both in the boreholes and in all internal areas of excavation.

6.1.5 Detailed analysis of height data from this work along with that from previous investigations should allow a refining of the proposed size and finished height of both phases of mound construction, as well as adding detail to construction methods and providing an opportunity to examine the contact horizon between the two mounds.

6.1.6 Norwich remains one of the most investigated mottes in Britain and as such this type of information is significant to the overall understanding of this type of monument across Britain and northern France.

RO 4) to consider the possible presence of post-enlarged mound soil horizon and the implications of the discovery of post-mound but pre-keep features.

6.1.7 One of the most unusual elements of this work was the discovery of a small number of features relating cutting into the top of the second mound, but pre-dating the keep wall construction. The implications of the method and timescale of construction of the mound and keep should be further considered.

RO 5) to investigate the extent and depth of the Norman keep foundations, their relationship with underlying mound deposits and to examine evidence associated with the failure of the north-east corner of the keep.

6.1.8 Excavations revealed that different construction techniques were employed in different parts of the keep and the methods used appears to correlate with the type of underlying deposit. The establishment of these differences impact on the interpretation of the failure of the north wall which additional analysis would further elucidate. The present works included a re-

interpretation of one of the trenches excavated in 1986 and the implications of this should be further explored.

RO 6) to identify features associated with the construction (or any later repair) to the keep walls.

- 6.1.9 Several features were identified as post-holes probably supporting timber scaffolding. Further examination of these, their stratigraphic location and spatial relationship with the upstanding walls would inform on construction techniques employed during the construction and maintenance of the keep.

RO 7) to explore the construction and significance of walls associated with pier bases subdividing both the north and south compartments.

- 6.1.10 The presence of a dividing wall, associated with the known pier bases was clearly established. These would have formed physical barriers sub-divided the internal space within the keep. Evidence of the later rebuilding of the pier bases was also evident but much of the stratigraphic sequence associated with this had been removed by later truncation.

RO 8) to investigate the phasing of internal division of the south-east compartment of the keep and subsequent repair.

- 6.1.11 The divisions within the south-east corner of the keep were seen to be largely contemporary, but not keyed into the outer wall of the keep. An underpinning of one of the internal walls was undertaken at a later date. Relationships with the underlying mound deposits and comparison with the failure of the north keep wall will be of interest.

- 6.1.12 Information on the phasing of these walls can feed into the interpretation and reconstruction of the first floor arrangements of the chapel above.

RO 9) to identify the Norman floor levels within the keep and develop an understanding of how variations in this may reflect on the internal arrangements and use of the keep.

- 6.1.13 Assessment has shown that the probable Norman floor levels within the keep vary between compartments. This may have impact on accessibility and use and these differences should be examined and considered with the levels of access from the spiral staircases.

RO 10) to characterise occupation and activity within the keep, specifically internal floor surface and use deposits, with particular reference to variations in their constructional character, duration and date and the implications for the zoning of activities

- 6.1.14 Highly notable during the excavations was the variation of types of deposits in the different areas of the keep which were physically separated from each other. The three variations which stand out are areas dominated by floor surfaces and constructional debris (Area 1 North), areas of occupational debris and small industrial usage (Area 1 South) and areas of pitting (Area 3). Consideration of the temporal differences or contemporaneity of these activities should be studied in more detail and the implications of the types of activities, usage and movement through the area of the keep should be considered. This information is the first large scale assemblage of stratigraphic, artefactual and ecofactual to be retrieved and examined from within Norwich castle keep.

RO 11) to provide artefactual and ecofactual evidence relating to status, date and use of the keep.

- 6.1.15 Information from previous excavations (Shepherd Popescu 2009; Wallis 2003) will facilitate comparison between information directly associated with the keep and that from other areas of the mound and the expansive defended area of the castle baileys.

RO 12) to provide evidence for trade links both with and beyond East Anglia

- 6.1.16 Evidence from the pottery assemblage will contribute to this study and comparison of sources can be made for items deposited within the keep to that across other parts of the city

RO 13) to examine diet, butchery practices, aspects of husbandry and the use of natural (wild) resources

- 6.1.17 Information gained from the animal, fish and bird bone assemblages along with that from the environmental sampling will provide significant data on these aspects. A comparison with the data from other excavations of the castle complex (Shepherd Popescu 2009; Wallis 2003) and from other excavations across Norwich can be made.

RO 14) to contribute to castle studies at a local and national level

- 6.1.18 There have been few opportunities across the country to examine construction and use deposits of a Norman castle and its Norman and medieval occupation. As such these investigations will provide significant data which be incorporated into the wider study of the castle.

- 6.1.19 Study of the Norman and medieval castle has often focused on their setting and military use. In contrast the data from the present work reveals detailed information about construction techniques and everyday living and as such provides an opportunity to examine these aspects. The present investigations provide a unique dataset to the broader study of castles in East Anglia and beyond.

RO 15) to confirm and examine surviving evidence relating to the pre-Soanes prison.

- 6.1.20 Evidence likely to represent the pre-Soanes prison was located and further examination of this along with documentary evidence should confirm the dating of these features, which will feed into on-going studies of the history of the Castle as a prison.

RO 16) to examine a feature thought to form part of Soanes prison of 1792/3 and to examine the relationship of this with the structural alterations to the west keep wall.

- 6.1.21 One cistern or cess pit thought to originate during this period of construction was recorded. The relationship of this feature with a possible water supply from the roof and the thickening of the west keep should be examined along with its relationship with contemporary structures.

RO 17) to present the extent of truncation of deposits within the keep

- 6.1.22 Excavations undertaken on 1974 and 1986 had previously been recorded. Evidence revealed during the present works includes the location and extent of the truncation of the deposits within the keep during its conversion to a museum, as well as later drain diversions. These can now be fully mapped.

6.2 Interfaces

- 6.2.1 These works formed a phase, albeit a major intervention, in the on-going study of Norwich castle, examining its construction, use and demise as a Royal stronghold.

- 6.2.2 Previous excavations within the keep have already been cited and include excavations in 1974, 1986 (Ayers 2016) and 1999-2001 (Wallis 2003, 2016) and photographic evidence and other antiquarian notes are held by the Norfolk Museums Service. On top of the mound but exterior to the keep small interventions were made between 1987-1998 (Shepherd Popescu 2009) and in 1999-2001 (Wallis 2003, 2016). Not all of these works are fully published. During production of a grey literature report, these previous works will be referred to where they directly influence the interpretation of the deposits excavated in 2018.

- 6.2.3 Excavations recording the mound make-up were undertaken between 1999-2002 (Wallis 2003) and some antiquarian photographs held by the Norfolk Museums Service also show mound deposits. Again these will be referred to where they directly impact on the information recovered in the recent excavations.
- 6.2.4 Throughout most of the 20th-century, studies of the keep have relied on the architectural information held within the upstanding structural elements of the keep and comparison with other Norman keeps. Over the years, various interpretations relating to the internal arrangements, use and development of the internal space within the keep have been put forward. Key published contributions to these studies are those by Philip Barker, Paul Drury and Sandy Heslop. A recent metric survey of the interior of the keep has been examined and interpreted in detail by Roland Harris. Although key to the understanding of the use of the keep the details of the upstanding architecture will not be fully explored in the archaeological analysis, some of the archaeological information discovered does have implications for interpretation of the upstanding structure, and the results will therefore feed into the interpretation of the architectural details.
- 6.2.5 The history of the castle as a prison from late 18th-century was reasonably well documented and this has been studied and analysed, along with surviving structural evidence by Nick Arber (2009). Again the newly recorded archaeological features will feed into the understanding of the 18th- and 19th-century prisons and the documented evidence will help interpret the archaeological evidence.
- 6.2.6 Further works with and around the keep will be carried out over the forthcoming months as the *Gateway to Medieval England* project is rolled out. Forthcoming works include further small-scale investigations within the keep to allow the constructions of new stairways, lifts and doorways through the keep walls, as well as recording necessitated by the removal of the present staircase accesses.
- 6.2.7 Outside of the keep it is anticipated that works will be required for a crane base (to the west), new toilet facilities (to the north) and new entranceway (to the east.) It is anticipated that each of these interventions will be subject to archaeological assessment and analysis.

6.3 Methods Statement

Stratigraphic

- 6.3.1 The stratigraphic data is key to the understanding of the site and as such contributes to all of the revised research aims.
- 6.3.2 The provisional allocation of individual contexts to groups and groups to specific periods will be reviewed and the matrix revised. This entails reconsidering the stratigraphic evidence alongside the datable artefactual evidence and will involve close co-operation between all involved in the analysis stage of the project.
- 6.3.3 On completion of this procedure, more detailed group texts will be written to make the archive more accessible. The grey literature text will be drawn from these group texts.
- 6.3.4 The database, paper record, matrices and ACAD drawings will be checked, edited and updated. From the database, integrated context and finds listings for the groups will be produced and group drawings (where appropriate) will be printed out from CAD. Together these provide stratigraphic information for specialists and will form a key part of the archive.
- 6.3.5 As the archaeological evidence covers such a broad timespan, research into many different areas will be necessary. At this point research will focus on previous archaeological

interventions through the mound (Wallis 2003, Shepherd Popescu 2009, Wallis 2016, Ayers 2016).

- 6.3.6 On receipt of the specialist reports these will be edited and integrated with the site text and/or archive as appropriate.

Boreholes

- 6.3.7 The thin section work proposed for the borehole samples could help to elucidate the character of the pre-mound dark earth and address whether the deposit formed *in situ* or was imported, whether there is any variation between the profiles and whether there is any evidence to address the nature of the occupation and activities carried out at the site. Any remaining sediment following subsampling for thin sections, although samples would be small, could also be processed for assessment of any charcoal and charred plant remains. Analysis of the fine-grained strata within the (earlier?) mound make-up may help to clarify the derivation, process and duration of construction, *eg* identification of stabilisation horizons and incipient pedogenesis.

Pottery

- 6.3.8 The analysis of the pottery assemblage will address specific issues. These include the search for parallels for currently unidentified glazed ware along with analysis of the three-dimensional spatial distribution of pottery fabrics and forms in features and structures. This will aid in study of the taphonomy of the site, and to provide information relevant to the study of social status and land use.
- 6.3.9 A comparison of the assemblage with other large groups of pottery from the city will be made and a report written, selected sherds will be illustrated.
- 6.3.10 Any refinement to the spot-dating will feed into the stratigraphic analysis of the site.

Ceramic Building Material

- 6.3.11 A full catalogue of the assemblage will be completed.
- 6.3.12 Analysis will include comparison of the assemblage with other large assemblages from the city along with the study of spatial distribution of fabrics and forms in features and structures. A final report will be written.

Mortar

- 6.3.13 No further work is required.

Small Finds

- 6.3.14 **Metal and glass.** Detailed catalogue entries will be completed. Items not yet assessed by the specialist will be submitted for cataloguing. A report will be written and selected items illustrated.
- 6.3.15 **Worked animal bone.** Detailed catalogue entries will be completed, a report written and items selected for illustration.

Conservation

- 6.3.16 All iron objects will be x-rayed. Four items have been selected for conservation.

Glass

- 6.3.17 The assemblage will be checked for diagnostic forms.

Metal-working debris

6.3.18 No further work is required.

Struck flint

6.3.19 No further work is required.

Stone

6.3.20 Roland Harris will be invited to comment on seventeen selected pieces of architectural stone. Comments will be included in a revised report. Some pieces may require illustration.

Human Skeletal Remains

6.3.21 No further work is required.

Animal Bone

6.3.22 Additional recording of measurements will be made to complete the archive, this will allow the establishment of age, sex and taphonomy for the full assemblage.

6.3.23 Spatial analysis will be undertaken and a comparison with assemblages from the castle complex and other city sites will be made. A report will be written.

Fish Remains

6.3.24 Fish remains >2mm will be extracted from 36 sample residues and fish remains <2mm from 14 flots. The fish remains within the assemblage will identified and catalogued.

6.3.25 Analysis will be undertaken considering status, the role of imported fish in comparison with locally sourced fish, the significance of freshwater fishing. Comparison will be made to other local assemblages where data is available. A report will be written.

Bird Bone

6.3.26 Bird bone will be identified, and comparison with other contemporary Norwich assemblages will be made. A report will be written.

Environmental Samples

6.3.27 Further processing and sorting of samples from five selected contexts, comprising 13 buckets and additional sorting for two contexts to retrieve mineralised remains will be undertaken.

6.3.28 A report detailing all the results and comparison with assemblages from other city sites will be written.

Marine Mollusca

6.3.29 No further work is required.

Illustration

6.3.30 Site drawings and photographs to support the written stratigraphic text will be selected. They will be prepared to publication standard by the graphics team.

6.3.31 A small number of finds have been identified as being suitable of illustration. These include c.10 pottery, c.4 copper alloy, c.1 iron, c.12 worked bone and two glass items. Some of the small find illustration will take the form of annotated photographs, where appropriate. A few pieces of worked stone may require illustration.

6.4 Report and Publication

6.4.1 The purpose of the analysis is to produce a complete grey literature report for the excavations undertaken in 2018. At this point the results will not otherwise be published as further work

is planned for 2019/2020. On completion of all of the archaeological excavation and recording associated with the *Gateway to Medieval England* project an appropriate level and place of publication will be identified. This decision will be undertaken in consultation with Norfolk Museums Service. It is hoped that the final publication will also include the results of the excavations undertaken in 1999-2001 that are at present unpublished.

6.5 Ownership and Archive

- 6.5.1 The archive will be deposited with the Norfolk Museums Service for curation. This will include the site paper archive, photographic archive, artefactual archive and a digital archive.
- 6.5.2 The paper archive will include the site registers, context sheets, plans and sections. The photographic archive consists of black and white negatives and digital colour images. Time-lapse photographs were also taken.
- 6.5.3 The digital archive will include the site database, finds reports and scans of the site plans and sections.

7 RESOURCES AND PROGRAMMING

7.1 Project Team Structure

7.1.1 The project team is set out in the table below:

Name	Organisation	Role
Paul Sperry	OA East	Project management
Elizabeth Popescu	OA East	Project management/academic advice
Sue Anderson	External	Pottery, CBM
Hayley Foster	OA East	Animal bone
Rebecca Nicholson	OA South	Fish bone
tbc	tbc	Bird bone
Liz Stafford	OA South	Geoarchaeology
Rachel Fosberry	OA East	Environmental
Martha Craven	OA East	Environmental
Denise Druce	OA North	Charcoal
tbc	tbc	Insects
Natasha Dodwell	OA East	Finds management
Roland Harris	External	Worked Stone
Chris Howard-Davis	External	Small finds
tbc	tbc	Worked Animal Bone
Debbie Forkes	Norfolk Museums Service	X-ray, Conservation
Dave Brown	OA East	Graphics
Gillian Greer	OA East	Graphics
Heather Wallis	External	Lead archaeologist/author
Roland Harris	External	Worked stone

Table 8. Project team structure

7.2 Task List and Programme

7.2.1 Following approval of this assessment by relevant parties, the programme of analytical work requires discussion with Norfolk Museums Service.

7.2.2 A task list is presented below.

Task no.	Description	Performed by	Days
	Stratigraphic/structural		
1	Allocate context numbers to and check interpretation of bore hole data	Heather Wallis	1.5
2	Refine groups and update matrix	Heather Wallis	1.5
3	Expand group text	Heather Wallis	2.5
4	Check and edit database	Heather Wallis	1
5	Check and edit CAD drawing	Heather Wallis	1
6	Prepare data for specialists	Heather Wallis	1
7	Prepare group text and drawings for archive	Heather Wallis	2
8	Write grey literature report	Heather Wallis	4
9	Read, comment and integrate finds reports	Heather Wallis	2.5
10	Research/comparison based on previous interventions	Heather Wallis	2.5
11	Check and edit grey literature report	Heather Wallis	1
12	Revise photo index	Heather Wallis	2
13	Project liaison and administration	Heather Wallis	2
	Boreholes		
14	Interpretation	Elizabeth Stafford	tbc
15	Thin section micromorphological analysis	tbc	tbc
	Artefactual		
16	Pottery	Sue Anderson	3
17	Ceramic Building material	Sue Anderson	1.5

Task no.	Description	Performed by	Days
18	Metal and Glass Small Finds	Chris Howard-Davis	3.5
19	Bone Small Finds	tbc	1
20	Conservation (including x-ray), 7-10 x-ray plates, conserve 4x cua objects	Norfolk Museums Service	
21	Glass	tbc	0.5
22	Stone	Roland Harris/Heather Wallis	1
Faunal and Environmental			
23	Faunal remains	Hayley Foster	
	Additional detailed cataloguing		10
	Report		6
24	Bird bone	tbc	tbc
25	Fish bone		
	Extraction of further fish remains	Env. Ass. Supervisor	7
	Identification of remains	Rebecca Nicholson	10
	Analysis and report	Rebecca Nicholson	2
26	Plant remains		
	Additional processing and sorting	Martha Craven	12
	Identification and recording	Rachel Fosberry	2
	Tabulation of results	Martha Craven	1
	Report	Rachel Fosberry	3
27	Charcoal identification (if necessary)	Denise Druce	1
28	Insect identification	tbc	tbc
Grey Literature Report			
29	Select and prepare illustrations and plates	Heather Wallis	1.5
30	Finds illustration/photography c. 10 x pot, c.4 x cua, c.1 x Fe, c.12 x bone, c.2 x glass	Photographer/Dave Brown/Gillian Greer	3
31	Site drawings/plates	Dave Brown/Gillian Greer	5
32	Edit	Elizabeth Popescu	2
33	Prepare archive	Katherine Hamilton	3
Project Management			
34	Project management	Elizabeth Popescu	2
35	Project management	Paul Spoerry	1

Table 9. Task list for analysis

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APPENDIX A: BOREHOLE SURVEY BY ELIZABETH STAFFORD

Methods

- A.1.1 Seven boreholes were drilled through the castle mound for geotechnical purposes by a specialist drilling subcontractor - four (WS1-4) in the basement of the keep following completion of the archaeological excavations, and three (WSA-C) outside through the backfilled archaeological test pits. The boreholes were drilled with a small 'Terrier' type percussion windowless sampler capable of extracting cores in 1m lengths to the top of the sandy natural (Norwich Crag). The drilling was monitored on site by an archaeologist from OA.
- A.1.2 Cores were sealed, labelled and transported to the geotechnical contractors' store in Peterborough where they were extruded, photographed and recorded by an OA geoarchaeologist. Following recording, the cores were submitted to the geotechnical engineer for separate recording and subsampling. In discussion with the geotechnical contractor and following a brief review of the sequences, it was agreed that a selection of representative cores could be retained intact (*ie* would not be subject to geotechnical testing) in order to make them available at a later date for archaeological analysis if required (*eg* stratigraphical and thin section analysis). Subsequent to the geotechnical recording being completed these selected cores were transported to OA premises for storage.
- A.1.3 The geoarchaeological sediment descriptions were recorded on standard borehole proformas in line with industry guidelines (Historic England 2015) and based on Jones *et al.* (1999). This includes identification of key strata and comments on texture, compaction, colour, inclusions and the nature of contacts and boundaries. The hand-written records were digitised and the digital photos cropped and arranged by intervention into a photo-transect to allow visual correlation of key strata (Plate 5).

Results

- A.1.4 Overall recovery of intact cores samples was extremely good. Some compaction, core loss and slippage was encountered but this was generally minimal and can clearly be seen in the photo-transect. Where voids did occur within the cores these were recorded on the proformas and included in the descriptions presented in Table 10.
- A.1.5 The clean basal sandy natural of the Norwich Crag was proven in most cores to adequate depth. However, the sand was only seen by a few centimetres in the final core in Borehole WSB. In Borehole WSC it was not seen within the cores, however, a check of bulk SPT samples recovered by the contractor further down the sediment profile proved the sand was present within 0.5m of the base of the final core at 8.5m BGL.
- A.1.6 Overlying the natural sand in all boreholes was a distinctive very dark humic (sandy) silty clay interpreted as a possible (pre-mound) Late Saxon dark earth deposit. This unit was a little variable and in places looked mixed and bedded with frequent charcoal and variable poorly sorted gravel clasts. The lower boundary where observed appeared quite abrupt, although with some evidence of a possible weathered subsoil beneath (possibly truncated). Generally, the deposit appeared very dense and compacted, probably due to the weight of the overlying material and may have originally been substantial thicker. Variation occurred in WSA whereby a depth of mixed deposits beneath the dark earth may represent the fill of a feature.
- A.1.7 The overlying deposits representing the mound were highly variable and complex, generally comprising sands and silty sands with variable amounts of poorly sorted flint and chalk gravel. In places (*eg* WS1, WS3 and WSA) there appeared substantial thicknesses of relatively clast-free orange brown sand bedded with grey sandy silt (earlier mound material?). It is not clear if these grey lenses represent stabilisation horizons with incipient soil formation and/or import

of turf/occupation soils, but they clearly differ in character from the coarser gravelly units. Significant deposits of compacted chalk rubble were noted in WSB and WSC (and to a lesser extent WS4) which probably represent the later extension of the mound.

Potential and recommendations

- A.1.8 The retention of the intact borehole cores from the castle mound offer the potential for further detailed analytical work on the sediments which could include thin section micromorphological analysis. This may be coupled with additional stratigraphical analysis to link the sequences with data from area excavations within the Keep and the test pits, as well as other interventions from previous archaeological investigations in the vicinity. It may be possible to model the original underlying topography should sufficient spatial data be available.
- A.1.9 The thin section work could help to elucidate the character of the pre-mound dark earth and address whether the deposit formed *in situ* or was imported, whether there is any variation between the profiles and whether there is any evidence to address the nature of the occupation and activities carried out at the site. Any remaining sediment following subsampling for thin sections, although samples would be small, could also be processed for assessment of any charcoal and charred plant remains. Analysis of the fine-grained strata within the (earlier?) mound make-up may help to clarify the derivation, process and duration of construction *eg* identification of stabilisation horizons and incipient pedogenesis.

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WS1			Description	Preliminary interpretation	mOD
0.00	1.40	Silty sand	Loose and dry, mid reddish grey brown (10YR 5/4) silty sand. Sand is coarse with frequent poorly sorted sub-angular to sub-rounded clasts. Occasional degraded fragments of (oyster?) shell. At 0.45m-0.56m mixed with greyish brown (10YR 4/3) silty sand. At 0.56-0.62 a lense of dense, cream coloured, chalky diamict with frequent rounded clasts of degraded chalk. Abrupt contacts	2nd mound	31.90
1.40	1.60	Chalk	Dense and very firm chalky clay silt with frequent rounded clasts of degraded chalk. Lower boundary diffuse over 50mm		
1.60	2.00	Clay silt	Dense mid to light brown (10YR 6/3) clay silt. Structureless, with frequent small peagrit sized chalk clasts and occasional rounded clasts up to 30mm. At 1.85m large chalk clast up to 80mm		
2.00	2.40	Sandy clay	Dense firm, mixed mid yellowish brown (10YR 5/3) sandy clay. Sand is coarse to medium, with flecks of chalk and occasional poorly sorted clasts		
2.40	3.34	Sand	Below 2.4m becoming softer, yellowish brown medium sand (10YR 5/4), becoming greyer (10YR 5/2) below 3.0m, occasional poorly sorted clasts. Lower contact irregular 3.34-4.0m		
3.34	4.55	Silty sand	Dense and firm, becoming softer below 4m, mid to dark brownish grey silty sand (10YR 4/2). Sand is medium. Occasional poorly sorted clasts, frequent charcoal fragments	1st mound	29.50
4.55	5.27	Sand	Soft, loose, bright orange yellow (7.5YR 6/6), slightly clayey, medium to coarse sand. Frequent poorly sorted flint clasts, rounded to sub-angular. Large rounded pebble at 5m (80mm).		
5.27	5.32	Flint	Layer of flint clasts within a dark grey clay silt matrix		
5.32	5.40	Mortar?	Cream coloured, curmbly mortar like material		
5.40	5.56	Sand and clay	Mixed deposit of soft grey and reddish brown medium sand with some clay. Occassional poorly sorted clasts		
5.56	6.56	Silty sand	Firm dark grey silty, medium sand		
6.56	7.00	Humic silty sand	Dense and firm, very dark brown (humic) silty medium sand with frequent charcoal fragments. Occasional small to medium clasts. Flecks of CBM/daub? Some slippage into core below. DARK EARTH		
7.00	7.40	Sand	Pale yellow to yellow at the base (10YR 8/2 to 2.5Y 8/6), coarse sand with occasional small to medium clasts . NORWICH CRAG	L ate Saxon	25.34
				Natural	24.90

WS2				Preliminary interpretation	mOD
0.00	0.50	Clay silt	Dense, very firm, pale brown (10YR 7/3) chalky clay silt. Very mixed with abundant poorly sorted of degraded chalk and occasional very large shattered flint. Occasional medium sized flint clasts up to 30mm sub-rounded to sub-angular. Lower contact abrupt and irregular.	2nd mound	32.33
0.50	1.00	Sand	Loose and soft, reddish orange brown (10YR 6/6) medium to coarse sand with occasional clasts of chalk and flint, poorly sorted. Below 0.95m mixed with frequent clasts of degraded chalk and a single large clast of flint		
1.00	1.10	Void	Core void		
1.10	1.20	Sand	As above but with a very large degraded chalk clast at an abrupt boundary		
1.20	1.45	Sand	Reddish brown (10YR 5/6) medium to coarse sand with frequent to occasional flint and chalk clasts, frequent charcoal flecks.		
1.45	2.10	Sand	Becoming slightly greyer (10YR 5/4) below 1.45m where there is a concentration of flint and chalk pebbles		
2.10	2.20	Clay silt	Lens of dense, firm, pale brown (10YR 7/3) chalky clay silt with irregular upper and abrupt lower boundary		
2.20	2.77	Sand	Greyish brown (10YR 5/4) medium to coarse sand with flint and chalk clasts, frequent charcoal flecks. Shattered flint at 2.4-2.46m		
2.77	2.90	Clay silt	Lens of dense, firm, pale brown (10YR 7/3) chalky clay silt		
2.90	3.40	Sand	Greyish brown (10YR 5/4) medium to coarse sand with flint and chalk clasts, frequent charcoal flecks. Frequent Fe staining below 3.24m and a large flint clast at 3.36-3.39		
3.40	4.00	Silty sand	Grading to medium sand mixed with chalky silt (10YR 6/3-4)	1st mound ?	28.33
4.00	5.00	Silty sand	Greyish brown (10YR 6/4) medium slightly silty sand. Mixed structure. Shattered flint at 4.00-4.10m, 4.18-4.24m, 4.94-5.00m. At 4.43-4.48m Fe mottling. Occasional degraded chalk fragments. Concentration of chalk pellets at 4.60-4.66m		
5.00	6.00	Silty sand	As above, mixed dumo deposits of sand with flint. Flint at 5.54-5.60m, 5.73-5.79m, 5.86-5.90m. Clinker at 5.94-5.96		
6.00	6.43	Sand	Firm orange brown (10YR 6/4 to 6/6) slightly silty medium to coarse sand. Abrupt lower contact	1st mound	26.33
6.43	7.00	Humic clay silt	Firm slightly sandy clay silt, very dark greyish brown (10YR 3/2 grading to 5/2). Frequent charcoal, rare flecks of shell and CBM/daub, occasional small pebbles. Structureless. DARK EARTH	Late Saxon	25.90
7.00	7.10	Void	Core void		
7.10	7.21	Humic clay silt	As above. Abrupt lower contact		

7.21	7.25	Clayey sand	Interface, (10 YR 6/3) mixed sand with a little clay and small diffuse patches of dark earth. Abrupt upper contact.	Natural	25.12
7.25	8.00	Sand	Very clean structureless medium sand (10YR 8/2). NORWICH CRAG		

WS3				Preliminary interpretation	mOD
0.00	0.80	Silty sand	Firm mid reddish grey brown (10YR 5/3) silty fine to medium sand. Similar to WS1. Chalk flecks and fragments throughout, with occasional large and smaller rounded pebbles of flint. Charcoal flecks frequent. Chalk clast at 0.51-0.60m.	2nd mound	32.03
0.80	1.75	Silty sand	Abrupt change to mid greyish brown medium sand (10YR 6/6) mixed with chalky silt, chalk and flint clasts		
1.75	2.20	Chalk	Lenses of dense degraded white chalky silt (putty like) at 1.75-1.85m and 1.92-2.20m. 40mm void at top of core		
2.20	2.37	Silty sand	Abrupt change to mid greyish brown medium silty sand (10YR 6/6). Clast free		
2.37	3.79	Silty sand	As above but with frequent chalk and flint clasts, very mixed with some large fractured flint. Lower contact angled and abrupt 3.79-3.88m		
3.79	4.68	Sand	Loose orange brown (10YR 6/6 to 5/3) medium sand. Occasional large flint clasts up to 100mm, occasional chalk flecks. Common charcoal flecks. Below 4.60m mixed with deposit below		
4.68	5.13	Sand	Becoming more yellow with mixed clasts and lenses of dark grey sand. Lower contact abrupt		
5.13	5.30	Sand	Bed of grey medium sand. Lower contact irregular and a little diffuse	1st mound ?	29.83
5.30	6.00	Sand	Firm greyish brown medium sand. Occasional clasts up to 30mm. Common charcoal and Fe flecks		
6.00	6.34	Flint	Shattered flint and chalk with some sand (from above?)	1st mound ?	28.24
6.34	6.63	Humic clay silt	Very dark greyish brown (humic) clay silt with a little fine to medium sand and occasional chalk flecks. Very degraded bone at 6.62m. DARK EARTH		
6.63	6.70	Sand	Mixed grey brown sandy interface (subsoil?)	Late Saxon	25.69
6.70	7.00	Sand	Loose mid reddish brown (7.5 Y 5/6) medium to coarse slightly silty sand. NORWICH CRAG	Natural	25.40
7.00	9.00	Sand	Loose mid greyish brown grading to light brown sand below 7.2m, with small gravel peagrit up to 20mm. Below 8.43m with Fe mottling. NORWICH CRAG		
9.00	10.00	Sand	Bedded coarse sand and silty clay. NORWICH CRAG		

WS4				Preliminary interpretation	mOD
0.00	0.50	Silty sand	Mid greyish brown silty sand with chalk gravel to 0.5m. Core damaged	2nd mound	32.08
0.50	1.00	Chalk silt	Very dense light brown chalky silt with chalk gravel		
1.00	1.32	Silty sand	Mid reddish grey brown silty sand with poorly sorted clasts of chalk and flint. Sharp lower contact		
1.32	2.16	Chalk	Very dense degraded chalk mixed with light brown clay silt (putty like) with frequent chalk gravel below 1.70m		
2.16	4.00	Silty sand	Dense, mixed deposits of chalk gravel and reddish brown clay silty sand with frequent poorly sorted flint		
4.00	4.42	Void	Partial recovery, redeposited material		
4.42	5.57	Chalk silt	Very dense degraded chalk mixed with light brown clay silt (putty like). Large quartzite pebble at 4.95-5.00m. Irregular lower contact		
5.57	5.70	Silty sand	Mid grey and brown mixed silty medium sand. Common charcoal and occasional poorly sorted flint gravel.	1st mound ?	26.51
5.70	5.92	Clayey sand	Pale brown clayey sand with flint gravel	1st mound ?	
5.92	6.00	Humic silty sand	Clear change to dark grey brown silty sand with common charcoal and rare small burnt stone fragments. DARK EARTH	Late Saxon	26.16
6.00	6.10		Redeposited?		
6.10	6.54	Humic clayey silt	Dense dark grey brown clay silt with medium sand, with small rounded pebbles. Common charcoal. Shattered flint at 6.20-6.25m with orange sand (10YR 3/2). Below 6.40 becoming very silty and dark grey (10YR 4/1). DARK EARTH		
6.54	6.59	Sand	Lens of fine sand or mortar?		
6.59	6.85	Humic sandy silt	Very dense very dark grey humic sandy silt (10YR 5/2). Slightly diffuse lower contact. DARK EARTH		
6.85	8.00	Sand	Loose pale brown clean medium sand grading to bright yellow brown below 7.5m. NORWICH CRAG	Natural	25.23

WSA				Preliminary interpretation	mOD
0.00	1.00	Made ground	Backfilled testpit	Modern	32.54
1.00	1.30	Made ground	Redeposited mixed mid to dark greyish brown medium sand (backfill)		

1.30	1.77	Sand	Orange brown (10YR6/6) medium to coarse sand, occasional poorly sorted flint gravel	Post-med?	31.24
1.77	2.06	Silty sand	Firm, dark greyish brown silty sand, mottled brown, with occasional poorly sorted flint gravel		
2.06	2.57	Sand	Firm, clean orange brown (10YR6/6) medium to coarse sand, occasional poorly sorted flint gravel	1st mound ?	30.46
2.57	4.26	Silty sand	Firm, dark greyish brown medium to coarse silty sand, mottled brown, mixed with common poorly sorted gravel of chalk, shell, CBM and charcoal flecks. Flint clasts up to 100mm. Clear lower contact		
4.26	4.40	Sand	Firm orange brown, mottled grey mixed sand with occasional small CBM fragments		
4.40	5.00	Sand	Loose orange brown clean sand	1st mound	28.14
5.00	5.24	Void	Partial recovery of sand as above		
5.24	5.84	Sand	Firm, orange brown (7.5YR 6/6) clean medium sand, Fe stained. Rare clasts of flint, poorly sorted up to 40mm. Greyer towards base with clay content. At 5.80m large clast of chalk 30mm. Abrupt lower contact		
5.84	6.00	Humic clay silt	Firm dark grey humic sandy clayey silt (10YR 4/2) DARK EARTH	Late Saxon	26.70
6.00	6.37	Void			
6.37	6.45	Humic clay silt	Firm dark grey humic sandy clayey silt (10YR 4/2). As above but disturbed. DARK EARTH		
6.45	6.60	Silty sand	Firm, mixed medium sand with some silt, pale yellowish brown (10YR 7/3) and greyish brown (10YR 6/2). Occasional flecks of CBM and clasts of flint up to 20mm. Possible degraded oyster shell. FEATURE FILL?	Feature fill	26.09
6.60	7.00	Silty sand	Grades into darker grey medium sand with silt (10YR 6/2) below 6.60m. Occasional poorly sorted flint, up to 50mm at 6.95m. FEATURE FILL?		
7.00	7.74	Silty sand	Firm, dark grey brown silty sand (2.5Y 4/2), occasional small clasts of yellow sand and peagrit, CBM flecks		
7.74	8.00	Silty sand	Firm, mid to light brown silty medium sand (2.5Y 5/3) with occasional large flint clasts up to 50mm and peagrit, occasional charcoak flecks. FEATURE FILL?		
8.00	8.20	Void			
8.20	8.33	Silty sand	Firm, dark grey brown silty sand (2.5Y 4/2), structureless and clast-free. Charcoal flecks. FEATURE FILL?		
8.33	8.96	Silty sand	Firm, mid to light brown slightly silty medium sand (2.5Y 5/3) with occasional large flint clasts up to 50mm and peagrit, occasional charcoak flecks. Mixed structure with occasional clasts of dark grey silty sand. Clear lower contact		
8.96	9.00	Sand	Bright orange yellow coarse sand (10YR 6/6) NORWICH CRAG?	Natural	23.58

WSB				Preliminary interpretation	mOD
0.00	1.20	Made ground	Backfilled testpit	Modern	32.75
1.20	2.00	Silty sand	Clean medium to coarse silty sand (10YR 5/3), with occasional poorly sorted flint and chalk clasts below 1.80m	Post-med?	31.55
2.00	2.15	Void			
2.15	2.85	Sandy clay	Soft, mid brown (10YR 4/3) silty sandy clay mixed with frequent chalk and flint gravel, poorly sorted.		
2.85	3.29	Clayey sand	Soft, mid brown (10YR 5/3) clayey medium sand with common chalk gravel at 3.20-3.23m	2nd mound?	29.90
3.29	3.38	Sandy clay	Very dense chalk silt and gravel mixed with mid brown (10YR 4/3) sandy clay		
3.38	3.76	Clayey sand	Soft mid brown (10YR 5/3) clayey medium sand with common poorly sorted chalk gravel		
3.76	4.00	Chalk rubble	Compacted chalk	2nd mound	28.99
4.00	4.13	Void			
4.13	5.00	Chalk rubble	Compacted chalk		
5.00	5.30	Void			
5.30	6.00	Chalk rubble	Compacted chalk		
6.00	6.50	Void			
6.50	7.00	Chalk rubble	Compacted chalk		
7.00	7.33	Void			
7.33	7.56	Chalk rubble	Compacted chalk		
7.56	8.25	Silty sand	Dark grey, medium to coarse slightly clayey silty sand (10YR 4/2), mixed with lighter brown (10YR 5/3) sand below 7.5m. Occasional rounded gravel up to 10mm. DARK EARTH	Late Saxon	25.19
8.25	10.00	Sand	Clean pale brown medium to coarse sand. Occasional to frequent peagrit. NORWICH CRAG	Natural	24.50

WSC				Preliminary interpretation	mOD
0.00	1.00	Made ground	Backfilled testpit	Modern	32.76
1.00	1.45	Made ground?	Mid to dark greyish brown very mixed deposit of sandy silt ith some fine sand and frequent poorly sorted gravel and occasional chalk. Brick fragments. Backfill?	Post-med?	31.76

1.45	2.00	Chalk	Compacted chalk	2nd mound	31.31
2.00	2.15	Void			
2.15	2.40	Chalk	Compacted chalk		
2.40	3.00	Silty sand	Very loose, dry slightly silty medium sand, mid to dark greyish brown. Occasional to frequent poorly sorted gravel of flint and chalk flecks		
3.00	3.12	Sandy clay	Mid brown very sandy clay with chalk gravel. Sand is medium		
3.12	3.93	Chalk	Compacted chalk. Intrusion from above from CPT 3.27-3.42m		
3.93	4.00	Void			
4.00	4.35	Void			
4.35	5.00	Chalk	Compacted chalk		
5.00	5.50	Void			
5.50	6.00	Chalk	Compacted chalk with large flints		
6.00	6.40	Void			
6.40	7.00	Chalk	Compacted chalk. Clast of reddish brown clay at 6.90-6.94m		
7.00	7.25	Void			
7.25	7.50	Chalk	Compacted chalk	Late Saxon	25.26
7.50	8.00	Humic sandy silt	Very dark greyish brown humic clayey sandy silt. Occasional chalk and flint gravel. Darker at upper contact. Common charcoal flecks. DARK EARTH		
8.00	8.50	Humic silty sand	SPT sample: as above	Natural	24.26
8.50	9.00	Sand	SPT sample: Orange brown and yellow brown coarse sand mixed with dark grey silty sand. INTERFACE WITH NORWICH CRAG		
10.00	10.50	Sand	SPT sample: Pale brown, clean coarse sand. NORWICH CRAG		

Table 10. Borehole results

APPENDIX B: ARTEFACT ASSESSMENTS, INTERNAL EXCAVATIONS (ENF143286)

A.2 Pottery by Sue Anderson

Introduction

A.2.1 A total of 3427 sherds of pottery weighing 40.679kg was collected from 81 contexts. Table 11 shows the quantification by fabric; a summary catalogue by context is included in the archive.

Description	Fabric	Fabric date range	No	Wt/g	Eve	MNV
Thetford-type ware	THET	10th-11th c.	38	320	0.25	34
Thetford Ware (Grimston)	THETG	10th-11th c.	1	38		1
Stamford Ware	STAM	850-1150	3	14		2
<i>Total Late Saxon</i>			<i>42</i>	<i>372</i>	<i>0.25</i>	<i>37</i>
Early medieval ware	EMW	11th-12th c.	124	731	0.38	96
EMW micaceous	EMWM	11th-13th c.	7	52		2
Early medieval ware transitional	EMWT	11th-12th c.	22	222		6
Yarmouth-type ware	YAR	11th-12th c.	2	9		2
Early medieval sparse shelly ware	EMWSS	11th-13th c.	3	34		3
Grimston coarseware	GRCW	11th-M.13th c.	4	71	0.06	3
<i>Total early medieval</i>			<i>162</i>	<i>1119</i>	<i>0.44</i>	<i>112</i>
Local medieval unglazed	LMU	11th-14th c.	1088	10123	6.39	765
Waveney Valley coarsewares	WVCW	L.12th-14th c.	1	10	0.07	1
Medieval coarseware	MCW	L.12th-14th c.	8	98	0.35	6
Flemish Blue-Grey Ware	FLBG	12th-13th c.	1	7		1
Flemish greyware	FLGW	Medieval	1	3		1
Grimston-type ware	GRIM	L.12th-14th c.	1147	12629	5.74	755
Yarmouth-type glazed wares	YARG	13th-15th c.	170	2063	2.01	105
Ely Glazed Ware	ELYG	Med-LMed	10	155		3
Hollesley Glazed Ware	HOLG	L.13th-E.14th c.	7	35		5
Ipswich Glazed Ware	IPSG	L.13th-E.14th c.	3	9		3
London-type ware	LOND	L.12th-E.14th c.	5	29		2
Saintonge ware	SAIN	12th-13th c.	3	33	0.08	3
Unprovenanced glazed	UPG	L.12th-14th c.	12	93		6
<i>Total medieval</i>			<i>2456</i>	<i>25287</i>	<i>14.64</i>	<i>1656</i>
Late Grimston-type ware	GRIL	14th-15th c.?	14	138	0.20	7
Late medieval and transitional	LMT	15th-16th c.	530	6539	2.51	394
Cistercian type Ware	CTW	16th c.	2	14		2
Midland Purple	MIDP	L.14th-16th c.	1	3		1
Dutch-type redwares	DUTR	15th-17th c.	11	130	0.15	10
Dutch redwares unglazed	DUTU	L.14th-17th c.	2	45		1
Siegburg Stoneware	GSW1	E.14th-17th c.	8	176		4
Langerwehe Stoneware	GSW2	L.14th-15th c.	4	30	0.15	4
Raeran/Aachen Stoneware	GSW3	L.15th-16th c.	22	283	0.10	22
Unprovenanced late medieval	NLLM	15th-16th c.	5	65	0.18	2
<i>Total late medieval</i>			<i>599</i>	<i>7423</i>	<i>3.29</i>	<i>448</i>
Glazed red earthenware	GRE	16th-18th c.	81	2620	2.18	98
Speckle-glazed Ware	SPEC	L.17th-18th c.	30	2373	0.74	9
West Norfolk Bichrome	WNBC	17th c.	2	13		2
Post-medieval redwares	PMRW	16th-18th c.	1	4		1

Description	Fabric	Fabric date range	No	Wt/g	Eve	MNV
Tin glazed earthenwares	TGE	16th-18th c.	5	74	0.34	4
Post-medieval slipwares	PMSW	17th-19th c.	1	7		1
Weser Ware	WES	E.-M.17th c.	1	5	0.04	1
Cologne/Frechen Stoneware	GSW4	16th-17th c.	7	82		7
Martincamp Ware Type II	MART2	16th c.	1	5		1
Staffordshire-type Slipware	STAF	L.17th-18th c.	8	169	0.79	6
<i>Total post-medieval</i>			<i>137</i>	<i>5352</i>	<i>4.09</i>	<i>130</i>
Creamwares	CRW	1730-1760	3	24	0.17	3
English Stoneware	ESW	17th-19th c.	18	932	0.68	9
English Stoneware Nottingham-type	ESWN	L.17th-L.18th c.	2	22		1
English Stoneware Staffordshire-type	ESWS	L.17th-M.18th c.	1	12		1
Westerwald Stoneware	GSW5	E.17th-19th c.	3	83	0.23	2
Late blackwares	LBW	18th-E.20th c.	2	17	0.08	2
Late glazed red earthenware	LGRE	18th-19th c.	1	30		1
<i>Total modern</i>			<i>30</i>	<i>1120</i>	<i>1.16</i>	<i>19</i>
Unidentified	UNID		1	6		1
Totals			3427	40679	23.87	2403

Table 11. Pottery quantification by fabric

Methodology

A.2.2 Recording follows MPRG guidelines (2001). Quantification was carried out using sherd count, weight and estimated vessel equivalent (EVE). The minimum number of vessels (MNV) within each context was also recorded, but cross-fitting was not attempted unless particularly distinctive vessels were observed in more than one context. All fabric codes were assigned from the author's post-Roman fabric series. Form terminology for medieval pottery is based on MPRG (1998). Fabrics were identified based on Jennings' Norwich work (Jennings 1981). Recording uses a system of letters for fabric codes together with number codes for ease of sorting in database format. The results were input directly onto an Access database, which forms the archive catalogue.

Assemblage summary

- A.2.3 Only a small proportion of this assemblage is Late Saxon in date, the majority of it Thetford-type ware. Small quantities of non-local Late Saxon wares are also present. Only two rims are present, both from possible lamps. This group, had it been in use in the castle itself, would have to date to the late 11th century. However, it is possible that some or all of this group came to the site with the soil and hardcore used to construct the mound.
- A.2.4 The early medieval group is also relatively small. Local sand-tempered fabrics (EMW, EMWM, EMWT, GRCW) predominate, with few of the calcareous-tempered wares (YAR, EMWSS). The small quantity of Yarmouth-type ware is unusual for the city as it is normally the second most frequent early medieval ware from contemporary sites across the town. Only four rims are present, all of them simple everted types from jars.
- A.2.5 The high medieval group makes up the largest proportion of the assemblage. Just under half of the group by sherd count comprises coarsewares of local manufacture, together with a few non-local greywares. The majority of coarsewares are typical Norwich 'LMU', although this incorporates a range of fine sandy to very fine sandy micaceous wares which were probably made at more than one production site. Whilst most probably came from Potter Heigham and Woodbastwick, where waste scatters have been found (Jennings 1981), it is possible that some came from further afield. Certainly there is at least one rim sherd which is more typical of

Suffolk than Norfolk and has been recorded as WVCW. Of the identifiable vessels, there are more jugs (40) than jars (37) in this assemblage, which is unusual, and there are very few other forms (5 bowls, 1 dripping dish, 1 handled jar or spouted pitcher). The jar forms suggest a spread across the whole medieval period, although there are slightly more developed forms than simple forms, suggesting an increase in use/disposal in the 13th/14th centuries. The coarseware jugs were supplemented by a large group of glazed jugs, particularly Grimston-type ware examples. Of the 755 vessels (this number may be too high due to the difficulty in determining individual vessels from non-joining body sherds), only 50 are identifiable as jugs and 18 as face jugs, although it is likely that most of the Grimston vessels were jugs. Another 13 jugs and a jar were identified in the 'Yarmouth-type' glazed ware group. Most of the other glazed wares are represented by body sherds only, but there is an unprovenanced jug rim and a jug rim and a handle in Saintonge ware. Other glazed wares were limited to a few from Suffolk, Cambridgeshire and London, although further work on the small unprovenanced group may widen the catchment area.

- A.2.6 Late medieval wares make up the second largest period group of the assemblage by sherd count. It is likely that some of the Grimston and Yarmouth-type glazed wares in this assemblage were contemporary with the LMT vessels and many were found in the same contexts. In particular there are jugs with cordons, incised lines or combing, all of which appear to be more typical of the later period of Grimston ware production. However, only those vessels which contained substantial glazing internally have been included in the 'GRIL' fabric. Other late medieval wares include a few examples of vessels from the English Midlands and the near continent, particularly the Low Countries and Rhineland. In terms of forms, jugs are again the dominant type (25 examples), with a few bowls, pipkins, jars and mugs also present.
- A.2.7 The post-medieval group is relatively small and much of it may be contemporary with the late medieval and transitional material, dating to the 16th century. Glazed redwares (GRE, SPEC, WNBC) dominate the group, and there are a few unglazed redwares (PMRW), along with whitewares (TGE) and slipwares (PMSW, STAF) from further afield. German stonewares and slipwares were the main imports of this period. Unusually for a post-medieval assemblage from the city, there are no Iron Glazed Blackware sherds, and the quantity of TGE is very small, which may also point to an early date, or perhaps short period of deposition, for the group.
- A.2.8 Pottery of 18th/19th-century date was represented by only 30 sherds. These are dominated by English stonewares, most of which are pieces of large tankards. A fragment of a blackware bowl and two creamware plate rims are the only other identifiable forms in this group. One small sherd was unidentified but may be an unglazed fragment of LMT or YARG.
- A.2.9 Included in the late medieval assemblage are at least two sherds which have been crudely formed into discs, most likely for playing pieces. Both were unstratified (3006, backfill 1986), but could perhaps have been made by prisoners housed in the keep. Other vessels showed signs of wear which may suggest re-use as tools (perhaps for scratching graffiti) and one Grimston jug base fragment had a central hole drilled through the base and may have been re-used as a plantpot.

Provenance and phasing

- A.2.10 A summary of the pottery by area and period is provided in Table 12. Whilst medieval pottery is the most common group in all three areas, as would be expected given the dominance of this period in the assemblage as a whole, it is proportionately more common in Area 1. The proportions (and actual quantities) of late medieval and post-medieval wares are much greater in Areas 2 and 3.

Area	Sub-Area	LSax	EMed	Med	LMed	PMed	Mod	Un
1	North	3	41	351	4	3		
1	South	21	89	1572	131	18		1
1	Unstrat		8	125	4	2		
<i>Totals</i>		<i>24</i>	<i>138</i>	<i>2048</i>	<i>139</i>	<i>23</i>	<i>0</i>	<i>1</i>
2	Cistern and under stairs	2		25	31	108	30	
2	Main Area	4	10	90	127	2		
2	Unstrat	7	4	90	140	2		
<i>Totals</i>		<i>13</i>	<i>14</i>	<i>205</i>	<i>198</i>	<i>112</i>	<i>30</i>	<i>0</i>
3	Main Area	4	6	196	148	1		
3	Unstrat	1		11	15			
<i>Totals</i>		<i>5</i>	<i>6</i>	<i>207</i>	<i>163</i>	<i>1</i>	<i>0</i>	<i>0</i>

Table 12. Pottery by area and ceramic period

Site Period	Date range	LSax	EMed	Med	LMed	PMed	Mod	Un
2.2	c.1094-1122	15	8	3				
2.3	c.1122-1250	2	7	5				
3	c.1250-1538	7	80	1475	35			1
3.1	c.1250-1345		2	20				
3.2	1345-1539	5	33	494	144			
3/4	c.1250-1750		5	70	112			
4	1538-c.1750	3	1	28	64	11		
5	c.1750-2018			24	27	106	30	
5.3	L.19th c.		10	114	55	13		
5.4	20th c.+	2		1	4	2		
Unphased		8	12	226	159	4		

Table 13. Pottery by ceramic period and site period

- A.2.11 Very little pottery was recovered from Period 2, despite there being a relatively high proportion of early and high medieval pottery which would have been in use in that date range. Much of this material appears to have been redeposited in Period 3, but at least some of the medieval wares will be contemporary with that phase. The earliest closely phased late medieval wares occur in Period 3.2, which covers their broad period of use, but they are also found residually in quite large quantities and a high proportion was from unphased or redeposited layers. Post-medieval wares make an appearance in Period 4, but are more common in Period 5. Whether this is due to redeposition or late use of these wares is uncertain at this stage.
- A.2.12 The assemblage is broadly as expected from a site of medieval and later date in Norwich. However, the range of pottery fabrics is limited, and there are few obvious imports before the late medieval period. Other unusual features of the assemblage include the very high proportion of jugs in the high and late medieval periods, and the lack of blackwares and tin glazed earthenwares in the post-medieval assemblage. These findings will require more research at the analysis stage, by comparison with other excavated areas of the castle and its bailey, and with assemblages from elsewhere in the city.
- A.2.13 The medieval group is relatively large and most of it is well stratified. Depending on where the rims and other diagnostic sherds are in the site sequence, it may be possible to use them to enhance the dating evidence for these periods in the city. These can be compared with the

evidence previously published for Dragon Hall (Anderson 2005) and Castle Mall (Lentowicz 2009).

- A.2.14 It may be worth choosing a selection of medieval and/or post-medieval wares for illustration, but the forms are generally no different from other assemblages of this type and can be paralleled in the published corpus for Norwich. For archive purposes, nine sherds or vessels require illustration/photography.
- A.2.15 The assemblage can be compared with other large assemblages from the castle itself (*eg* Anderson 2006) and Castle Mall (Lentowicz 2009), as well as other large sites in the city, such as Alms Lane (Jennings 1985), Oak Street, Coslany Street and St Mary's Alley (Anderson 1997; 1999; 2013), and Dragon Hall (Anderson 2005). Comparison with assemblages from sites in Norwich and the wider region will help to place the assemblage in context.
- A.2.16 Spatial distribution of the pottery may be of value in determining the use and disuse of areas within the site. Estimation of the degree of residuality by context will also be of use in this study, and will aid in the investigation of less easily dated or intrinsically undatable finds such as animal bone.
- A.2.17 The potential of this assemblage is to provide evidence for dating and phasing of the site; pottery use, consumption and possibly manufacture; trade links both within and outside East Anglia; and status of the occupants. This will aid one of the main post-Roman pottery research aims for Norfolk, to revise the Norwich corpus and fabric series (Irving 2011, 37, EA5), and also aids with the development of our understanding of the relationship between Norwich and its hinterland, and the city's role as a centre of supply and demand (Medlycott 2011, 70).
- A.2.18 This report provides a brief outline of the pottery types present in the assemblage, but the material has not yet been described in detail or placed in context, either within the site itself or within the broader historic environment of the region.

Recommendations and further work

- A.2.19 The following work is required for a final report:
- Search for parallels for currently unidentified glazed wares.
 - Three-dimensional spatial distribution of pottery fabrics and forms in features and structures to aid in study of the taphonomy of the site, and to provide information relevant to the study of social status and land use.
 - Comparison of the assemblage with other large groups of pottery from the city.
 - A report suitable for archive and/or publication will be prepared.
 - Nine vessels have been selected for illustration. Further illustration may be required if publication is anticipated.

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A.3 Ceramic Building Material *by Sue Anderson*

Introduction

A.3.1 A total of 507 fragments of CBM was collected from 57 contexts. This assessment is based on a rapid scan of the material held in the Bar Hill office of OA East, and information provided from the bulk finds quantification and context database, which provides total weights by context (146.152kg in total). Larger fragments have been measured where complete dimensions were available, and fabrics of these pieces were noted. Smaller fragments were counted by form only. A few additional fragments were extracted from the pottery assemblage and these have been recorded in full, and the weights have been added to the total quantity generated from the bulk finds database.

Area	Sub-Area	structure	pit/PH	surface	layer	other	u/s	Total
1	-						12	12
1	North	4	22	4	35	7		72
1	South		15	95		51		161
2	-						11	11
2	Main Area	2	52	3				57
2	Cistern and under stairs	2	63	1	58			124
3	Main Area		37	22	4	4	3	70

Table 14. CBM quantities by excavation area and context type

A.3.2 Table 14 summarises the quantities by excavation area and broad context type. The largest groups were recovered from the southern part of Area 1 and the cistern and understairs part of Area 2. Most fragments were recovered from the fills of open features, from surfaces and

from layers, with only small quantities recovered from structural features (including stanchions and a foundation trench).

Period	Description	Code	No. frags
Roman	Roman tile	RBT	3
Medieval	Plain roof tile: medieval	RTM	118
		RTM?	5
	Early brick	EB	176
	Finial?	FIN	2
	Late/post-medieval	Plain roof tile: late/post-medieval	RTP
		RTP?	3
	Later brick	LB	78
		LB?	3
	Later brick/floor brick	LB/FB	1
	Pantile	PAN	13
	Quarry floor tile	QFT	1
	Chimney pot	CP	2
	Drainpipe	DP	1
Undated	Unidentified	UN	10
	Plain roof tile?	RT?	1

Table 15. Quantities of CBM forms

- A.3.3 Table 15 provides a quantification of CBM types. Two fragments of Roman tile were recovered from surfaces 3035 and 3086 in Area 1 South, and a third piece was from pit fill 3130 in Area 3. Tile of this period was often re-used in the Anglo-Saxon period and it was probably brought to the site with other rubble forming the make-up of the mound.
- A.3.4 Medieval plain roof tile and brick fragments were relatively common in the assemblage, but most pieces were small and few could be measured. However, there were five half-bricks with dimensions between 120–130mm wide by 50–70mm thick, the majority towards the top ends of these ranges. These are large bricks and most are probably relatively early, perhaps of later 13th or 14th-century date, although none was *in situ*. Early bricks were recovered from all three areas in similar quantities, but medieval roof tiles were significantly more frequent in Area 1.
- A.3.5 A small quantity of post-medieval roofing material was recovered, with plain tiles occurring more frequently than pantiles. Most were recovered from cess pit 3074 in Area 2. Few fragments had any distinguishing features, although four fragments had circular peg holes, and one of these had two holes close to the centre.
- A.3.6 Several samples of late/post-medieval red bricks were recovered. Like the post-medieval roof tiles, the majority of these came from Area 2 cess pit 3074 and buried soils. This group was relatively homogenous, comprising fine sandy bricks with rounded pebble and flint inclusions with sizes ranging between 223–235mm x 108–114mm x 53–58mm, and several with diagonal skintling marks on the stretchers. The size, appearance and presence of these marks suggests a pre-19th-century date for this group, and they may be as early as the 16th century.
- A.3.7 A few 19th-century bricks were also recovered, these ranging in size from 105–112mm wide and 63–68mm thick, but only one length was measurable (240mm). Several had white paint on header or stretcher surfaces and most of these were recovered from Area 1 (pit 3010 and features 3012, 3016, 3058). A few white-firing bricks of this period were also recovered, including pieces related to Stanchion 2 and a masonry floor support in Area 2. Also belonging to this period were a small piece of quarry floor tile from buried soil 3036 in Area 2, and two pieces of chimney pot from intrusion 3016 in Area 1.

Fired clay

A.3.8 Surprisingly little fired clay was recovered (Appendix 2). Eight fragments (108g) were recorded, most of which were small rounded lumps of orange clay with chalk inclusions. One piece from occupation layer 3025 had a flat surface and may be a piece of early brick, and a fragment of grey fired clay from pit fill 3130 appeared to have a wattle impression at one edge.

Mortar

A.3.9 Only a small quantity of mortar was recovered separately from the CBM, although there were several fragments of the latter with lime mortar adhering. The mortar assemblage comprised 27 pieces (Appendix 3; 14 fragments were seen during the assessment) and included a large fragment with a flat surface which may have served as bedding for floor tiles, and several large angular lumps which may be pieces of wall core. A few modern cementitious fragments were also recovered.

Provenance and phasing

Sub-Area	Period	RBT	RTM	RTM?	FIN?	EB	LB	LB?	LB/FB	RTP	CP
North	-					2					
	3.1		2			5					
	3.2		28			14					
	5.6		2			2	12			6	
South	2.2					1					
	3	2	57	2	2	40	2	1		3	
	4		4			19	2			7	
	5.3		6	1		1	3	1		5	2
U/S			5			1		1	1	3	

Table 16. Area 1 CBM quantities by period and form (fragment count)

A.3.10 Table 16 shows the distribution of CBM forms by site period in Area 1. Apart from an ?intrusive fragment of 'early' brick in Period 2.2, all CBM occurs from Period 3 onwards and medieval types are most common in Period 3 in the southern area and Period 3.2 in the northern. Some fragments of post-medieval material appear in Period 3 in the south, but these could date to the latest part of this period (*ie* 16th century). Some medieval material is redeposited in later periods, and overall there is very little post-medieval CBM but most of it occurs from Period 4 onwards, as would be expected.

Sub-Area	Period	RTM	RTM?	EB	LB	RTP	RTP?	RT?	PAN	QFT	UN
Main Area	-			10							
	3/4	3		38	1						
	5.3				4				1		
Cistern	5	1	2	2	41	60	2	1	10	1	1
	5.3			1	1						
	5.4	1									
U/S		6				2	1		2		

Table 17. Area 2 CBM quantities by period and form (fragment count)

A.3.11 Table 17 shows the distribution of CBM forms by site period in Area 2. Most of the early brick in this group was recovered from Period 3/4 features, whilst late brick and post-medieval roof tiles occur mainly in Period 5.

Sub-Area	Period	RBT	RTM	EB	LB	RTP	DP	UN
Main Area	3.2	1	3	29		2		9
	4			2	3	1		
	5.3			8	7	1	1	
U/S	-			1	2			

Table 18. Area 3 CBM quantities by period and form (fragment count)

A.3.12 Table 18 shows the distribution of CBM forms by site period in Area 3. In this area, early brick was in use by Period 3.2, and later brick from Period 4. Very few roof tiles were present but both medieval and post-medieval types were present in Period 3.2; as noted above this would be in keeping with the latest date of the phase.

Recommendations

A.3.13 This is the first CBM assemblage of reasonable size to have been studied from excavations within the castle keep. The potential of this assemblage is to provide information on the types of ceramic building material in use at the castle during the medieval to post-medieval periods. Medieval and post-medieval tile and brick form the bulk of this assemblage, with only three pieces identified as Roman.

A.3.14 The following tasks are required during the analytical stage:

- The material has not yet been catalogued in full or placed in context, either within the site itself or as part of the broader historic environment of the region. As a minimum standard, full quantification by fabric and form is required for the purposes of preparing an archive and to allow for disposal of some material prior to deposition if appropriate.
- Comparison of the assemblage with other large groups of CBM from the castle bailey excavations and from elsewhere in the city and county is required.
- Three-dimensional spatial distribution of CBM fabrics and forms in features and structures will be important in studying the taphonomy of the site, and in providing information relevant to the study of social status and land use.
- In order to reconstruct the types of structures present in different phases, it will be necessary to integrate the analysis of the ceramic building material with the study of any other building material collected from the site (*eg* fired clay, stone, wood, plaster/mortar, window glass and fittings), as well as any recorded structural evidence.
- A report suitable for archive and/or publication will be prepared.

A.4 Small Finds *by Chris Howard-Davis*

Methodology

A.4.1 The same methodology was used for all of the classes of find detailed below. Each fragment was examined, assigned a preliminary identification and, where possible, a date range. Outline spreadsheet entries were created, using Excel 2013 format, and the data recorded (context, small finds number, material, category, type, quantity, condition, completeness, maximum dimensions, outline identification, brief description, and broad date) serve as the basis for the comments below. The state of preservation (condition) was assessed on a broad four point system (namely poor, fair, good, excellent).

Copper alloy

A.4.2 **Quantification:** in all, 18 fragments of copper alloy, probably representing 17 artefacts, were examined. Most could be described as being in fair condition, although a number were encrusted in dried soil and had a light covering of corrosion products, and a few were unidentifiable, highly corroded scraps. Five of the objects are regarded as unstratified, and two are from very late, Period 5 contexts.

- A.4.3 **Assessment:** The group included one coin and one token. The former (SF unknown) from context 3003 (unstratified) was not available to the author. The token (SF 3) is also unstratified (cxt 3006). Whilst requiring cleaning before a definitive identification can be made, the obverse appears to bear a shield, suggesting it to be either a late medieval French token, or, more likely, a Nuremburg issue imitating a French jeton, of slightly later date.
- A.4.4 Most of the other identifiable objects are personal objects. A single buckle (SF 1) was recovered unstratified (cxt 3006). As one of the less well-preserved copper alloy objects, it will require cleaning before a detailed description can be made, but the form (probably oval with an offset bar), whilst long-lived, suggests a medieval date, probably the 14th century. A small, and poorly-preserved fragment (SF 11) from Period 3 occupation debris 245 (cxt 3025) might be from the loop of a second buckle, but is sufficiently undiagnostic for this to remain a very tentative identification. Two further items (SF 2 and SF 23) can be identified as simple strap loops. Again these are likely to be of late medieval date. The former is unstratified (cxt 3006), the latter comes from Period 4 pit group 246 (cxt 3015) assigned to the 17th-century or later.
- A.4.5 A further two small personal items came from Period 3-4 robber pit 206 (cxt 3163). One, SF 137, is a medium-sized dress pin with a wound and crimped head, likely to be of very late medieval or early post-medieval date, making it broadly contemporary with the context. The other, SF 138, is probably a relatively large aglet or lace chape, which could, again be broadly contemporary with the intervention which created 206.
- A.4.6 Other identifiable objects were confined to three nails. One, SF 96, with a domed head, suggesting it to be decorative rather than utilitarian, was from Period 3 occupation layer 239 (cxt 3055) and is thus likely to be medieval, but the others, SF 4, from Period 5.3 borehole 208 (cxt 3017), and SF 143, found unstratified (cxt 3006) are effectively undatable. The remainder of the copper alloy objects are fragmentary and will remain unidentified. SFs 175 and 176 are both from Period 3.2 pits 225 (cxt 3128); SF 177 comes from contemporary occupation layer 223 (cxt 3116), SF 25 is from Period 3.2 make-up 259 (cxt 3034), and SF 55 is from general Period 3 make-up/occupation deposit 243 (cxt 3035). It is likely that SF 130 is contemporary with its context (3088), late (Period 5) material (213) within a cistern. A fragment of wire (SF 139) found unstratified (cxt 3007) is undoubtedly modern.
- A.4.7 **Potential and further work:** the few recognisable objects will contribute in a limited manner, to the dating and any discussion of daily life on the site. It is, however, unlikely that they will sustain significant further analysis, beyond brief catalogue entries and a mention in the appropriate parts of any future report.
- A.4.8 **Conservation requirement:** SFs 3, 1, 2, and 23 will require cleaning and conservation before analysis can be completed.

Ironwork

- A.4.9 **Quantification:** in all, 256 fragments of ironwork, probably representing 223 artefacts, were examined. Most could be described as being in poor to fair condition, but a number were obscured by a medium-thick covering of corrosion products. At this stage in the analysis, x-radiography has not been undertaken. Five of the objects are regarded as unstratified, and two are from very late, Period 5 contexts.
- A.4.10 **Assessment:** apart from nails, discussed below, there were very few recognisable objects recovered. They are discussed below in chronological order. A medieval arrowhead (SF 67) was recovered from Period 3 make-up/occupation layer 241 (cxt 3042).
- A.4.11 A small blade fragment (SF 134) was recovered from Period 3.2 pit group 225 (cxt 3128); lacking in diagnostic features, it cannot be dated. A small fragment of scale-tang blade (SF 5)

was found in Period 4 pit group 246 (cxt 3015), and is probably contemporary with the period of deposition, as scale-tang blade were predominant by the 17th century.

- A.4.12 A single small fragment of horseshoe (SF 9) came from Period 3 occupation debris 245 (cxt 3025). Its size precluded any accuracy in dating, but it is most likely to be late medieval in date.
- A.4.13 An undiagnostic fragment of bar (SF 101) came from Period 3 occupation layer 239 (cxt 3056) and a fragment of strip (SF 66) was from a contemporary make-up/occupation layer, 241 (cxt 3042). A small fragment of sheet (SF 168) came from Period 3.2 make-up deposit 226 (cxt 3110). None of these items are of particular significance.
- A.4.14 By far the largest group amongst the ironwork can be identified as nails with relative confidence. A total of 192 fragments were recorded, probably representing at least 177 nails. Some 38 fragments are unstratified. In all they comprise *c.*75% of the ironwork assemblage. Most appear to come from medium-sized hand-forged nails suitable for use in carpentry rather than for joining major timbers. The chronological distribution of nails is tabulated below (Table 19), but it must be noted that the nails themselves are of little use in refining dating, being a long-lived and simple form which changes little through time. It should also be noted that a few of the nails, from Period 5 contexts and unstratified, are very modern, perhaps deriving from earlier archaeological interventions.

Period	Context type	Context	Group number	No frags	No objects
2	Ungrouped features	3046	262	1	1
3	Occupation	3056	239	9	9
3	Occupation	3083	239	2	2
3	Make-up/occupation	3042	241	60	57
3	Make-up/occupation	3035	243	18	18
3	Large pit	3038	244	3	3
3	Large pit	3041	244	2	2
3	Occupation debris	3025	245	17	17
3.1	Hollow way	3089	258	5	5
3.2	Make-up	3034	259	5	5
3.2	Pits	3033	260	4	3
3.2	Pits	3072	260	2	2
3/4	Pit	3199	205	1	1
4	Pit	3015	246	3	3
5	Use of cistern	3088	213	3	2
5	Use of cistern	3078	214	2	2
5	Cistern disuse	3036	214	4	3
5.3	Cistern disuse	3029	215	1	1
5.3	Brockbank borehole?	3017	208	6	6
5.3	Boardman stanchions	3044	209	1	1
5.3	Boardman drains	3020	210	5	5
Unstratified		3001	263	2	2
Unstratified		3003	263	17	9
Unstratified		3006	263	9	9
Unstratified		3007	263	1	1
Unstratified		3008	263	3	2

Unstratified		3009	263	6	6
				192	177

Table 19: distribution of nails and probable nails

A.4.15 Three further items can be considered with this group; there is a single, effectively undatable lozenge-shaped rove (SF 112) from Period 3 occupation layer 239 (cxt 3083), a fragmentary cast iron drain cover (SF 141) from Period 5.3 pit 238 (cxt 3099), and a modern tent peg (no SF) found unstratified (cxt 3006).

Period	Context type	Context	Group number	No frags	No objects
3	Occupation	3056	239	4	4
3	Make-up/occupation	3042	241	25	22
3	Makeup/occupation	3035	243	2	2
3	Occupation debris	3025	245	4	1
3.2	Pits	3128	225	1	1
3.2	Makeup	3034	259	1	1
4	Pits	3013	246	4	4
5	Use of cistern	3088	213	1	1
5	Disuse of cistern	3031	214	1	1
Unstratified		3005	263	4	4
Unstratified		3007	263	1	2
Unstratified		3009	263	1	2
					42

Table 20. distribution of unidentifiable fragments

A.4.16 **Potential and further work:** The potential for further analysis is very limited. After x-ray, brief catalogue entries should be completed (with accurate dimensions added from the x-radiographs), and appropriate mention made in any future report.

A.4.17 **Conservation requirement:** all items will require x-ray before analysis can be completed. The objects are currently well-packed, and there is probably no requirement for conservation.

Lead

A.4.18 **Quantification:** there is a small group of 16 fragments of lead. As most, if not all, seem to derive from the use of metallic lead in building, it is not possible to comment on their completeness. Condition varies from light corrosion to a moderately thick layer of white corrosion products.

A.4.19 **Assessment:** the group consists of solidified drips of molten metal and offcuts of thin sheet, and is tabulated below (Table 21). Two items (SF 117 from Period 2.3 surface 257 (cxt 3061), and SF 100 from Period 3 occupation layer 239 (cxt 3056) could well be lead used to run-in and secure other objects. It should be noted that SF 116 from surface 235 (cxt 3095), originally identified as a spindle whorl, has been re-identified as a small run-in.

A.4.20 It is notable that much of the lead derives from Period 2.3 and Period 3 make-up layers, raising the possibility that it reflects the reclamation and recycling of lead originally used elsewhere.

Period/sub-Period	Context	Group no	Description	Object	
2.2	3095	235	Levelling deposit/surface	Run-in?	1
2.3	3061	257	Surface	Run-in?	1
2.3	3061	257	Surface	Melt	1
2.3	3101	256	Make-up	Melt	1
2.3	3105	256	Make-up	Sheet	1
2.3	3105	256	Make-up	Melt	1
2.3	3105	256	Make-up	Melt	1
3	3025	245	Occupation debris	Melt	1
3	3025	245	Occupation debris	Tag	1
3	3042	241	Make-up/occupation	Melt	1
3	3042	241	Make-up/occupation	Melt?	1
3	3056	239	Occupation debris	Offcut	1
3	3083	239	Occupation debris	Offcut?	1
5.3	3017	208	Borehole	Melt	1
	3006	263	Unstratified	Offcut	1
	3009	263	Unstratified	Offcut?	1
					16

Table 21. Distribution of lead artefacts

- A.4.21 **Potential:** this small group of metalwork has no further potential to inform the dating or development of the site.
- A.4.22 **Further work:** full catalogue entries should be completed for every object and a brief report prepared for inclusion in any future report.
- A.4.23 **Conservation requirement:** the objects are currently well-packed, and there is no requirement for conservation.

Worked Animal Bone

- A.4.24 **Quantification:** in all, 22 fragments of worked bone were recovered, probably representing 21 objects. All are in good condition, although few are obviously complete. They do not fall into any particularly significant functional groups.
- A.4.25 **Assessment:** there is a small number of items associated with dress and personal appearance. There are three plain bone pins; two are from Period 3.2 features, occupation floor 221 (SF 135; cxt 3118) and pit 225 (SF 190; cxt 3127), and the third from Period 3-4 pit 205 (SF 200; cxt 3168). They are usually assumed to have been used in dress. Such pins are not chronologically sensitive, and thus cannot be assigned a date.
- A.4.26 SF 189, from pathway 258 (cxt 3089) associated with Period 3.1, is a small and carefully-made cylindrical bead; although probably bone, its pale colour might suggest it to be ivory and this will require confirmation. It cannot be dated except from its context, but would not be out of place in the medieval period, being, perhaps, a rosary bead. A somewhat larger, and less well-finished item (SF 193) from Period 3.2 pits 225 (cxt 3114), is clearly a slice through a bone shaft. It is, however, trimmed to give a roughly hexagonal outline, and thus could have been intended for use as a bead. Equally, its shape could be fortuitous, being an offcut from the production of a handle for a whittle-tanged tool.
- A.4.27 Other classes of find are confined to two handles, both intended for whittle-tanged blades, but neither of particular quality or craftsmanship. One (SF 197) is from Period 3.2 make-up deposits 226 (cxt 3110), the other (SF 198) from contemporary pit 225 (cxt 3114). There is also a single tuning peg (SF 204), which comes from Period 3-4 pit 205 (cxt 3168) and is presumably contemporary with other finds from its fill. These were in use over a long period, from the Roman period well into the post-medieval period (MacGregor 1985), and serve only to indicate the presence and use of a stringed instrument.

- A.4.28 The group also includes four examples of large bird bones (probably goose radii) which have been modified with an oblique cut across the shaft, to form what are usually identified as dip pens (see for instance MacGregor 1985, fig 67g), although other uses have been discussed. These are not uncommon finds in Norwich (see also Margeson 1993) where they appear in contexts dated between the 14th and 16th century (*ibid*, 69). Obviously associated with literacy, it is not unreasonable to assume that they reflect the substantial level of administration required in the day-to-day running of a substantial high-status establishment. Two of these (SF 10, SF 15) are from Period 3 occupation debris 245 (cxt 3025), one (SF 136) from Period 3.2 underpinning 224 (cxt 3130), and the fourth (SF 4) is from Period 4 pit 246 (cxt 3013).
- A.4.29 The remainder of the worked bone is probably waste, being offcuts from the production of other bone objects. They fall into two groups; SF 202, from Period 3.2 pit 225 (cxt 3128) and SF 201 from Period 5.3 rubble-filled pit 228 (cxt 3099) being rather similar mid-shaft fragments with a deep cut groove circling one end, and both are broken across the groove, suggesting perhaps that they are failed attempts to make plain handles. The two are sufficiently similar to suggest that they might be parts of the same object, although no obvious join was noted.
- A.4.30 SFs 100, 192, 194, 195, 203 are also clearly closely related. All have one end trimmed to a square-sectioned projection, or are detached square-sectioned fragments. Their purpose is not clear, but they lack the grooving and file marks (and the green discolouration) typical of pinner's bones, and thus this identification has been rejected. Three are from Period 3.2 pit group 225 (SFs 100, 192, 203; cxts 3115, 3127, and 3128 respectively) and two (SFs 194, 195) are unstratified or from Period 5 backfill. A single small ring of bone, cut from a midshaft fragment (SF 191, again from Period 3.2 pit group 225 (cxt 3127) is also probably an offcut.
- A.4.31 It is questionable whether or not SF 196, found unstratified (cxt 3006) is mammalian bone, and it should be examined by a bone specialist.
- A.4.32 **Potential and further work:** although none of the objects can contribute significantly to any refinement of the dating for the site, several give some insight into the kinds of activity undertaken, especially during Period 3.2, when day to day objects were being lost, or discarded into pits. None will sustain significant further analysis, but brief catalogue entries should be prepared, including, where possible, an identification of the bone type, and a brief report, mentioning local comparators, should be compiled for inclusion in any future report.
- A.4.33 **Conservation requirement:** the objects are currently well-packed, and there is no requirement for conservation.

Glass object

- A.4.34 **Quantification and assessment:** a single, well-preserved, translucent yellow glass bead (SF 188) was from Period 3 occupation debris 245 (cxt 3025). Medieval glass beads are not particularly common (Egan 1991), and its method of manufacture (wound/lamp work) does little to elucidate its dating. The fact that it appears to imitate amber could have some small significance.
- A.4.35 **Potential and further work:** this small object is unlikely to contribute significantly to the further understanding or dating of the site and will require no further analysis, beyond a brief catalogue entry and brief mention in the appropriate parts of any future report.
- A.4.36 **Conservation requirement:** the object is currently well-packed, and there is no requirement for conservation.

Conservation requirements

- A.4.37 The following copper alloy objects (SFs 1, 2, 3, and 23) have been recommended for cleaning and conservation. Two of them are, however, from unstratified contexts, and might therefore be regarded as insufficiently important to the site narrative to warrant conservation.
- A.4.38 The x-radiography of the entire ironwork assemblage will enable identifications to be confirmed, and moderately accurate measurements to be taken from the resulting plates in order to ensure that the items are adequately recorded.
- A.4.39 Nothing else requires conservation or cleaning.

Illustration requirements

- A.4.40 The same copper alloy objects (SFs 1, 2, 3, 23) will require illustration, although the same caveat pertains. The single glass bead (SF 188) will require illustration (modified digital image rather than line drawing). The following worked bone items will require illustration:

Bone pins	SF 135, SF 190, SF 200
Bone beads	SF 198, SF 193
Bone pens	SF 6, SF 10 (both points), SF 136
Bone tuning peg	SF 204
Bone-working waste (group 1)	SF 201 (with SF 202 if a join can be established)
Bone-working waste (group 2)	SF 203

Table 22. Worked bone objects for illustration

- A.4.41 All can probably be illustrated with modified digital images rather than line drawings.

Bibliography

Egan, G, 1991 Beads, in G Egan and F Pritchard, *Dress Accessories c 1150- c 1450*, Medieval Finds from Excavations in London, 3, London, 305-18

MacGregor, A, 1985 *Bone, Antler, Ivory, and Horn. The Technology of Skeletal Materials since the Roman Period*, London

Margeson, S, 1993 *Norwich Households. Medieval and Post-Medieval Finds from Norwich Survey Excavations 1971-78*, EAA, 58, Norwich

Addendum by Heather Wallis

- A.4.42 At the time of the small find assessment, nine items from the site were not available for study. They were:

Context	SF No.	Material	Category	Object date
3013	6	Bone	?Writing implement	Medieval
3038	28	Ceramic	Vessel	Medieval
3025	43	Glass	Bead	Medieval
3088	131	Leather	Unidentified	Post-medieval
3004	a	Coconut shell	Other	n/d
3083	110	Bone	Unidentified	n/d
3129	133	Fe	Nail	n/d
3007	167	Iron	Object	n/d
3000	140	Bone	Cigarette holder	Modern

Table 23. Additional Small Finds

- A.4.43 With the exception of the modern items these artefacts should be submitted to the relevant finds specialists for identification and comment. The ceramic vessel (SF28) should be integrated with the pottery bulk finds. The bone ?writing implement (SF6) and the glass bead (SF43) require illustration.

A.5 Metal-working debris *by Heather Wallis*

A.5.1 Just seven fragments of slag weighing 0.39kg was retrieved from the excavations, five of these pieces came from Period 3 contexts in Area 1 the remaining two pieces from Period 2 context also in Area 1. A very small quantities of hammer-scale were also retrieved from the environmental samples. This small assemblage does not merit further analysis, but the presence of slag within the keep during the medieval period should noted.

A.6 Struck flint *by Heather Wallis*

A.6.1 The assemblage of struck flint was small totalling 75 pieces over half of which was in Period 3 contexts. Most of the flint is small fragments, the residue from building construction. No single group contained sufficient struck flint to suggest a deliberate building repair horizon. Little more can be drawn from this assemblage, other than to note its presence where applicable in the final report.

Period	Number
0	5
2	2
3	44
3/4	6
4	16
5	2

Table 24. Quantity of flint by period

A.7 Glass *by Heather Wallis*

A.7.1 A small quantity of glass was retrieved from the excavation totalling 38 fragments. All except for three pieces were retrieved from the backfill of the Period 5 cistern in Area 2. Two pieces were from a 19th-century exploratory pit and one was unstratified from cleaning layers.

A.8 Stone *by Neil Moss*

Introduction and methodology

A.8.1 The worked stone assemblage comprises 262 pieces weighing 392.735kg, of which 156 pieces weighing 370.82kg has at least one worked face or diagnostic feature. The latter group was returned to Norwich Castle keep for assessment sometime after the excavation works had been completed. Recording work was therefore undertaken with artificial light as there is no natural light in this part of the keep.

A.8.2 Each of these pieces of stone was issued with a unique identification number preceded by the letter code WS. An individual record sheet, including sketch was completed and a digital photo was taken of each piece. Details such as material, form, tooling and other diagnostic features were recorded on an Excel spreadsheet and are presented in the appendix.

A.8.3 Of the assemblage examined 154 were limestone architectural fragments the other two fragments being a piece of ?marble and a piece of chert. The architectural fragments consist of five different types of stone the most common being Caen (134 pieces). Others are Clipsham (8), Yorkstone (6), Barnac (4) and Quarr.

Caen

A.8.4 The Caen stone forms the largest group (134). Many of these are fragments of voussoir or ashlar, likely to have originated from the vaulted ceiling. There is a wide variation in weathering with some pieces showing severe weathering (WS07,34, 64, 84 + 85). Many pieces show heat-

discolouration or 'pinking' (WS04, 05, 24, 25, 38, 40, 41, 42, 43, 47, 48, 49, 58, 60, 65, 68, 85, 89, 90, 92, 112 + 118).

- A.8.5 The tooling is predominantly diagonal boaster work typical of early medieval masonry. Occasionally heavier diagonal tooling is present, possibly from quarry work (WS09, 35, 36, 55, 73, 74, 80, 124, 128, 138 + 142). Some of the pieces have boaster tooling but aligned orthogonally, parallel to arris. (WS54, 60, 67, 72, 101, 102, 110, 138, 153, 154 + 156) this tooling seems consistent with jambs or ashlar adjacent to a doorway. A few pieces have claw-chisel tooling (WS21, 77, 91, 93, 105 + 123).
- A.8.6 A thin skim or wash of lime mortar has been applied as a surface treatment to some of the pieces (WS64, 81, 150, 151, 152, 153, 155) and some pieces have a brown, cess? Staining (WS34, 84, 85, + 96).

Barnack

- A.8.7 Of the four examples of Barnack stone one is a jamb (WS06), one a voussoir (WS103) and two are classified as ashlar (WS122 + 152). Diagonal tooling is present on 2 pieces (WS103 + 152). A single setting-out line is visible on the jamb (WS06).

Quarr

The two pieces of Quarr (WS126 + 127) are both ashlar fragments and have diagonal boaster tooling.

Clipsham

- A.8.8 The eight pieces of Clipsham (WS01, 02, 03, 78, 79, 82, 120 + 121) form a highly fragmented assemblage with a variety of forms including voussoirs (WS82, 120 + 121) floor tiles (WS78 + 79). A variety of tooling is apparent including boaster (WS01, 03, 82, 120 + 121) and cold-chisel (WS02 + 03).

Yorkstone

- A.8.9 This small assemblage of six pieces (WS87, 107, 113, 115, 132 + 134) was entirely devoid of diagnostic features. It is highly likely that all the Yorkstone comes from prison floor slabs.

Other

- A.8.10 One piece of chert and one of ?marble (WS27 + 95) are probably both naturally occurring pieces.

Features

- A.8.11 Twenty-one of the fragments show signs of being affected by heat, two appear to be sooted and three have evidence of a surface limewash. Four have been stained by cess. Twenty-five of the fragments show evidence of having been re-used.

Recommendations

- A.8.12 Much of the assemblage consists of fragments of Caen ashlar with few other diagnostic features. Thirteen pieces are of more interest and are listed in the table below. It is suggested that further comment on these items is sought from Roland Harris. Illustration of the pieces with markings may be required. This assessment was carried out prior the site phasing being available so consideration of the assemblage by Period and Group may also prove informative.

Reference No.	Brief description
WS06	Jamb with setting-out
WS08	Ashlar with setting-out
WS19	Voussoir with graffiti

WS20	Vousoir with concentric moulding
WS47	Roll moulding. Engaged roll
WS55	Rebate
WS69	Drum
WS136	Rebate
WS138	Ashlar with tooling masterclass
WS148	Setting-out?
WS154	Jamb chamfered with scratches.
WS156	Jamb chamfered
WS157	Abacus

Table 25. Summary of architectural stonework

A.9 Human Skeletal Remains *by Natasha Dodwell*

A.9.1 A small number of human bones were recovered during the excavations within the keep basement. None were articulated all occurring as residual material in non-burial contexts. Details are presented below.

Context	Element	Zone	Age
3013	L. femur	Left prox. & mid shaft	Adult
	L. femur	Distal joint	Adult
	L. femur	l. head	Adult
	Lumbar vertebra	-	Adult
	2 nd left metacarpal	Complete	Adult
3034	5 th right metatarsal	Complete	Adult
3083	L. tibia	Shaft & distal joint	Adult
3086	L. tibia	Complete	Older sub adult/young adult
	R. humerus	Mid shaft	Older subadult/adult

Table 26. Disarticulated human skeletal remains

A.9.2 The three fragments of left femur recovered from the backfill of a 17th-century or later pit (3013), although unfitting, are probably from the same limb. A single vertebra and metacarpal were also present in this deposit.

A.9.3 The remaining human bones were found within Period 3 deposits and probably indicates some residuality in these contexts.

A.9.4 No further analysis of these remains is required although their presence should be noted in future reporting.

APPENDIX B FAUNAL AND ENVIRONMENTAL ASSESSMENTS: INTERNAL EXCAVATIONS (ENF143286)

B.1 Faunal remains *by Hayley Foster*

Introduction and methodology

- B.1.1 The faunal assemblage from the keep basement excavations was large, with 96kg of bone being recovered. Remains were retrieved via hand-collection and environmental residues, with sieving carried out on site for those contexts rich with small mammal, fish and bird bones. The assemblage totals 1770 identifiable phased fragments. An additional 353 fragments were identified but were from unphased contexts, therefore not included in the overall NISP totals. The species represented include cattle (*Bos taurus*), sheep/goat (*Ovis/Capra*), horse (*Equus caballus*), pig (*Sus scrofa*), dog (*Canis familiaris*), cat (*Felis catus*), fallow deer (*Dama dama*), red deer (*Cervus elaphus*), rabbit (*Oryctolagus cuniculus*), mouse (*Mus musculus*), hare (*Lepus* sp.), shrew (*Sorex araneus*), fox (*Vulpes vulpex*), weasel (*Mustela nivalis*) and vole (*Microtus arvalis*). For purposes of assessment, material was divided into periods 2, 3, 3/4, 4 and 5 ranging in date from the mid 11th century to the present.
- B.1.2 The method used to quantify this assemblage was based on that used for Knowth by McCormick and Murray (2007) which was modified from Albarella and Davis (1996).
- B.1.3 Identification of the faunal remains was carried out at Oxford Archaeology East. References to Hillson (1992), Schmid (1972) and von den Driesch (1976) were used where needed for identification purposes. Distinguishing between sheep and goat was attempted on postcranial elements following Boessneck *et al.* (1964).

The assemblage

- B.1.4 The assemblage is dominated by domesticates including cattle, sheep/goat and pig, with pigs been the most well represented taxa. A presence of wild species including fallow deer, red deer and rabbit also played a prominent role.
- B.1.5 Preservation of the bone was fair to poor, due to the high levels of fragmentation related to carcass processing and taphonomic changes. Very few fragments were burnt, with only two singed fragments recovered from an unphased backfill.

Species represented

- B.1.6 The faunal remains primarily represent heavily processed domestic food waste, with a small presence of craftworking debris, and possible pets and/or guard dogs.
- B.1.7 **Cattle** were well represented in all periods and there appears to be no significant biases in body part distribution as cranial elements, foot elements and meaty bones were recovered. This suggests that cattle were raised close by or brought in on the hoof. Dental wear data was minimal, the limited evidence suggesting the presence of young and older animals. Fusion data will need to be analysed to gain a better understanding of age at slaughter.
- B.1.8 **Sheep/goat** were represented by 557 fragments with 51 of the fragments differentiated as sheep. No fragments could be classified as distinctly belonging to goat. Sheep/goat appear to have been slaughtered between 2 years of age and adulthood, however a trend in Period 3 shows a presence of lambs between birth and 5 months, suggesting that sheep/goat were reared close by.
- B.1.9 **Pig** remains made up the highest percentage of fragments from the assemblage. Pigs are generally associated with high status assemblages and are exploited for meat. The ageing data suggests that pigs with slaughtered around 17-27 months of age. The presence of young

unfused, porous long bones may suggest consumption of suckling pig. This also suggests that it is likely that pigs were reared in a close proximity to the castle. Pigs were adaptable to most urban and rural environments, making them easy to rear. The noticeable decline in pig remains during Periods 4 and 5 is likely linked to the decrease in status of the castle and a shift in the economy and the reliance on pork as a primary dietary component.

- B.1.10 **Equid** remains are scarce in the assemblage, with only two fragments identified as horse. As stated above the majority of the faunal remains are related to domestic food waste, meaning that horse remains would not be expected to be disposed of within the castle keep.
- B.1.11 Remains belonging to **cats** were found in three separate contexts (3038, 3088 and 3103), while **dogs** were found in nine separate contexts. The presence of a large dog was noted in context 3006, with a distinguishably sizeable atlas recovered, however this context was from an unphased backfill. Remains belonging to smaller dogs were also recovered suggesting canines were kept as pets. Cats would have been kept as pets but to also catch vermin.
- B.1.12 **Red deer** and **fallow deer** are present in small number in the assemblage. Fallow deer remains were heavily processed with chop marks present on long bones and a sawn tibia. Deer are a typical high-status medieval species as nobility were involved with the hunting of deer as a social activity and sport.
- B.1.13 **Small mammals** are well represented in the assemblage, probably as a result of the diligent recovery techniques. Lagomorphs made up over 6% of the overall NISP. Rabbits are another species typically associated with the high-status medieval diet, as nobility were known to have kept rabbit warrens and obtained rabbits for both their meat and fur. Rodents, shrews and mustelids also had a small presence.
- B.1.14 A single vertebra body from a **cetacean**, probably dolphin, was recovered from context 3110 a floor layer. A fragment belonging to dolphin was previously recovered from the barbican well excavation (Moreno Garcia 2009). Documentary evidence has suggested that cetaceans were highly prized and considered the property of the king or nobility when washed up onshore (Gardiner 1997).
- B.1.15 For the purposes of assessment, **bird** bones were not recorded to species, however bird bone consisted of 3.70kg and 1629 fragments from hand-collection. It should be noted a variety of species were present including various galliforms and swan.

The assemblage by period

B.1.16 Table 27 below shows number of identifiable mammal remains (NISP) by period.

Species	Period					Total
	2	3	3/4	4	5	
Pig	21	491	28	16	43	599
Cattle	11	288	77	43	53	472
Sheep/Goat	10	327	37	27	59	460
Dog		7			2	9
Cat	2	2			3	7
Horse		1				1
Fallow Deer	1	11	1	1	4	18
Red Deer		3	1			4
Red Deer/Fallow Deer (?)		2				2
Rabbit	2	62	10	6	14	94
Hare		8		1	1	10
Mouse	3	44			2	49
Shrew		5				5
Small Rodent (?)		1				1

Vole		29	1			30
Rat		1				1
Stoat/Weasel		1				1
Weasel		1				1
Fox (?)	3				2	5
Cetacean		1				1
Total	53	1285	155	94	183	1770

Table 27. Number of identifiable mammal remains (NISP) by period

B.1.17 **Period 2.** Only 53 fragments of identifiable faunal material dated to this period. Remains were retrieved from Area 1 (North and South) and Area 2 (main area). Pigs constituted the highest frequency of fragments in Period 2 and Area 1, however, sheep/goat saw a higher minimum number of individuals (MNI) overall in Period 2.

Species	NISP	NISP%	MNI	MNI%
Pig	21	39.6	2	16.7
Cattle	11	20.8	2	16.7
Sheep/Goat	10	18.9	3	25.0
Cat	2	3.8	1	8.3
Fallow Deer	1	1.9	1	8.3
Rabbit	2	3.8	1	8.3
Mouse	3	5.7	1	8.3
Fox (?)	3	5.7	1	8.3
Total	53	100.0	12	100.0

Table 28. Number of identifiable specimens (NISP) and minimum number of individuals (MNI) from Period 2

Species	NISP North	NISP% North	NISP South	NISP% South
Pig	9	36.0	11	47.8
Cattle	4	16.0	6	26.1
Sheep/Goat	5	20.0	3	13.0
Cat	0	0.0	2	8.7
Fallow Deer	1	4.0	0	0.0
Rabbit	1	4.0	1	4.3
Mouse	2	8.0	0	0.0
Fox (?)	3	12.0	0	0.0
Total	25	100	23	100

Table 29. Number of identifiable specimens (NISP) from Area 1 North and South (Period 2)

Species	NISP	NISP%
Pig	1	33.3
Sheep/Goat	1	33.3
Mouse	1	33.3
Total	3	100

Table 30. Number of identifiable specimens (NISP) from Area 2 main area (Period 2)

B.1.18 **Period 3.** Period 3 dates to the mid 13th century to reformation, with the majority of the remains coming from the mid 14th to mid 16th centuries when the castle was first used as a gaol. Period 3 comprised of the highest frequency of faunal material from the castle keep assemblage, with remains coming from Areas 1 and 3. Area 1 South contained the bulk of the faunal material. Period 3 contained a higher NISP for pigs and sheep/goat remains than cattle remains. However, Area 3 contained a higher number of cattle and sheep/goat than pigs. The wide variety of species and presence of wild taxa is indicative of a typical medieval high-status diet.

Species	NISP	NISP%	MNI	MNI%
Pig	491	38.2	12	18.5
Cattle	288	22.4	10	15.4
Sheep/Goat	327	25.4	11	16.9
Dog	7	0.5	1	1.5
Cat	2	0.2	1	1.5
Horse	1	0.1	1	1.5
Fallow Deer	11	0.9	2	3.1
Red Deer	3	0.2	1	1.5
Red Deer/Fallow Deer (?)	2	0.2	1	1.5
Rabbit	62	4.8	5	7.7
Hare	8	0.6	2	3.1
Mouse	44	3.4	4	6.2
Shrew	5	0.4	2	3.1
Small Rodent (?)	1	0.1	1	1.5
Vole	29	2.3	7	10.8
Rat	1	0.1	1	1.5
Stoat/Weasel	1	0.1	1	1.5
Weasel	1	0.1	1	1.5
Cetacean	1	0.1	1	1.5
Total	1285	100.0	65	100.0

Table 31. Number of identifiable specimens (NISP) and minimum number of individuals (MNI) from Period 3

Species	North NISP	North NISP %	South NISP	South NISP %
Pig	57	33.1	352	44.3
Cattle	37	21.5	154	19.37
Sheep/Goat	39	22.7	186	23.4
Dog	0	0.0	4	0.5
Cat	1	0.6	1	0.1
Horse	0	0.0	1	0.1
Fallow Deer	2	1.2	8	1.0
Red Deer	1	0.6	2	0.3
Red Deer/Fallow Deer (?)	0	0.0	1	0.1
Rabbit	14	8.1	23	2.9
Hare?	5	2.9	3	0.4
Mouse	6	3.5	33	4.2
Shrew	2	1.2	3	0.4
Small Rodent (?)	0	0.0	1	0.1
Vole	8	4.7	20	2.5
Rat	0	0.0	1	0.1
Stoat/Weasel	0	0.0	1	0.1
Weasel	0	0.0	1	0.1
Total	172	100.0	795	100.0

Table 32. Number of identifiable specimens (NISP) from Area 1 North (Period 3)

Species	NISP	NISP%
Pig	82	26.3
Cattle	95	30.4
Sheep/Goat	101	32.4
Dog	1	0.3
Fallow Deer	1	0.3
Red Deer/Fallow Deer (?)	1	0.3
Rabbit	24	7.7
Mouse	5	1.6
Vole	1	0.3
Cetacean	1	0.3
Total	312	100.0

Table 33. Number of identifiable specimens (NISP) from Area 3 main area (Period 3)

B.1.19 **Period 3/4.** Material from Period 3/4 was solely retrieved from the main part of Area 2. Unlike Period 3, cattle dominated this period and pigs were the third most numerous taxa. The percentages of species represented seems to be more consistent with those remains from Period 4, Area 1.

Species	NISP	NISP%	MNI	MNI%
Pig	28	18.1	3	16.7
Cattle	77	49.7	5	27.8
Sheep/Goat	37	23.9	4	22.2
Fallow Deer	1	0.6	1	5.6
Red Deer	1	0.6	1	5.6
Rabbit	10	6.5	3	16.7
Vole	1	0.6	1	5.6
Total	155	100.0	18	100.0

Table 34. Number of identifiable specimens (NISP) and minimum number of individuals (MNI) from Period 3/4

B.1.20 **Period 4.** Material dating to Period 4 was mainly retrieved from Area 1 South with only two fragments from Area 2. This period was when the castle keep was continuing to be used as a gaol. This period sees a decrease in the importance of pigs and an increase in cattle remains.

Species	NISP	NISP%
Pig	16	17.4
Cattle	43	46.7
Sheep/Goat	26	28.3
Fallow Deer	1	1.1
Rabbit	5	5.4
Hare	1	1.1
Total	92	100.0

Table 35. Number of identifiable specimens (NISP) from Area 1 South (Period 4)

Species	NISP	NISP%
Sheep/Goat	1	50
Rabbit	1	50
Total	2	100.0

Table 36. Number of identifiable specimens (NISP) from Area 2 main area (Period 4)

B.1.21 **Period 5.** The period 5 faunal material was retrieved from Areas 1, 2 and 3. Period 5 dates to the mid 18th century to the 21st century, yet the majority of this material is from demolition debris. Therefore, there is the potential for residual material.

B.1.22 As in Period 4, pigs are no longer the dominant species as sheep/goat and cattle remains are more prominent. The bulk of material was recovered from Area 1 South, much like in the previous phase.

Species	NISP	NISP%	MNI	MNI%
Pig	43	23.5	3	16.7
Cattle	53	29.0	2	11.1
Sheep/Goat	59	32.2	5	27.8
Dog	2	1.1	1	5.6
Cat	3	1.6	1	5.6
Fallow Deer	4	2.2	1	5.6
Rabbit	14	7.7	2	11.1
Hare	1	0.5	1	5.6
Mouse	2	1.1	1	5.6
Fox (?)	2	1.1	1	5.6
Total	183	100.0	18	100.0

Table 37. Number of identifiable specimens (NISP) and minimum number of individuals (MNI) from Period 5

Species	NISP North	NISP North %	NISP South	NISP South %
Pig	2	16.7	26	33.8
Cattle	5	41.7	20	26.0
Sheep/Goat	2	16.7	26	33.8
Dog	0	0	1	1.3
Fallow Deer	0	0	1	1.3
Rabbit	3	25.0	2	2.6
Hare	0	0	1	1.3
Total	12	100.0	77	100.0

Table 38. Number of identifiable specimens (NISP) from Area 1 North and South (Period 5)

Species	NISP Main	NISP Main %	NISP Cistern	NISP Cistern %
Pig	2	9.1	8	14.5
Cattle	8	36.4	16	29.1
Sheep/Goat	10	45.5	13	23.6
Dog	1	4.5	0	0.0
Cat	0	0.0	3	5.5
Fallow Deer	0	0.0	3	5.5
Rabbit	1	4.5	8	14.5
Mouse	0	0.0	2	3.6
Fox (?)	0	0.0	2	3.6
Total	22	100.0	55	100.0

Table 39. Number of identifiable specimens (NISP) from Area 2 main area and cistern (Period 5)

Species	NISP Main	NISP Main %
Pig	5	29.4
Cattle	4	23.5
Sheep/Goat	8	47.1
Total	17	100.0

Table 40. Number of identifiable specimens (NISP) from Area 3 main area (Period 5)

Other features of the assemblage

- B.1.23 There was evidence of bone working on sheep/goat metapodials and pig fibulae. Bone pins were noted as were bones that were highly polished, likely in preparation for further craftworking. There was a lack of cattle horncores and deer antlers, indicating that horn and antler working was occurring elsewhere in the castle or market. Small numbers of worked antler and horn were recovered from previous excavation of the Castle Mall (Albarella *et al.* 2009).
- B.1.24 Signs of gnawing were apparent on various species, with cases of pathological changes in sheep remains.
- B.1.25 Butchery marks were present on approximately 7% (over 100) of the recordable fragments, however as vertebrae (excluding the atlas and axis) and ribs were non-recordable, it should be noted that the vast majority of ribs showed evidence of cut and chop marks and vertebrae showed heavy longitudinal chop marks. Cervical vertebrae (C3) were noted with transverse chop marks resulting in the removal of the head. Ribs had cut and chop marks on both large and medium mammal ribs, evidence of both filleting of meat and division into joints of meat. Butchery marks were mostly the results of rapid dismemberment of animals for food preparation. Butchery was methodical and systematic, probably carried out by skilled butchers at the castle. The evidence suggests that animals were predominantly brought to site on the hoof and butchered on site, however, in addition partially dressed carcasses could have been transported to the castle from the city market.

Potential

- B.1.26 The faunal remains from Norwich Castle Keep are of regional and national significance as they can provide important insight into diet, butchery practices, how food waste was disposed of and husbandry. It is therefore recommended that the assemblage is fully recorded and compared with other significant assemblages. The remains will shed further light on social status and add to the overall picture of life at Norwich Castle in addition to the previous zooarchaeological work conducted at the Castle Mall and other areas of the castle.

Recommendations

- B.1.27 The mammal bones contain many ageable mandibles and measurable bones which need to be recorded and compared with those from previous excavations at the castle, other medieval castles, and medieval assemblages from Norwich.
- B.1.28 More in depth spatial analysis will need to be conducted to look closely at trends in body part distribution between areas and periods.
- B.1.29 Bird and fish remains should be analysed by appropriate specialists.

Task list

Description	Performed by	Days
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Taking measurements, producing data tables/charts, complete recording of ageing, sexing and taphonomy.	Hayley Foster	10
Writing of report	Hayley Foster	6
TOTAL		16

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B.2 Fish Remains *by Rebecca Nicholson*

Introduction

- B.2.1 Fish remains were rapidly assessed from 53 samples and from 46 contexts, which represents the great majority of the recovered assemblage, with the Phase 3 occupation surfaces especially rich in fish bones, most of which were in good or very good condition. The total assessed fish assemblage comprises an estimated 4500 bones, which includes around 800 hand collected fragments with the remainder deriving from the sorted portions of the residues of bulk soil samples. A large number of bones remain in the <5mm unsorted residues.
- B.2.2 Soil samples ranged in volume from 2L to 40L and up to 10L was processed from each. Spreads of occupation material were gridded, and consequently a number of contexts are covered by up to 6 of the processed samples. As part of the flotation processes, all residues were sieved to 0.5mm and routinely sorted to 5mm, occasionally to 2mm. Where fish remains were seen to be present in the unsorted portion of the residue the unsorted material was retained and has been rapidly scanned as part of this assessment. Fish remains, including scales, are also present in some of the flots recovered for botanical remains but these have not been scanned or quantified.
- B.2.3 The method adopted for this assessment was to rapidly scan most of the bags of recovered fish bone, noting the approximate number of identifiable bones, the general condition of the bones and the range of species present as well as any other distinctive characteristics. The assessment was undertaken with the aim of providing a general overview of the material, without the use of a reference collection or published guides, and so it is likely that minor species may have been missed. All assessment data has been recorded in an Excel spreadsheet.

Species

- B.2.4 The hand collected material is unsurprisingly dominated by bones from larger fish, most commonly cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*) and ling (*Molva molva*), the last represented in several contexts only by vertebrae and a cleithrum which suggests the inclusion of dried stockfish, although butchery marks appear to be very scarce. Other species typically recovered in the sieved samples include large and smaller flatfish (*Pleuronectidae* and *Scophthalmidae*), conger eel (*Conger conger*), herring (*Clupea harengus*), whiting (*Merlangius merlangus*), shark/ray (*Elasmobranchii*), mackerel (*Scomber scombrus*), sea bream (*Sparidae*) and possibly pollack (*Pollachius pollachius*) and torsk (*Brosme brosme*). Freshwater and migratory species include pike (*Esox lucius*), eel (*Anguilla anguilla*), small cyprinid (*Cyprinidae*) and very occasionally salmon/trout (*Salmonidae*) and smelt (*Osmerus eperlanus*). The samples included much greater quantities of bones from the smaller species, in some cases with several hundred identifiable bones recovered from 10 litres of soil, and considerable quantities of bones from smaller fish additionally present in the unsorted residues.
- B.2.5 Fish remains are especially abundant in Period 3 contexts including occupation surface 3025 in Area 1 South and make-up layer 3034 in Area 1 North as well as in surface/dump 3117, and pit fills 3114, 3127 and 3136, all of which are from Area 3 (main area, sub-period 2). Fill 3128 (Area 3, main area) had a particularly rich fishbone assemblage more typical of an occupation

deposit or pit fill deriving from kitchen waste (sample 55). There does not appear to be any clear variation in taxonomic composition between the various areas, although some of the largest fish were present in Area 1 South. The very rapid nature of the assessment means that patterning may become evident after more detailed recording.

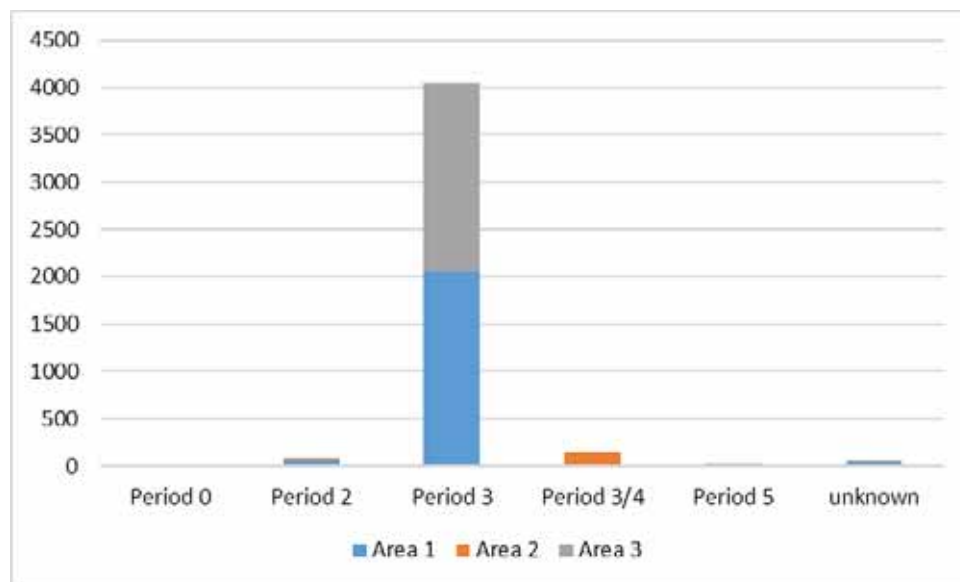


Chart 1. Estimated number of identifiable bones by main period and excavation area (excludes material yet to be extracted from the residues and flots)

Potential

- B.2.6 The fish remains have very high potential to provide valuable information about fish consumption directly relating to the occupation of the castle from the mid 13th century to the Reformation, although more precise dating of the individual deposits would be required to maximise the potential of the assemblage to inform about the use of the keep during this period of its history.
- B.2.7 While determining 'status' from food remains is not entirely straightforward, some larger fish such as salmon, pike, turbot and sturgeon were expensive items and so can be used as indicators of wealth. In this respect it should be noted that no remains of sturgeon have so far been seen in the assemblage and other 'status' items are not frequent, but some of the fish which are present such as the larger flatfish and conger are not typically food for the poor. Generally, the variety of species appears unusually broad if it records food fed to prisoners.
- B.2.8 The assemblage can usefully be compared to the very large collection of fish remains from Castle Mall (Site 777N), where considerable differences in taxonomic composition were observed between the different phases of activity (Locker 2009). Superficially at least the taxonomic composition of the fish remains from the keep resemble those from Castle Mall.
- B.2.9 Part of the proposed analysis will include an examination of the likely role of imported, stored fish and to examine the relative significance of locally caught versus imported or traded fish. The assemblage can usefully be compared to contemporary records of fish from other regions (superficially it appears distinctively different to assemblages from castles, urban and religious sites in the south of England, for example) and the evidence will be examined in the light of national trends (*cf.* Barrett *et al.* 2004).
- B.2.10 The significance of freshwater fish and fishing will be considered.

B.2.11 Fewer than an estimated 200 bones were recovered from Phase 2 contexts, and only 20 from Phase 5 contexts. No fish remains were identified from Phases 1 or 4. Consequently the potential for investigating diachronic change in fish procurement and consumption from this assemblage is minimal, but the valuable assemblage from Castle Mall will provide relevant comparative material.

Recommendations

B.2.12 Prior to analysis the remaining unsorted residues >2mm which have been identified as containing abundant fish remains (number = 36) should be sorted in order to ensure that the material is not biased in favour of large boned fish. The finer fractions of those residues which were rich in fish remains should be scanned and any identifiable remains extracted from a proportion (25% of the residue). Fish remains should be extracted from any flots that have been identified as containing significant quantities. In some cases, this may be done at the same time as sorting for charred plant remains.

B.2.13 Bones and scales will be identified with the aid of a modern comparative collection and published sources (*eg* Watt *et al.* 1997). Measurements will be taken on bones where appropriate, using digital callipers to 0.1mm.

Retention, dispersal and display

B.2.14 The fish remains should be incorporated into the archive as they have high potential to contribute to future research projects, for example isotopic research into the origins and migratory patterns of fish through time is a rapidly expanding area of scientific investigation. Sorted residues, unless required for another specialism, should be dispersed.

Task list

Description	Performed by	Days
Extraction of fish remains from 36 retained residues >2mm, a selection of <2mm residues and 14 flots	Environmental Assistant Supervisor	7
Identification of fish assemblage	Rebecca Nicholson	10
Research, analysis and preparation of report	Rebecca Nicholson	2
TOTAL		19

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B.3 Environmental Samples *by Rachel Fosberry*

Introduction

B.3.1 Sixty-six bulk samples were taken from features within the excavated area inside the keep of Norwich Castle. Samples were taken from layers and deposits that date from the construction of the enlarged castle mound (Period 2, Phase 2), the occupation of the keep and internal changes (Period 2, Phase 3), the occupation of the keep from the mid-13th century to Reformation (Period 3), the continued use as a prison (Period 4) and the mid 18th-century use to present day (Period 5).

Period	2.2	2.3	3	3.1	3.2	3 or 4	5	0
Area 1	7	3	23	1	5			1
Area 2	7					3	1	
Area 3	2				14			

Table 41. Number of bulk samples by area and period

B.3.2 The purpose of this assessment was to determine whether plant remains are present in samples, their mode of preservation and whether they are of interpretable value with regard to domestic, agricultural and industrial activities, diet, economy and rubbish disposal.

B.3.3 The samples proved to be particularly productive with regard to cess material that is considered to relate to culinary and possible latrine waste. Small bones, mainly fish but also including small mammal and birds are abundant in several of the samples. Plant remains are relatively scarce, especially charred plant remains, but preservation of plants (and insects) through mineralisation occurs in several samples.

B.3.4 Methodology. Identification of plant remains is with reference to the *Digital Seed Atlas of the Netherlands* (Cappers *et al.* 2006) and the authors' own reference collection. Nomenclature is according to Zohary and Hopf (2000) for cereals and Stace (2010) for other plants. Carbonised seeds and grains, by the process of burning and burial, become blackened and often distort and fragment leading to difficulty in identification. Mineralised plant remains are fossils of the internal case of the plant part (usually seeds) which can also lead to difficulty in identification as they can produce a reverse-image of the seed coat. Plant remains have been identified to species where possible. The identification of cereals has been based on the characteristic morphology of the grains and chaff as described by Jacomet (2006).

B.3.5 For the purpose of this assessment, items such as seeds and cereal grains have been scanned and recorded qualitatively according to the following categories:

= 1-5, ## = 6-25, ### = 26-100, #### = 101 – 500, ##### = 501+ specimens

Results

B.3.6 The results are presented by group, period and area:

B.3.7 **Group 230, Period 2.2, Area 1.** Layer 3205 from the mound make-up in the South area does not contain preserved remains other than occasional fish bones.

B.3.8 **Group 235, Period 2.2, Area 1.** Seven samples were taken for mortar analysis from floor layers within the South area. Sample 41, internal surface layer 3103 was processed and contains only occasional fish bones.

B.3.9 **Group 251, Period 2.2, Area 1.** Post hole 3281 contains building debris only.

B.3.10 **Group 252, Period 2.2, Area 1.** Occupation layers 3134, 3133 and 3148 are sparse in content other than building debris although layer 3148 contains two charred oat grains and a charred pea. Post hole 3132 contains moderate charcoal only.

B.3.11 **Group 253, Period 2.2, Area 1.** Ground raising layer 3129 is comprised of building debris only.

- B.3.12 **Group 201, Period 2.2, Area 2.** Seven samples were taken from four post holes that are thought to pre-date the keep in the main area of Area 2. Charred plant remains include low volumes of charcoal, a single barley grain and a fragment of nutshell in post hole **3251** and four oat (*Avena* sp.) grains in post hole **3253**. All the samples contain frequent untransformed seeds of elderberry (*Sambucus nigra*), low density of fish bone and frequent building material (between 1.5 – 2kg).
- B.3.13 *Recommendations:* The untransformed seeds within these post holes could be significant as they suggest that the features remained open, possibly with posts removed, in an uncovered area in which elder was growing. Elder is an early coloniser of disturbed soils and is fast-growing and produces abundant berries. The seeds have a tough outer coat (testa) which makes them particularly resistant to decay and they are frequently found surviving in archaeological deposits where other plant remains have decayed. The seeds could be radiocarbon dated.
- B.3.14 **Group 208, Period 2, Area 3.** Post hole **3181** does not contain any preserved remains other than building debris
- B.3.15 **Group 219, Period 2.2, Area 3.** Layer 3210 (Sample 70) from the mound has not been processed.
- B.3.16 **Group 236, Period 2.3, Area 1.** Sample 30, internal surface layer 3057 was taken for mortar analysis and has not been processed.
- B.3.17 **Group 256, Period 2.3, Area 1.** Levelling/ground raising layers 3101, 3102, 3105 and 3120 contain occasional mineralised seeds, including a corn gromwell (*Lithospermum arvense*) seed in Sample 45 and occasional fish bones.
- B.3.18 **Group 257, Period 2.3, Area 1.** Four samples were taken from occupation floor layers for mortar analysis (retained at the Castle).
- B.3.19 **Group 238, Period 3, Area 1.** Two samples from the make-up layer 3086 in the south contain occasional charred and mineralised remains, fish bones and building debris but are considered to have low potential.
- B.3.20 **Group 239, Period 3, Area 1.** Several samples were taken from occupation layers 3055, 3056 and 3083 within the South area. Layers 3055 (Samples 12- 15) and 3083 (Sample 23) were obvious layers of burning and abundant charcoal (up to 3.8L) was recovered. Fish bones are also frequent in these samples.
- B.3.21 *Recommendations:* The charcoal has potential for species identification and radiocarbon dating (if required).
- B.3.22 **Group 241, Period 3, Area 1.** Five samples (Samples 7-11) were taken from a grid over a very thin occupation layer 3042. Moderate charcoal is present in all of the samples. Charred seeds of black bulrush (*Schoenus nigricans*) and mineralised seeds of corncockle (*Agrostemma githago*), henbane (*Hyoscyamus niger*) and dock are present in Sample 10. A tiny fragment of mineralised string was noted in Sample 8. Fish bones are abundant in all the grid samples.
- B.3.23 *Recommendations:* The samples have been fully processed. The fine fraction of the residues has been retained and could be sorted for mineralised remains.
- B.3.24 **Group 245, Period 3, Area 1.** Six samples (Samples 1-6) were taken from a grid over South occupation layer 3025. Charcoal is less frequent. Mineralised seeds are present in most of the samples and include sedges (*Carex* spp.), poppy (*Papaver* sp.), henbane, thistles (*Carduus/Cirsium* sp.), nettle (*Urtica dioica*) and figs (*Ficaria carina*). Fish bones are abundant in all of the samples and mineralised insects are frequent.

- B.3.25 *Recommendations*: The samples have been fully processed. The fine fraction of the residues has been retained and could be sorted for mineralised remains and any small finds.
- B.3.26 **Group 258, Period 3.1, Area 1**. The fill of path 3093 (Sample 29) was sampled due to obvious fish bones. Occasional untransformed elderberry seeds and a moderate amount of charcoal are preserved. A bone bead was recovered from the sample residue.
- B.3.27 **Group 259, Period 3.2, Area 1**. Samples 22, 24, 25, 26 taken from floor make-up layer 3034 contain occasional charred grain, occasional untransformed elderberry seeds and abundant fish bone. Sample 24 also contains abundant small mammal bones.
- B.3.28 **Group 260, Period 3.2, Area 1**. Sample 16, fill 3072 of post hole 3073 was taken primarily for artefact retrieval. Fish and small bones are present and can be considered for analysis. The flot contains untransformed elderberry seeds only.
- B.3.29 **Group 262, Period 3.2, Area 1**. Make-up layer 3224 (Sample 72) contains building debris only.
- B.3.30 **Group 221, Period 3.2, Area 3**. Occasional charred cereal grains are present in occupation layer 3118 (Sample 63) and internal surface layer 3117 (Sample 62). Fish bones are present in both samples and are abundant in layer 3117 which also contains a possible coprolite and occasional mineralised fig seeds and fly pupae. Pit 3175 (Sample 69) contains only sparse remains.
- B.3.31 **Group 222, Period 3.2, Area 3**. Samples were taken from pits 3135 (Sample 58), 3137 (Sample 59) and 3149 (Sample 60). Occasional charred and mineralised remains are present in each pit fill indicating cess deposits. The mineralised remains are most frequent in pit 3135 (Sample 58) which also contains abundant fish bone.
- B.3.32 *Recommendations*: Processing of the remaining bucket of Sample 58 and the residue sorted microscopically for retrieval of mineralised seeds and insects. Insect analysis could be considered.
- B.3.33 **Group 223, Period 3.2, Area 3**. Occupation layer 3116 (Sample 57) from the internal surface of the main area in Area 3 contains occasional mineralised insects and fig seeds and abundant fish bone.
- B.3.34 *Recommendations*: Potential for plant and insect remains is considered moderate but there is a cess inclusion which could be considered. Three buckets of this sample remain unprocessed. Additional processing may produce a more significant assemblage.
- B.3.35 **Group 224, Period 3.2, Area 3**. Pit 3159 contains only occasional fish bones and a single charred grain.
- B.3.36 **Group 225, Period 3.2, Area 3**. Five samples were taken from the disuse fills of pits 3113 (Sample 47), 3125 (Sample 49) and 3126 (Samples 50, 52 and 55). Occasional charred grains are present in each feature and fish bones are abundant. Pit 3126 produced significant remains from both fills sampled that indicate the inclusion of cess/sewage; fill 3128 (Samples 50 and 55) contains a relatively diverse assemblage of mineralised seeds that include figs, possible strawberry (*Fragaria* sp), corncockle, field bindweed (*Calystegia sepium*) and docks (*Rumex* sp.), sloe/cherry (*Prunus spinosa/cerasus*) kernel and a well-preserved mineralised rye grain. Mineralised insects are frequent and fish bones are abundant, and particularly in Sample 50. Sample 52 (fill 3127) contains a less plant remains bit includes mineralised insect remains along with fish and bird bones. Mound make-up 3112 (Sample 48) has not been processed but it may have potential for pollen.

- B.3.37 *Recommendations*: The remaining three buckets of the three samples from pit 3126 are recommended for processing and sorting for mineralised remains. Insect analysis is recommended.
- B.3.38 **Group 205, Period 3/4, Area 2.** Fill 3199 of pit 3167 (Sample 65) in the main area of Area 2 produced the most abundant assemblage of charred plant remains from the entire site. It contains mixed cereals, predominantly barley and wheat, with occasional cereal chaff, peas, dock and sedge seeds. Mineralised fig seeds are also present. Fish and bird bones are present.
- B.3.39 *Recommendations*: The remaining three buckets should be processed. Full quantification of plant remains is required and the residue should to be sorted microscopically for retrieval of mineralised seeds.
- B.3.40 **Group 206, period 3/4, Area 2.** Pit 3162 (Samples 64 and 71) contains three charred oat grains and single grains of rye and barley and occasional mineralised fig seeds. The fills of this pit are likely to have been mixed during earlier excavation and are therefore not recommended for further study.
- B.3.41 **Group 213, period 5, Area 2.** Cistern 3074 (Sample 44) contains several mineralised fly pupae, two mineralised grape seeds, two charred wheat grains and frequent vitrified charcoal, probably coal. Small bones and fish bones are present in moderate densities.
- B.3.42 *Recommendations*: The remaining three buckets should be processed. The residue needs to be sorted microscopically for retrieval of mineralised seeds and insects. Insect analysis should be considered.

Summary by Area

- B.3.43 **Area 1 North.** 16 samples: 4 bedding, 3 floor, 1 path, 3 post holes, 4 internal surface layers. Negligible charred plant remains, abundant fish bone from post holes.
- B.3.44 **Area 1 South.** 24 samples: 21 occupation layers, 1 buried soil, 2 make-up areas. Abundant charcoal, cess deposits with abundant fish bone, negligible charred plant remains.
- B.3.45 **Area 2.** 7 post holes and 4 pits. Frequent untransformed seeds in 2.2 post holes. Abundant charred plant remains in Period 3/4 pits and mineralised (cess) remains in Period 5 cistern.
- B.3.46 **Area 3.** 8 pits, 2 mound-make up, 1 post hole, 2 natural, 2 internal surface, 1 occupation floor. Sparse charred plant remains. All 8 pits contain cess deposits and abundant fish bone. Occupation floor, surfaces and post hole contains fish bone.

Discussion

- B.3.47 Preservation of plant remains from the samples from Norwich Castle keep is by carbonisation and mineralisation. Each of these methods of preservation is differential; carbonisation only occurs under certain conditions when plant material is incompletely burnt and reduced to pure carbon. Any surviving charred remains will only represent a small proportion of the original material being burnt. Mineralisation occurs when the organic component of a seed or fruit is replaced by minerals. This process will also only occur under certain conditions, most commonly when mixed with wet waste that is rich in calcium and phosphates and only certain types of plant remains commonly become mineralised. The charred plant remains are predominantly cereal grains and have been recovered from each of the three areas in small quantities that are likely to represent discarded burnt grain that has been mixed with general refuse, possibly midden deposits. The only significant assemblage was recovered from the main area of Area 2 from group 205, Period 3/4 pit **3167**. The assemblage contains a variety of cereals, chaff, peas and weed seeds and probably represents a mixed deposit from a number of sources but additional processing and further study may reveal additional information.

B.3.48 Mineralised plant remains were also recovered from all three areas of the keep from Period 2, Phase 3 through to Period 4 deposits. Fig seeds predominate and there is evidence of other fruits through the seeds of grape/raisin and cherry/sloes. Additional evidence is likely to be found once the sample residues have been sorted. Mineralised insects, mainly in the form of fly puparia, are also frequent.

B.3.49 Untransformed seeds of elderberry as well as other tough-coated seeds such as bramble (*Rubus* sp.) are most notable in the Group 201, Period 2.2 in Area 2 but they also can be found in lesser quantities in many samples from all areas and all periods. It is not always clear whether the seeds represent the consumption/culinary use of berries or the inclusion of wind-blown material.

Potential

B.3.50 The plant remains are reasonably well preserved and have potential to yield valuable data about diet and urban food supplies during the medieval and early post-medieval period in Norwich Castle, thus contributing to the research aims of this project. Further study of the selected samples will help to characterise deposits relating to occupation and activity within the keep and it is of particular relevance that contemporary plant assemblages from samples analysed from the excavations at Castle Mall will provide a comparison. Initial results suggest similar findings in which the food plants that have been preserved are quite limited in density and diversity. There is little or even no evidence of more exotic food plants such as spices and nuts that would be expected from a high-status site in both the earlier period (Murphy 2009, 354) and throughout the continued occupation in the later medieval period. Murphy interprets assemblages that contain mineralised remains and are rich in fish bone such as these as sewage or latrine waste. The vast quantities of fish bone recovered from the keep would suggest that the deposits contain a significant sewage component.

Recommendations

B.3.51 Mineralised seeds can often be too heavy to float and the residues of samples from cess deposits need to be examined under the microscope to ensure maximum retrieval of these remains. Where the selected samples have additional unprocessed soil, further processing and examination of the flots and residues will be required.

Processing tasks

Group	Context Number	Cut	Sample Number	Area	Sub-Area	Period	Sub-Period	Further work	Timescale
241	3042	0	7	1	South	3		sort sample residues	0.5
241	3042	0	8	1	South	3		sort sample residues	0.5
241	3042	0	9	1	South	3		sort sample residues	0.5
241	3042	0	10	1	South	3		sort sample residues	0.5
241	3042	0	11	1	South	3		sort sample residues	0.5
245	3025	0	1	1	South	3		sort sample residues	0.5
245	3025	0	2	1	South	3		sort sample residues	0.5
245	3025	0	3	1	South	3		sort sample residues	0.5
245	3025	0	4	1	South	3		sort sample residues	0.5

245	3025	0	5	1	South	3		sort sample residues	0.5
245	3025	0	6	1	South	3		sort sample residues	0.5
213	3088	3074	44	2		5		process remaining bucket	1
222	3136	3135	58	3	Main Area	3	2	process remaining bucket and sort residue	1
223	3116	0	57	3	Main Area	3	2	process remaining bucket and sort residue	1
225	3128	3126	55	3	Main Area	3	2	process remaining bucket and sort residue	1
225	3128	3126	50	3	Main Area	3	2	process remaining bucket and sort residue	1
205	3199	3167	65	2	Main Area	3/4		process remaining bucket and sort residue	1.5
								Total	12

Task list

Description	Performed by	Days
Additional processing and initial sorting	Martha Craven	12
Identification and recording	Rachel Fosberry	2
Tabulation of results	Martha Craven	1
Report	Rachel Fosberry	3
TOTAL		18

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B.4 Marine Mollusca by Carole Fletcher

Introduction and methodology

- B.4.1 Marine mollusca were collected by hand from wells and pits from works both within the keep and in the external test pits. The shells recovered are mostly edible examples of oyster *Ostrea*

edulis, from estuarine and shallow coastal waters, with small but significant numbers of whelks *Buccinum undatum* and cockles *Cerastoderma edule*; a single fragment of razor clam *Ensis* sp. was recovered from grave 4038. The shell is moderately well to poorly preserved and does not appear to have been deliberately broken or crushed, although it has undergone post-depositional damage.

- B.4.2 The shells were weighed, recorded by species, and right and left valves noted, when identification could be made, using Winder (2011) as a guide. The minimum number of individuals, width, or length was not recorded, due to the small size of the assemblage.

Factual data

- B.4.3 In total, 284 shells, weighing 2.567kg, were recovered, mainly from layers, pits, and post holes. No features, except context 4037, surface 3042 and grave 4038 contained enough shells to indicate one or more meals of oysters or whelks alone; however, they may have been combined with other foods. Most features produced low numbers of shells.
- B.4.4 Throughout the assemblage, only three oyster shells show evidence of damage, in the form of a small 'U' or 'V'-shaped hole on the outer edge (usually) of the left valve. This damage is likely to have been caused by a knife during the opening or 'shucking' of the oyster, prior to its consumption.
- B.4.5 Context 4037 produced 26% of the assemblage, 75 shells, a mix of oyster, whelk and cockle, mostly incomplete shells. Grave 4038 and layer 3042 between them produced a further 20%. The remainder of the assemblage came from a variety of layers and feature types across the excavated areas.

Discussion

- B.4.6 The presence of marine mollusca indicates transportation of a marine food source to the site, and that it formed part of the medieval diet. The shells demonstrate the ability of the occupants of the settlement to access foods sources beyond their immediate area and surrounding hinterland. The shells recovered are mostly of a moderate size and represent general discarded food waste indicating, at most, a small number of meals.
- B.4.7 Previous excavations at Norwich Castle (Murphy in Shepherd Popescu 2009) also produced marine shell in relatively small quantities, with a range of species almost identical to the current phase of work and in similarly poor condition. Marine mollusca assemblages recovered from other castle sites such as Carisbrooke Castle on the Isle of Wight (Campbell and Russell 2014) and Clare Castle in Suffolk (Lewis and Ranson 2013) appear to be broadly similar to that recovered here.
- B.4.8 Most rural assemblages of marine mollusca tend not to include whelks or contain very few compared to the quantity of oysters. The fact that they are present in high status sites such as castles suggests that they are being deliberately selected as a delicacy for those sites.
- B.4.9 Although not closely datable in themselves, the mollusca may be dated by their association with pottery or other material also recovered from the features, the bulk of which is medieval. The assemblage is too small to draw any but the broadest conclusions, in that shellfish were reaching the site from the coastal regions, although perhaps with a broader range of species available than normally seen. Overall, this indicates trade with the wider area, as might be expected from a high-status site.

Statement of potential

- B.4.10 The assemblage has little potential to aid local, regional and national research priorities.

Further work

- B.4.11 A statement should be prepared for publication and the catalogue acts as a full archival record, beyond this no further work is recommended.

Retention, dispersal and display

- B.4.12 The mollusca may be of some use for educational/handling collections, otherwise the material may be deselected prior to archive deposition.

Task list

Description	Performed by	Days
No further work is required, unless the site is published, then the information should be summarising for the publication	Author of publication	0.1

APPENDIX C ARTEFACT ASSESSMENTS, EXTERNAL TEST PITS (ENF143655)

C.1 Pottery by Sue Anderson

Introduction

- C.1.1 Forty sherds of pottery weighing 0.411kg was collected from four contexts. Table 42 shows the quantification by fabric; a summary catalogue by context is included in the archive.

Description	Fabric	Fabric date range	No	Wt/g	Eve	MNV
Thetford-type ware	THET	10th-11th c.	4	69	0.07	4
Early medieval ware	EMW	11th-12th c.	7	85	0.10	5
Local medieval unglazed	LMU	11th-14th c.	18	175	0.17	13
Grimston-type ware	GRIM	L.12th-14th c.	6	48		6
Yarmouth-type glazed wares	YARG	13th-15th c.	3	12		3
Late medieval and transitional	LMT	15th-16th c.	2	22		1

Table 42. Pottery quantification by fabric, external test pits

Methodology

- C.1.2 Quantification was carried out using sherd count, weight and estimated vessel equivalent (eve). The minimum number of vessels (MNV) within each context was also recorded, but cross-fitting was not attempted unless particularly distinctive vessels were observed in more than one context. All fabric codes were assigned from the author's post-Roman fabric series. Form terminology for medieval pottery is based on MPRG (1998). Fabrics were identified based on Jennings' Norwich work (Jennings 1981). Recording uses a system of letters for fabric codes together with number codes for ease of sorting in database format. The results were input directly onto an Access database, which forms the archive catalogue.

The assemblage

- C.1.3 Four sherds of Thetford-type ware were recovered from buried soil 4014. Three were body fragments and the fourth was a large part of a large non-handled storage jar with a wedge rim (Anderson 2004 type 5; Dallas 1984 form AF?) and applied thumbed strips below the rim and vertically over the body.
- C.1.4 Seven sherds of early medieval ware represented five vessels. Sherds were found in buried soil 4028 and mixed deposits 4037. The three sherds from the former were part of an oxidised jar with a simple everted rim and possible thumbed decoration on the rim edge.
- C.1.5 Eighteen sherds of LMU were recovered of which four were from grave fill 4002 and the rest were from mixed deposits 4037. These contexts also contained six sherds of Grimston-type glazed ware. Fragments from the grave included two thickened everted rims of 13th/14th-century date. From 4037 there were fragments of an inturned jar rim and an everted thickened bowl rim, both probably 12th/13th-century.
- C.1.6 Later wares comprised three body sherds of Yarmouth-type glazed wares and two pieces of a late medieval and transitional ware vessel, all from mixed deposit 4037.

Pottery by context

- C.1.7 The fabric distribution by context is summarised in Table 43, with suggested spotdates.
- C.1.8 Most of the pottery was recovered from context 4037, which is suggested to date to the late medieval phase. The grave was associated with 13th/14th-century pottery but this may be

residual in this context. Both buried soils contained early pottery and may relate to soil brought to the site to build the mound.

Cut	Context	Feature Type	Fabric	Spotdate
4038	4002	grave	LMU GRIM	13th-14th c.
-	4014	buried soil	THET	10th-11th c.
-	4028	buried soil	EMW	11th-12th c.
-	4037	mixed deposits	EMW LMU GRIM YARG LMT	L.14th-15th c.

Table 43. Pottery by context with spotdates, external test pits

Recommendations

- C.1.9 This small assemblage has been fully recorded and no further work is required.

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C.2 Ceramic building material by Sue Anderson

- C.2.1 Four fragments of CBM (236g) were recovered from mixed deposit 4037. These comprised two small fragments of early brick, a fragment of medieval roof tile, and a fragment of medieval ?ridge tile (20mm thick, green glazed) covered in medium sandy buff-coloured mortar. The group represents demolition rubble of medieval date.
- C.2.2 One small irregular fragment (21g) of fired clay in a medium sandy fabric with calcareous and clay pellet inclusions was recovered from context 4037. Its function is uncertain, but it could be a piece of CBM which has lost its original surfaces.
- C.2.3 No further work is required on this small assemblage.

C.3 Faunal Remains by Hayley Foster

- C.3.1 Only a small quantity of faunal remains were recovered from the external test pits. There were 25 fragments in total dating to three different periods (Periods 2, 3 and 4). The condition of the assemblage is fair however fragmentation is high.
- C.3.2 Species represented include cattle (*Bos taurus*), sheep/goat (*Ovis/Capra*), pig (*Sus Scrofa*), dog (*Canis familiaris*), rabbit (*Oryctolagus cuniculus*) and fallow deer (*Dama dama*). The majority

of the fragments dated to Period 4, with dog remains comprising the majority of fragments, probably from one individual animal.

Species	NISP	NISP%
Dog	12	48.0
Cattle	4	16.0
Sheep/Goat	3	12.0
Pig	4	16.0
Rabbit	1	4.0
Fallow Deer	1	4.0
Total	25	100.0

Table 44. Identifiable fragments by species

Species	Period 2 NISP	Period 3 NISP	Period 4 NISP
Dog	0	2	10
Cattle	1	0	3
Sheep/Goat	1	1	1
Pig	0	0	4
Fallow Deer	0	0	1
Rabbit	0	1	0
Total	2	4	19

Table 45. Identifiable fragments by period

- C.3.3 The size of the assemblage does not allow for any solid interpretations to be made, however details can be added to the data from gathered from other excavations to gain a better understanding of the zooarchaeological material from the castle and surrounding areas.

C.4 Human Skeletal Remains *by Sue Anderson*

- C.4.1 Incomplete remains of at least two human skeletons associated with the prison cemetery were uncovered during the excavation of a test pit on Norwich Castle mound. Some bones had been removed from the test pit and some remained *in situ*, but all had to be recorded on site.
- C.4.2 The bones were in good condition and some were complete. Articulated remains comprised two pairs of feet (upper sk 4034, lower sk 4035) and a third foot below those (unnumbered?). The bones that had been removed sk 4002 were a complete right tibia, the distal end and part of the shaft of a right femur, a right patella, most of a left innominate in three pieces, a complete sacrum, a complete ulna, a lower thoracic vertebra, a seventh cervical vertebra, and fragments of a right scapula. Apparently disarticulated bones still *in situ* comprised the distal end of a right humerus, at least two ribs, the left innominate and the head of a left humerus.
- C.4.3 The *in situ* remains (sk 4034) which could be seen comprised the lower ends of the tibiae (the upper parts of which were within the baulk and not exposed), both tali, the right navicular and all three cuneiforms, all five right metatarsals. the right hallucial phalanges, the left calcaneum, the left first cuneiform, the left first and second metatarsals, and the left distal hallucial phalanx and proximal phalanx of the second toe. The bones were large and possibly male (the first metatarsal measured 65mm long). The right second metatarsal was removed for radiocarbon dating, which returned a date of cal AD 1450-1650 (95.4%).

- C.4.4 The remains of sk 4035 (visible in the section) were all five right metatarsals, the left first to third metatarsals and two proximal phalanges. The bones were fairly small in comparison with (4034) (the first metatarsal was 56mm long) but relatively robust, and sex was indeterminate.
- C.4.5 Part of the left foot of a sub-adult was visible below the left foot of sk 4035), with an unfused proximal epiphysis of the proximal hallucial phalanx.
- C.4.6 Of the bones recovered as sk 4002, the size and appearance of each part suggested that most of the bones removed from the test pit belonged to a single individual, although clearly the presence of three sets of feet and two left innominates indicates that more were present in the excavated area. Based on the appearance of the innominate and sacrum, together with the size of the humeral head, this individual was an adult ?female. The lengths of the tibia and ulna were measured using a hand tape as no other method was available on site. The tibia measured c.350mm and the ulna c.240mm, producing rough stature estimates of 163m and 160m respectively (based on the female equations of Trotter 1970). Radiocarbon dating produced a result of cal AD 1470-1690 (88.8%).
- C.4.7 Previous work on the castle mound produced a group of seven adult skeletons, all but one of which were male (the other being unsexed), together with disarticulated remains which included a child (Anderson 2009). Other disarticulated remains have been found elsewhere on the mound (Boghi 2001), and this group included adults of both sexes and a number of children. Whilst the former are interpreted as 17th-century prisoners, the latter group relates to several phases of use of the castle, but much of it may be residual, perhaps brought to the site in soils used for the mound construction. The grave uncovered during the recent work has been spot-dated to the 13th/14th century on the basis of associated pottery (Anderson, above) and appears to represent several articulated burials laid out on top of each other with their feet towards the east.

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Addendum by Natasha Dodwell

- C.4.8 A disarticulated adult left femur neck and head (sk 4039) was recovered from Borehole WSA. The diameter of the femur head, 47.72mm. The break at the neck occurred post-mortem but close to death as the bone still seems to be collagen rich. A sample of this bone was submitted for radiocarbon dating, which returned a date of cal AD 960-1170 (94.8%). It was recovered from a depth of between 11 and 12m from within the natural sands. It is not fully understood how this bone was retrieved from this depth as the method of coring should have prevented material 'slipping' to a greater depth within the bore.

C.5 Scientific Dating

- C.5.1 Three samples of human bone were submitted to Scottish Universities Environmental Research Centre, Glasgow for radiocarbon dating.

- C.5.2 Samples 3 and 4 were from articulated skeletons associated with the prison cemetery located to the west of the keep in Test Pit C, while Sample 7 was from a femur recovered from one of the bore holes (WSA). This was extracted with the core material at depth of between 11 and 12m, which was within the natural sand.
- C.5.3 A summary of the samples is presented below:

Context	Sample No.	Fabric date range	Test pit	Lab Code	Summary of results 95.4% probability
4002	3	HSR	C	SUERC-82215	1470-1690 1760-1810
4034	4	HSR	C	SUERC-82216	1450-1650
4039	7	HSR	A	SUERC-82217	900-920 960-1170

Table 46. Samples for radiocarbon dating

Full results



RADIOCARBON DATING CERTIFICATE
 16 October 2018

Laboratory Code SUERC-82215 (GU49125)
Submitter Zoe Ui Choileain
 Oxford Archaeology East
 15 Trafalgar Way
 Bar Hill
 Cambridgeshire
 CB23 8SQ
Site Reference ENF143655
Context Reference 4002
Sample Reference 3
Material Bone : hsr
 $\delta^{13}\text{C}$ relative to VPDB -19.4 ‰
 $\delta^{15}\text{N}$ relative to air 11.2 ‰
C/N ratio (Molar) 3.2
Radiocarbon Age BP 343 ± 25

N.B. The above ^{14}C age is quoted in conventional years BP (before 1950 AD) and requires calibration to the calendar timescale. The error, expressed at the one sigma level of confidence, includes components from the counting statistics on the sample, modern reference standard and blank and the random machine error.

Samples with a SUERC coding are measured at the Scottish Universities Environmental Research Centre AMS Facility and should be quoted as such in any reports within the scientific literature. The laboratory GU coding should also be given in parentheses after the SUERC code.

Detailed descriptions of the methods employed by the SUERC Radiocarbon Laboratory can be found in Dunbar et al. (2016) *Radiocarbon* 58(1) pp.9-23.

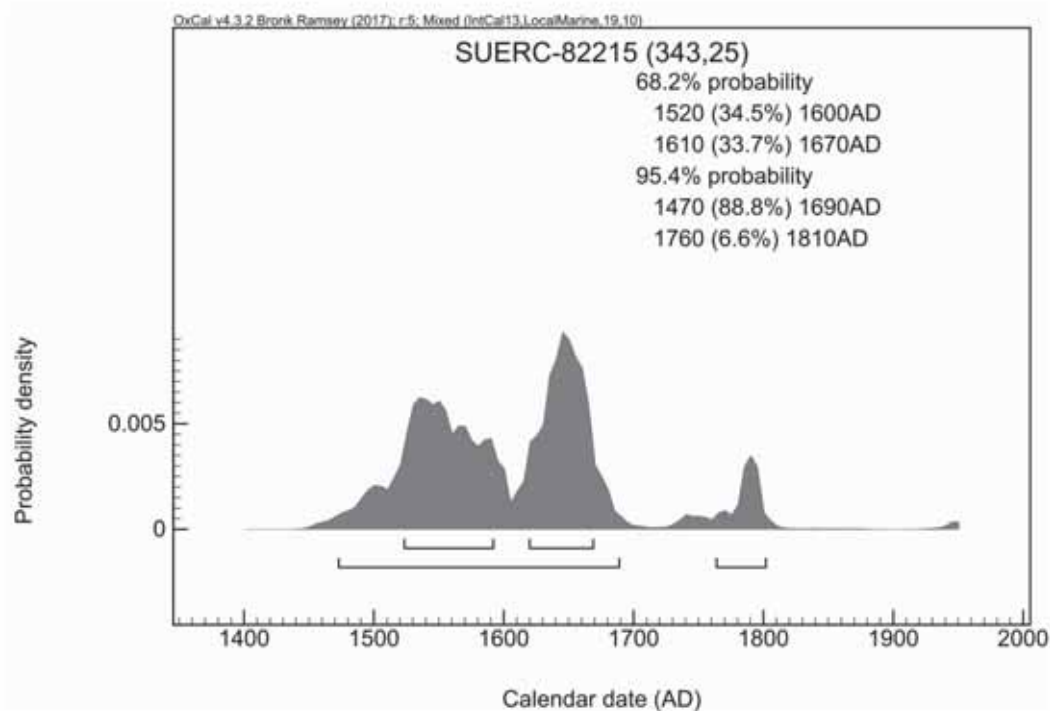
For any queries relating to this certificate, the laboratory can be contacted at suerc-c14lab@glasgow.ac.uk.

Conventional age and calibration age ranges calculated by :

P. Nayant

Checked and signed off by :

B. Taylor



The radiocarbon age given overleaf is calibrated to the calendar timescale using the Oxford Radiocarbon Accelerator Unit calibration program OxCal 4.*

The above date ranges have been calibrated using a mix of the IntCal13 and Marine13 calibration curves. †

Human bone collagen with a $\delta^{13}\text{C}$ value above -20‰ , accompanied by a raised $\delta^{15}\text{N}$ value, is taken to indicate a marine component in the diet. The percentage contribution of this marine component is calculated using end-members of -21.0‰ (fully terrestrial) and -12.5‰ (fully marine) with an uncertainty of 10% applied.

The $\delta^{13}\text{C}$ value of -19.4‰ gives a 19% marine contribution ($\pm 10\%$).

A regional marine offset (ΔR) of 0 ± 50 years has been used in the calibration.

Please contact the laboratory if you wish to discuss this further.

* Bronk Ramsey (2009) *Radiocarbon* 51(1) pp.337-60

† Reimer et al. (2013) *Radiocarbon* 55(4) pp.1869-87



RADIOCARBON DATING CERTIFICATE
16 October 2018

Laboratory Code SUERC-82216 (GU49126)
Submitter Zoe Ui Choileain
Oxford Archaeology East
15 Trafalgar Way
Bar Hill
Cambridgeshire
CB23 8SQ
Site Reference ENF143655
Context Reference 4034
Sample Reference 4
Material Bone : hsr
 $\delta^{13}\text{C}$ relative to VPDB -20.1 ‰
 $\delta^{15}\text{N}$ relative to air 11.8 ‰
C/N ratio (Molar) 3.2
Radiocarbon Age BP 384 ± 24

N.B. The above ^{14}C age is quoted in conventional years BP (before 1950 AD) and requires calibration to the calendar timescale. The error, expressed at the one sigma level of confidence, includes components from the counting statistics on the sample, modern reference standard and blank and the random machine error.

Samples with a SUERC coding are measured at the Scottish Universities Environmental Research Centre AMS Facility and should be quoted as such in any reports within the scientific literature. The laboratory GU coding should also be given in parentheses after the SUERC code.

Detailed descriptions of the methods employed by the SUERC Radiocarbon Laboratory can be found in Dunbar et al. (2016) *Radiocarbon* 58(1) pp.9-23.

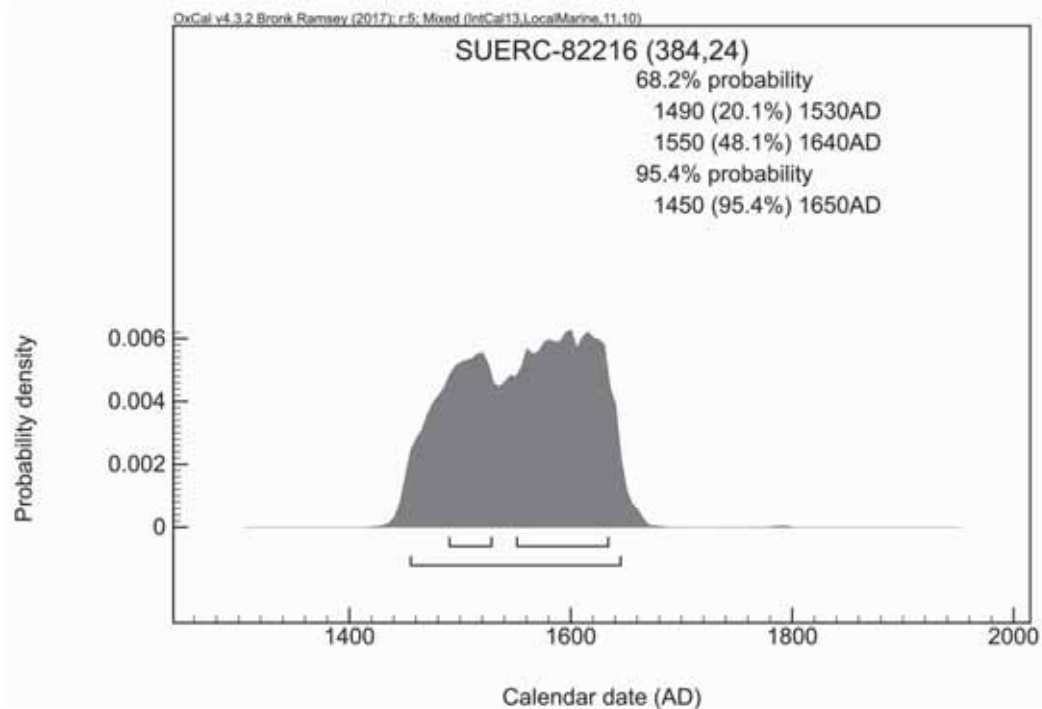
For any queries relating to this certificate, the laboratory can be contacted at suerc-c14lab@glasgow.ac.uk.

Conventional age and calibration age ranges calculated by :

P. Nayant

Checked and signed off by :

B. Taylor



The radiocarbon age given overleaf is calibrated to the calendar timescale using the Oxford Radiocarbon Accelerator Unit calibration program OxCal 4.*

The above date ranges have been calibrated using a mix of the IntCal13 and Marine13 calibration curves. †

Human bone collagen with a $\delta^{13}\text{C}$ value above -20‰ , accompanied by a raised $\delta^{15}\text{N}$ value, is taken to indicate a marine component in the diet. The percentage contribution of this marine component is calculated using end-members of -21.0‰ (fully terrestrial) and -12.5‰ (fully marine) with an uncertainty of 10% applied.

The $\delta^{13}\text{C}$ value of -20.1‰ gives a 11% marine contribution ($\pm 10\%$).

A regional marine offset (ΔR) of 0 ± 50 years has been used in the calibration.

Please contact the laboratory if you wish to discuss this further.

* Bronk Ramsey (2009) *Radiocarbon* 51(1) pp.337-60

† Reimer et al. (2013) *Radiocarbon* 55(4) pp.1869-87



RADIOCARBON DATING CERTIFICATE
 16 October 2018

Laboratory Code	SUERC-82217 (GU49127)
Submitter	Zoe Ui Choileain Oxford Archaeology East 15 Trafalgar Way Bar Hill Cambridgeshire CB23 8SQ
Site Reference	ENF143655
Context Reference	4039
Sample Reference	7
Material	Bone : hsr
$\delta^{13}\text{C}$ relative to VPDB	-18.5 ‰
$\delta^{15}\text{N}$ relative to air	13.2 ‰
C/N ratio (Molar)	3.2
Radiocarbon Age BP	1103 \pm 25

N.B. The above ^{14}C age is quoted in conventional years BP (before 1950 AD) and requires calibration to the calendar timescale. The error, expressed at the one sigma level of confidence, includes components from the counting statistics on the sample, modern reference standard and blank and the random machine error.

Samples with a SUERC coding are measured at the Scottish Universities Environmental Research Centre AMS Facility and should be quoted as such in any reports within the scientific literature. The laboratory GU coding should also be given in parentheses after the SUERC code.

Detailed descriptions of the methods employed by the SUERC Radiocarbon Laboratory can be found in Dunbar et al. (2016) *Radiocarbon* 58(1) pp.9-23.

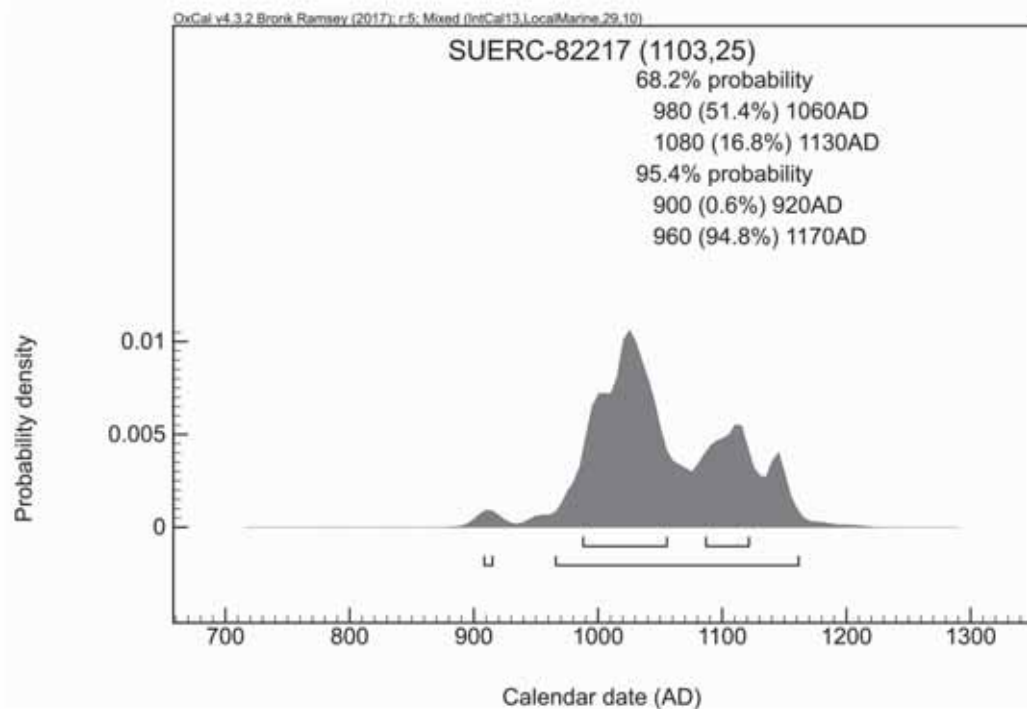
For any queries relating to this certificate, the laboratory can be contacted at suerc-c14lab@glasgow.ac.uk.

Conventional age and calibration age ranges calculated by :

P. Nayant

Checked and signed off by :

B. Taylor



The radiocarbon age given overleaf is calibrated to the calendar timescale using the Oxford Radiocarbon Accelerator Unit calibration program OxCal 4.*

The above date ranges have been calibrated using a mix of the IntCal13 and Marine13 calibration curves. †

Human bone collagen with a $\delta^{13}\text{C}$ value above -20‰ , accompanied by a raised $\delta^{15}\text{N}$ value, is taken to indicate a marine component in the diet. The percentage contribution of this marine component is calculated using end-members of -21.0‰ (fully terrestrial) and -12.5‰ (fully marine) with an uncertainty of 10% applied.

The $\delta^{13}\text{C}$ value of -18.5‰ gives a 29% marine contribution ($\pm 10\%$).

A regional marine offset (ΔR) of 0 ± 50 years has been used in the calibration.

Please contact the laboratory if you wish to discuss this further.

* Bronk Ramsey (2009) *Radiocarbon* 51(1) pp.337-60

† Reimer et al. (2013) *Radiocarbon* 55(4) pp.1869-87

APPENDIX D RISK LOG

D.1.1 The table below lists potential risks for the PX analysis work.

No.	Description	Probability	Impact	Countermeasures	Estimated time/costs	Owner	Date updated
1	<i>Specialists unable to deliver analysis report due to over running work programmes/ ill health/other problems</i>	<i>Medium</i>	<i>Variable</i>	<i>OA has access to a large pool of specialist knowledge (internal and external) which can be used if necessary</i>	<i>Variable</i>		
2	<i>Non-delivery of full report due to field work pressures/ management pressure on co-authors</i>	<i>Medium</i>	<i>Medium-high</i>	<i>Liaise with OA management team</i>	<i>Variable</i>		

APPENDIX E HEALTH AND SAFETY

E.1.1 All OA post-excavation work will be carried out under relevant Health and Safety legislation, including the Health and Safety at Work Act (1974). A copy of the Health and Safety Policy can be supplied. The nature of the work means that the requirements of the following legislation are particularly relevant:

- Workplace (Health, Safety and Welfare) Regulations 1992 – offices and finds processing areas
- Manual Handling Operations Regulations (1992) – transport: bulk finds and samples
- Health and Safety (Display Screen Equipment) Regulations (1992) – use of computers for word-processing and database work
- COSHH (1988) – finds conservation and environmental processing/analysis

APPENDIX F

OASIS REPORT FORM

Project Details

OASIS Number	oxfordar3-341968		
Project Name	Norwich Castle Keep Basement		
Start of Fieldwork	February 2018	End of Fieldwork	April 2018
Previous Work	Yes	Future Work	Not known

Project Reference Codes

Site Code	XNFNOC18	Planning App. No.	
HER Number	ENF 143286, ENF 143655	Related Numbers	SAM 1004054

Prompt	Not known
Development Type	Large/ medium scale extensions to existing structures
Place in Planning Process	Not known/Not recorded

Techniques used (tick all that apply)

- | | | |
|--------------------------------------------------------------|------------------------------------------------------------|--------------------------------------------------------------------------|
| <input type="checkbox"/> Aerial Photography – interpretation | <input type="checkbox"/> Grab-sampling | <input type="checkbox"/> Remote Operated Vehicle Survey |
| <input type="checkbox"/> Aerial Photography - new | <input type="checkbox"/> Gravity-core | <input checked="" type="checkbox"/> Sample Trenches |
| <input checked="" type="checkbox"/> Annotated Sketch | <input type="checkbox"/> Laser Scanning | <input checked="" type="checkbox"/> Survey/Recording of Fabric/Structure |
| <input checked="" type="checkbox"/> Augering | <input checked="" type="checkbox"/> Measured Survey | <input checked="" type="checkbox"/> Targeted Trenches |
| <input type="checkbox"/> Dendrochronological Survey | <input checked="" type="checkbox"/> Metal Detectors | <input checked="" type="checkbox"/> Test Pits |
| <input type="checkbox"/> Documentary Search | <input type="checkbox"/> Phosphate Survey | <input checked="" type="checkbox"/> Topographic Survey |
| <input checked="" type="checkbox"/> Environmental Sampling | <input checked="" type="checkbox"/> Photogrammetric Survey | <input type="checkbox"/> Vibro-core |
| <input type="checkbox"/> Fieldwalking | <input checked="" type="checkbox"/> Photographic Survey | <input type="checkbox"/> Visual Inspection (Initial Site Visit) |
| <input type="checkbox"/> Geophysical Survey | <input type="checkbox"/> Rectified Photography | |

Monument	Period	Object	Period
Castle	Medieval (1066 to 1540)	pottery	Post Medieval (1540 to 1901)
	Choose an item.	pottery	Medieval (1066 to 1540)
	Choose an item.	tile	Medieval (1066 to 1540)

Insert more lines as appropriate.

Project Location

County	Norfolk	Address (including Postcode) Norwich Castle Museum
District	Norwich	
Parish	Norwich	
HER office	Norfolk	
Size of Study Area	900 msq	
National Grid Ref	TG 2318 0852	

Project Originators

Organisation	OA East
Project Brief Originator	Norfolk Historic Environment Service

Project Design Originator	Paul Spoerry & Elizabeth Popescu
Project Manager	Paul Spoerry & Elizabeth Popescu
Project Officer	Heather Wallis

Project Archives

	Location	ID
Physical Archive (Finds)	Norwich Castle Museum	NWHCM2019.109
Digital Archive	Norwich Castle Museum	NWHCM2019.109
Paper Archive	Norwich Castle Museum	NWHCM2019.109

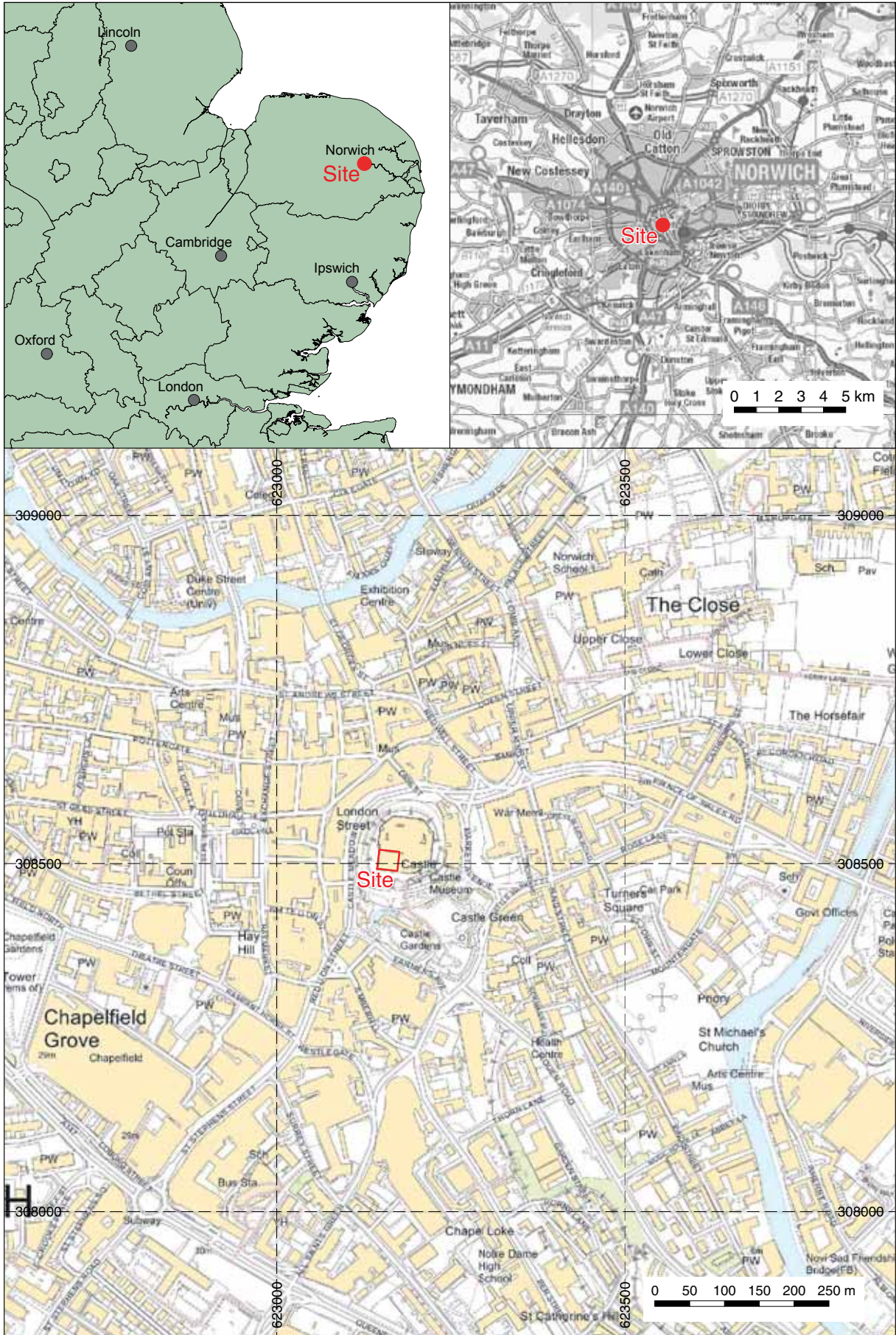
Physical Contents	Present?	Digital files associated with Finds	Paperwork associated with Finds
Animal Bones	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Ceramics	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Environmental	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Glass	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Human Remains	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Industrial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Leather	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Metal	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Stratigraphic	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Survey	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Textiles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Worked Bone	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Worked Stone/Lithic	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
None	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Digital Media

Database	<input checked="" type="checkbox"/>
GIS	<input checked="" type="checkbox"/>
Geophysics	<input type="checkbox"/>
Images (Digital photos)	<input checked="" type="checkbox"/>
Illustrations (Figures/Plates)	<input checked="" type="checkbox"/>
Moving Image	<input type="checkbox"/>
Spreadsheets	<input checked="" type="checkbox"/>
Survey	<input checked="" type="checkbox"/>
Text	<input checked="" type="checkbox"/>
Virtual Reality	<input type="checkbox"/>

Paper Media

Aerial Photos	<input type="checkbox"/>
Context Sheets	<input checked="" type="checkbox"/>
Correspondence	<input checked="" type="checkbox"/>
Diary	<input checked="" type="checkbox"/>
Drawing	<input checked="" type="checkbox"/>
Manuscript	<input type="checkbox"/>
Map	<input checked="" type="checkbox"/>
Matrices	<input checked="" type="checkbox"/>
Microfiche	<input type="checkbox"/>
Miscellaneous	<input checked="" type="checkbox"/>
Research/Notes	<input checked="" type="checkbox"/>
Photos (negatives/prints/slides)	<input checked="" type="checkbox"/>
Plans	<input checked="" type="checkbox"/>
Report	<input checked="" type="checkbox"/>
Sections	<input checked="" type="checkbox"/>
Survey	<input checked="" type="checkbox"/>



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Figure 1: Site location (red). Scale 1:8000



Figure 2: Trench plan overlaid on a basic outline of the castle keep



Figure 3: Plan of Period 2.2 Group 201 features in Area 2

Mapping date provided by The Downland Partnership 2017

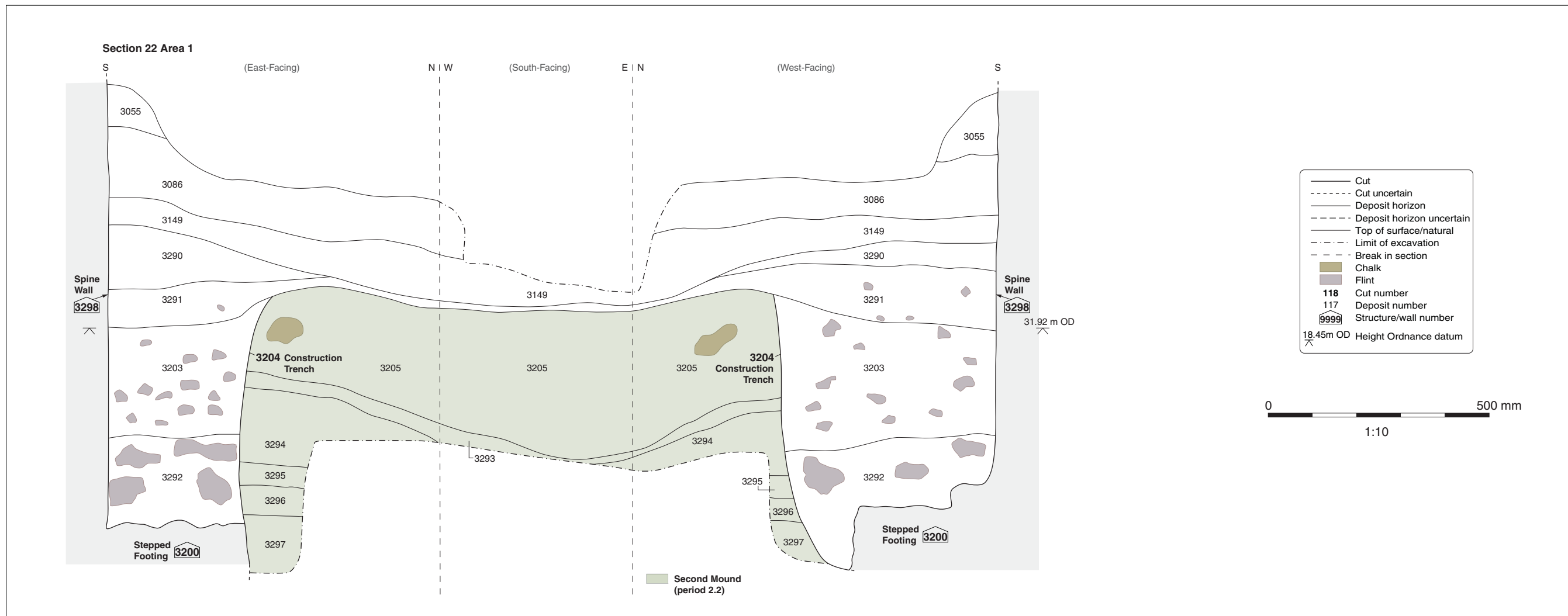


Figure 4: Section through mound deposits, Area 1

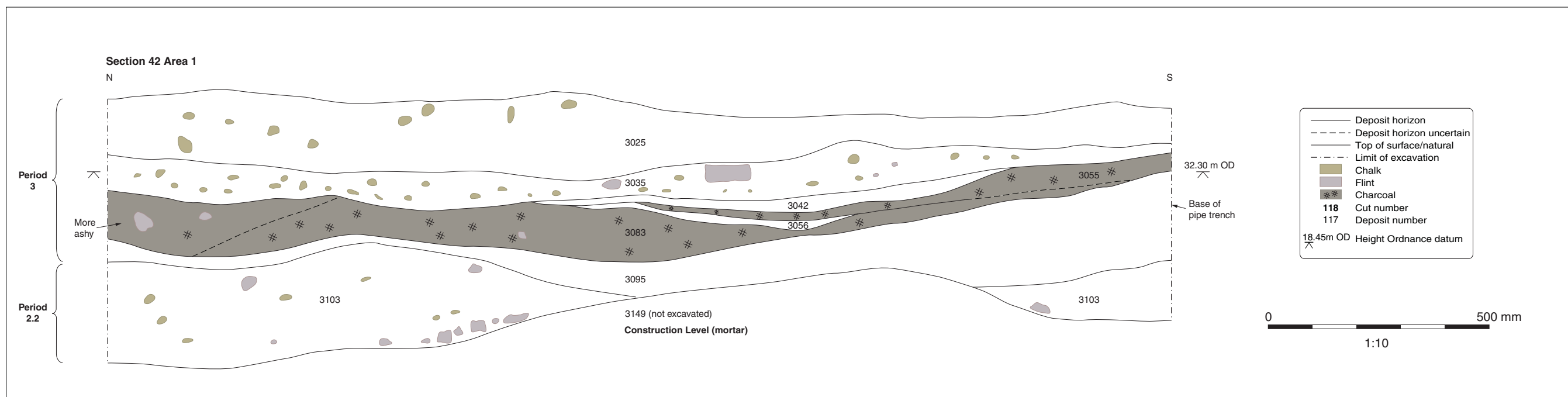


Figure 5: West facing section across Area 1 South



Plate 1: Area 1 North. Showing mortar floor surface. Looking east



Plate 2: Area 1 South. Showing occupation layers. Looking east



Plate 3: Area 2 cistern/cess pit. Looking south-east



Plate 4: Area 3 at end of excavation. Showing modern drainage trench and features cut into mound material. Looking west

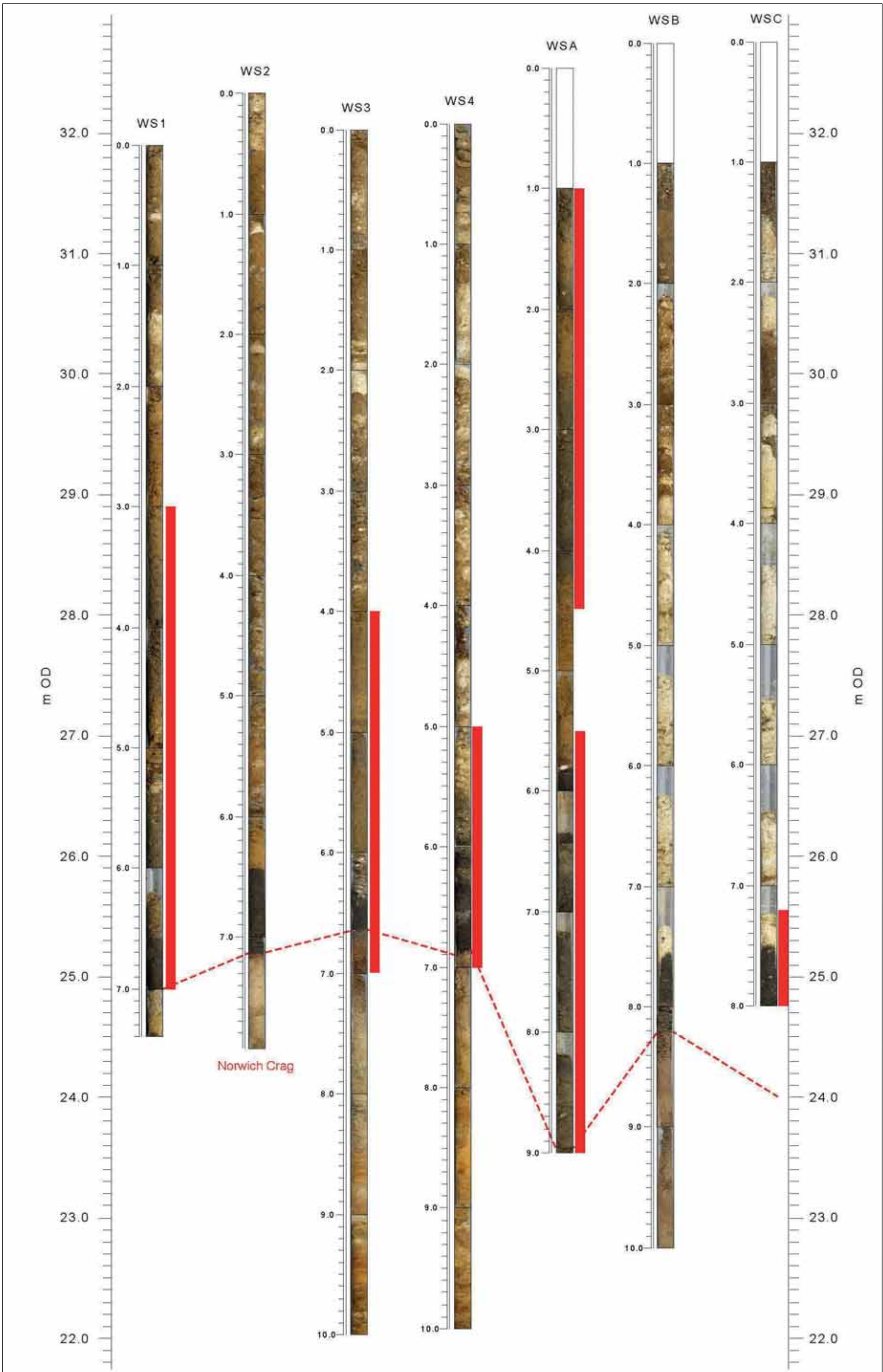


Plate 5: Collated borehole data, showing the relative levels of each window sample (WS)



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