University of Leicester
Archaeological Services

An Archaeological Excavation at 16-26 Oxford Street, 28 Newarke Street and Allen House, Castle Ward, Leicester NGR: SK 585 040

John Thomas

ULAS Report No 2014-199.

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John Thomas

For: Thomas May & Co. Architects

Checked by

Signed: 

Date: 1/12/2014

Name: Vicki Score.

University of Leicester
Archaeological Services
University Rd., Leicester, LE1 7RH
Tel: (0116) 2522848 Fax: (0116) 2522614

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Summary

Archaeological excavation in advance of development at the junction of 16-26 Oxford Street and 28 Newarke Street, Leicester revealed a well-preserved sequence of deposits reflecting prehistoric, Roman and medieval occupation. Evidence for prehistoric activity was suggested by a small assemblage of struck flints, but also sherds of Neolithic pottery from a possible pit. Early Roman activity included evidence for domestic occupation, including a pit and post holes, in association with a complex of boundary gullies dated to the later 1st-early 2nd century. In the 2nd-3rd century a large boundary ditch was created towards the eastern side of the development area that may have defined the back edge of plots leading away from the main Tripontium Road leading to the South Gate of the walled town. Two burials lying adjacent to the boundary are probably of a similar date.

By the 4th century an area of the site nearest to Newarke Street had become part of the southern cemetery of the Roman town. Eleven burials relating to this phase of the activity were identified, arranged in well-ordered rows on an east-west alignment similar to other excavated burials nearby, interpreted as being of Christian belief. In other respects however the burials from this site were very different. Many contained grave goods, including hairpins, dress items and finger rings, while others faced west, were decapitated or were buried in a prone position – strongly suggestive of a more pagan tradition of burial.

Medieval activity was reflected by a spread of large refuse and cess pits, generally organised along a linear arrangement, suggesting backyard activity relating to plots fronting onto Oxford Street to the west. The pit fills contained a series of domestic assemblages with some evidence for metalworking in the 15th/16th century. An oven or kiln base was also associated with this later medieval phase.

During the 17th/18th century the area was occupied by the towns Civil War defensive earthworks and a massive ditch running along Newarke Street was revealed. Following the disuse and infilling of this ditch a building was constructed alongside Newarke Street, with re-used materials, some of which may have derived from a demolished medieval building. The new structure probably relates to the early re-occupation of the south suburb following the Civil War.

The excavation has proved particularly important in highlighting the prospect of recovering complex and well preserved archaeological information from areas within the southern suburb of Roman and medieval Leicester.

The site archive will be held by Leicester City Museum Service, under the accession code A2.2013.

Introduction

Open area archaeological excavation was undertaken by University of Leicester Archaeological Services (ULAS), on land at the junction of Oxford Street and Newarke Street, Castle Ward, Leicester between February 4th – 8th (Characterisation Phase) and March 5th - April 17th 2013 (Excavation Phase). Prior to the excavation, a desk-based assessment had been undertaken by WSP Environmental UK (Meek 2006) and a trial trench evaluation by ULAS (Parker and Jarvis 2007), both of which had demonstrated the significant archaeological potential of the site. The excavation was carried out in response to re-development proposals for student and commercial accommodation on the land (Leicester Planning Department Ref: 20130696), and was commissioned by Thomas May & Co. Architects.

The development site is located to the rear of Allen House which occupies the corner of Oxford Street and Newarke Street (SK 585 040; Fig. 1). The site is broadly rectangular, measuring approximately 0.27 hectares and lies on fairly flat ground at a height of around 64m OD.

The site lies within an area of significant archaeological potential, as demonstrated by the desk-based assessment (Meek 2006). This highlighted the possibility of surviving remains dating from the Roman, Anglo Saxon and Medieval periods, with the site lying adjacent to the main road leading from the south gate of the town. There was a very high potential for the site to contain the remains of a Roman cemetery, which has been partly revealed during excavations immediately east, during the refurbishment of the Elfed Thomas Law School and to the north, on the opposite side of Newarke Street. Evidence suggested that the cemetery extended towards the Oxford Street area.

The extant buildings on the site are almost all cellared for depths of up to 2m. It is likely that the excavation of these cellars will have removed any archaeological remains on these parts of the site, but other areas between the buildings will not have been so severely disturbed.

An archaeological evaluation of the site, consisting of two trial trenches excavated between existing buildings was undertaken in 2007 (Parker & Jarvis 2007). Both trenches revealed relatively complex archaeological remains at a depth of 0.7m – 1.1m beneath the modern ground surface. Of particular note was the discovery of a human burial in Trench 2 on the eastern side of the site, indicating that, as suspected, a continuation of the Roman cemetery was present on the site. Additionally, the evaluation revealed Roman layers and surfaces, all cut through by Medieval and later pits and possible structural remains, all probably representing backyard activity associated with buildings fronting Newarke Street or Oxford Street.

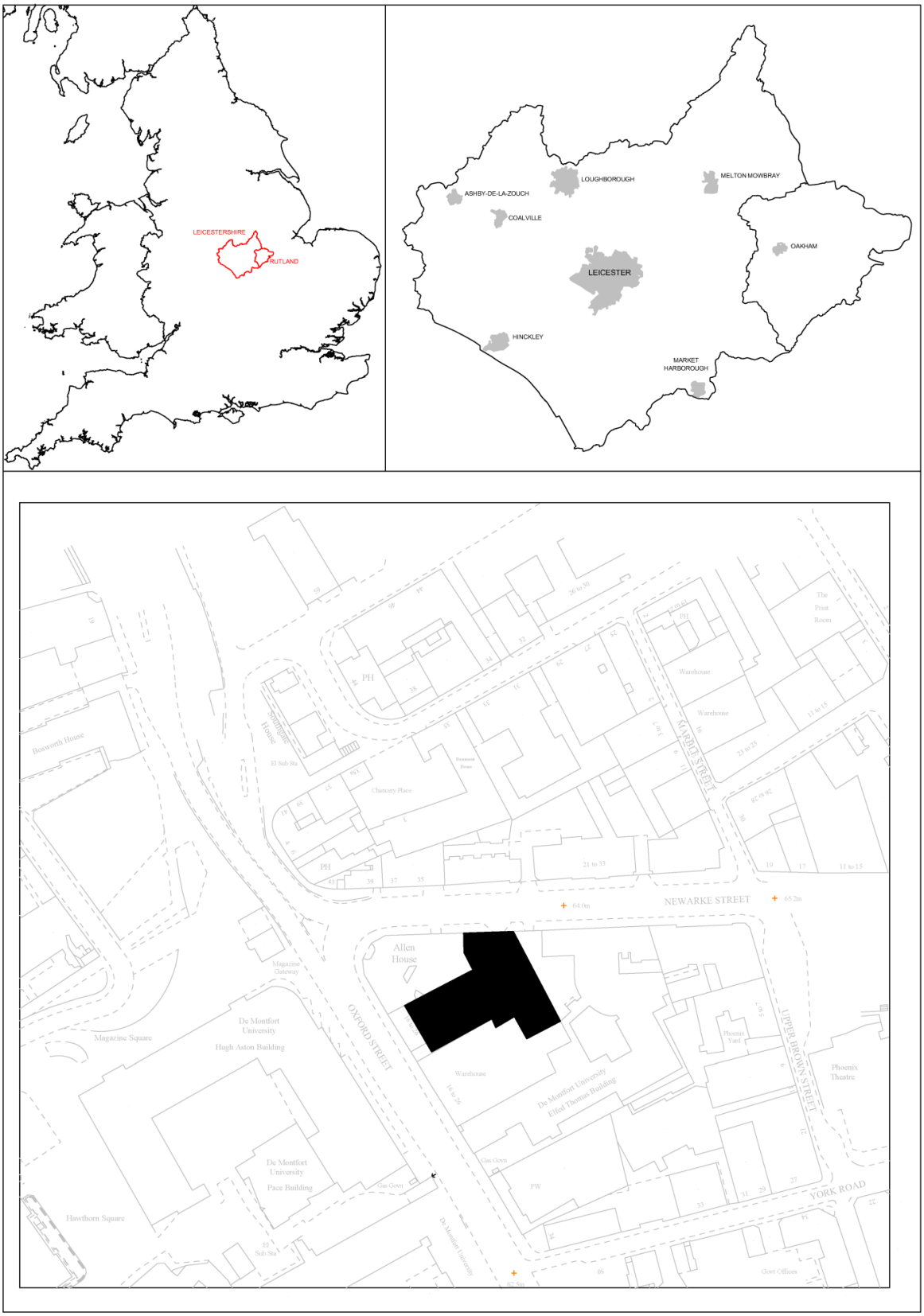

Figure 1: Site location (OS map 233 Leicester & Hinckley area 2000)

Geology

The Ordnance Survey Geological Survey of Great Britain Sheet 156 indicates that the underlying geology consists of Mercian Mudstone with overlying river gravels.

Archaeological and Historical Background

The site lies some 150m to the south of the Roman and medieval town walls of Leicester, and south-east of the location of the town's South Gate (Figs 2 & 3). The line of the Roman Tripontium road which ran from the South Gate of the Roman town to *Tripontium* on the Warwickshire/Leicestershire border passes just west of the site.

The site lies within the southern suburbs of the walled town, known to have been occupied in the Roman and medieval periods. The area was also used as a cemetery in the Roman period, with burials having been excavated on adjacent sites. Archaeological excavation on the Elfed Thomas site to the east revealed a number of burials lying along the western boundary of the site, with evidence suggesting that this cemetery would project into the development area (Cooper 1996). Roman burials have also been excavated to the north of the site, on the opposite side of Newarke Street (Derrick 2009) and were also recorded during the construction of Allen House in 1926 (Dare 1927 54-55 and Plate 2)

Anglo Saxon occupation has been recorded to the south of the development area on both sides of Oxford Street. Oxford Street follows the line of the medieval road that ran southwards from the South Gate. Medieval suburban occupation following the line of the road has been recorded on either side of the street. The medieval Newarke Precinct is located to the west of Oxford Street, with the Magazine Gateway (the former entrance to the precinct) lying c.75m to the north-west on the Oxford Street frontage.

During the English Civil War, additional defences were erected around the walled town of Leicester. The southern part of the town, and especially the Newarke area, was the scene of much activity during 1645. Evidence for Civil War defensive ditches has previously been recorded on Oxford Street.

The development site has high potential for significant archaeological deposits to be present, particularly along the eastern edge of the site, but also in other areas that have not been disturbed by later cellaring.

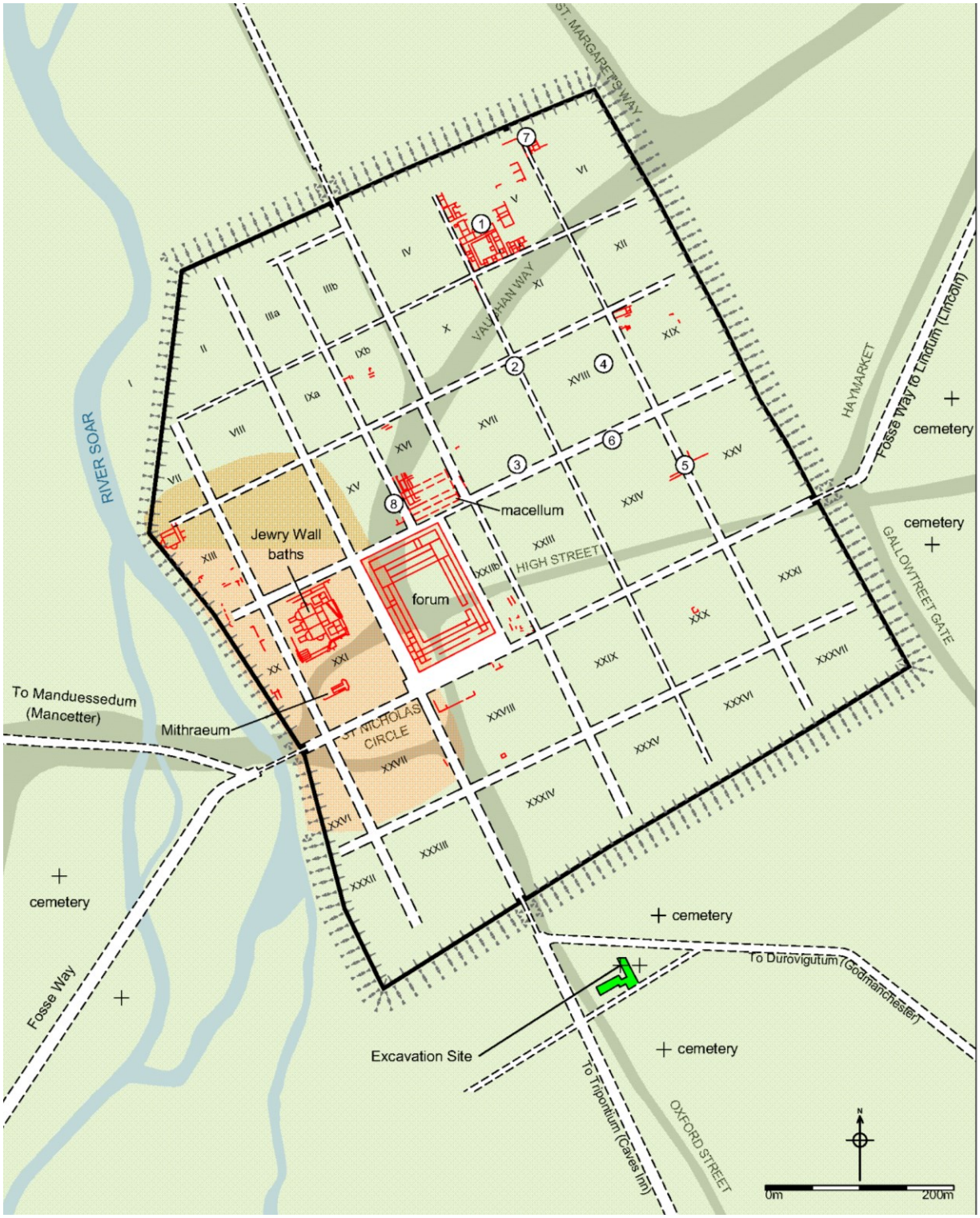

Figure 2: Plan of Roman Leicester with excavation site highlighted

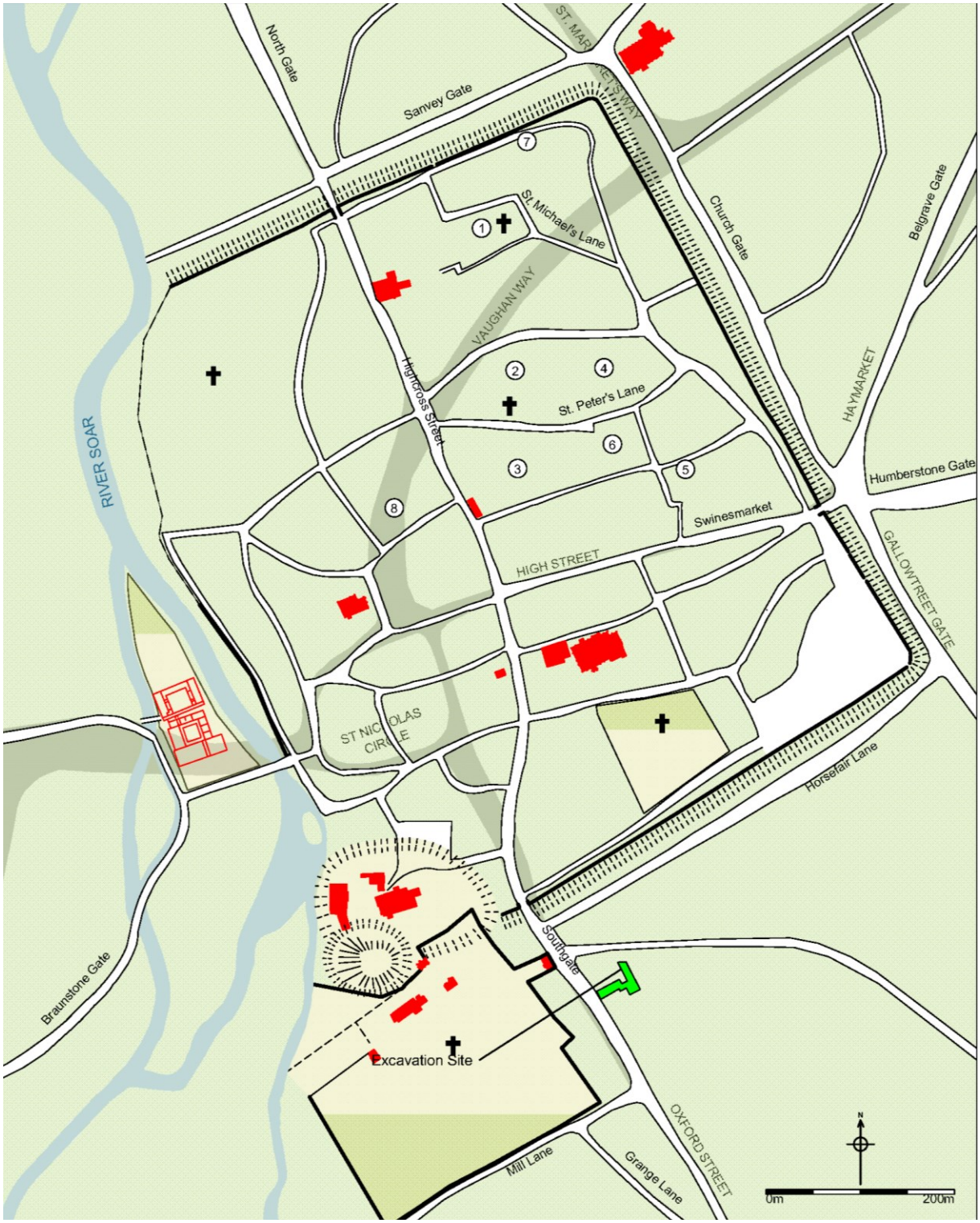

Figure 3: Plan of medieval Leicester with excavation site highlighted

Aims and Objectives

General:

- the establishment of the form, function and chronology of any preserved archaeological remains, utilizing all appropriate scientific and analytical techniques;
- the recognition and investigation of activity and occupation areas;
- the recovery of palaeo-environmental remains, including waterlogged deposits;
- the recovery of artefactual remains to assist in the development of local and regional type series;
- the recognition and investigation of industrial activity.

Prehistoric:

- the identification of any evidence for settlement evidence from the Iron Age or earlier; in particular evidence for the proto-urban, pre-Roman settlement, its extent and character.

Roman:

- the identification of any evidence for any traces of extra-mural suburbs, cemeteries or agricultural activity;
- the role of the immediate southern hinterland of Roman Leicester.

Early Medieval (Anglo-Saxon):

- the identification of any evidence for occupation during the 6th, 7th and 8th centuries;
- the identification of any evidence for the development of extra-mural suburbs or agricultural activity in the centuries before the Norman Conquest.

Medieval:

- the identification of any evidence for the development of extra-mural suburbs or agricultural activity in the centuries after the Norman conquest
- the role of the immediate southern hinterland of Medieval Leicester.

The following objectives were also considered:

- establishment of the form, function and chronology of any preserved archaeological remains, utilising all appropriate scientific and analytical techniques;
- the recognition and investigation of activity and occupation areas;
- recovery of palaeo-environmental remains, including waterlogged deposits;
- examination of evidence for settlement development within the hinterland around Leicester;
- recovery of artefactual remains to assist in the development of local and regional type series;

Specific aims of the excavation were to determine:

- The presence of evidence for the continuation of the Roman cemetery that has been previously recorded at the Elfed Thomas site to the east.
- The presence of any Anglo-Saxon remains that may be present within the area associated with post-Roman occupation in the southern suburb of the walled town.
- The presence of medieval remains within the areas fronting Oxford Street and Newarke Street.

Methodology

General Methodology and Standards

All work followed the Institute for Field Archaeologists (IfA) *Code of Conduct* (2012) and adhere to their *Standard and Guidance for Archaeological Excavations* (2008).

Excavation Methodology

The excavations concentrated on three areas, Trenches 1-3 measuring 243m^{2,} 71m^2 and 158m^2 respectively that were going to directly affected by the development proposals (Fig.4). Areas containing existing live drains and services were avoided.

Figure 4: General plan of the development area showing excavation locations

The uppermost demolition rubble, yard surfaces and topsoil layers were removed from the three areas using a 360^0 tracked mechanical digger equipped with a toothless ditching bucket. These layers were removed gradually under constant archaeological supervision, until the first significant archaeological horizon was reached. Removed overburden was stored on site at a safe distance from the excavation areas to enable restoration of the site once the archaeological work was complete.

Following removal of the overburden from the excavation areas the top of the archaeological level was revealed. The area was hand-cleaned and a scaled plan was drawn of the archaeological features. Archaeological features were then subject to sample excavation and a written, drawn and photographic record made of each intervention.

Human remains encountered were recorded and removed in compliance with relevant Home Office regulations.

Results of the Excavation

The excavations produced evidence of a long history of human activity on the site, predominantly of Roman, medieval and post-medieval date but with some evidence for prehistoric activity. The complexity of the sites archaeology varied between the three excavation areas, but in general the remains encountered were characterised by reasonably deep, multi-layered deposits, resulting from the long-term occupation on the site. The artefacts and other evidence collected from the excavated features and layers provide detailed information about the activities associated with the site during the different periods.

In the description of the archaeological sequence below, Cut numbers are denoted by square brackets (e.g. [408]), while fills and layers are shown in round brackets (e.g. (206)).

Trench 1

Roman Remains

Evidence for Roman activity in the area of Trench 1 was restricted to a small assemblage of residual pottery found within medieval pits. The date range of this assemblage covered the late 1st through to the 4th century AD with a weighting towards the 1st / 2nd century. A small number of stray human bones within the pit fills may also relate to Roman cemetery activity given the general context of the site but no graves or other cut features of this period were identified. It seems likely that any surviving Roman evidence was destroyed as a result of the medieval pitting in this area.

Medieval Remains

Medieval activity in Trench 1 was characterised by a spread of pits presumably relating to rear-yard activity within properties fronting onto Oxford Street (Figs 5 & 6). The pits were of variable size and contained a range of fills and material culture assemblages. Dating derived from pottery indicated broadly 5 phases of activity between the 12th-18th centuries.

Figure 5: General view of Trench 1 facing west

c.1100-1250 (Leicester Ceramic Phase 8)

Pit [1117] was a substantial circular feature in the centre of Trench 1, with vertical sides and a flat base, measuring *c.*2.20m diameter x 1.5m deep. It contained two clear fills, the earliest of which was (1120), consisting of mixed red/yellow-brown firm silty sand. The nature of this deposit suggested it was a mixture of dumped waste and natural slumping of the pit sides whilst open. This deposit contained 12th-13th century pottery, including fragments of jars in Potters Marston and Stamford ware fabrics, animal bone and ceramic buildings material (CBM). The pits upper fill consisted of firm brown-grey silty sand (1118) containing a similar range of medieval pottery, animal bone, CBM. This feature was eventually cut through by the later Pit [1008] (see below).

Pit [1119] was partially revealed in the north-east corner of Trench 1 (Fig. 7). It was an extremely large circular feature, measuring an estimated 5-6m in diameter x >2m deep with steep sloping upper edges, leading to vertical lower edges. A section through the upper levels of the pit was machine-excavated and it was taken lower by hand digging but the overall size of the feature precluded full excavation. The edges of Pit [1119] were overlain by a very hard layer of cemented orange/red gravel/ sand (1186) with patches of green staining. Above this was a layer of very clean and friable, light brown-grey silt (1126) which contained large fragments of several Potters Marston ware ceramic jars, animal bone and CBM. Overlying this was a thick deposit of blocky orange/red clay (1125) which appears to have been deposited in a single event, perhaps with the purpose of sealing the pit and consolidating the ground it occupied. Further groups of 12th-13th century pottery, animal bone and CBM were recovered from this layer.

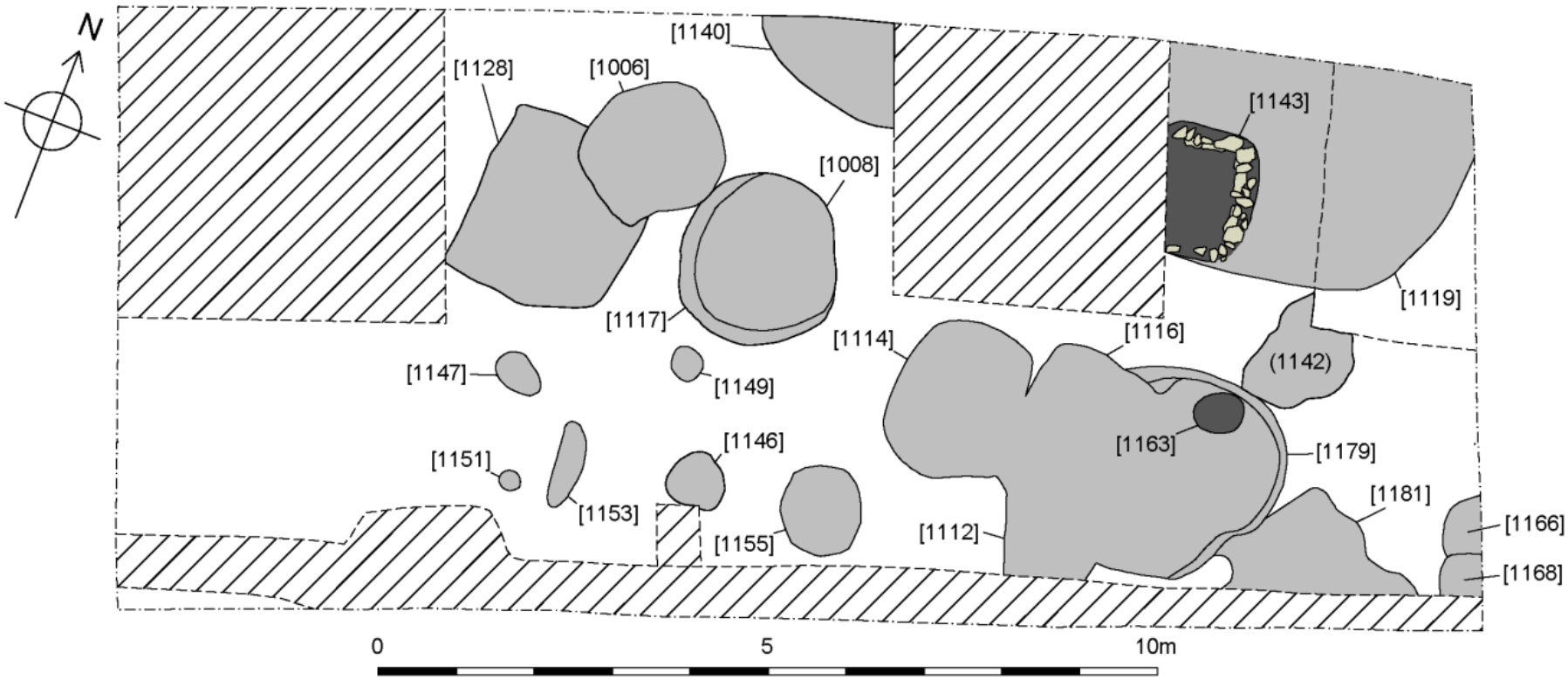

Figure 6: Medieval remains in Trench 1 (modern intrusions hatched)

Pit [1140] was only partially exposed, protruding from the northern edge of the trench and cut by a modern cellar to the east. However enough survived to allow some excavation to characterise the feature. The pit appeared large and circular in plan (greater than 1.2m in diameter) with very steep, near vertical edges. Limitations on space precluded full excavation of this feature so the base was not reached but its depth was greater than 0.80m. The pit was filled with a series of layers, the earliest seen was (1139), consisting of friable brown-grey sandy silt and containing medieval pottery fragments and animal bone. The nature of this deposit suggested it had been allowed to build gradually within the pit in comparison to overlying layers.

Covering this was a thick layer of brown-red silty clay (1138) which may represent re-deposited natural clay and might have acted as a deliberate sealing layer to the feature. Medieval pottery & bone were also recovered from this deposit.

Overlying this was a friable layer of mid brown silty sand (1137) from which animal bone and CBM were recovered. Finally a layer of grey-blue sandstone fragments (1136) may have been laid down as a final consolidation of the pits area to counteract slumping. No finds were associated with this fill.

Situated on the southern side of Trench 1 **Pit [1155]** was a sub-circular feature with concave sides and a rounded base measuring *c.*1.05m in diameter x 0.38m deep. It was filled with a single deposit of friable, mid brown clayey sand (1156) from which a small amount of 12th-13th century pottery and animal bone were recovered.

A pair of intercutting pits was identified protruding from the eastern edge of Trench 1. The earliest, **[1166]** was only partially revealed and little could be ascertained about its character. The single fill that was exposed consisted of mid brown-grey silty sand (1167) containing a single sherd of medieval pottery. Pit [1166] was cut by a later feature, **Pit [1168]**, which had sloping sides and a flat base >1m wide. This feature was filled with a deposit of dark brown-grey silty sand (1169), from which 5 sherds of 13th-14th century pottery and animal bone were recovered.

Figure 7: Pit [1119] during excavation

c.1250-c.1400 (Leicester Ceramic Phase 9)

In the centre of the trench **Pit [1008]** cut though the backfilled remains of [1117] (see above). Similar to the earlier pit, this was also circular and had a similar profile with steep edges and a flat base, measuring *c.*1.80m diameter x 0.80m deep. Covering the base and edges of the pit was a *c.*0.25m thick layer of very firm brown-pink sandy clay (1121) that appears to have been deliberately laid as a lining for the pit. Above this was a deposit of brown-grey silty sand (1010) containing 13th-14th century pottery, animal bone, CBM and charcoal flecks, as well as lumps of red-clay that may have derived from the pit lining. The pit was finally filled with a layer of dark brown-grey silty sand (1009) containing a range of 13th-14th century pottery, animal bone and CBM and was distinguished from the earlier fill by an absence of the red-clay component.

Pit [1114] was a substantial sub-rounded feature measuring *c.*1.6m across x >0.75m deep. It had very steep, near vertical sides but the base was not reached. The pit contained a single fill, (1113), which consisted of yellow-grey clayey/silty sand formed through a combination of dumped waste and natural slumping of the pits edges. This deposit contained 13th-14th century pottery, animal bone and CBM.

A complex sequence of intercutting pits occupied the south-east quarter of the trench, close to the eastern edge of Pit [1114]. The earliest, **Pit [1179]** was sub-circular with very steep, near vertical edges >0.70m deep. The pit contained several fills; the earliest of those revealed consisted of dark grey-brown silty sandy clay (1174) containing slate fragments and charcoal flecks. Overlying this was a layer of loose and friable grey-brown silty sandy clay (1178) containing charcoal flecks. On the eastern edge of the pit a band of charcoal-rich, very dark grey-brown silty sandy clay (1176) lay against the pit edge.

Pit [1179] was cut through on the western side by a second feature, **Pit [1116]**. This pit was not seen in plan but had gradually sloping edges and a fairly flat base up to 0.80m deep. It contained two fills, the earliest of which was a layer of red-brown silty clay (1173=1177) which contained 21 sherds of 13th-14th century pottery, slate fragments, charcoal and mortar flecks. The upper fill of [1116] consisted of mixed grey-brown/orange silty sandy clay (1115=1174) containing pottery, charcoal and mortar flecks. Two iron knives (Sf6 & Sf30) were also recovered from this deposit.

A third pit, **[1112]**, cut the western side of [1179]. The full shape of this feature was not visible in plan but a steep sloping eastern edge leading to a stepped base > 0.60m deep. A series of deposits had filled this feature. The earliest was a layer of light grey-brown silty sandy clay (1172) containing charcoal and mortar flecks and a residual 3rd century Roman coin (Sf7 see below). This was overlain by grey-brown layer of silty sandy clay (1171) which was in turn covered by a layer of mid brown sandy silt (1111) from which 13 sherds of pottery were recovered. A final fill, (1170) consisted of friable dark grey-brown silty sandy clay.

The tops of the three pits were covered entirely by a *c.*0.20m thick layer of dark grey-brown silty sandy clay (1180) that was probably laid down in an attempt to consolidate the soft ground of the underlying pit fills. This was later cut through by a small circular pit **[1163]**, measuring *c.*0.53m in diameter x 0.47m deep. The pit contained two fills; the earliest consisted of very soft and friable mid-grey-brown silty clay (1162) which may have contained cess-like material. This deposit contained a single sherd of 13th-14th century pottery, slate fragments, tile and abundant micro-faunal evidence.

The upper fill of the pit (1161), comprised red-brown silty sandy clay (1161). No finds were associated with this deposit.

c.1400-c.1550 (Leicester Ceramic Phase 10)

Pit [1128] was the most westerly feature exposed in Trench 1 and contained the majority of the pottery assemblage recovered from this part of the site. It was a substantial square feature with vertical sides measuring *c.*2.00 x 2.00m x >1.65m deep (the base was not reached). The pit was filled with a series of layers containing domestic waste and demolition debris. The earliest deposit consisted of brown-grey silty sand (1135) that had accumulated against the south-eastern edge of the pit. This was overlain by layers (1130) and (1129); blue-grey silty sand containing possible cess-like material and demolition debris respectively, both of which appeared to have been tipped in to the pit from the south-east. Following this the pit appears to have become filled in more gradually. Fill (1133) consisted of brown-grey very silty sand and this was overlain by a thin layer of black/very dark grey-brown charcoal-rich sandy silt (1131). This was covered by a layer of dark yellow-brown mixed sand/clay silt deposit (1129) containing domestic waste (pottery, animal bone and CBM). Above this was another layer containing domestic waste (1124) which consisted of light/mid yellow-brown silty sand with limestone and charcoal flecks. Above this was a deposit rich in demolition debris (stone and slate rubble as well as a range of 13th-14th century pottery - 1123) that otherwise was very similar in composition to (1124). Finally a layer of dark grey-brown silty sand (1122) completed the infilling of [1128]. This contained an assemblage of 13th-14th century pottery, animal bone, CBM and a copper alloy dress pin and two copper alloy lace chapes (Sf1, see below).

c.1500-c.1650 (Leicester Ceramic Phase 11)

Cutting into the upper fill of 12th-13th century Pit [1119] was a square stone-lined feature, **Pit [1143]** that had been partly truncated on its western side by a modern cellar. [1143] was *c.*1.6m wide and survived to a depth of *c.*0.25m, with vertical sides and a generally flat base. The pit was lined with a roughly built stone construction (1142) of mainly granite pieces, but with occasional brick, loosely bonded with silty clay. Within the pit a single deposit of friable mixed grey silty clay contained abundant charcoal, 4 sherds of 16th century pottery and animal bone.

Pit [1158] was a circular feature that cut through the top of the infilled 13th-14th century Pit [1114]. It measured *c.*1.4m in diameter x 0.35m deep and had steep edges and a flat base. The pit contained two fills, the earliest of which consisted of friable green-grey sandy silt (1160) with a high charcoal content. A small collection of pottery, animal bone and CBM came from this deposit as well as 3 near complete clay tobacco pipes with spur bowls which have parallels with other excavated examples from Leicester dating to *c.*1680-1710. The upper fill of the pit consisted of firm yellow-brown clayey sand (1159) with occasional charcoal flecks. A small group of 17th century pottery, animal bone, glass and CBM were found within this deposit, along with the shaft of a copper alloy dress pin (Sf2, see below).

Modern (Leicester Ceramic Phase 13)

Pit [1006] was a circular feature with a *c.*1.6m diameter near the northern edge of Trench 1. It had vertical sides and was excavated to a depth of *c.*0.80m and augered to a depth of *c.*1.1m beyond that, although even then the base of the feature was not revealed. Based on the shape and dimensions of the feature it seems probable that this was a disused well. No lining existed in support of this theory but CBM fragments within the backfill may have derived from a brick lining that was robbed out. The pit contained a single fill of homogenous red/orange clayey silt (1007) with occasional flecks of limestone and lumps of hard red clay. A number of 18th century pottery sherds from a mug and teapot were recovered from fill (1007). The otherwise 'clean' and sterile nature of this deposit suggested that [1006] was backfilled in a single event, possibly with re-deposited natural material from nearby. This feature cuts Pits [1117] and [1128].

Undated

Pits [1147] and [1149] lay slightly south of the large pit group. These were two smaller features, both of which were very shallow and may have been the truncated remains of post-holes. Feature [1147] was oval in shape measuring *c.*0.6m x 0.35m x 0.04m deep. It was filled with brown-grey clayey sand (1148). Slightly east of this, feature [1149] was circular (*c.*0.40m diameter) with steep sides and a flat base. It was filled with grey silty sand (1150) containing lumps of red clay and charcoal flecks.

Pit [1181] and [1184] lay in the south-east corner of Trench 1. Pit [1181] was partially revealed as a shallow and irregular pit. This measured >1.2m x >2.3m x 0.3m deep and had shallow, but uneven edges and an uneven base. The full extent of this feature was not evident as it had been truncated by later pits and a modern service pipe to the south. Scorch marks on the base of the feature and the charcoal rich fill (1157 – very dark grey silty sand) suggest that this feature was used as a fire-pit but no dateable finds were recovered. Pit [1181] was truncated by Pit [1184] on its southern edge. This was a small sub-circular feature with very

steep edges and a single fill of yellow-orange mixed sand (1185). No finds were associated with this feature. Both pits were truncated by Pit [1179].

Trench 2

Trench 2, in the south-east quarter of the development area, produced evidence for Roman and medieval activity, in the form of burials, a boundary ditch and refuse pits (Fig. 8).

Figure 8: Trench 2 prior to excavation

Roman Remains

Roman remains in Trench 2 consisted of a large ditch, and two burials (Fig. 9).

The centre of Trench 2 was occupied by a large ditch **[2033]** oriented north-north-west – south-south-east (Fig. 10). This feature was *c.*1.80m wide x 0.88m deep and had a fairly even V-shaped profile with steep sloping sides and a narrow flat base. It contained two fills; the earliest (2038) consisted of light orange brown clay silt (2038) with charcoal flecks, which contained a single sherd of late 1st – mid 2nd century Roman pottery and animal bone. This was overlain by a deposit of dark yellow-brown friable loam (2034) with charcoal flecks, forty sherds of Roman pottery dating to the 3rd century, three 3rd-4th century Roman coins (Sf's 23, 25 & 27 see below), animal bone and CBM. The pottery from this later ditch fill was remarkable in that it contained remains of six East Midlands Burnished ware type jars which stood out as unusual within the overall site assemblage.

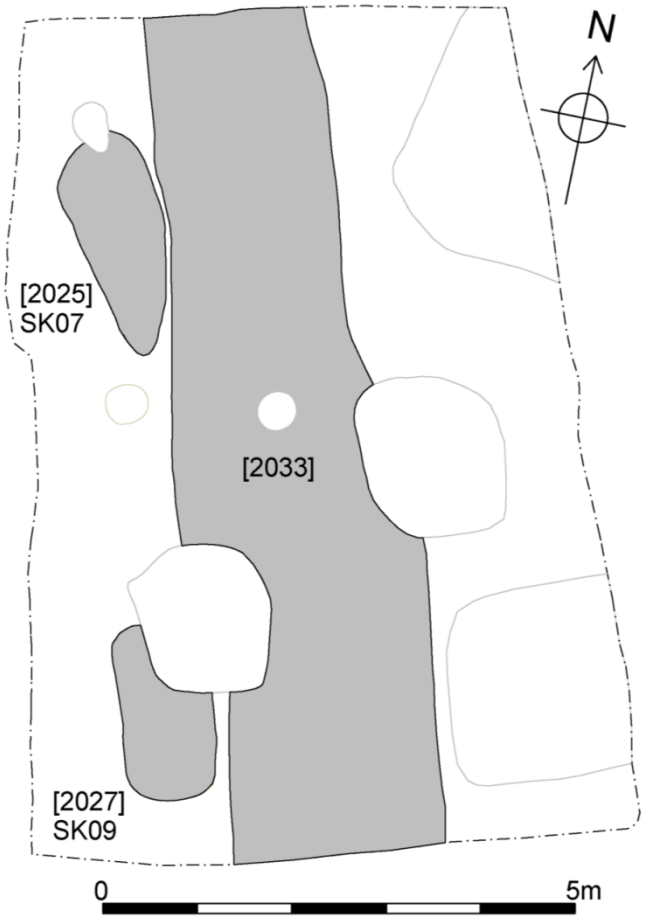

Figure 9: Roman remains in Trench 2 (later features in outline only)

Figure 10: Cross-section through Ditch [2033]

A rectangular grave cut with rounded corners **[2027]** lay adjacent to the western edge of Ditch [2033] on a similar alignment and was probably positioned in respect of this feature. The grave measured *c.*1.90m x 0.90m x 0.25m deep and had vertical sides and a flat base (Fig. 11). It was relatively deeper than others located within the site (see Trench 3 below for comparison). It was truncated on the north-eastern corner by medieval pit [2016].

The well preserved skeletal remains of a female individual (**SK 09**) lay in a supine position with extended arms by the side of the body and head at the northern end of the grave. The skull faced towards the east and had probably slumped into this position over time. Part of the lower jaw, left hand side shoulder and upper arm had slumped as a result of truncation from medieval pit [2016]. Iron nails arranged around the edge of the grave cut indicate that SK 09 was buried in a coffin. The woman was also buried with a series of finds that may be classed as grave goods: beneath her head were two bone hairpins (Sf 22) whilst hobnails (Sf 19) arranged across her ankles/feet indicated that shoes had been placed with her in the coffin (see Small Finds report below).

The grave cut was filled with a deposit of firm, yellow-brown, mixed stone-rich clayey soil (2029). A small assemblage of 12 1st-2nd century pottery sherds was found within the grave fill. These are thought not to represent grave goods but instead are probably residual within the deposit.

A second grave cut **[2025]** lay along the western edge of ditch [2033] and may also have been positioned in respect of this boundary (Fig. 12). The pit was an elongated oval shape in plan measuring *c.*2.4m x 0.80m wide x 0.24m deep with sloping sides and a flat base.

Figure 11: Burial SK 09 [2027] facing west

Figure 12: SK 07 [2025] facing west

A child's skull (**SK 07** aged 1-3 years) was located in association with iron nails at the southern end of the grave. This was covered over with a layer of re-deposited, brown-yellow, natural subsoil (2032). The remainder of the pit was filled with a deposit of dark yellow-brown very silty sand (2026) which contained a skull fragment and 4 fragmentary limb bones of an infant/juvenile as well as a small amount of 2nd-3rd century Roman pottery. Given the similarity in age between the skull and other human bones in this grave, a connection does seem likely. There was no suggestion of articulation and the bones were poorly preserved. It is possible that the body of this individual entered the ground in a disarticulated state

Medieval Remains

Evidence for medieval activity in Trench 2 consisted of three pits, a shallow linear feature and a scatter of post holes (Fig. 13).

c.1100-1250 (Leicester Ceramic Phase 8)

A large squared feature, **Pit [2035]** protruded from the north eastern corner of the trench and is probably best interpreted as a pit given its characteristics. This feature had very steep, stepped edges up to a depth of 0.8m but the base was not reached. The pit had at least two fills, the earliest consisting of mid brown silty sand with orange clay lenses (2037). Above this was a final layer of mid brown silty sand (2036) with charcoal flecks and decayed mortar. Seven sherds of 12th-13th century pottery, animal bone and CBM were also recovered from this layer.

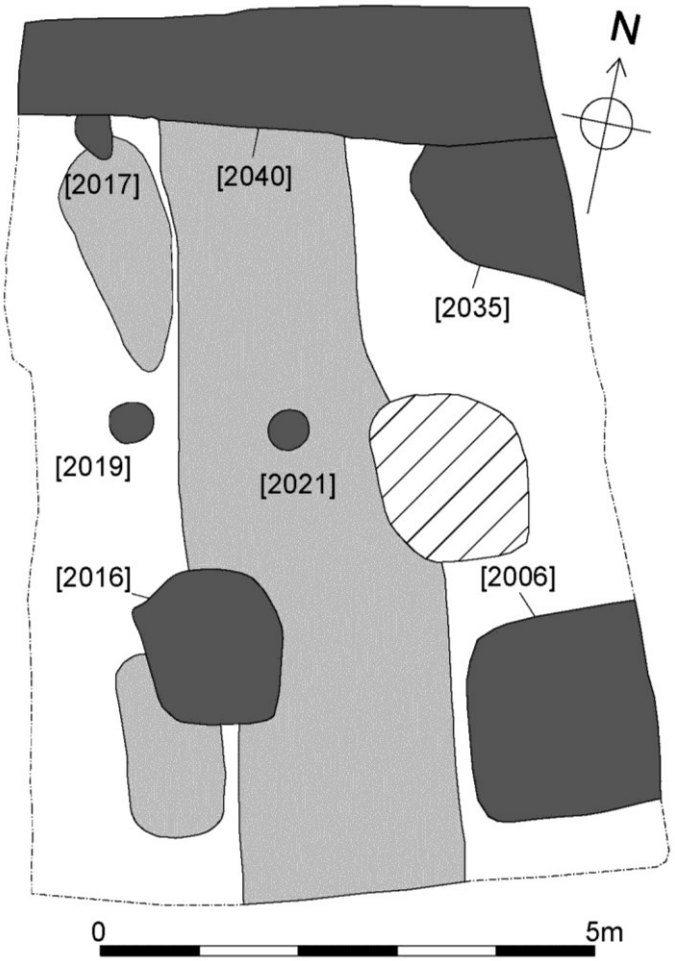

Figure 13: Medieval remains in Trench 2 (earlier features in grey & modern feature hatched)

c.1250-c.1400 (Leicester Ceramic Phase 9)

A square stone-lined pit **[2006]** protruded from the south-east corner of the trench (Fig. 14). This measured approximately 2m square x 1m deep. It had vertical sides and a generally flat base and had been cut into the natural red clay on this part of the site. The pit edges were lined with a well-constructed wall (2005) of irregularly coursed slate (some re-used roofing slate with nail holes) and granite fragments with occasional pieces of Daneshill sandstone and large water-worn river cobbles. The stones were mostly bonded with red clay although there were also patches of beige / green-beige sandy silt which became very solid towards the base of the feature.

Figure 14: Pit [2006] partially excavated showing lower fills and stone lining

At the base of Pit [2006] were two thin layers that may have related to its use as a cess pit. The earliest, (2012) was a compact deposit of mid grey-brown sandy silt on the northern side of the pit base. Covering this was a layer of softer grey-brown sandy silt (2011) that extended to cover the entire area of the pit base.
Above this was a compact deposit of mid grey-brown sandy silt on the northern side of the pit (2010) and an overlying deposit of soft/friable grey-brown sandy silt (2009) that covered the inner area of the pit. Two sherds of 14th century pottery were recovered from this fill.

Covering these layers was a coal-rich layer (2008) which had a distinctly 'modern' appearance

c.1400-c.1550 (Leicester Ceramic Phase 10)

Pit [2016] was a large sub-rectangular feature on the western side of Trench 2. It truncated Grave Cut [2029] and Roman ditch [2033]. The pit measured *c.*1.67m x 1.34m x >1.5m deep and had very steep, near vertical sides but the features depth did not allow full excavation.

Excavation of this pit revealed at least two fills. The earliest was a deposit of mid grey sandy silt with charcoal flecks (2014) containing a considerable amount of animal bone including many small bones, pottery, four copper alloy pins & a lace chape (Sf 20), and a buckle plate (Sf 21), also made of copper alloy.

Above this was a layer of dark grey-brown friable silty sandy clay (2013) with a dark, organic appearance. A reasonably sized assemblage of pottery representing a range of 15th/16th century vessels, and animal bone were recovered from this layer.

A possible linear feature **[2040]** ran across the northern end of the trench on an N-S alignment. This was a difficult feature to interpret as it was only partially visible. Excavation revealed that [2040] was a wide, shallow feature >1.1m wide x 0.3m deep with a very uneven base as if multiple features had been infilled with the same deposit. The feature was filled with a mixed deposit of light grey-brown silty sand with orange sand patches (2039), containing 15th-16th century medieval pottery, residual Roman pottery and animal bone.

A group of post holes, **[2017], [2019] & [2021]** lay just to the south of [2040]. All were of similar dimensions and contained similar fill deposits, suggesting they were associated, perhaps relating to a former structure. [2017] contained a single sherd of Midland Purple pottery, suggesting a 15th/16th century date.

Trench 3

Trench 3 was the busiest of the three excavation areas, containing evidence for a long sequence of archaeological activity from the prehistoric period through to the 17th century (Fig. 15).

Figure 15: Trench 3 prior to excavation (Newarke Street in the background)

Prehistoric Activity

The earliest evidence for activity in Trench 3 was found in the south-east corner of the excavation where a possible pit [3084] was partially visible (for location see Fig. 16). This feature was revealed following removal of Roman ditch [3069]. The full plan shape of [3084] was not fully discernible but excavation showed that it had steep sloping edges and flat base. It had a single fill of soft grey-brown silty sandy clay (3083) which contained two sherds of Neolithic pottery.

Roman Remains

Early Roman Occupation (Late 1st-Early 2nd century)

Early Roman occupation was characterised by a series of linear boundary ditches, a large pit and a group of post holes (Fig. 16). Limited evidence from the fills of these features, including pottery and animal bone, indicated nearby domestic activity during the late 1st to early 2nd century.

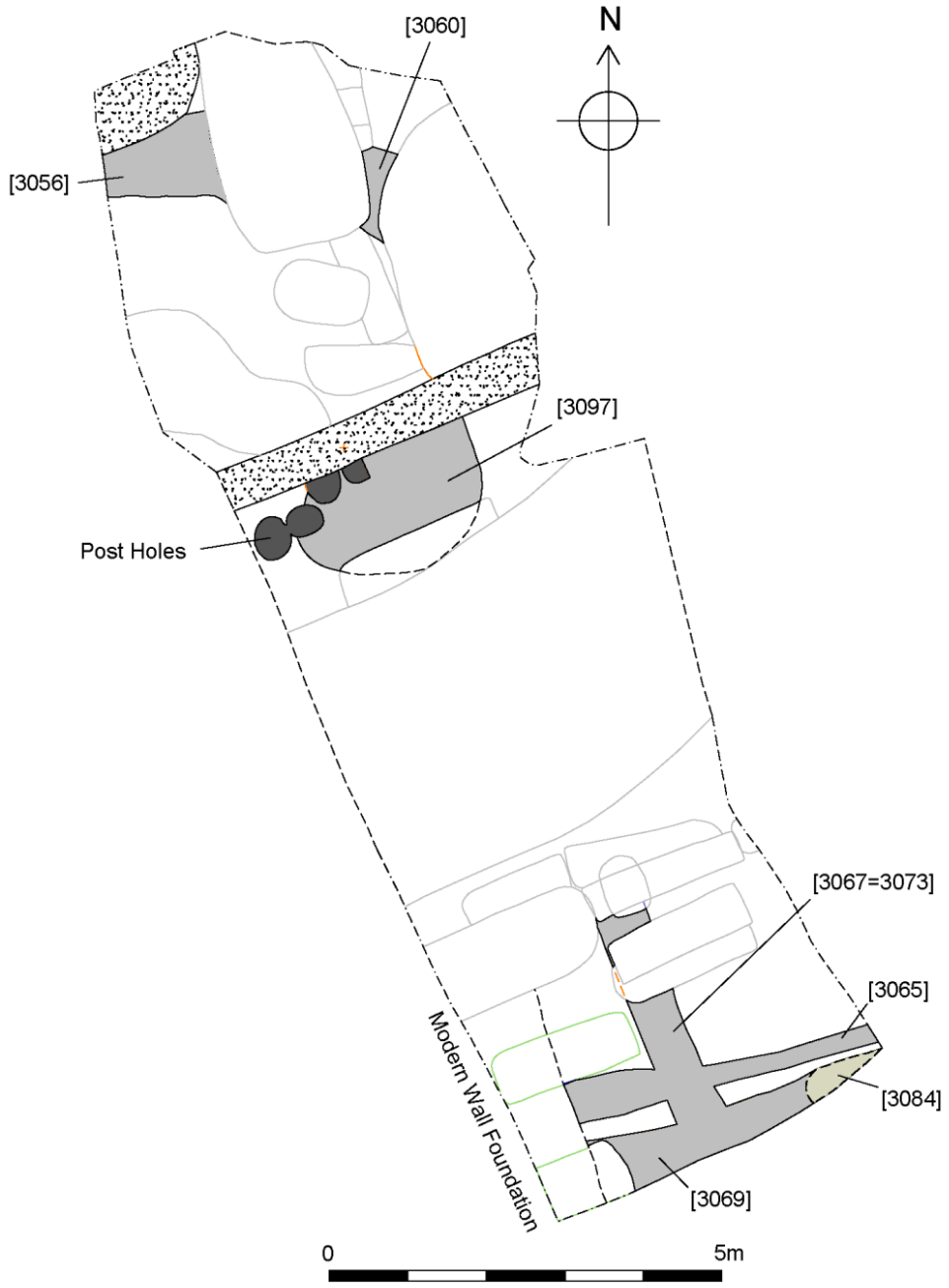

Figure 16: Early Roman remains in Trench 3 (later features in outline & modern intrusions hatched)

The Northern half of Trench 3

The truncated remains of possibly curving ditch **[3056]** & **[3060]** were located in the north-western corner of Trench 1, adjacent to Newarke Street. Disturbance from modern and medieval activity had resulted in much of this feature being removed, but enough remained to provide a general characterisation. Ditch [3056] lay on an approximate north-west – south-east alignment and was *c.*0.80m wide x 0.28m deep with steep sides and a flat base. It was filled with mid grey-brown silty clay (3055) from which 2 sherds of 2nd century pottery were recovered. A short distance to the east another section of this feature was revealed [3060], surviving between medieval pits [3022] and [3024]. This had a similar profile and fill and contained a single sherd of 2nd century pottery.

A large circular pit **[3097]** was located *c.*3m south of the curving ditch. It had been truncated on its northern side by a concrete wall footing, and on its southern side by Grave Cut [3062] SK05 (see below). Pit [3097] was approximately 2.4m wide x 0.82m deep and contained a series of fills. A *c.*0.10m thick lens of very dark grey, charcoal rich silty sand (3106) located on the eastern side of [3097] was the earliest deposit, lying on the base of the pit. Following this two layers of orange sandy clay (3104) on the western side and (3105) on the eastern side of the pit, probably represented episodes of slumping from the pit sides. Covering these was a *c.*0.50m thick layer of firm mid/dark grey sandy silt (3103) that appeared highly organic and contained green/yellow lenses suggestive of cess-like content. Above this was a layer of red-yellow sandy clay (3102) and finally a layer of yellow-brown fine silty sand (3101) completed the pits infilling. This final deposit contained 1st-2nd century Roman pottery and animal bone.

A cluster of four post holes cut through the top of backfilled pit [3097]. These were all of similar dimension and two were excavated ([3094] & [3096]). [3094] was *c.*0.50m diameter x 0.20m deep and [3096] was *c.*0.40m diameter x 0.13m deep. Both were filled with grey-brown silty sandy clay but produced no finds.

The Southern half of Trench 3

The early Roman remains in the southern half of Trench 3 consisted of a series of linear boundary features organised at right angles to one another on east-west and north-south alignments. The general impression was that the boundaries represented a sequence of events but their fills were difficult to distinguish apart, so phasing them was not possible.

Ditch [3069] ran along the southern edge of the trench and lay on an east-west orientation. This was only partially revealed but measured >1.10m wide x 0.22m deep. Its northern edge was fairly gently sloping, leading to a broad flat base. The ditch had a single fill (3068) consisting of dark grey-brown silty sandy clay containing sherds of 1st-2nd century Roman pottery, animal bone and CBM.

Ditch [3065] was located adjacent and slightly north of Ditch [3069]. It too crossed the southern side of the trench on an east-west alignment, perhaps suggesting that one boundary had replaced the other at some point. The ditch had a wide and shallow profile, measuring *c.*0.95m wide x 0.15m deep, with sloping sides and a fairly flat base. A single fill consisted of mid to dark brown clayey silt (3064) containing 1st-2nd century Roman pottery, animal bone and CBM.

A narrow gully **[3067]** = **[3073]** entered the excavation from the southern edge and occupied the centre of Trench 3 on a north-south orientation. It had a well-defined U-shaped profile with steep sloping sides and a rounded base, measuring *c.*0.75m wide x 0.30m deep. The gully contained a single fill consisting of mixed yellow-brown silty clay (3066) with 1st-2nd century Roman pottery, and a lava quern fragment (Sf31).

Roman Cemetery Remains (3rd-4th century)

Remains of 11 Roman graves were revealed in Trench 3, confirming the potential for further evidence relating to the southern cemetery of the walled Roman town (Fig. 17). The majority of the graves were laid out in ordered rows on an east to west alignment, showing similar character to burials recorded on previous excavations in cemetery (Cooper 1996, Derrick 2009). However several burials displayed very different characteristics, indicating that a range of burial traditions had been respected during the cemetery's use.

The Northern half of Trench 3

Remains of two virtually complete, and one very truncated, burials were excavated in the northern half of the trench.

Grave Cut [3052] (SK 03) was a very truncated grave in the northern half of Trench 3. The area surviving measured *c.*0.40m x 0.30m x 0.02m deep. It was filled with grey-brown clayey silt (3051) and within this were the very fragmentary remains of an adult? female, comprising the lower jaw, a skull fragment and upper vertebrae. So little of this feature survived that it is interpret too much however the positioning of the remaining bones suggests that the individual had been buried on an east-west orientation. This grave had been truncated to the west by [3022] and to the east by Pit [3033], both of which were medieval in date.

Grave Cut [3054] (SK 04) was located in the northern half of the trench, approximately 3m south of SK 03, and was a rectangular feature oriented east-west (Fig. 18). [3054] measured >1.55m x 0.60-0.50m wide, becoming narrower towards the eastern end, which had been truncated by Pit [3033]. The grave had very steep, near vertical sides (*c.*0.16m deep) leading to a flat base. It was filled with dark grey-brown sandy silty clay with orange mottles (3053) containing charcoal fragments and clay lumps.

The skeletal remains of a female individual aged between 26-45 years lay within the grave on an east-west orientation. She had been laid in a supine position with arms and legs extended and hands crossed over her pelvis. On her left hand were two rings (one made of jet **Sf11** and one of iron **Sf14**) and beneath her head was a composite bone comb held together with iron rivets (**Sf13**). A loose arrangement of nails around the head suggested the individual had been buried in a wooden coffin. A squared stone beneath the head in the north-west corner of the grave may have been used to support the coffin at this point.

The western end of the grave [3054] was intermittently 'lined' (particularly noticeable on the southern side of the grave) with upright granite blocks, perhaps to stabilise the coffin or act as a marker. Included within these stones was a broken fragment of rotary quernstone (**Sf12**). A single sherd of 1st century Roman pottery was also recovered from the grave fill.

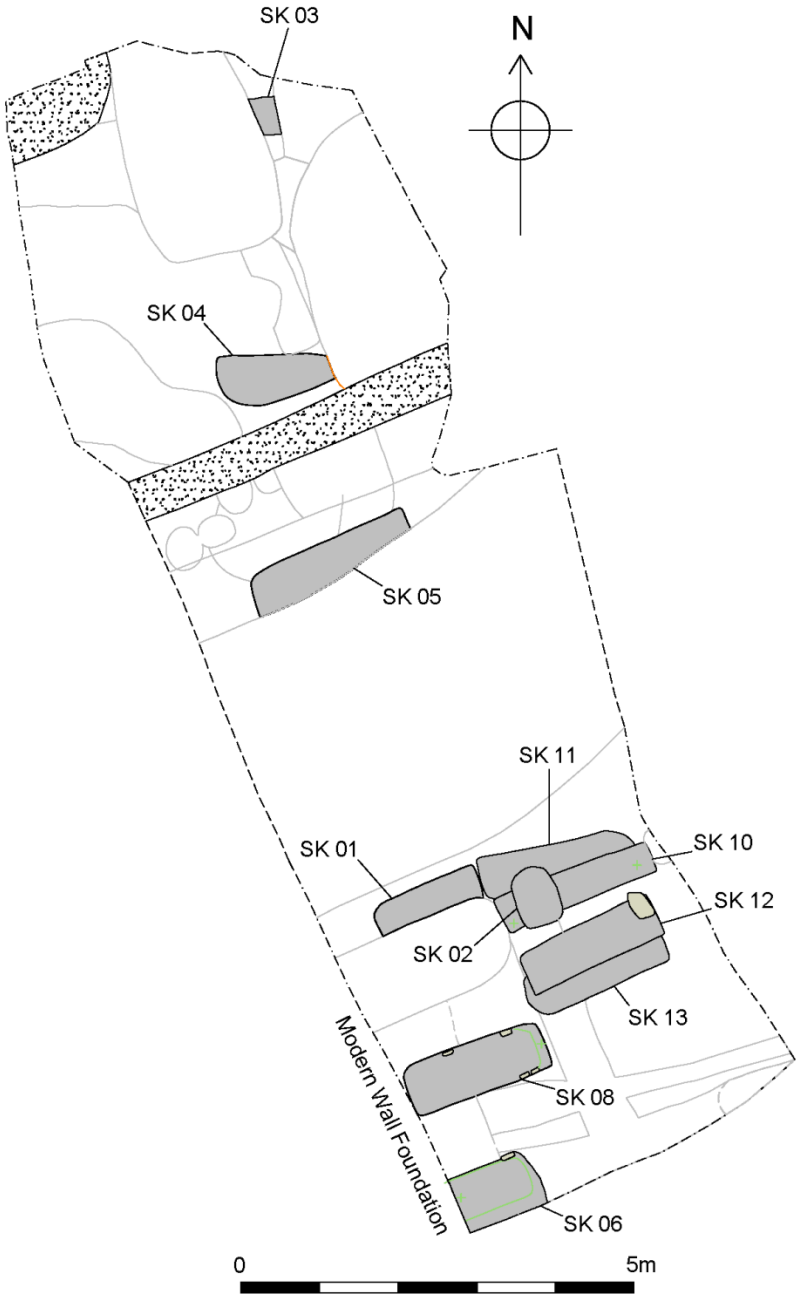

Figure 17: Roman cemetery remains in Trench 3 (earlier and later features in outline)

Figure 18: Grave Cut [3054] SK 04 facing north

Figure 19: Grave cut [3062] (SK 05) facing south

Grave Cut [3062] (SK 05) was located approximately 2.2m south of [3054] and had been slightly truncated on its southern side by the Civil War ditch [3013] (see below). [3054] was rectangular, with vertical sides and a flat base and was oriented east-west (Fig. 19). The grave fill consisted of mid-dark grey-brown clayey silt with patches of red clay (3061). Within this were the skeletal remains of an adult male (SK 05) aged between 26-35 years, lying in a supine position with the arms and legs extended. The body was laid out on an east-west orientation. A disarticulated? foot **SF14** was located on the shin bone of the right leg. Unlike other burials within this group there was a lack of iron coffin nails, however a clear

vertical boundary on the northern side of the grave suggested that a coffin had been used. A number of granite slabs formed a partial 'lining' to the grave and were located between the edge of [3062] and the possible coffin edge. One stone was positioned close to the left hand upper arm while the rest concentrated around the feet at the eastern end of the grave.

The southern half of Trench 3

Remains of eight individual burials were excavated in the southern half of Trench 3. There was a lack of later pitting in this part of the trench and survival was generally better, although some truncation was clear. In contrast to the burials to the north, the southern group displayed evidence for interment in regular rows, but there was also intercutting between the graves, indicating different phases of the cemetery's use (Fig. 20).

Figure 20: Roman graves under excavation in the southern half of Trench 3

Grave Cut [3049] (SK 01) was located in the southern half of Trench 3 and lay on an east-west orientation (Fig. 21). It had been slightly truncated on its southern side by later pit [3015]. Grave [3049] was rectangular, measuring *c.*1.52m long x >0.45m wide, with very steep, near vertical edges (*c.*0.11m deep) leading to an irregular base. The grave fill (3050) consisted of mixed orange/brown silty sandy clay with small pebbles and four sherds of Roman pottery dating to the 2nd century.

Within (3050) were the skeletal remains of a juvenile individual (unsexed) aged between 9-12 years. The body had been laid out west-east in a supine position with the head raised and facing slightly to the south. The positioning of the left arm had been disturbed by the later

truncation but the finger bones of the left hand lay on the chest area, suggesting that it had been flexed over the chest. The right arm was also flexed, with the right hand possibly placed over the pelvis although the later disturbance made this slightly unclear. Both legs were extended but crossed at the shin area, with the right leg crossing over the left. Several tile fragments were found near the feet and a curved tile was found between the ankles of the crossed legs but the significance of this (if any) is unclear. A number of iron nails located around the body indicate that the individual was buried in a wooden coffin.

Figure 21: Grave Cut [3049] Burial SK 01 facing north

Grave Cut [3071] (SK 06) was located in the south west corner of the trench and had been disturbed by the construction trench for a recent wall that ran along the western edge of the area (Fig. 22). What remained of the grave indicated that it was rectangular in plan measuring >1.14m x up to 0.80m wide. The grave had vertical sides (up to 0.25m deep) and a flat base. A deposit of very dark grey-brown silty sandy clay (3070) filled the grave and contained 11 sherds of late 1st- 2nd century Roman pottery. Within this were the skeletal remains of a male individual (SK 06) aged between 18-25 years oriented west-east. The individual was buried lying on their left side with the head facing south. Disturbance from the wall footing had effectively removed much of the skeleton, leaving only the skull, torso and part of the upper left arm, but the length of the grave suggests that the individual would have been laid in an extended position. Iron nails arranged around the head indicated that the individual had been buried within a coffin. Two metal finds were located in association with the burial: a copper alloy stud (**Sf15**) lay at the base of the torso, and a copper alloy object (**Sf18**) was found beneath the skull. Grave cut [3071] cut through the top of ditch [3069].

Figure 22: Grave Cut [3071] Burial SK 06 facing north

Grave Cut [3082] (SK08) was located approximately *c.*0.8m north of [3071] and lay on a similar east-west orientation (Fig. 23). [3082] had also been disturbed by the wall footing on the western edge of the trench but it was positioned slightly further east and more of this grave had survived. The grave cut was rectangular with rounded corners, measuring *c.*1.80m long x 0.60m wide. It had vertical edges, up to 0.40m deep, and a flat base. [3082] was filled with a deposit of mixed grey-brown sandy silty clay and blocks of re-deposited pink natural clay (3081) which contained seven sherds of late 1st – 2nd century Roman pottery and ceramic tile fragments.

Within the grave were the skeletal remains of a mature male individual aged 46+ years lying in a supine position on an east-west orientation. The legs were extended and the arms flexed and crossed over the pelvis. The skeletons skull was missing and may have been disturbed by the wall footing. The western edge of the grave cut was only a short distance from the top of the vertebrae however, suggesting that the individual had been buried in a decapitated state. If so, it is possible that the skull had once lain on the chest area and had been removed during the excavation of the wall footing. One large tile fragment lay directly over the left hand side of the pelvis but the significance of this is uncertain.

No iron coffin nails were recovered from this burial however the presence of intermittent stone 'lining' and the fact that the upper left leg had rolled out of position suggests that SK 08 had been buried within a coffin.

Figure 23: Grave Cut [3082] Burial SK 08 facing south

Figure 24: Grave Cut [3085] Burial SK 10 facing north

Grave Cut [3085] (SK 10) was located in the southern half of Trench 1 on the eastern side of the trench (Fig. 24). It was rectangular, oriented east-west and measuring *c.*2m long x 0.50m wide. It had vertical sides (*c.*0.30m deep) and a generally flat base. The grave was filled with a deposit of dark grey-brown silty clay with red clay mottles (3086) which contained 32 sherds of late 1st-2nd century Roman pottery. Within the grave were the skeletal remains of a male individual (SK 10) aged between 26-35 years lying in a prone position on an east-west

alignment. Both legs and the left arm were extended but the right arm was flexed with the hand lying under the pelvis. Iron nails located around the edge of the grave indicated that this individual had been buried in a coffin. Two metal objects were associated with SK 10: a bent copper alloy needle (**Sf16** see below) was found slightly above the right shoulder and a bronze buckle (**Sf17** see below) was located on the southern edge of the grave adjacent the individuals hip.

Grave Cut [3088] (SK 11) was a rectangular feature on an east-west orientation located on the eastern side of Trench 3 measuring *c.*2.10m long x 0.60m wide (Fig. 25). It was had vertical edges (*c.*0.20m deep) and a flat base. The grave was filled with dark grey-brown silty clay (3087) containing 21 sherds of late 1st-2nd century Roman pottery.

Within the grave were the skeletal remains of a female individual aged 46+ years lying on her left side with flexed arms and legs. The body was oriented east-west with the head facing northwards. Several nails from around the grave edge indicated that the body had been buried in a coffin.

A 2nd-3rd century coin (**Sf24** see below) was found in the pelvic region of the skeleton and may have been placed with the body deliberately.

Figure 25: Grave Cut [3088] Burial SK 11 facing south

Grave Cut [3090] (SK 12) lay *c.*0.28m south of [3085] and lay on similar east-west orientation (Fig. 26). [3090] was rectangular with vertical edges and a flat base measuring *c.*1.76m x 0.50m x up to 0.24m deep. It was filled with a deposit of dark grey-brown sandy silty clay (3089) containing 35 sherds of late 1st- 2nd century Roman pottery.

The skeletal remains of a female individual (SK 12) aged 46+ years lay within the grave in a prone position on an east-west alignment. The legs were extended, but bent slightly towards the south, and the arms were flexed and crossed over the stomach area. A copper alloy hair pin (**Sf26**) was found on the southern edge of the grave near the hip of SK 12, but it was not clear if this belonged to this burial or that of SK 13 which had been slightly truncated by

[3090]. One iron nail was found in this grave suggesting that the body had been buried in a coffin. This idea was also supported by the positioning of the bones from the upper body that had all collapsed outwards.

Figure 26: Grave Cut [3090] Burial SK 12 facing north

Grave Cut [3092] (SK 13) was earlier than [3090] and lay slightly further south (Fig. 27). This was a rectangular feature on an east-west alignment, with vertical sides and a flat base measuring *c.*1.75m long x 0.50m wide x 0.30m deep. The grave had been slightly disturbed on the northern edge by the later grave cut [3090]. A deposit of mid-brown silty clay (3091) filled the grave and contained 3 sherds of 1st-3rd century Roman pottery.

The skeletal remains of a female individual (SK 13) aged between 26-35 years lay within the grave on an east-west alignment. The body lay in a supine position with extended arms and legs. No skull survived, presumably having been disturbed when [3090] was dug. Iron nails around the edge of the grave suggested burial in a wooden coffin. A concentration of small iron nails around the feet of SK 13 raised the possibility that this person had been buried with hobnail boots.

Figure 27: Grave Cut [3092] Burial SK 13 facing north

Figure 28: Grave Cut [3048] Burial SK 02 facing east

Grave Cut [3048] (SK 02) was located in the centre of the southern half of Trench 3 and lay on a north-south orientation (Fig. 28). It was generally rectangular in shape (measuring *c.*0.85m x 0.40m) but had rounded ends. What remained of [3048] was very shallow (*c.*0.15m deep) with steep sloping edges and a generally flat base. This grave cut through the upper fills of Graves SK 10 and SK 11. The grave fill (3047) consisted of loosely

compacted, mid grey-brown silty clay. Within this were the remains of a young juvenile (unsexed) aged between 2-3 years who had been buried on a south-north orientation, lying on their left side with slightly flexed arms and legs. The individuals head had been removed and placed at the feet alongside two broken but near complete pottery vessels: a 1st century grey ware flask and a 4th century Nene Valley ware beaker, at least one of which may have been included as grave goods.

Medieval Remains

Remains of medieval activity were concentrated in the northern half of the trench and comprised several pits, dated to the 15th-16th century, adjacent to the Newarke Street frontage (Figs 29 & 30).

Figure 29: Excavating Medieval pits in Trench 3

c.1400-c.1550 – Leicester Ceramic Phase 10

Pit [3022] was a large, possibly rectangular pit protruding from the northern edge of the trench. It measured >2.9m long x 1.50m wide and had very steep, near vertical sides. The pit base was not reached but excavation ceased approximately 0.70m down from the top of the feature. Two fills were revealed: the earliest consisting of reddish-brown silty sandy clay (3029) and this was covered with a layer of dark grey-brown silty sandy clay (3021) containing sandstone chunks, slate fragments, a large assemblage of late medieval pottery and animal bone.

Pit [3024] protruded from the eastern edge of Trench 1 in the northern half of the trench. An elongated semi-circular plan-shape was exposed, with sloping edges near the top of the pit, and vertical edges lower down in the feature. The pit had been cut into natural sandy subsoil and the upper edges appear to have slumped when it was open, eroding the original shape. The general depth of Pit [3024] and its proximity to the trench edge, precluded full excavation but two fills were identified. The earliest consisted of mixed charcoal/coal rich deposits and organic/cess-like material (3023) which appeared in cross-section as a series of fine layers and lenses resulting from periodic deposition within the pit. Above this was homogenous deposit of mid brown sandy clay silt (3017) with charcoal fragments, a small group of 15th-16th century pottery and animal bone. A dump of Daneshill sandstone fragments lay between the two fills.

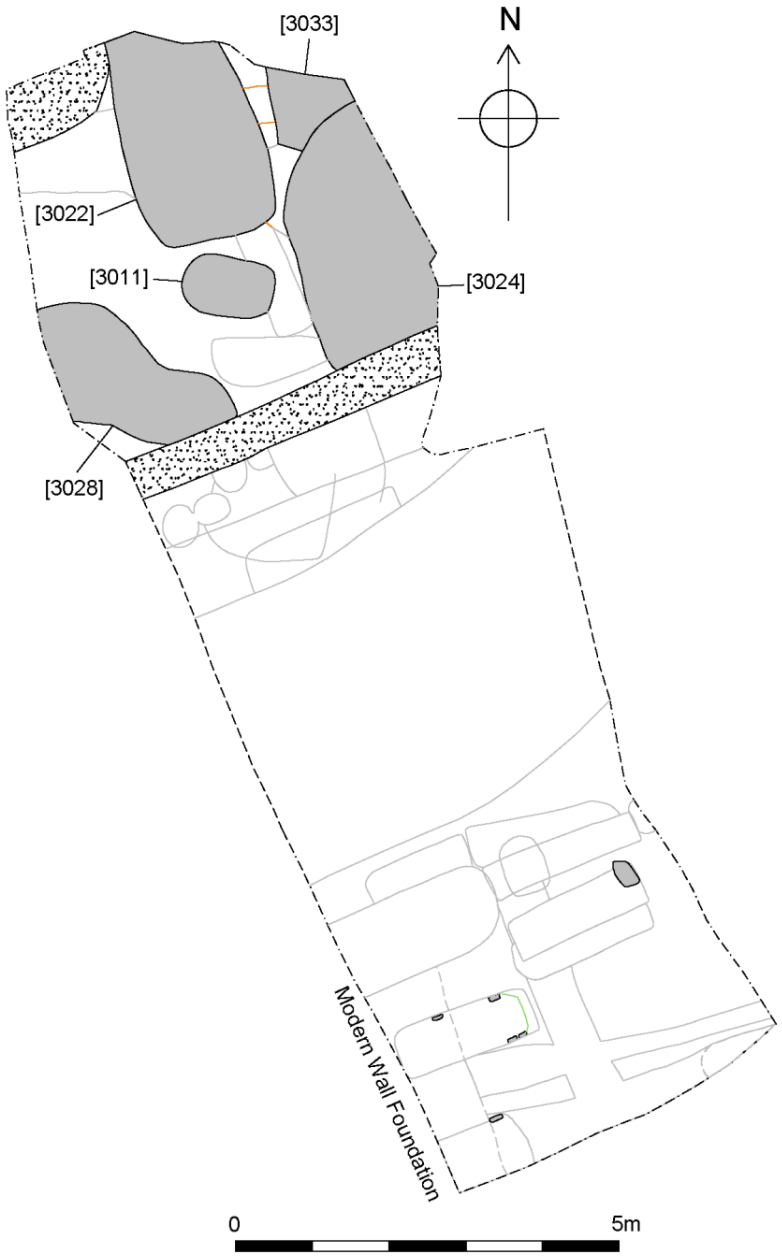

Figure 30: Medieval remains in Trench 3 (earlier and later features in outline)

Pit or oven [3028] lay on the western side of Trench 1 and in plan appeared to be a 'figure of eight' shape (Fig. 31). Excavation showed that [3028] comprised a circular pit to the south east, with an adjoining shallow slope to the north west. At the base of the shallow slope the underlying natural clay was heavily scorched. The main pit was *c.*0.60m in diameter with steep sloping sides. At the base was a layer of rounded cobbles and Daneshill sandstone fragments (3032) with a deliberately laid outer cobble wall which survived to two courses high. This may have acted as a rough base to a probable oven. The scorching on the natural clay extended slightly onto the cobbles at the point where they met the base of the shallow slope. Above the cobbles was a thin layer of dark grey-brown sandy silt (3031) with cobble and sandstone fragments, perhaps deriving from collapse of a superstructure. Above this was a *c.*0.13m thick layer of pale brown fine, silty soil which sloped down towards the centre of the feature. Overlying this was a layer of mid grey-brown/ red mottled silty clay (3025) containing charcoal flecks, 15th-16th century pottery, animal bone and CBM. The pits final fill consisted of dark grey-brown friable silty clay (3026) containing 15th-16th century pottery and CBM.

Figure 31: [3028] partly excavated showing stone layer (3032)

Undated

Pit [3033] was an unusual feature partially revealed in the north-east corner of the trench. It partly lay beyond the northern trench edge and had been truncated to the south by Pit [3024]. What remained however suggested a shallow, flat-based feature with unevenly cut sloping edges [3033]. Cutting into the base of [3033] were three stake-holes [3038], [3040] & [3042] and another, [3044] lay on the edge of the excavation but may have been related to the group. There was no discernible pattern to the stake-holes but they were not observed during the removal of fill from [3033] and it is therefore likely that they relate to this feature. [3033] contained a *c.*0.25m thick layer of dark grey-brown sandy clay silt (3020) containing charcoal fragments and flecks and oyster shell fragments. Above this was a thin layer of mid greenish-brown silty clay (3036). No finds were associated with this feature.

Pit [3011] was a small oval feature in the northern half of Trench 3. It measured *c.*1.28m x 0.75m x 0.28m deep fairly steep sloping sides and an irregular edge, sloping down to the western side. Two fills were contained within [3011]; the earliest consisted of mid-brown silty clay (3010) and the latest was a layer of dark grey-brown silty sandy clay (3009). Animal bone and CBM were recovered from this feature, but not datable evidence.

Overlying all the medieval pits was a thick layer of grey-brown 'garden soil' (3008 – *c.*0.20-0.30m deep) consisting of silty sandy clay containing occasion pebbles, charcoal flecks and slate fragments.

Post-Medieval Remains

Post-dating the medieval pits and cutting through the 'garden soil' (3008) was a substantial 17th century ditch, probably relating to Leicester's Civil War defences. A large pit to the south of this may date to the same period of activity. Overlying the backfilled ditch was a stone and brick building that made use of recycled materials for its construction (Fig. 32).

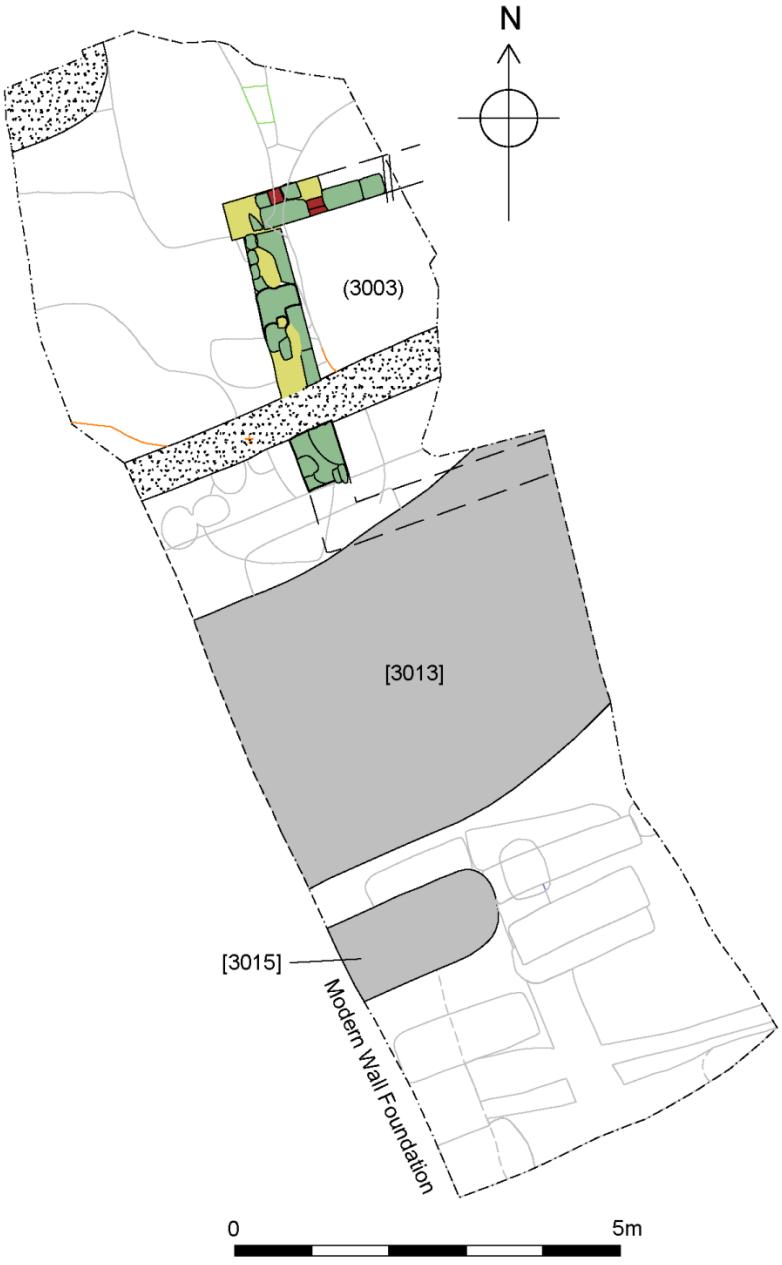

Figure 32: Post medieval remains in Trench 3

c.1650-c.1750 – Leicester Ceramic Phase 12

A substantial ditch **[3013]** crossed the centre of Trench 3 on a north-east – south-west orientation (Fig. 33). This feature had a broad V-shaped profile, measuring *c.*3.90m wide x 1.20m deep, with steep sloping edges and a narrow base. The narrow, slot-like base contained a primary fill of grey-brown silt (3046) probably representing initial silting while the ditch was open. Above this was a layer of firm reddish-brown clay (3045) and overlying this was a generally mixed deposit of overlapping silt and clay layers (3012) probably deriving from a final episode of deliberate infilling. Finds recovered from the latest fill of

this feature included a small collection of residual medieval pottery sherds as well as early post medieval Cistercian and Midland Yellow wares.

Figure 33: Cross section of the Civil War ditch [3013]

Remains of a stone and brick built building **(3003)** measuring *c.*3.78m wide x >1.70m long, were revealed in the northern half of the trench (Figs 34 & 35). This building was defined by an L-shaped arrangement of walls forming the gable end of a building aligned E-W along the frontage of Newarke Street. The majority of the structure lay beyond the eastern edge of the trench.

The walls which were constructed of apparently re-used materials, were *c.*0.50m thick and mainly utilised blocks of Daneshill sandstone and bricks that were built within a construction cut [3005] *c.*0.55m deep, effectively creating a sunken room or cellar. Many of the sandstone blocks were curved, suggesting they had originally been used in a tower or staircase construction. Their form and level of masonry skills suggest they had once been part of a high status building.

Care had been taken in how the materials were used so that the bricks formed the footing of the wall, the flat faces of the sandstone blocks formed the facing of the interior, and sandstone rubble was used to pack the exterior edge of the foundation cut. The walls were bonded with light yellow-brown mortar containing very fine sand or silt and lime fragments.

The southern end of the building had largely been removed as a result of disturbance from a modern wall footing, but a cross section of the southern return was visible in the eastern trench edge.

Within the walls was a well laid floor of tightly packed granite cobbles (3006) with worn upper surfaces suggesting longevity of use. Floor (3006) was set on a bed of brown silt and crushed pale grey-brown lime mortar containing frequent charcoal fragments.

Overlying the floor was a *c.*0.50m thick demolition layer of mid yellow-brown lime mortar fragments containing brick debris, tile and slate and two portions of walling comprising 3-4 courses of bonded brick. Part of a 17th-18th century Cistercian ware cup was found within the construction cut for the building but otherwise, dating material was scarce.

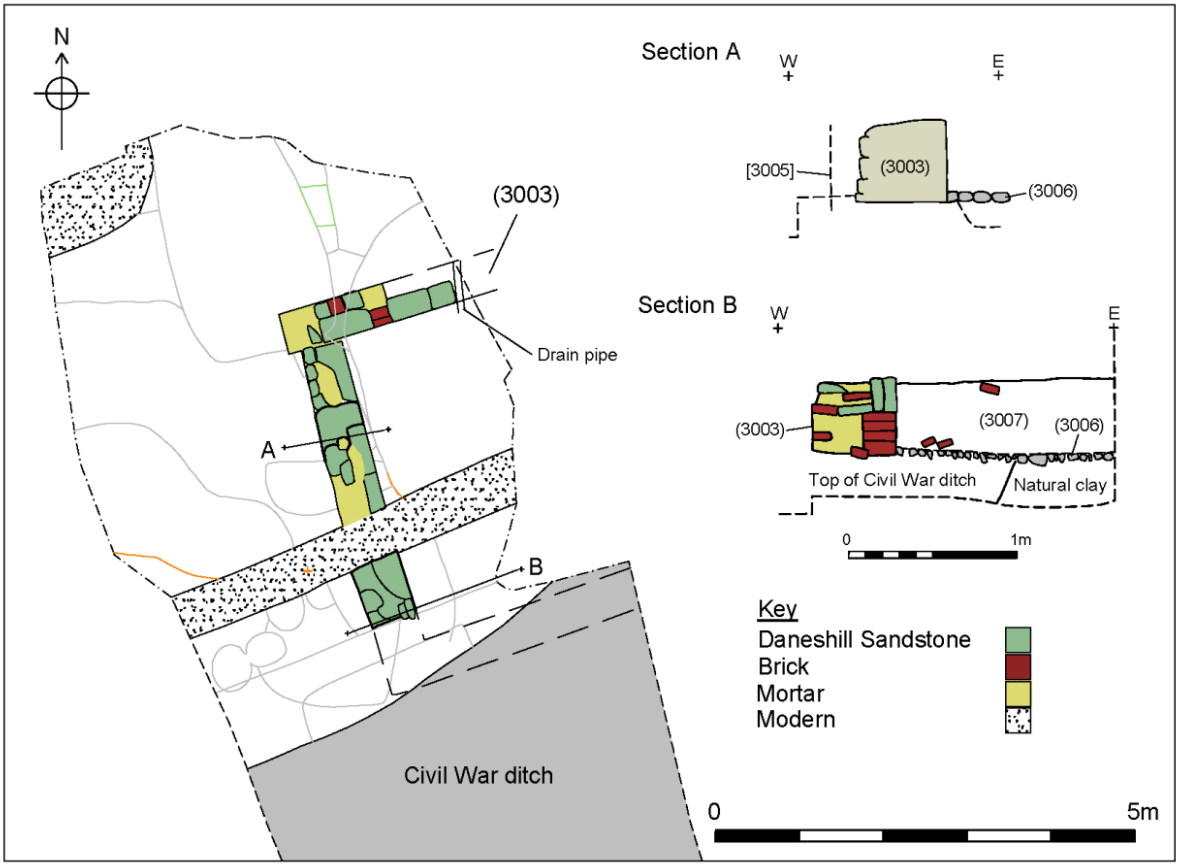

Figure 34: Plan and section drawings of the Post Medieval building

Pit [3015] was located near the centre of the trench and protruded from the western edge of the excavation. It was not fully revealed but the suggestion was that it was a rectangular feature with rounded corners measuring >1.60m x 1.10m wide. Its profile was well defined with very steep, near vertical edges and a flat base lying *c.*0.53m from the top of the feature. The pit was filled with a single deposit of very dark grey-brown silty sandy clay (3014) containing large chunks of sandstone, slate fragments and abundant lumps and flecks of mortar indicative of demolition debris. Also within (3014) were 17th-18th century pottery fragments, CBM and disarticulated human bone from Roman burial SK 01 that was truncated by [3015].

A second pit [3019] was revealed within the base of [3015]. The shape of this feature was uncertain but it had a clearly defined rounded profile with steep sloping sides. The pit was filled with a slate rich deposit within a grey-brown silty clay matrix (3018). Pottery and CBM dating to the 17th-18th century were found among the slates.

Figure 35: The Post Medieval building foundations under excavation showing the cobbled floor

The Prehistoric Pottery - Nicholas J. Cooper

Three body sherds (13g) from a single vessel were recovered from fill (3083) of pit [3084]. The sherds were analysed under low power microscopy and recorded by fabric and form in accordance with the Leicestershire Prehistoric Pottery Fabric Series (Marsden 2011, 62, Table 1) and with reference to other published material, for example from Willington (Marsden *et al*. 2009).

The largest sherd has a slight S-shaped profile suggesting it comes from the shoulder or neck of the vessel and is decorated with two sets of incised lines set at right angles, suggesting a herringbone pattern but not cleanly executed. The fabric is dark grey throughout and manufactured with large and angular white and brown crushed 'pebble' quartz inclusions up to 5mm (similar to Leics. fabric Q5) which in characteristic of Peterborough Ware found at Lodge Farm Rothley in the Soar Valley and at other sites in the Trent Valley such as Willington (Marsden *et al*. 2009, 85, fabrics Qu1 and Qu2). The incised decoration is not typical of the impressed ware tradition but the fabric strongly suggests a Neolithic date. The radiocarbon dates for the material from Willington suggest a date range of *c*.3500-2900 cal BC (Marsden *et al*. 2009, 96).

Romano-British Pottery - Elizabeth Johnson

Assemblage Size and Condition

An assemblage comprising 333 sherds of Roman pottery weighing 3.466kg with an EVEs value of 6.595, was retrieved from the excavations. The average sherd weight of 10.4g suggests average levels of preservation. There was evidence of later disturbance, with 138 sherds (41.4%) recovered from medieval deposits.

Methodology

The pottery was examined in hand specimen using a binocular microscope at x15 magnification and classified using the Leicestershire fabric series for Roman pottery (Pollard 1994). Specific fabrics were assigned to all sherds wherever possible within the archive dataset, however, in this report the generic ware groups summarised below (Table 1) are used for clarity of quantified data presentation.

Table 1: Summary of Roman pottery fabric series (Pollard 1994).

Fabric Code:	Fabric Type:
Samian	Samian wares
C	Colour-coated wares
MO	Mortaria
AM	Amphora
BB1	Black Burnished wares

Fabric Code:	Fabric Type:
GW	Grey wares
CG	Calcite gritted (shelly)
OW	Oxidised wares
WW	White wares
WS	White slipped wares

Quantification was by sherd count, weight (grams) and estimated vessel equivalents (EVEs based on rim values). Average sherd weights (ASW) have also been calculated to provide an indication of the condition of the material and levels of preservation within the assemblage. Vessel forms were assigned where diagnostic sherds allowed, using the Leicestershire Museums form series (Pollard nd) and other published typologies. The dataset was recorded and analysed within an Excel workbook, which comprises the archive record.

Summary of major pottery fabrics within the assemblage

The table below details a summary of the major pottery fabrics within the assemblage as a whole. Fig. 36 shows the percentage of fabrics present by EVEs as a measure of individual vessels identified, whilst sherd count is shown to enable comparison with other published sites. All references to percentage values relate to sherd count unless otherwise stated.

Table 2: Quantification of the Roman pottery.

Fabric	Sherds	% Sherds	Weight (g)	% Weight	EVEs	% EVEs	ASW (g)
AM	7	2.1%	140	4.0%	0	0.0%	20.0
BB1	24	7.2%	183	5.3%	0.695	10.5%	7.6
C	24	7.2%	259	7.5%	0	0.0%	10.8
CG	9	2.7%	96	2.8%	0.1	1.5%	10.7
GW	174	52.3%	1859	53.6%	3.185	48.3%	10.7
MO	7	2.1%	250	7.2%	0.26	3.9%	35.7
OW	2	0.6%	10	0.3%	0.225	3.4%	5.0
Sam	34	10.2%	172	5.0%	0.63	9.6%	5.1
WS	2	0.6%	18	0.5%	0	0.0%	9.0
WW	50	15.0%	479	13.8%	1.5	22.7%	9.6
Total	333	100.0%	3466	100.0%	6.595	100.0%	10.4

Grey coarse wares account for 52.3%, the majority of which are most likely locally made providing utilitarian jars and bowls for general household use. Most of the vessels are jars with 17 jar rims recovered, including rounded outcurved, roll necked, everted and lid-seated forms.

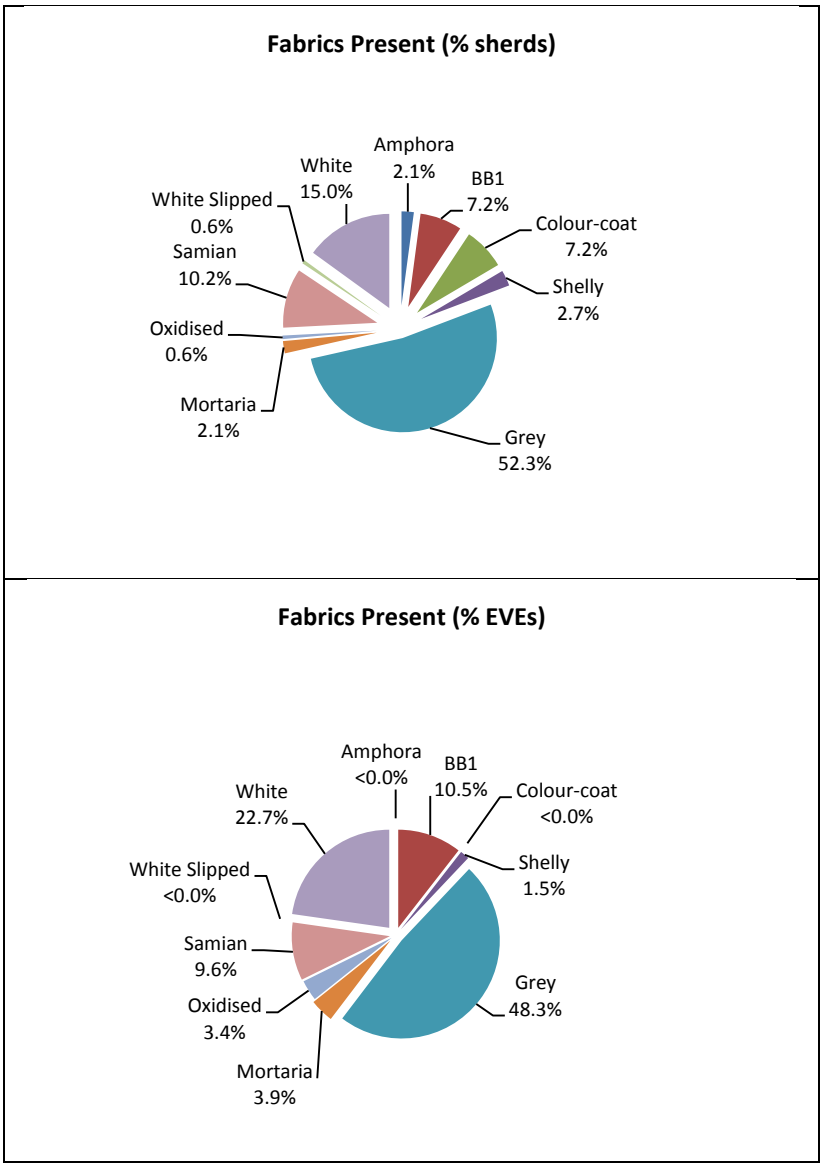

Figure 36: Roman pottery fabrics present by % sherds (above) and EVEs (below).

Decorative styles present include lattice, barbotine ring and dot, roulette zones and burnishing. The remaining vessels include bowls, dishes, beakers and lids. Forms present include reeded and flat rimmed bowls and plain rimmed dishes. Almost all the grey wares could date within the 2nd century. The presence of reeded rimmed bowls and lid-seated jars, along with the barbotine ring and dot motif indicates a date from the later 1st to the middle of the 2nd century (Pollard 1994, 77; Johnson 2009, 27). Only the East Midlands Burnished wares from (2034) and a sherd of Nene Valley grey ware from (1178) need date beyond the end of the 2nd century (Todd 1968). There are very few shelly wares, all of which are jars including one roll necked rim. A date range from the late 1st to the 2nd century is most likely for these vessels.

The remaining coarse wares indicate regional supply to the site and comprise white, white-slipped, oxidised and Black Burnished wares. The Black Burnished wares comprise jars dishes and bowls, including flat rimmed bowls and plain rimmed dishes with intersecting arc decoration. There is also one grooved rim bowl. The presence of these forms suggests a date

range from the middle of the 2nd century up to the mid-late 3rd century (Holbrook and Bidwell 1991, 107-112). White wares form the next largest fabric group after grey wares at 15%. Most of the vessels are flagons including ring neck and devolved ring neck forms dating to the 2nd century. There are also three bowls, including a hemispherical bowl and two with orange/brown painted decoration comparable to Northamptonshire painted wares of the late 1st to mid-2nd centuries. There are very few white-slipped and oxidised wares, including a flagon and globular beaker, both dating from the later 1st to 2nd centuries. The most likely sources for the white, white-slipped and oxidised wares are Mancetter-Hartshill and Northamptonshire (Swan 1984, 98-101; Pollard 1994, 113-114).

The fine wares comprise samian wares and colour-coated wares, including imports and Romano-British products. Imported samian wares from South and Central Gaul account for 10.2% of the assemblage. The forms present include Drag.18 plates, Drag 18/31 and 18/31R dishes, Drag.29 and 37 bowls and Drag.27 cups, suggesting a date range from the 1st century to the middle of the 2nd (Webster 1996). Colour-coated wares account for 7.2% and, with the exception of one imported beaker from (3055), are all from the Nene Valley. The imported beaker is from Central Gaul with barbotine scroll decoration and dates from the middle of the 2nd century into the early 3rd (Tyres 1996, 137-138). The Nene Valley colour-coated wares include a flagon, flanged bowl, castor box lid and dish dating to the 3rd and 4th centuries. Although beakers are produced from the middle of the 2nd century, the forms present in this assemblage are all later types dating to the 3rd and 4th centuries, including folded, pentice moulded and barbotine scale decorated forms (Howe *et al* 1980).

Specialist wares account for 4.2% of the assemblage, with mortaria and amphorae represented in equal amounts. Most of the mortaria are from Mancetter-Hartshill and date from the later 1st or 2nd centuries. One Nene Valley mortaria dating from the middle of the 2nd to the middle of the 3rd century was recovered from (3089). The amphorae types present are the Dressel 20 Spanish olive oil amphora and the Gauloise 4 wine amphora from Gaul. These two types are the most common ones found in Leicester and date from the mid-late 1st century through to the middle of the 3rd (Peacock and Williams 1986, 136; 142-143).

Discussion

As mentioned previously, just over 40% of the material is residual and as a whole, there are only four contexts from which more than a very small amount of pottery was recovered. Three of these are stratified Roman deposits, (3085), (3087) and (3089).

The pottery from (3085), (33 sherds weighing 212g), comprises a mix of grey, white, samian and Black Burnished wares dating to the later 1st and 2nd centuries, including barbotine ring decoration, a flat rimmed bowl and Drag.18/31 samian ware dishes. However, there are also three sherds of Nene Valley colour-coated ware representing two beakers, one of which is a slit folded form dating to the 4th century (Howe *et al* 1981, 20-21). The material from (3087), (39 sherds weighing 262g), comprises an amphora, grey, oxidised, white and samian wares dating to the later 1st and 2nd centuries, along with one Black Burnished ware grooved rimmed bowl dating from the later 2nd to mid-late 3rd century (Holbrook and Bidwell 1991, 98). Finally, the pottery from (3089), (21 sherds weighing 288g), comprises an amphora, grey, white and samian wares, including a ring necked flagon, jar with lattice decoration and Drag.18/31 samian ware dish dating within the 2nd century. The latest datable vessel is a Nene Valley mortarium which dates from the middle of the 2nd century to the middle of the 3rd. The pottery from (3089) is in the best condition with an average sherd weight of 13.7g and a date around the middle of the 2nd century is most likely overall.

The fourth notable deposit is (2034), which appears to be the upper fill of a Roman ditch disturbed by medieval activity. Forty sherds of pottery were recovered weighing 584g. A striking difference between this group and the rest of the assemblage is the presence of six East Midlands Burnished ware type jars dating to at least the 3rd century; along with a Black Burnished ware jar rim and Nene Valley colour-coated ware beaker with barbotine scales, also dating to the 3rd century. The remaining material dates within the 2nd century, including a white ware flagon and some abraded samian ware. As with (3089), the condition of the material is good compared to some other groups, with an average sherd weight of 14.6g, and clearly dates into the 3rd century.

The other feature worth mentioning is grave SK02, from which a colour-coated ware beaker and almost complete grey ware flask were recovered. The beaker is a pentice moulded form from the Nene Valley dating to the 4th century.

The assemblage is typical of an urban assemblage from Leicester, with 17.4% fine wares and 4.2% specialist wares. The quantity of imports (12.6%) and non-local regional wares (25.9%) is also what would be expected from a site in the city dating from the 2nd century onwards. The 3rd and 4th century material is mostly colour-coated ware, with the only later grey wares found in (2034). Apart from (2034), the quantity of material dating later than the 2nd century overall is very small. Most of the assemblage is grey, white, and samian wares, with small amounts of Black Burnished ware and mortaria, suggesting mostly later 1st and 2nd century occupation. It could be that there was a change in the nature of activity after the 2nd century culminating in the later Roman cemetery.

The Post Roman Pottery, Tile & Clay Tobacco Pipes - Deborah Sawday

The Pottery

Methodology (Tables 3- 8)

The pottery was examined under an x20 binocular microscope and classified using the ULAS fabric series (Sawday 1989), (Davies and Sawday 1999), (Sawday 2009) and with reference to the guidelines set out by the Medieval Pottery Research Group, (MPRG 1998, MPRG, 2001). Quantification is by sherd number, weight (grams) and vessel rim equivalent (EVEs - calculated by adding together the circumference of the surviving rim sherds, where one vessel equals 1.00)

Table 3: The post Roman pottery and ridge tile fabrics.

Fabric	Common Name/Kiln & Fabric Equivalent where known	Approx. Date Range
ST3	Stamford – coarse, fabrics E/F, H A/D (1)	c.850/900-1050+
ST2/ ST21	Stamford – fine/very fine, fabrics G B/C (A) (1)	c.1050-12th C.
ST1	Stamford – very fine, fabrics B/C (1)	c.1150-13th C.
RS/RS1	Reduced Sandy wares - ?Local	c.850-c.1400
PM	Potters Marston - Potters Marston, Leicestershire (2)	c.1100-c.1300/50+
SP3	Splashed ware 3 - Leicester (3)	c.1100-1250
OS1/2	Oxidised Sandy 1 /2 ?local	c.1100-1250
CS	Coarse Shelly - Northants CTS 330(4)	c.1100-1400
CO1	Coventry D ware, Warwick CTS SQ21(5)	c.1150-1250
CC1	Chilvers Coton fabric A/Ai (6), Warwick CTS WW01, WW012? (5)	c.1250-1400
CC2	Chilvers Coton fabric C (6), Warwick CTS SQ30, SLM10 (5)	c.1250/1300-1500
NO3	Nottingham Light Bodied/Reduced Green Glazed - NOTGL/NOTGR (7)	Early/mid 13th c.1350
NO4	Nottingham Off White Sandy (7)	1275-1350
BR2	Brill/Boarstall type, Oxford OXAM 17 (8)	1250-1300+
MS1	Medieval Sandy wares – misc. fine quartz tempered fabrics	c.1200-1400
MS2	Medieval Sandy 2– misc. coarse soft fired quartz tempered fabrics, including coarse Chilvers Coton fabrics A/Ai, (6), and Nottingham, Burley Hill/Allestree, Derbyshire (9)	Early/mid 13th C.-1400
MS3	Medieval Sandy 3 – misc. coarse hared fired quartz tempered fabrics -? Burley Hill/Allestree/Ticknall, Derbyshire (9)	Early/mid 13th C.-c.1400-1400/1450
MS7	Medieval Sandy 7 - misc. predominantly later medieval coarse red sandy fabrics, possibly from sources similar to the above.	Early/mid 13th C.-c.1400-1400/1450
MS8	Medieval Sandy 8 - ?under-fired MP2	c.1350-1550
MP1	Midland Purple 1 – Chilvers Coton fabric D, (6), Warwicks CTs MP (5)	c.1375-1550
MP2	Midland Purple ware 2 -? Ticknall, Derbyshire (9)	c.1375-1550
MP3	Midland Purple 3 –vitrified MS3, -? Ticknall, Derbyshire (9)	c.1375-1550
MP4	Midland Purple 4, ?Ticknall, Derbyshire (9) transit.into EA1, (10)	c.1375-1550+
TG	Tudor Green type/Surrey White (11)	c.1400-1600
TG2	Tudor Green/Surrey Hampshire Border (11)	c.1400-1600
CW1	Cistercian– Chilvers Coton fabric E (6), Warwicks CTS CIST (5)	c.1450/1475-1550

CW2	Cistercian ware 2 -? Ticknall, Derbyshire (9) (10) (12)	c.1450/1475-1550
MB	Midland Black– local, -? Ticknall, Derbyshire (12)	c.1550-1750
MY	Midland Yellow – local, -? Ticknall, Derbyshire (12)	c.1500-1725
MA2	Martincamp Stoneware, Northern France (13)	c.1500-1550
RW	Redware/Low Countries/English	c.1450-1700
SW	Stoneware	Post Med/Modern
EA1	Earthenware 1 – Coarse Post Medieval Earthenware - Chilvers Coton/Ticknall, Derbyshire (9) (10) (12)	c.1500-1750
EA2	Earthenware 2 – 'Pancheon ware', Chilvers Coton/Ticknall, Derbyshire (6) (12)	17th C-18th C. +
EA7	Earthenware 7 - Slip ware (14)	Late 17th- early 18th
EA8	Earthenware 8 - Cream ware	1730-1850
EA10	Earthenware 10 - Fine White Earthenware/China	Modern

Table 4: Key to references in Table 3

(1) Kilmurry 1980, Leach 1987	(8) Mellor *et a*l 1989-1991 - check
(2) Haynes 1952, Vince 1984, Sawday 1991, Davies & Sawday 1999	(9) Coppack 1980, Cumberpatch 2002-2003
(3) Sawday 1998, Davies and Sawday 1999	(10) Sawday 1989, Gooder 1984
(4) Northants CTS	(11) Pearce and Vince 1988
(5) Redknap & Perry 1996, Soden and Ratkai 1998.	(12) Boyle & Rowlandson 2006-2008, Boyle 2002-2003, Vince 2007
(6) Mayes & Scott 1984.	(13) Hurst *et a*l 1986
(7) Coppack 1980, Nailor & Young 2001.	(14) Gooder 1984

Table 5: The Post Roman pottery site totals by fabric, sherd numbers and weight (grams) in approximate chronological order.

Fabric	Common Name	Sherds	Weight (grams)	Eve	Av Sherd Weight	% total by sherd nos.
Saxo Norman						
ST3	Coarse Stamford	2	11	0.05		
ST2	Fine Stamford	28	197	0.2		
RS/RS1	Reduced Sandy	5	78			
Sub-Total		35	286	0.25	8.17	6.04
Early/High Medieval						
ST1- ST2/1	Fine/Very Fine Stamford	41	541	0.076		
PM	Potters Marston	213	4486	1.96	21.06	
SP3	Splashed	6	91	0.1		
OS1/OS2	Oxidised Sandy	14	343	0.23		
CS	Coarse Shelly	22	1228	0.29	55.81	
CO1	Coventry	2	29			
BR2	Brill/Boarstall	6	125			
CC1	Chilvers Coton	42	477	0.03	11.35	
NO3/4	Nottingham	12	98	0.16		
MS	Medieval Sandy	15	390	0.4		
MS1	Medieval Sandy	4	51			
MS2	Medieval Sandy	5	65			
Sub-Total		382	7924	3.246	20.74	65.97
Late Medieval/Early Post Medieval						
CC2	Chilvers Coton	9	200			

MS3	Medieval Sandy	18	430	0.2	23.88	
MS7	Medieval Sandy	1	9			
MS8	Medieval Sandy	1	157			
MP1	Midland Purple	9	108			
MP2	Midland Purple	34	1001	0.5	29.44	
MP3	Midland Purple	3	67			
MP4	Midland Purple	2	43			
TG/TG2	Tudor Green/Surrey White	2	3	0.05		
CW1	Cistercian	15	244	0.08	16.26	
CW2	Cistercian	28	260	0.44	9.28	
CW/MB	Cistercian/Midland Black	4	47			
MY	Midland Yellow	2	76	0.03		
RW	Redware	1	6			
MA2	Martincamp Stoneware	2	36			
SW	Stoneware	1	8			
EA1	Earthenware 1	2	67			
Sub-Total		134	2762	1.3	20.61	23.14
Post Medieval/Modern						
EA7	Slipware	1	12	0.06		
EA8	Creamware	21	542	0.82		
EA10	Fine White Earthenware/China	6	15			
Sub-Total		28	569	0.88	20.32	4.83
Site Totals		**579**	**11541**	**5.676**	**19.93**	**99.98**

Table 6: The medieval and later pottery by ceramic phase, fabric sherd numbers and weight (grams).

FABRIC	PHASE										TOTALS	
	8		9		10		11/12		13			
	shds	grams	shds	grams	shds	grams	shds	grams	shds	grams	shds	grams
Saxo Norman												
ST3			2	11							2	11
ST2	7	33	6	75	15	89					28	197
RS/RS1			2	49	3	29					5	78
Sub Total	7	33	10	135	18	118					35	286
Medieval												
ST21			21	119							21	119
ST1	15	392			5	30					20	422
PM	81	2382	84	1217	44	846	3	18	1	23	213	4486
SP3	1	23	3	31	2	37					6	91
OS1/2			6	43	7	265	1	35			14	343
CS	16	1078	1	3	5	147					22	1228
CO1			1	6			1	23			2	29
CC1			4	63	38	414					42	477
NO3			7	74	4	20					11	94
NO4			1	4							1	4
BR2					6	125					6	125
MS/MS1			14	384	5	57					19	441
MS2			1	6	4	59					5	65
Sub Total	113	3875	143	1950	120	2000	5	76	1	23	382	7924
Later Medieval/Early Post Medieval												
CC2					9	200					9	200
MS3			2	17	15	381	1	32			18	430
MS7					1	9					1	9
MS8					1	157					1	157

MP1					8	78	1	30			9	108
MP2					29	893	5	108			34	1001
MP3					3	67					3	67
MP4					2	43					2	43
TG/2					1	2	1	1			2	3
CW1					14	240	1	4			15	244
CW2					23	242	5	18			28	260
CW2/MB							4	47			4	47
MY							2	76			2	76
MA2/RW							3	42			3	42
SW							1	8			1	8
EA1							2	67			2	67
Sub Total			2	17	106	2312	26	433			134	2762
Later Post Medieval/Modern												
EA7							1	12			1	12
EA8									21	542	21	542
EA10							1	4	5	11	6	15
Sub Total							2	16	26	553	28	569
Site Totals	**120**	**3908**	**155**	**2102**	**244**	**4430**	**33**	**525**	**27**	**576**	**579**	**11541**

Ceramic Phases (Table 7)

The stratified assemblage, 579 sherds, weighing 11541 grams, and a vessel rim equivalent of 5.676, has been divided into ceramic phases based on the range of pottery fabrics and vessel forms present.

Table 7: The medieval and later pottery by ceramic phase, sherd numbers and weight (grams) by trench.

Phase	**Trench**								
	1			**2**			**3**		
	sherds	**grams**	**EVE**	**sherds**	**grams**	**EVE**	**sherds**	**grams**	**EVE**
Phase 8	113	3854	1.67	7	54				
Phase 9	149	1938	1.16	6	164				
Phase 10	108	2204	1.33	62	956	0.11	74	1270	0.62
Phase 11	18	220	0.43	2	49				
Phase 12							18	267	0.19
Phase 13	22	565	0.82				5	11	
Totals	**410**	**8781**	**5.41**	**77**	**1223**	**0.11**	**97**	**1548**	**0.81**

Phase 8 - c.1100-1250

Possible cess pit – 1119, pits 1117, 1140, 1155, 1166, 2035

Assemblage: 120 sherds, 3908 grams, 1.67 EVEs, 32.5 grams ASW (average sherd weight)

Typically Potters Marston ware dominated this assemblage and jars were the most common identifiable vessel form, chiefly 12th century cylindrical but more commonly shouldered forms dating from the mid or later 12th into the 13th century (Davies and Sawday 1999, figs.88 and 89), (Sawday 2009). Fine Stamford wares, fabrics ST1 and ST2 were also present, including a cup fragment in ST2 and the half profile of a copper glazed jug in fine

Stamford ware, fabric ST1, dating from the later 12th century (Kilmurry 1980). Two upright and squared Coarse Shelly ware jars (McCarthy 1979, fig.82.91) date generally from *c*.1200.

Phase 9 – c.1250-c.1400
Pits - 1008, 1112, 1114, 1116, 1163, 1168, 1179, layers – 2006, (1165), ditch 4 - 2033
Assemblage: 155 sherds, 2102 grams, 1.16 EVEs, 13.5 grams ASW

Most of the cut features and the layer (1165) contained wheel thrown and glazed pottery dating from *circa* 1250, including one or more examples of the following: the Chilvers Coton fabrics CC1 and CC2; the Nottingham wares NO3 and NO4 and the Medieval Sandy wares MS and MS3. Whilst hand-made Potters Marston constituted the only find in the layer 2006, and the pit 1168, in both cases the pottery was thought to date typologically from the mid-or later 13th or 14th centuries.

Residual pottery, predominantly coarse and fine Stamford wares, but also Sandy Reduced and Oxidised wares, Coventry ware CO1 and earlier examples of Potters Marston, occurred predominantly in 1008, although much of the remaining Potters Marston in this phase was probably also residual; the ware is common in Leicester from at least the 12th century. Single sherds of the earlier medieval Leicester Splashed ware, fabric SP3, occurred in 1114, 1179 and 2033.

Of note was a lead glazed pedestal dish rim in the coarse Stamford ware, ST3, a comparatively rare form at Stamford where it is dated from the late 12th and early 13th centuries (Kilmurry 1980, 41). A jar and a bowl also occurred in Stamford ware; a bowl in Oxidised Sandy ware, and two jars and a lamp Potters Marston. However, over-all jugs were the most frequently observed vessel type, chiefly identified either by their rims, necks or handles. These were not only in Potters Marston and in a wheel thrown example of a Coarse Shelly ware in 1114, but are also commonly found in the wheel thrown glazed sandy wares noted above.

Phase 10 – c.1400-c.1550
Pits – 1128, 2016, 2040, 3022, 3024, possible cess pit – 1143, pit/oven – 3028, post hole – 3028
Assemblage: 244 sherds, 4430 grams, 2.06 EVEs, 18.15 grams ASW

This phase is generally characterised by the presence of late medieval Midland Purple ware dating from the later 14th to the mid-16th centuries. The bulk of the pottery, over 88 per cent by sherd numbers, was recovered from the back-fill of the pits 1128, 2016 and 3022. Cistercian ware, which is dated in Leicester from the mid or later 15th century, was found in contexts 1128 and 2016.

Part of a copper glazed bottle, (Kilmurry 1980, fig.63.18.4), and a storage jar were found in residual Stamford and Reduced Sandy ware, and jars, bowls and jugs occurred in a range of early and high and later medieval wares, including an everted bowl rim in MS3 paralleled at the Austin Friars, Leicester (Woodland 1981, fig.35.137). The later medieval vessel types included a cistern in the Midland Purple fabric MP2 in 1128, also paralleled at the Austin Friars, Leicester (ibid. 1981, fig.37.158) and, in the same fabric, part of a jar with internal lid-seating and residue on the interior, possibly an industrial base, but with no clear evidence of industrial use. Cups make an appearance in fabrics in CW1 and CW2 in 2016, 1128, and 3005 as noted above, (ibid. 1981, fig.41.207-209, fig.43.260). There was little evidence of the

applied decoration which is typically found on earlier examples of Cistercian ware, save one example of a trace of white clay, which has fired yellow under the lead glaze, on a CW1 cup rim in the pit 2016.

Phase 11 – c.1500-c.1650
Possible cess pit - 1143, pit – 1158, grave - 2032,
Assemblage: 20 sherds, 269 grams, 0.43 EVEs, 13.4 grams ASW

Part of a flask in the Martincamp Stoneware, MA2, which is commonly dated to the 16th century in Britain (Hurst 1986) and three sherds of Cistercian or Midland Black ware – the latter dating from *circa* 1550 - were recovered from the possible cess pit 1143. The fourteen sherds in the back-fill of the pit 1158 included residual Potters

Marston, Oxidised Sandy, Tudor Green, Midland Purple and Cistercian wares as well as post medieval Midland Yellow and, Red ware and a burnt pedestal base cup or jug fragment, probably an early post medieval continental import, in unclassified Stoneware.

Two sherds, one in medieval Coventry D ware and part of a flask in the Martincamp Stoneware, MA2, which probably dating to the 16th century, as noted above, were intrusive in the Roman grave 2032.

Phase 12 – c.1650-c.1750
Ditch – 3013, circular pit – 3015, structure - 3005, floor - 3006.
Assemblage: 13 sherds, 256 grams, 0.19 EVEs, 22.8 grams ASW

Predominantly medieval pottery was recovered from the back-fill of the civil war ditch 3013 together with sherds of Cistercian/Midland Black ware, Midland Yellow and the early post medieval Earthenware EA1 the two latter both dating from *circa* 1500. Part of a Cistercian ware cup was found in the structure 3005 together with an intrusive piece of modern china in the associated context, 3006. Both contexts over lay the civil war ditch. An internally glazed body sherd in EA1, thought to be part of a jar, and the rim of a press moulded dish with trailed slip decoration, dating from the late 17th or early 18th century (Gooder 1984) were found in the pit 3015.

Phase 13 - Modern
Pit – 1007, demolition layer – 3007
Assemblage: 27 sherds, 576 grams, 0.82 EVEs, 21.3 grams ASW

The back-fill of the pit 1007 contained the profiles of a mug and teapot; both covered internally and externally with a lead glaze, firing a strong butter yellow in Cream ware, fabric EA8. The former has a blue mocha type decoration superimposed on a band of white slip below the rim. Similarly, the jug has horizontal lines of blue paint, on the upper and lower body enclosing two bands of engine turned ribbing painted in a white slip. Bands of slipped decoration are typical of the late 18th century examples of this ware (Draper 1984, 51). A sherd of modern Earthenware, EA10, was the only find recorded from the demolition layer 3007.

Discussion

The relatively high average sherd weight of 32.5 grams for the phase 8 group as a whole, and for the Coarse Shelly and Potters Marston wares in particular in the backfill of the possible cess pit 1119 and the pit 1117, suggests that that at least some of this material may be primary or secondary refuse. This is supported by a number of joining sherds in these two wares in these to contexts. Conversely, most of the predominantly residual Stamford ware and the Potter Marston from the remaining pits in this group were extremely fragmentary with a high breakage rate. All of this pottery occurred in Trench I, save seven sherds, weighing 54 grams from a pit in Trench 2.

The phase 9 assemblage was generally fragmentary and much of the material was apparently residual in this phase. The Potters Marston, which spanned both phase 8 and 9 in terms of its date range, dominated the assemblage in terms of both sherd numbers and weight, and had an average sherd weight of less than 15grams. The later wheel thrown 13th and 14th century Chilvers Coton, Nottingham and Medieval Sandy wares had a similarly low average sherd weight of approximately 17 grams, even allowing for the fragment of Medieval Sandy ware in the pit 1179, which weighed 157 grams. The bulk of the pottery was recovered from the six pits in trench 1, with only a small assemblage occurring in a layer and a ditch in Trench 2.

Nor surprisingly perhaps, much of the pottery in the late medieval phase 10 is residual with 13th and 14th century wares, predominantly Potters Marston and the Chilvers Coton fabric CC1 very much in evidence. Once again the bulk of the assemblage occurred in a possible cess pit in Trench 1, with a relatively small group of pottery from two pits and a post hole in Trench 2, and for the first time a relatively small assemblage from two pits and a possible oven in Trench 3.

Little can be said of the phase 11 assemblage of only twenty sherds. However, the presence of Martincamp Stoneware in both Trenches 1 and 2 is of some note as this is a relatively uncommon find in Leicester.

All of the phase 12 pottery assemblage occurred in Trench 3, the majority, nine sherds from the backfill of the civil war ditch in Trench 3, was residual save for three early post medieval finds in the Earthenware EA1, Midland Yellow and Cistercian/Midland Black ware. The two sherds associated with the structure above the ditch comprised a fragment of late medieval Cistercian ware, and a presumed intrusive sherd of modern china in the floor level associated with the structure. A small assemblage of early modern pottery was recovered from trenches 1 and 3.

Conclusion

The post-Roman pottery dated from the Saxo Norman to the modern period, the range of fabrics and vessel types being fairly typical of the domestic assemblages in the city and the immediate environs. However, no early/middle Saxon pottery was recovered and only a handful of possibly late Saxon sherds in the coarse Stamford ware fabric ST3 and Reduced Sandy ware occurred residually in phases 9 and 10 in Trench 1. Unlike recent excavations at De Montfort University, there was no late Saxon St Neots or Lincoln Shelly ware, and no obvious examples of Leicester ware.

Most of the pottery was recovered from Trench 1 and much of the assemblage as a whole lay within phases 8 and 9, dating from *c.*1100 to *c.*1400. There is evidence of 12th and 13th century settlement along both sides of Oxford Street with a range of pits and other features

representing back-yard activity (Finn 2004, 63) as has also been shown here, notably in Trench 1 which most probably relates to the street frontage on what is now Oxford Street. Documentary evidence in the form of a charter indicates that both burgesses and customary tenants, (peasants) were living along Southgate Street, now Oxford Street, outside the South Gate by *c.*1200, (Courtney 1998, 124).

The relatively paucity of finds from trench 3 which also lay south of the town wall and fronted on to Newarke Street, formerly Hangman's Lane, mirrors the relatively small medieval pottery assemblages recovered during excavations to the north east at the Elfred Thomas School of Law on Newarke Street (Cooper 1996), and on the opposite side of the street (Derrick 2009, 93). Both sites suggested agricultural activity rather than habitation (ibid.2009, 93) during the medieval period.

Here, the presence of two pits, including a possible cess-pit, and what may be an oven, all dating from the 15th or early to mid-16th centuries, does hint at later medieval occupation, however any evidence for mud-walled buildings for example, may not have survived. The south suburb was described as the poorest area of Leicester and accordingly it was the only suburb to be demolished during preparations for the siege of the borough in 1645 (Courtney 1998, 124). This fact may account, in part, for the very small early post-medieval pottery assemblage in phase 11.

The Medieval Ridge Tile

Twenty four fragments of medieval ridge tile, weighing 805 grams were recovered in total from the site. Three fragments, 95 grams, were found in the pit 1114 and the layer context 1165 in phase 9 in Potters Marston and the Leicester Splashed ware, SP3. The former was decorated with the remains of a crest, but this was not identifiable. Both fragments were glazed.

Table 8: The medieval ridge tile by ceramic phase, fabric, fragment numbers and weight (grams).

FABRIC	PHASE						TOTALS	
	9		10		11			
	No	grams	No	grams	No	grams	No	grams
PM	2	64	5	206	1	10	8	280
SP3	1	31					1	31
CC1			2	49			2	49
MS1			2	80			2	80
MS3			10	346			10	346
MS8			1	19			1	19
Sub Total	**3**	**95**	**20**	**700**	**1**	**10**	**24**	**805**

The largest assemblage, 20 fragments, weighing 700 grams was found in the pits 2016, 3022 and 3024 in phase 10. All were glazed, save two fragments in Potters Marston, and one in the Chilvers Coton fabric CC1. Only one Potters Marston fragment showed evidence of torching, or mortar, in this instance, on the upper surface of the tile. An abraded fragment, weighing 10 grams occurred in the post medieval pit 1158 in phase 11.

The range of fabrics present mirrors that found in the pottery and is fairly typical of the ridge tile found in the city and suburbs, including another small assemblage found during previous excavations on Newarke Street, (Cooper 1996). However, given the poverty of the southern suburb (Courtney 1998) and the relatively low average weight of the tile fragments, and the small size of the assemblage over-all, it seems most likely that this material may have been formerly used, perhaps before being dumped here, to roof the more substantial buildings in the town or perhaps the Newarke.

The Clay Pipe

Three clay pipes with spur bowls from the pit 1158 in phase 11 are paralleled at Freeschool Lane, Leicester (Higgins 2009, fig.41.15), where they were dated to *c.*1680-1710. Fragments of clay pipe stems were also recovered from contexts 3017 and 1007 in phases 12 and 13.

Roman and Medieval Building Materials - Rebecca Lucy Hearne

Roman Ceramic Tile

A total of 255 fragments of Roman ceramic tile weighing 22kg were recovered. All the material occurred in a variable orange sandy fabric typical of tile of this date across the city and no detailed fabric analysis has been undertaken (Martin 1999). The material was identified to type and quantified by fragment count and weight and summarised in Table 9

Table 9: Roman Ceramic Tile

Type	Weight (kg)	Fragments	%Frags
Pedalis	9.05	34	14
Imbrex	1.75	19	7
Tegula	3.37	47	18
Misc.	7.56	155	61
Total	21.73	255	100

The majority of the material (61%) is unidentifiable to type, indicating the fragmentary nature of the assemblage, which occurs in secondary contexts and cannot be associated with a specific building. However, 39% many of the fragments can be identified as roof tiles (*tegulae* and *imbrices* 25%) or wall tiles/bricks (*pedalis* 14%). No flue tiles were identified. The assemblage includes the re-use of large tile fragments, probably salvaged from stone-founded buildings within the town wall for re-use as packing within grave cuts as demonstrated for example in Graves 8 (2.7kg) and 10 (1.2kg), alongside the re-deposition of small fragments in Roman and post-Roman contexts.

Other Roman Building Material

Examples of worked stone were recovered from Roman contexts (Table 10), including examples of tesserae from (3070) and the re-use of architectural blocks as packing with Graves 4 and 8. The stones present included Danehills sandstone and Lincolnshire Limestone (Ashton 1980).

Table 10: Worked Stone

Con	Cut	Description/Lithology	Long mm	Wide mm	Thick mm	Weight (g)
3070		2 mosaic tesserae; 1 x Danehills sandstone with adhering mortar and iron oxide grains, 1 x red cerami with adhering mortar.	<26	<24	<18	21
3078		Architectural stone? Limestone block with 2 squared edges and 2 flat faces displaying working traces/striations.	<140	<95	<35	896
3079		Worked architectural limestone fragment.	<85	<35	<20	61

3081	SK08	Worked architectural limestone fragment with working traces/striations.	<70	<55	<25	128
3089		Possible worked limestone fragment with one slightly rounded edge.				
	SK04	Stone from beneath head/coffin. Rectangular limestone slab with some adhering iron oxide; previous architectural stone.	<145	<95	<35	862

Medieval Ceramic Tile

A small group of six flat nib tile fragments (1100g) was recovered from (3007), in a dark red sandy fabric. Torching with mortar is apparent on all examples.

Medieval Roofing Slate

A total of 22 partial and complete medieval roofing slates were recovered from 12 contexts (Table 11). Where complete, dimensions have been measured.

Table 11: Medieval Swithland Roofing Slate

Con	Cut	Description/Lithology	Long mm	Wide mm	Weight (g)
U/S		Slate fragment with partial peghole and iron nail.	<100	<110	218
1009		5 slate fragments; 1 x narrow rectangular fragment with a partial peghole.			
1123		Complete narrow rectangular slate with circular pecked peghole and squared edges.	<200	<70	227
1137		Incomplete diamond-shaped slate. No peghole.			
1162		Incomplete narrow rectangular slate. No peghole. Traces of mortar on both faces.			
2005		4 slate fragments; 3 x rectangular with mortar on both faces and bored round pegholes. 1 x triangular with mortar traces and pecked peghole adjacent to one long edge.	<170	<115	<508
2034	2033	Near-complete rectangular fragment with partial circular pecked peghole.	c. 140	<100	275
2036		Triangular slate fragment with partial circular pecked peghole.			
3017		2 complete rectangular slates with mortar traces on both faces and circular bored pegholes.	<210	<130	<376
3020		Diamond-shaped slate with some adhering mortar. No peghole.			
3021	3022	2 irregularly triangular slates with circular bored pegholes and mortar traces.	<160	<115	<242
3026		Slate fragment with partial circular bored peghole.			
3046		Slate fragment with partial circular bored peghole.			

A variety of medieval long slates, with circular peg holes were identified, similar to those found at Causeway Lane (Gnanaratnam 1999) and manufactured from the nearby Swithland slate outcropping to the north-west of Leicester (McWhirr 1988, Ramsey 2007). Lime mortar torching was observed on ten examples.

The Small Finds - Nicholas J. Cooper

X-radiography, conservation and photographs by Graham Morgan.
Coin identifications by Richard Buckley

Roman Finds from the Cemetery

Grave 4 [3054]

This female of 26-45 years wore two finger rings on her left hand; one of jet and one of iron with a silver setting. Behind the head were the remains of a composite bone comb held together with iron rivets.

Finger rings

1) **Sf11** Trench 3 Sk.4. Jet finger ring. Hoop is of plano-convex section, narrowing to the point opposite the bezel, perhaps partly through wear on the inside of the palm (Figs. 37 - 39). Top of hoop flattened to form a rectangular bezel upon which is incised a design comprising a saltire cross with a vertical line across the centre and cross hatched infill to the acute angled segments (Fig. 1). The inside of the hoop unusually shows the cell structure of the original wood. Internal diameter 16mm, width of bezel 5mm.

Figure 37: Jet finger ring before removal from the finger bone.

Figure 38: Jet finger ring. Scale in centimetres

Figure 39: Jet finger ring: detail of internal surface on the underside of the bezel showing cell structures from the fossilised wood.

The design on the bezel resembles the Christian symbol *iota chi* the Greek initials of *Iesous Christos*, formed by superimposing an 'I' over an 'X' (Petts 2003, 105), but the crosshatching in the opposing segments might argue for this simply being an attractive design. Two authorities on Christianity in Roman Britain, David Petts and Martin Henig were consulted over the design but no consensus was reached; the former accepting it and the latter less generous. It certainly *could* be a Christian symbol even with an attempt to disguise it, although the use of jet would probably argue for a 4th century date after the Edict of Toleration. There are a number of examples of Christian symbols including *iota chi*, *chi rho* and the *rho* cross occurring on finger rings and other artefacts, and I am grateful to David Petts for supplying some of the following parallels. The use of *iota chi* is recognised in Roman Britain on a lead tank from Brough, Nottinghamshire (Watts 1995, 318) and a pewter plate from Stamford held in the British Museum (British Museum Collection online database). A silver finger ring from Thirsk, N. Yorkshire, recorded by the Portable Antiquities Scheme http://finds.org.uk/database/artefacts/record/id/388279) has what appears to be an *iota chi* symbol on it, described as a *chi rho* with the loop missing. A second example from Navenby in Lincolnshire, is a jet ring of the same form as the current one, with a rather crudely incised saltire cross and a line running longitudinally through it (Mann 2011, 107 fig.4.16.2). Two other jet examples are worthy of note: the first from Bagshot in Surrey, bears a *rho* cross (Graham 2002, 211) and the second, from York, bears a saltire cross (Allason-Jones 1996, 37, no.165).

2) **Sf14** Trench 3 Sk.4 (Fig. 40). Iron hoop, tapering to the back but damaged and swelling evenly to form the bezel in which is an almost circular setting of silver; the longitudinal edges being straighter close to the edge of the bezel. The silver setting sits in a hollow in the bezel but seems to overspill it slightly and therefore be slightly proud of it. Despite the damage, the form indicates that the ring belongs to the 'classic' 1st and 2nd century Roman type (Henig Types II and III/ Guiraud Type 2) ultimately derived from Hellenistic prototypes (Johns 1996, 42, figs.3.1 and 3.2). Width of bezel 10mm; diameter of setting 8mm.

Figure 40: Iron ring with silver setting before removal from the finger bone.

Iron rings are relatively uncommon compared to copper alloy ones, with nine in the British Museum catalogue (Manning 1985, 77-78, Pl.33, J1-9) and just one in the large urban assemblage from Colchester, which is of similar form but the setting is missing (Crummy 1983, 50, fig.52, 1793). The shrine site at Higham Ferrers, however, yielded 11 iron finger rings out of a total of 64, although the author was sceptical that the numbers were unusual or that the deposition of iron at a shrine was significant (Scott 2009, 202, Table 5.24). If the burial is 4th century in date, the ring would therefore appear to have already been an heirloom when it entered the ground and the lack of parallels for silver settings might indicate that it was a replacement for an original gemstone or glass setting that had been lost.

Bone Comb

3) **Sf13** Trench 3 Sk4, [3054] (3053). Very fragmentary remains of a double-sided composite bone comb, comprising four pieces of rectangular side plate with iron rivets *in situ*, three with parts of the toothed plate attached. Three other fragments of the toothed plate, with the stubs of teeth visible. Width of side plate 20mm.

Unfortunately the comb is too fragmentary and incomplete for detailed identification beyond saying that it is a late Roman comb of the type found in other late Roman cemeteries such as Lankhills Winchester (Galloway 1979, 247 fig.31.471). Combs have not been previously recorded from a Leicester burial of Roman date, as far as is known.

Rotary quern

4) **Sf12** [3054] (3053) Sk4 Quern fragment used as packing within grave fill to support one end of the coffin.

Grave 6 [3071]

Decorative stud

5) **Sf15** Sk.6 (3070) [3071] located above head. Cu alloy stud with a convex head flattened on top, with down curved edges and slightly raised centre. Short tapering shank is bent. Diameter: 19mm.

A range of similar studs come from Colchester (Crummy 1983, 116, fig.120.3157) and were used to embellish organic material such as leather, or perhaps wooden furniture. It is not clear if it was deliberately placed in the grave or was accidentally incorporated into the grave fill.

6) **Sf18** Sk.6 (3070) [3071]. Cu alloy object (since lost). Described possibly as a brooch in the finds register, but given the presumably late date of the burial this might be unlikely.

Grave 9 (2029)

Hairpins

7) **Sf22**, Sk.9 (2029), close to head. Two bone hairpins of Crummy Type 1, with tapering shafts and plain, flat heads (Crummy 1983, 20, fig.17). Both are poorly preserved with surfaces eroded to expose the cancellous tissue beneath. The shorter pin is better preserved with a flat head and areas of polished surface but the tip is broken; incomplete length 91mm. The head of the second pin is damaged; incomplete length 122mm.

Type 1 bone hairpins are common finds in Roman Leicester with 19 recovered from Causeway Lane (Cooper 1999, 254, fig.121) but along with the more common Type 2, pins with tapering shafts generally date to the later 1st and 2nd century; their greater length associated with the fuller hairstyles of the period.

Hobnails

8) **Sf19** Sk9 (2029), found near feet. Fe hobnails. Ten Manning Type 10 hobnails. Average head diameters 6mm (from X-ray).

Grave 10 [3085] (3086)

Belt fitting

9) **Sf17**, Sk.10 [3085] (3086), located adjacent to the hip. Cu alloy buckle plate and buckle frame with base of iron pin *in situ*. Fitting comprises a rectangular sheet buckle plate, folded over a presumably leather belt and secured by three rivets, one centrally and on the inside edge of the plate. The inside edge and the upper and lower edges of the plate are decorated with a line of raised dots on both outside and inside surfaces. A slot in the plate accommodates the pin held by D-shaped frame with scalloped outside edge. The projection opposite the pin has a grooved pin rest which is mimicked on the other projections with a smaller groove. Length of fitting: 55mm, width of frame: 45mm.

No direct parallel for the scalloped-edge buckle frame has been traced but an example of a D-shaped frame with a rectangular plate with the same arrangement of rivets and bearing lines of raised dots was excavated at Lankhills from Grave 106, dated AD350-370/90; Clarke arguing that rectangular plates become more common towards the end of the 4th century (Clarke 1979, 272, fig.34.126). Late Roman belt fittings are not known from any other burials in Leicester and are often associated with individuals in the military or civil service which may suggest that this middle aged man was of some status.

Needle

10) **Sf16**, Sk.10 [3085] (3086), located slightly above the right shoulder. Cu alloy needle of Crummy's (1983) Type 3 with a groove above and below the eye slot (1983, 67, fig.70.1991). Pin bent halfway down the tapering shaft and tip missing. Incomplete length: 60mm. A number are known from excavations in Leicester (Cooper 1999, 265, fig.128.128) and a 3rd or 4th century date range is suggested by the evidence from Colchester and elsewhere. Located above the right shoulder it is possible that it was used to temporarily secure an item of clothing in the grave such as a cloak, in place of a brooch.

Grave 12 [3090] (3089)

Hairpin

11) **Sf26**. Tr.3 Sk.12 (3089) [3090]. Cu alloy hairpin, bent and nearly complete, with tapering shaft and a wider head comprising three 'reels' or discs with milled edges separated by concave 'spools', surmounted by an ovoid platform on which stands one half of a crescent moon on its back or a pair of horns which extends more widely than the head; the other half broken. Length: 97mm.

A number of hair pins with milled disc heads have been recorded in Leicester, for example from Causeway Lane (Cooper 1999, 258, fig.123.56-57) which fit broadly into Crummy's (1983) Type 2 or Cool's (1990) Group 8, or more specifically Cool's subgroup including others from Leicester. The type appears to be locally-made but the occurrence of an extra

motif on top of the head makes this rather unusual and not closely paralleled, except for the occurrence of an upturned crescent on the top of Cool's Group 27, 'military standard' type pins (Cool 1990, 172, fig.13.1-3). The dating of the Causeway Lane examples together with others of Group 8 from Colchester, make the origin of the type in the later 1st or 2nd century likely, but how long they are produced for is unknown. If the burial is late Roman therefore, the hairpin could have already been an heirloom when it entered the ground.

Coffin nails

Nails were recovered from Graves 1, 2, 4, 6, 7, 9 10, 12 and 13. Nails were individually numbered and x-rayed. The lengths of complete examples are listed below (measured from the x-ray plates). All the nails are typical carpentry nails of Manning 1985 Type 1, with complete examples varying in length from 45mm to 105mm. The recovery of nails by grave is catalogued as follows.

Grave 1 [3049] (3050): nos. 1-5
Grave 2: nos. 6, 7 (75mm), 8
Grave 4 [3054] (3053): nos. 9-14
Grave 6: nos. 15-22
Grave 7 (2032): nos. 23-26 (70mm),
Grave 9 (2029): nos. 27 (75mm), 28 (105mm), 29-38, 45 (80mm), 58-60 plus bag of six fragments.
Grave 10: nos. 39-43, 46-53, 54 (80mm), 57, 61(48mm), 62 (45mm) Two nails
Grave 12 (3089) [3090]: no. 63
Grave 13 (3091) [3092]: nos. 64-65 and one other.

Other Nails
Nails (none complete) all of Manning Type 1 were recovered from (1139), (1162), (2013) x 4, (2026) x 3, (2034) x 5, (3007), Sf29 (3020), (3021) x 2, (3025), (3027) and (3068).

Other Roman Finds

Rotary Quern

[3067] (3066). Edge fragment from Roman Mayen lava quern upper stone with vertical tooling on skirt and oblique tooling on upper surface. Diameter estimated at 400mm; height 48mm.

Roman Coins

Six coins of Roman date were recovered and are catalogued below in chronological order. The earliest is a silver denarius of Julia Domna, wife of Septimius Severus dating to the early third century and found on the pelvis of Skeleton 11, a female of over 46 years. This is a valuable and early coin in this sequence and was probably deliberately placed with the body, perhaps in a purse tied at the waist. The remainder of the coins are of copper alloy and typical later 3rd and 4th century issues.

Catalogue

1) **Sf24** (3087) [3088] Skeleton 11. AR Denarius of Julia Domna. Obv: IIVLIA[. Rev: figure standing. 196-217.
2) **Sf25** (2034) [2033] CuA Radiate Obv: IMP CLAVDIUS AVG. Rev: ANNONA AVG. Claudius II, 268-70
3) **Sf27** (2034) [2033] CuA Radiate. Rev: VI[CTORIA] AVG. victory walking left. Tetricus 271-2.
4) **Sf7** Trench 1 (1172) CuA Obv: Radiate head ?SPES AVG. 3rd century.
5) **Sf23** (2034) [2033] CuA Obv: Helmeted Head VRBS [ROMA]. Rev: wolf and twins. TRP twin stars with a cross between. Constantine AD330-335
6) **Sf28** (3012) Civil War ditch. CuA 4th century illegible.

Medieval Finds

These are considered in broadly chronological order by phase and context.

Pit [1116] (1115) – Leicester Ceramic Phase 9 – c.1250-c.1400

Knives

1) **Sf6** [1116] (1115). Fe whittle-tanged knife blade. Small with tang almost continuous with the back of the blade. Blade edge curving up to tip. Length: 75mm, blade length 55mm.

2) **Sf30** [1116] (1115). Folding knife with Fe blade and bone handle. Blade enclosed within a two-piece handle comprising two bone plates of plano-convex section secured by a single rivet which acts as the hinge or pivot for the blade. Hinged end of the case is squared off, from one side of which extends a stub of iron; probably a thumb piece to facilitate the opening of the blade. Other end of case damaged. Incomplete length 80mm, width: 30mm, thickness: 15mm.

Folding knives are relatively unusual finds but there is a complete example of late 13th-century date from London and another separate blade of late 14th-century date (Cowgill et al. 1987, 106, fig.69.309-310).

Pit [2016] Pit [1128] – Leicester Ceramic Phase 10 – c.1400-c.1550

?Buckle plate

3) **Sf21** [2016] (2014) lower fill, Cu alloy rectangular ?buckle plate. One half of a folded sheet plate with a large central perforation, which appears to have been punched through subsequent to manufacture, and may have been a makeshift fixing for a buckle pin, although the wear does not suggest this. Two other torn perforations at the corners of the inside edge suggest riveting to a presumably leather belt. Length of plate: 33mm, width: 26mm. Two joining fragments from a tapering length of sheet appear to be from another object.

The object is not diagnostic enough to allow any parallels to be drawn but a medieval or late medieval date is likely.

Dress pins

4) **Sf20** [2016] (2014) lower fill. Four Cu alloy dress pins with separate wound wire heads. Three are complete and one missing its head. One has a wound wire head of three coils (length 27mm), one had a globular head formed from two coils (length 22mm), one has a

flat head made from a single coil (length 25mm) and the headless one has a length of at least 30mm.

5) **Sf1** (1122) upper fill. Single Cu alloy dress pin with separate wound wire head of two coils, flattened to form a compressed globe. This example is of heavier appearance than those from (2014) above. Length 37mm.

The use of pins in dressing, for example the securing of headdresses, as well as in tailoring, increases dramatically during the 14th and early 15th centuries (Egan and Pritchard 1991, 297), and these are common finds in Leicester

Lace Chapes

6) **Sf20** [2016] (2014) lower fill. Cu alloy lace chape made from sheet, folded to form a tapered cylinder with a straight, edge to edge seam and a rivet hole at the wide end. Length: 29mm, width: 2mm

7) **Sf1** (1122) upper fill. Two lace Cu alloy chapes as above but the wide end of the shorter example is torn at the rivet hole. Length: 28mm, width 2mm; Length: 24mm, width: 3mm.

Lace chapes were used to bind the ends of leather or silk laces characteristic of the more figure-hugging fashions of the 14th and 15th centuries onwards (Egan and Pritchard 1991, 281) and are also common finds in Leicester

Pit [3022] (3021) upper fill - Leicester Ceramic Phase 10 – c.1400-c.1550

Bone fitting

8) **Sf5** [3022] (3021) upper fill. Bone. Element of a composite object of unknown function, comprising a slightly tapering length of longbone with sawn and polished edges, of trapedzoidal section. The narrow end has a very precisely drilled circular hole (3mm diameter) running longitudinally for about 60% of the object's length (45mm) presumably to accommodate a metal rod. The wide end has two identical sets of grooves at right-angles to each other each with a central semi-circular cut out with a narrow slot in its base and single narrow slots on either side. Length: 71mm, max width: 16mm, max width: 6mm.

The object has been so precisely manufactured that it must be part of a composite mechanism. The narrow slots suggest that they accommodate strings, so perhaps it is part of a musical instrument.

Pit [1158] (1159) – Leicester Ceramic Phase 11 – c.1500-c.1650

9) **Sf2** (1159) upper fill. Cu alloy dress pin shaft without head. Tapering shaft bent. Length: 65mm.

Larger than the pins above, but rather too slight to be a residual Roman hairpin.

Undated: Pit [3033]

10) **Sf3** (3020) [3033] Fe horseshoe. One branch preserved with three ovoid nail holes towards the outer edge visible on x-ray. Incomplete length 110mm, width of web: 24mm.

Unfortunately, not well-preserved enough to date accurately but the more rounded rather than rectangular holes suggest a date before the 14th century. Horseshoes dating before the

Norman Conquest are known but this could not be assigned to that period with any confidence (Clark 1986).

11) **Sf10** (3020) [3033] Fe blade. Un-diagnostic fragment without tang. In complete length: 65mm, width: 20mm.

The Lithics - Lynden Cooper

A total of six worked flints were recovered from five contexts, giving a broad Neolithic to Bronze Age date and identified as follows.

Table 12: The stratified lithics

Context	Type
1178	Truncated serrated blade with visible sickle gloss. Probably Neolithic.
2029	Two secondary flakes.
3008	One tertiary flake.
3012	One secondary flake.
3021	Combination tool scraper/knife of Neolithic or Bronze Age date.

Industrial Remains - Graham Morgan

Evidence for metal working was recovered from four features in Trench 3 and is described below in context order (Table 13). This collection represents evidence for both iron extraction (smelting) and working in the vicinity.

Table 13: Metalworking evidence

Context	Description	gms
(3012) [3131]	Partly vesicular fayalite furnace slag.	36
(3012) [3131]	Fired sandy clay hearth lining, oxidized outer and reduced inner surfaces	11
(3021) [3022]	Lenticular section hearth bottom with vesicular fayalite, rust and charcoal	374
(3021) [3022]	Very dense fayalite tap slag.	552
	Partially vesicular fayalite hearth or furnace slag.	51
(3059) [3060]	Vesicular fayalite with charcoal hearth slag.	71
(3089)	Glassy slag of partially vitrified sand, stone and fuel ash, probably a hearth or furnace residue.	14
(3089) [3090]	Vesicular fayalite hearth slag.	10

Coal and Charcoal - Graham Morgan

Charcoal

Species present include Oak (*Quercus* spp.), Hazel (*Corylus avellana)* or Alder (*Alnus* spp.) and Field Maple (Acer campestre).

Table 14: Charcoal

Context		Dia	Rings	Age	Species
1113		50	18	18	oak
3017		15	16	16	maple
3017		40	16	20	oak
1009		60+	30	40	oak
1122		15	13	13	oak – slow grown
2013		40	8	8	oak – fast grown
1124		10	7	7	hazel
1162	1	60	23	23	ash
1162	1	30	22	22	oak – slow grown
1162	2	60	20	22	ash with a shaped end?
3021		20	18	18	oak – slow grown

Coal

Bituminous type coal was recovered from 1113, 1122, 1159, 2013, 3017, 3021.

Mortar and Plaster - Graham Morgan

Samples of mortar were recovered from contexts across the site and are described below in context order (Table 15).

This collection appears to be mostly render or mortar rather than plaster, although a few pieces of painted plaster (yellow on white) of medieval date are present. The piece containing tile fragments may be residual Roman material but otherwise a medieval or later date is applicable. In the case of the reed impressed render fragments from (3007), one containing a sherd of mottled ware (1650-1770), the building must have been constructed in the later 17th or 18th century at the earliest.

Table 15: Mortar samples

Context	Description
1113	White, <0.1mm, on coarse sandy buff plaster, 8mm thick.
1122	1] White lime render or plaster with some sand, 6mm thick, but smoothed on both faces, perhaps from lath impressions. 2] Off-white coarse sandy plaster with some lime lumps, 10mm thick. cf (3021) 3] Light coloured coarse sandy plaster or render, up to 8mm thick.
1159	Light coloured coarse sandy plaster or render with lath or stone impressions, up to 30mm thick.
1162	Slaked lime lump, with no obvious sand, with wood impressions
1173	1] Coarse sandy pale buff mortar with lime lumps, 40mm thick. cf (3029) 2] Light coloured coarse sand and gravel mortar with lime lumps, 50mm thick.

	3] Coarse sand and gravel mortar with tile fragments, 35mm thick. [Residual Roman?]
3003	1] Soft buff poorly mixed mortar with sand and lime lumps, 50mm thick. 2] A large piece of grey-green micaceous sandstone with a coarse sand mortar containing large white lime lumps.
3007	1] Coarse sandy mortar or render with brown silty lumps, showing impressions of stones, up to 50mm thick. 2] Coarse sandy plaster with reed impressions, 6 – 30mm thick. Some pieces show the same brown silty material as above. One sample contains a fragment of black glazed pottery, a sherd of mottled ware (Leics Fabric EA3) dating between 1650 and 1770 suggesting that the building was constructed in the later 17th or 18th century (Deborah Sawday pers. comm.) (Fig.41). 3] Yellow, <0.1mm, on white, 0.1mm, on pale buff sandy plaster, 6 – 30mm thick, with reed impressions. Some pieces show traces of hair or fibre impressions, perhaps from reed "flowers".
3012	Off-white coarse sandy plaster or mortar 25mm thick.
3017	Light weight off-white lime plaster with sand traces, 25mm thick. cf 1122
3018	Pale coloured coarse sandy mortar or render, 10 – 30mm thick, with lath impressions? This is possibly the render from a lath wall or ceiling.
3020	1] Light coloured coarse sandy plaster or render with lath or stone impressions, up to 30mm thick. cf (1159) 2] Off-white lime plaster with some sand, up to 15mm thick.
3021	Coarse sandy light buff mortar or render with a smoothed surface, containing some lime lumps, 35mm thick. This sample also contains a piece of brown to buff partly calcined lias limestone.
(3029) [3022] (3050) [3049] sk 1 fill	Coarse sandy pale buff mortar or render with white lime or chalk lumps, 50mm thick. Coarse sandy white plaster with lime lumps, 10mm thick.
(3089) [3090]	Coarse sand and gravel mortar or render, 16mm thick.

Figure 41: Render of 18th century date showing reed impressions

Osteological Analysis of Human Remains - Malin Holst

Introduction

In October 2013 York Osteoarchaeology Ltd was commissioned by University of Leicester Archaeological Services to carry out the osteological analysis of thirteen skeletons from Oxford Street, Leicester and a further individual from the opposite side of the road, on Newarke Street (NGR SK 586038). The remains were recovered in 2013 during an archaeological evaluation to determine the potential for surviving archaeological deposits in an area heavily disturbed by cellars belonging to 19th and 20th century industrial buildings, in advance of a development scheme.

While the burials derived from two different phases of excavation (thirteen burials from Oxford Street; A2.2013 and one from Newarke Street; A7.2013), all the burials belong to a large extra-mural late 4th century Roman cemetery, located south of the extant remains of the Roman settlement, approximately 130m from the town's south gate. Because of their interment in the same cemetery, the fourteen individuals have been considered together throughout the report. As both sites produced skeletons labelled Skeleton 1, the Newarke Street skeleton will be referred to as Skeleton 1.A7.

Each of the excavated graves contained a single inhumation. Burial positions varied widely within the assemblage (Table 16), whereas orientations were generally uniform. Eleven of the fourteen burials were orientated east to west, however, the positioning of the body within the grave was a little more varied; nine were buried with their heads to the west and the other two lay with their heads to the east. Skeleton 2 (a juvenile) had been decapitated and was orientated north to south with the head below their feet at the south end of the grave. This individual was also accompanied by two pottery vessels, also placed at their feet. Another juvenile (Skeleton 7) was also afforded an unusual burial rite. This individual consisted only of the remains of a skull, and was believed by the excavator to be a skull in a box burial. Skeleton 9 lay in a grave orientated north-west to south-east, with their head at the north-western end. Positions of the bodies within the graves varied; eight individuals were in an extended supine position (on their backs), one individual was extended and prone (lying face down), three of the skeletons lay on their left side, one of which was slightly flexed and the remaining two burial positions could not be discerned.

Table 16: Summary of archaeological information of inhumed skeletons

Skeleton No	Cut No	Site	Orientation (head first)	Position	Burial type	Finds	Date
1.A7	55	A7.2013	West to east	Extended supine	Simple	Two granite rocks, on south edge of grave	Early C4th
1	3049	A2.2013	East to west	Extended supine, right upper leg disturbed	Simple, (nails found in fill may suggest coffined)	Tile and residual pottery fragments	Early C4th
2	3048	A2.2013	North to south (head south at feet)	Slightly flexed on left side, head on feet	Possibly coffined	Nene valley and grey ware broken pots at feet	Early C4th

3	3052	A2.2013	West to east	Uncertain (only partial skull remains)	Simple	None	Early C4th
4	3054	A2.2013	West to east	Extended supine	Coffined with stone packing around head of grave	Two rings on left hand, quern stone fragment used as packing, iron object beneath skull	Early C4th
5	3062/3075	A2.2013	West to east	Extended supine	Coffined with stone packing between the coffin and the grave cut	None	Early C4th
6	3071	A2.2013	East to west, head looking south	On left side	Coffined	Copper alloy disc above head (SF15) copper alloy object beneath head (SF 18) pottery in backfill	Early C4th
7	2025	A2.2013	Unclear (skull fragments only)	Unclear (skull only)	Coffined skull only, found in a much larger grave, nails around skull suggest skull in a box	Pottery in backfill	Early C4th
8	3082	A2.2013	West to east	Extended supine	Simple, possibly coffined but no nails recovered, stone packing around the edge of the cut.	Residual pottery and tile	Early C4th
9	2027	A2.2013	North-west to south-east	Extended supine	Coffined	Hair pins near skull (SF22), hobnails near feet (SF19), residual pottery fragments in backfill	Early C4th
10	3085	A2.2013	West to east	Extended prone	Coffined	Bent pin on right shoulder (SF16) Bronze buckle (SF17) location unclear	Early C4th
11	3088	A2.2013	West to east (head looking north)	Extended, torso and skull on left side	Simple, possibly coffined	Coin in pelvis (SF24)	Early C4th
12	3090	A2.2013	West to east (head looking south)	Extended supine	Coffined	Copper alloy hair pin (SF26) could belong to Sk 12 or Sk13	Early C4th
13	3092	A2.2013	West to east	Extended supine	Coffined	Copper alloy hair pin (SF26) could belong to Sk 13 or Sk12	Early C4th

Previous excavations carried out at the same cemetery in 1993 (Cooper and Buckley 1996) recovered 38 individuals, in an area immediately east of the current evaluation, and further excavations carried out in 2002 (Derrick 2009) revealed 30 more inhumations further east. Excavations at another extramural cemetery, to the east of the fortress at Clarence Street (approximately 0.7 miles to the northeast of Oxford and Newarke Street) uncovered another 91 inhumations from the mid-3rd to 4th century (Gardner 2005), while an archaeological evaluation at Western Road, (approximately 0.8 miles southwest of Oxford Street and Newarke Street) recovered seventeen more inhumations in 2010 (Morris). Data from these cemetery publications will be used here for comparative analysis.

Aims and Objectives

The aim of the skeletal analysis was to determine the age, sex and stature of the skeletons, as well as to record and diagnose any skeletal manifestations of disease and trauma.

Methodology

The skeletons were analysed in detail, assessing the preservation and completeness, calculating the minimum number of individuals present as well as determining the age, sex and stature of the individuals (Appendix A). All pathological lesions were recorded and described.

Osteological Analysis

Osteological analysis is concerned with the determination of the identity of a skeleton, by estimating its age, sex and stature. Robusticity and non-metric traits can provide further information on the appearance and familial affinities of the individual studied. This information is essential in order to determine the prevalence of disease types and age-related changes. It is crucial for identifying gender dimorphism in occupation, lifestyle and diet, as well as the role of different age groups in society.

Preservation

Skeletal preservation depends upon a number of factors, including the age and sex of the individual as well as the size, shape and robusticity of the bone. Burial environment, post-depositional disturbance and treatment following excavation can also have a considerable impact on bone condition. Preservation of human skeletal remains is assessed subjectively, depending upon the severity of bone surface erosion and post-mortem breaks, but disregarding completeness.

Preservation was assessed using a grading system of five categories: very poor, poor, moderate, good and excellent. Excellent preservation implied no bone surface erosion and very few or no breaks, whereas very poor preservation indicated complete or almost complete loss of the bone surface due to erosion and severe fragmentation.

The preservation of the skeletons ranged from good to very poor (Table 17); indeed the preservation varied immensely within individual skeletons, for example the upper limbs and torso of Skeleton 12 survived in good condition, whereas the lower limbs of the same individual were in very poor condition.

Table 17: Summary of osteological and palaeopathological results

Sk. No	Preservation	Completeness	Age	Sex	Stature	Pathology
1.A7	Good	30%	36-45	Male	163.3cm ± 2.99cm	DJD in the right shoulder, elbow, hip, knee, ankle and foot, *osteochondritis dissecans* on right distal tibia
1	Moderate	90%	9-12	-	-	Bilateral *cribra orbitalia*, maxillary sinusitis, periosteal reaction on the left maxilla, right frontal. Slight calculus, caries, DEH
2	Good	90%	2-3	-	-	Periosteal reactions on occipital, mandible, sphenoid, maxillae. Calculus
3	Good	5%	18+	Female?	-	Osteoarthritis on C7; mild DJD on C5, 6 and T1. Slight to moderate calculus, DEH, mild periodontal disease
4	Poor	80%	26-45	Female	159.4 ± 4.30cm	Cribra orbitalia, maxillary sinusitis, mild DJD in the cervical and upper thoracic spine, right wrist, both hips, OA in lumbar spine, sacrum and right radius, tuberculoid lesions in the spine, Potts spine; fusion of L2 and L3, lytic lesion in L2, fusion of L1 and T12, bodies of T11 and T12 almost entirely destroyed, T10 and T9 fused, T7 and T6 fused, lytic lesion in T4, T5, periosteal reaction on T3, left ribs 4-10, right ribs 5-10, left tibia, sinusitis. Calculus
5	Moderate	80%	26-35	Male	179.8 ± 2.99cm	Spina bifida occulta, (S1), DJD in the left wrist, right hip, left ankle, probable tuberculoid changes to the spine, fusion of L4 and L5, periosteal reaction on calcaneus. Calculus, DEH, AMTL, periodontal disease
6	Good	15-20%	18-25	Male	-	*Cribra orbitalia*, periosteal reaction on frontal bone. Calculus, caries AMTL, periodontal disease, and tooth chipping
7	Good	10%	1-3	-	-	Periosteal reaction on right temporal, occipital, parietals, frontal
8	Moderate	75%	46+	Male	164.4 ± 2.99cm cm	Bilateral DJD on the manubrium, hamates, proximal femora, distal tibiae, distal fibulae, and calcaneus, left

						distal radius, right lunate, Schmorl's node, bifid spinous process of S1, possible DISH; fusion of anterior longitudinal ligament of T11-9, general bone forming activity
9	Good	95%	26-35	Female	158.8 ± 3.55cm	Lumbar ribs (bilateral), DJD on mid thoracic vertebrae, shoulders and left arm, Schmorl's nodes, periosteal reaction on the tibiae, fibulae, and femora, right calcaneus left pelvis, both humeri, four right ribs (probable pulmonary osteoarthropathy). Calculus, moderate periodontal disease, DEH, dental chipping
10	Poor	95%	26-35	Male	172 ± 2.99 cm	Schmorl's nodes, DJD in the cervical and upper thoracic vertebrae, left arm and right hip, periosteal reactions on occipital, frontal and parietals, femora, right humerus; *osteochondritis dissecans* on proximal 1st foot phalanx for the left MT1, spina bifida occulta S2,3 and 4 with mal-union of S1, asymmetry of transverse foramina of C6; asymmetry between the humeri - possible healed fracture, calculus periodontal disease, caries DEH, chipping, abscess
11	Moderate	90%	46+	Female	159.6 ± 3.55cm	Mild DJD in the spine, shoulders and hip, wedge shaped T1 - possible crush fracture, periosteal reactions on frontal and parietal, right lower ribs, exhibit an acute angulation at the angle of the rib reflecting possible binding Calculus, five congenitally absent teeth, retention of two deciduous teeth, AMTL, periodontal disease, DEH, caries
12	Poor	85%	46+	Male	161.8 ± 2.99cm (Caucasian) or 165.8 ± 3.53cm (African)	Well-healed fracture to the right distal radius, possible trauma of right femur/right tibia, secondary OA, periosteal reaction on mandible, zygomatics, maxillae, frontal, DJD on right 1st and 2nd metatarsals, torsion left humerus – possibly a fracture
13	Moderate	70%	26-35	Female	158.2 ± 3.55cm	Schmorl's nodes, DJD in spine, right shoulder, right and left hip

Key: DJD – degenerative joint disease, OA – osteoarthritis, DEH – dental enamel hypoplasia, AMTL – ante-mortem tooth loss, C – cervical vertebra, T – thoracic vertebra, L – lumbar vertebra, S – sacral vertebra

Completeness of the skeletons ranged from 5% to 95% (see Table 17); the majority of skeletons (57%) were over 80% complete, and a further two (14%) were between 50-75% complete. The incomplete nature of the remaining four skeletons (33%) was by and large caused by truncation by later features, although Skeleton 7 may have been intentionally deposited as an incomplete individual.

Minimum Number of Individuals

A count of the 'minimum number of individuals' (MNI) recovered from a cemetery is carried out as standard procedure in osteological reports on inhumations in order to establish how many individuals are represented by the articulated and disarticulated human bones (without taking the archaeologically defined graves into account). The MNI is calculated by counting all long bone ends, as well as other larger skeletal elements recovered. The largest number of these is then taken as the MNI. The MNI is likely to be lower than the actual number of skeletons which would have been interred on the site, but represents the minimum number of individuals which can be scientifically proven to be present.

Based on the bone count, a minimum of twelve individuals overall were present in the Oxford and Newarke Street burials, slightly less than the number of individuals identified archaeologically. These included two young juveniles, identified by two right orbital rims (part of the eye socket), one older juvenile, identified by numerous elements including both left and right unfused femur, tibia and fibula. A further nine adults were identified by nine right ischiae (part of the pelvis), proximal ulnae and proximal tibiae.

Assessment of Age

Age was determined using standard ageing techniques, as specified in Scheuer and Black (2000a; 2000b) and Cox (2000). Age estimation relies on the presence of the pelvis and uses different stages of bone development and degeneration in order to calculate the age of an individual. Age is split into a number of categories, from foetus (up to 40 weeks in *utero*), neonate (around the time of birth), infant (newborn to one year), juvenile (1-12 years), adolescent (13-17 years), young adult (ya; 18-25 years), young middle adult (yma; 26-35 years), old middle adult (oma; 36-45 years, mature adult (ma; 46+) to adult (an individual whose age could not be determined more accurately as over the age of seventeen). The categories defined here should perhaps be taken as a general guide to the relative physiological age of the adult, rather than being an accurate portrayal of the real chronological age; no doubt many of those aged '46+' would in actuality have been in their sixties, seventies or eighties when they died.

It was possible to determine the age at death of all of the individuals recovered from Oxford and Newarke Street, although in the case of one female and two males aging was based solely on dental attrition, as no other aging criteria survived. The skeletons from Oxford and Newarke Street consisted of eleven adults (78.6%) and three non-adults (21.4%). A higher proportion of males (50%) reached older adulthood (46+ years), compared to 20% of females (see Table 2). However, in the case of both sexes, the age at death appears to peak at middle adulthood (26-35 years, 66% of males and 60% of females). Only one individual died in young adulthood, male Skeleton 6. The non-adults were all juveniles, aged between one and twelve years.

At Newarke Street, a greater proportion of males survived into mature adulthood compared to women (Jacklin and Chapman 2009), similar to Western Street. Unfortunately, age classifications for non-adults from this site were not comparable. Neonates and infants were present at Clarence Street (Waldron 2005), where they made up 6.6% of the overall population, and a greater number of males reached mature adulthood than females. A similar pattern of adult mortality was observed at Newarke Street (Wakely and Carter 1996) and a small number of infants was also present.

Sex Determination

Sex determination was carried out using standard osteological techniques, such as those described by Mays and Cox (2000). Assessment of sex in both males and females relies on the preservation of the skull and the pelvis and can only be carried out once secondary sexual characteristics have developed, during late puberty and early adulthood.

Among the analysed skeletons, the adults were almost evenly divided between the sexes, with five females and six males (55% and 45% respectively of the eleven adults). It was possible to determine the sex of all the adult individuals.

Metric Analysis

Stature depends on two main factors, heredity and environment; it can also fluctuate between chronological periods. Stature can only be established in skeletons if at least one complete and fully fused long bone is present, but preferably using the combined femur and tibia. The bone is measured on an osteometric board, and stature is then calculated using a regression formula developed upon individuals of known stature (Trotter 1970). Leg measurements were obtained from the femora and tibiae and used to calculate robusticity (*meric* and *cnemic* indices).

Stature could be estimated for nine (82%) of the analysed adult skeletons, with fragmentation or the incomplete nature of the remains prohibiting the estimation of stature for two of the adults. The females ranged in height from 158cm to 160cm, with a mean stature of 159cm (see Table 2). This was consistent with the female average living height from the 1993 excavations at Newarke Street (Wakely and Carter 1996) of 159cm, but was lower than the average height of the females excavated during 2002 at Newarke Street (Jacklin and Chapman 2009) of 165cm (although this was only based on two individuals). The mean female stature at Oxford Street/Newarke Street directly corresponds with the Roman female mean (159cm) given by Roberts and Cox (2003).

The living height of the males varied more widely and was complicated by the fact that one individual (Skeleton 12) exhibited certain morphological traits which might suggest they were of African descent. The formula for estimating stature depends upon the individual's ancestry; as a result the stature of Skeleton 12 was calculated using both formulae. Estimated heights for the males ranged from 161cm to 180cm, with a mean of 168.8 cm when Skeleton 12's ancestry is treated as Caucasian or with a mean of 168.0cm when Skeleton 12's ancestry is treated as African. This was within the male range of heights observed previously at Newarke Street (Jacklin and Chapman 2009) and slightly above the mean (167cm). While the male range from excavations at Newarke Street in 1993 (Wakely and Carter 1996) was between 161-176cm, with a mean of 171cm, which was slightly taller than those examined in

the current study. The Oxford and Newarke Street males also fall slightly under the national mean (169cm) given for late Roman sites by Roberts and Cox (2003).

The *meric* index is a method of calculating the shape and robusticity of the adult femoral shaft. Calculations could be made for nine right femora (four female and five male) and eight left femora (three female five male). Just under 86% of the female femora fell into the *platymeric* range (broad and flat), with the remainder being *eurymeric* (rounded). Male femora were also largely *platymeric* with 70% falling into the board and flat range; the remaining 30% were *eurymeric.*

The *cnemic* index of the tibiae was calculated in order to establish the degree of tibial shaft flatness. Calculations could be made for eight right tibiae (three female and five male) and six left tibiae (three female three male). All of the tibiae were *eurycnemic* (broad).

Very few cranial indices could be measured due to the heavily fragmented nature of the crania present. Of the eight adults with crania, only three could be measured for indices pertaining to the facial skeleton (one female and two males).

One female fell into the *leptorrhinic* (wide nasal aperture) range of the nasal index, while the only male whose nasal index could be measured was *mesorrhinic* (average). The results of the orbital index revealed that the female had *hypsiconchic* (narrow orbits) and the only other individual to have measurable orbits (a male) was *chamaeonchic* (had wide orbits). The maxilloalveolar index provided mixed results among the measurable individuals; two individuals (a female and male) had *brachuranic* maxillae (broad), while the third individual (a male) had a *leptostaphyline* palate (narrow). Finally, the palatal index revealed that one individual (a female) had a *leptostaphylic* (narrow) palate and a second individual (a male) had a *mesostaphylinic* (average/medium) palate.

Non-Metric Traits

Non-metric traits are additional sutures, facets, bony processes, canals and foramina, which occur in a minority of skeletons and are believed to suggest hereditary affiliation between skeletons (Saunders 1989). The origins of non-metric traits have been extensively discussed in the osteological literature and it is now thought that while most non-metric traits have genetic origins, some can be produced by factors such as mechanical stress (Kennedy 1989) or environment (Trinkhaus 1978).

A total of thirty cranial (skull) and thirty post-cranial (bones of the body and limbs) non-metric traits were selected from the osteological literature (Buikstra and Ubelaker 1994, Finnegan 1978, Berry and Berry 1967) and recorded. The disarticulated bones were also scanned for non-metric traits.

Numerous cranial and post cranial non-metric traits were identified amongst the individuals from Oxford and Newarke Street, Leicester. *Ossicles* (additional bones in the sutures) were present in two thirds of the left and right lambdoid sutures (at the back of the cranium). In two individuals the ossicles were so large that they occupied a large portion of the occipital bone (Figure 42). Bennett (1965) has suggested that the formation of *ossicles* in this suture may be related to stresses placed on the growing cranium during foetal life and early infancy. *Ossicles* were more prevalent in males than females at Oxford and Newarke Street.

Figure 42: Ossicle in lambdoid (R) Sk 9

One individual also exhibited an *ossicle* at the left parietal notch. *Foramen of Huschke* (a small hole below the ear) and *precondylar tubercles* (nodule of bone at the base of the skull) were equally common, affecting 25% of the population. *Mastoid foramina* (holes around the ear bone area) tended to be *extrasutural*, and *accessory supraorbital foramen* (small holes above the eye sockets) were more frequently observed on the right side. Other traits were also present (Table 18).

Table 18: Cranial non-metric traits (adults)

Midline Traits	Trait Present	Part Present	%
Ossicle at Lambda	0	8	0%
Ossicle at Bregma	0	7	0%
Metopic Suture	0	9	0%
Palatine Torus	1	5	20%
Precondylar Tubercle	4	8	50%

Paired Traits	Right			Left		
	Trait Present	Part Present	%	Trait Present	Part Present	%
Highest Nuchal Line	0	6	0%	0	6	0%
Lambdoid Ossicle	3	5	60%	3	5	60%
Coronal Ossicle	0	7	0%	0	7	0%
Ossicle at Asterion	0	3	0%	0	4	0%
Ossicle at Parietal Notch	0	3	0%	1	5	20%
Ossicle at Pterion	0	3	0%	0	4	0%
Parietal Foramen	3	6	50%	3	6	50%
Auditory Torus	0	8	0%	0	8	0%
Foramen of Huschke	2	8	25%	2	8	25%

Mastoid For. Extrasutural	4	7	57.1%	7	7	100%
Sutural Mastoid Foramen	0	5	0%	1	4	25%
Open Post. Condylar Canal	2	5	40%	1	4	25%
Double Condylar Facet	0	6	0%	0	5	0%
Double Ant. Condylar Canal	3	6	50%	2	5	40%
For. Ovale Incomplete	1	3	33.3%	1	2	50%
Open For. Spinosum	1	4	25%	1	2	50%
Access. Less. Palat. For.	1	2	50%	0	1	0%
Maxillary Torus	2	7	28.6 %	1	7	14.3%
Mandibular Torus	1	8	12.5%	2	9	22.2%
Zygomatic. Facial For. Abs.	0	5	0%	0	4	0%
Access. Infra-orb. For.	2	5	40%	1	3	33.3%
Access. Supraorbital For.	4	9	44.4%	2	7	28.6%
Bridging Supraorbital Notch	2	8	25%	2	6	33.3%
Anterior Ethmoid For. Ex.	0	1	0.0%	1	3	33.3%
Posterior Ethmoid For. Ex.	0	0	0%	1	112	50%

Double anterior calcaneal facets and *double inferior talar facets* (differences in the shape of the joints of the heel) were common, affected 56% of tali and 66% of calcanei. Bipartite *transverse foramina* (double rather than single holes in the neck vertebrae) were also common, as was *Plaque* (roughened area of bone on the neck of the femur) and *hypotrochanteric fossa* (groove in the back of the femur). Other traits were less frequently observed (Table 19).

Table 19: Post-cranial non-metric traits (adults)

Midline Traits	Trait Present	Part Present	%
Sternal Foramen	0	1	0 %

Paired Traits	Right			Left		
	Trait Present	Part Present	%	Trait Present	Part Present	%
Lateral Atlas Bridging	0	5	0%	0	6	0%
Double Atlas Facet	2	7	28.6%	1	6	16.6%
Posterior Atlas Bridging	0	7	0%	0	7	0%
Transverse For. Bipartite	2	4	50%	1	4	25%
Suprascapular Foramen	4	6	66.6%	3	5	60%
Accessory Acromial Facet	0	3	0.0%	0	0	0%
Circumflex Sulcus	1	2	50%	2	4	50%
Supracondyloid Process	0	10	0 %	0	8	0%
Septal Aperture	1	8	12.5%	1	6	16.6%
Accessory Sacral Facet	0	1	0%	0	2	0%
Acetabular Crease	1	9	11.1%	1	7	14.3%
Allen's Fossa	1	6	16.6%	2	5	40%
Poirier's Facet	2	5	40%	1	4	25%
Plaque	3	1	42.9%	1	6	16.6%

Hypotrochanteric Fossa	3	9	33.3%	3	7	42.9%
Exostosis in Troch. Fossa	2	6	33.3%	2	4	50%
Third Trochanter	0	7	0%	1	7	14.3%
Emarginate Patella	0	4	0%	0	4	0%
Vastus Notch	0	4	0%	0	4	0%
Vastus Fossa	0	4	0%	0	4	0%
Med. Tib. Squatting Facet	1	9	11.1%	0	8	0%
Lat. Tib. Squatting Facet	1	9	11.1%	1	9	11.1%
Peroneal Tubercle	4	5	80%	1	3	33.3%
Double Ant. Calc. Facet	5	8	62.5%	5	7	71.4%
Absent Ant. Calc. Facet	0	7	0%	0	7	0%
Double Inf. Talar Facet	4	8	50%	5	8	62.5%
Med. Talar Facet	0	9	0%	0	8	0%
Lat. Talar Extension	0	9	0%	0	8	0%
Os Trigonum	6	9	11.1%	0	8	0%

The incidence of some non-metric traits may suggest a shared genetic heritage, where rarer traits were shared amongst skeletons; their distribution throughout the cemetery was examined to see if they were located within the same area, however, individuals with shared traits appeared to be randomly distributed throughout the cemetery.

Conclusion

The skeletal remains were on the whole moderately preserved and were largely complete. Osteological investigation has shown that a lower than average proportion of non-adults for the period was recorded, with youngest age groups (foetuses and neonates) being absent. Other than this, the small group contained a wide age range, extending from one year old to mature adulthood. The majority of adults are aged between 26 to 35 years. The non-adults were all in the juvenile category, aged from one to twelve years. The adults were almost evenly divided between males and females. The living height of the male adult population was slightly below the national average for the Roman period, while the females were of average Roman height. A number of shared non metric traits amongst the skeletons suggest a shared genetic heritage among some of the individuals, although familial groups or plots within the cemetery were not visible.

Pathological analysis

Pathological conditions (disease) can manifest themselves on the skeleton, especially when these are chronic conditions or the result of trauma to the bone. The bone elements to which muscles attach can also provide information on muscle trauma and excessive use of muscles. All bones were examined macroscopically for evidence of pathological changes.

Congenital Conditions

Heredity and environment can influence the embryological development of an individual, leading to the formation of a congenital defect or anomaly (Barnes 1994). The most severe defects are often lethal, and if the baby is not miscarried or stillborn, it will usually die shortly after birth. Such severe defects are rarely seen in archaeological populations, but the less severe expressions often are, and these individuals will usually have been unaware of

their condition. The frequency with which these minor anomalies occur may provide information on the occurrence of the severe expressions of these defects in the population involved (Barnes 1994). It may also provide information on levels of maternal health (Sture 2001).

Lumbar Ribs

Normally, there are twelve ribs on each side of the body, each attaching to one of the twelve thoracic vertebrae. Occasionally, there are ribs that attach to the seventh cervical or first lumbar vertebra. Skeleton 9 (young middle adult female) had two lumbar ribs (Fig. 43). Examination of the thoracic vertebrae revealed that each vertebral body possessed an articular facet for a rib, suggesting that there had not been any border shifting, and that the two small ribs were accessory ribs. Lumbar ribs were found in 0.9% of patients in a clinical study (Merks *et al* 2005). It is unlikely that the individual would have known about the anomaly.

Figure 43: Lumbar ribs, Sk 9

Cleft Neural Arches

Cleft (open) neural arches occur when the two halves of the neural arch, the part of the vertebra, which surrounds and protects the spinal cord, fail to unite during development (Barnes 1994). The gap in the bone is filled with a tough fibrous tissue in life and so the spinal cord remains protected and these defects are asymptomatic. They are usually seen at the border regions between different vertebral types, particularly in the lumbo-sacral region when the entire sacrum may be involved (*ibid*). Cleft neural arches are often referred to as *spina bifida occulta*. Cleft neural arches were seen in two individuals, both young middle adult males. Skeletons 5 and 10 both had clefts in the arches of the sacral vertebrae, in Skeleton 10 the second, third, and fourth neural arches were cleft (Fig. 44), and the first vertebra was bifid, while in Skeleton 5 only the first sacral vertebra was cleft. The frequency of *spina bifida occulta* among the adult population was 66.6% of complete or nearly complete adult sacra. This figure is considerably higher than the maximum of 25% of the population suggested by Barnes (*ibid*), but the sample is small. *Spina bifida occulta* was observed in one individual from Newarke Street (Wakely and Carter 1996).

Figure 44: *Spina Bifida Occulta* in S2-4 of Sk 10

Metabolic Conditions

Humans require an adequate supply of nutrients during childhood to support normal growth and development. Particular conditions are associated with the lack of specific nutrients, for example scurvy results from a diet lacking in vitamin C (found in fresh fruit and vegetables, and marine fish) and rickets from a lack of vitamin D (produced by the body during exposure to sunlight). Diagnosis of nutritional deficiencies in ancient populations is complicated by the fact that the skeletal changes can be difficult to diagnose, and that nutritional deficiencies tend not to occur in isolation (a diet deficient in one nutrient is very often deficient in others). In addition, many of the skeletal changes that develop in a child as a response to nutritional deficiency will be largely remodelled by the time the individual reaches adulthood (Ortner 2003, Lewis 2007).

Cribra Orbitalia and Anaemia

Cribra orbitalia, or fine pitting of the orbital roof, tends to develop during childhood, and often recedes during adolescence or early adulthood. Until recently, it was thought to be related to iron deficiency anaemia, a condition with complex causes linked to the environment, hygiene and diet (Stuart-Macadam 1992). However, a recent study has suggested that other forms of anaemia are more likely causes (Walker *et al* 2009). These include megaloblastic anaemia, which results following a diet deficient in Vitamin B_{12} (found in animal products) and/ or folic acid, and haemolytic anaemia (e.g. sickle cell anaemia and thalassemia, found in areas of the Old World prone to malaria). It was also suggested that chronic infections and scurvy (Vitamin C deficiency) may have led to the development of *cribra orbitalia* in Europe (*ibid*). *Cribra orbitalia* is commonly observed in archaeological populations, particularly associated with agricultural economies (Roberts and Cox 2003), and is often used as an indicator of general stress (Lewis 2000, Roberts and Manchester 2005).

Ten adult and four non-adult eye orbits were assessed for the presence or absence of *cribra orbitalia*. It was observed in all (100%) of the non-adult orbits available for examination. Just under one third of the adults with orbits available for examination were affected (Table 20). Males were just as likely to be affected as females. However; juveniles were more frequently affected than adults, suggesting that individuals affected with *cribra orbitalia* were less likely to reach adulthood or alternatively, that the lesions remodelled in adults.

Eight individuals from Newarke Street (Wakely and Carter 1996) had *cribra orbitalia*, providing a crude prevalence rate of 21% of the population. A further five individuals excavated from the Oxford Street cemetery in 2002 were affected, providing a prevalence rate of 28% of the population (Jacklin and Chapman 2009). A further individual, an immature skeleton, recovered from the Clarence Street excavations (Waldron 2005) was the only individual from the assemblage to exhibit *cribra orbitalia*, providing a crude prevalence rate of 1.1%. This suggests that the condition was unusually prevalent in the Oxford Street non-adults, particularly compared with the average Roman prevalence rate of 9.64% (Roberts and Cox 2003).

Table 20: Prevalence of *cribra orbitalia*

Age/Sex	Frequencies			Skeletons
	Right Orbit	Left Orbit	Individuals	
Males	1/3 (33.3%)	1/3 (33.3%)	1/4 (25.0%)	SK 6
Females	1/2 (50.0%)	0/2 (0.0%)	1/3 (33.3%)	SK 4
Total Adults	2/5 (40.0%)	1/5 (20.0%)	2/7 (28.6%)	
Juveniles	**3/3 (100%)**	1/1 (100%)	3/3 (100%)	SK 1A2, SK 2, SK7
Total Individuals	5/8 (62.5%)	2/6 (33.3%)	5/10 (50.0%)	

Scurvy

Scurvy develops following a prolonged deficiency in Vitamin C, which is found in fresh fruits and vegetables, as well as in marine fish. It is important to bear in mind that cooking food will destroy a large percentage of the Vitamin C it contains (Ortner 2003, 384). According to Aufderheide and Rodríguez-Martín (1998) it will take one to three months for the first symptoms to appear, if the consumption of Vitamin C is stopped completely. Children and infants are more likely to develop scurvy than adults, and the skeletal changes are usually most severe in infants. Ortner (2003, 384) has reported that the highest prevalence of scurvy occurs among infants between eight to ten months of age, although Lewis (2007, 127) indicates a broader age bracket of six months to two years.

One of the non-adults, Skeleton 7 (juvenile 2-3 years old), displayed skeletal changes frequently attributed to scurvy (Ortner 2003, 384-387). These included woven bone and fine porotic bone on the external and internal surfaces of many of the cranial bones. However; the post-cranial skeleton of the juvenile did not survive and as such it was not possible to observe whether or not manifestations of the disease seen elsewhere in the axial skeleton were present, and as such a differential diagnosis cannot be made. A prevalence rate of 0.03% has been recorded for scurvy for the Roman period (Roberts and Cox 2003).

New bone formation was present on the external surface of the right occipital where a hyper-porotic plaque like layer of bone was evident adjacent to the suture and on the right temporal, where porotic plaque-like bone with vascular impressions extended from the superior margin of the external auditory meatus (ear hole), along the zygomatic process and supra mental crest. Bilateral new bone formation was also evident on the parietals; the left was affected along the temporal articulation (Figure 45) and the right along the coronal and sagittal sutures, where porotic, plaque like new bone formation occurred. Similar bone was also observed on a fragment of left frontal bone along the coronal suture.

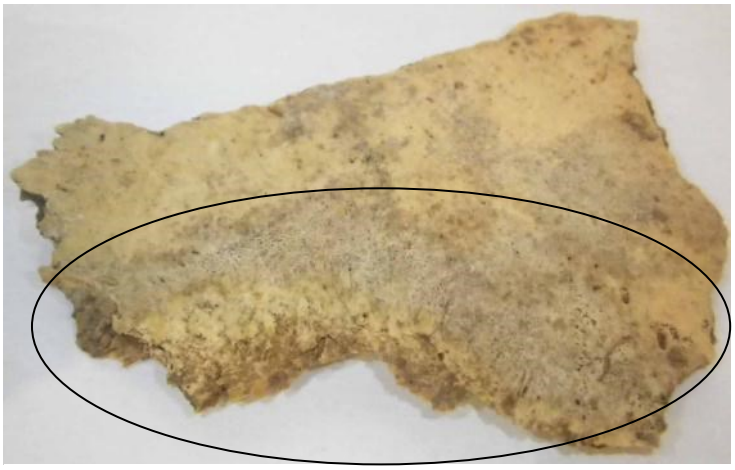

Figure 45: Porotic plaque like bone along temporal articulation, left parietal, SK 7

Disorganised porotic woven bone was also identified in the right orbit of the frontal bone. The endocranial lesions were visible on the frontal bone along the frontal crest. A further four unidentifiable vault fragments exhibited dense, disorganised, plaque-like bone on the endocranial surface, adjacent to the sutural margins. While the lesions cannot be definitively ascribed to scurvy, the bone formation does bear a resemblance to the type and distribution of lesions encountered in the cranial bones of individuals suffering from scurvy (Ortner 2003).

Trauma

The evidence for trauma in archaeological populations is restricted to that visible in the skeletal remains, unless soft tissue is preserved (Roberts and Manchester 2005, 85-86). Therefore, most of the soft-tissue injuries sustained by archaeological populations will be invisible, although occasionally soft tissue injuries can be inferred though ossification of the tissues at the site of damage, known as *myositis ossificans* (*ibid*). Much of the evidence for trauma in archaeological populations focuses on fractures to the bones (Roberts and Manchester 2005, 84-85), although long standing well-healed fractures may be hard to detect (Jurmain 1999, 186).

Fractures

Two adults had one or more bones fractured during life (18.2% of all adults), with the total number of bones fractured being two. These figures are high compared to the Romano-British average, of 10.7% of individuals suffering from fractures (Roberts and Cox 2003).

Two possible further incidents of trauma, involving the femur and tibia and two metatarsals, were also evident in Skeleton 12 (mature adult male), but could not be positively diagnosed as fractures and therefore have not been included in the prevalence rate, however they are discussed further below.

The first thoracic vertebrae of Skeleton 11 (mature adult female) was wedge shaped, with an anterior body height of 22.9mm and a posterior body height of 29.5mm, and may have been a compression fracture. Crush or compression fractures of the thoracic spine are most common in 'elderly patients with porotic bone who slip and fall on their bottom (Dandy and Edwards 2003, 154) or in 'younger patients who fall from a height and land on their heels (*ibid*). So long as 50% of the height of the body is not lost medical intervention may not be needed, however, 'even in slight deformities, back pain may persist for two or more years after injury and sometimes indefinitely' (*ibid*). The crude prevalence rate for vertebrae affected by crush fractures was 0.8% (1/132) or 10% of the adult population with one or more observable vertebral bodies.

Two vertebral end plate fractures were observed amongst the vertebrae of one mature adult male from Clarence Street (Waldron 2005), providing a crude prevalence rate of 1.25% (1/80 adults with vertebral crush fractures).
A further spinal crush fracture was evident in the remains of an individual from Newarke Street (Wakely and Carter 1996) providing a crude prevalence rate of (2.6%).

Skeleton 12 (mature adult male) exhibited a well-healed fracture to the right distal radius. The fracture ran superiorly from the medio-anterior border inferiorly to the latero-anterior edge, with no evidence of displacement of the distal fragment. The break was very well

remodelled with only a slight callus evident, consisting of smooth lamellar bone. A lack of visible displacement and mal-union would suggest that the fracture was neither a Colles', Smith's or Barton's fracture. Instead it appears to have been an isolated fracture of the radius, in which non-union is uncommon (Dandy and Edwards 2003, 203) and can be caused by direct trauma (*ibid*). The crude prevalence rate for radial fractures was 5.3% (1/19) or 10% of the population with at least one radius.

A greater number of fractures appear to have been observed at Clarence Street and Newarke Street. Fractures of one ulna, one fibula, one rib, two spinal crush fractures, one metacarpal fracture, one nasal fracture, one cranial fracture, and one dislocated shoulder were observed at Newarke Street (Wakely and Carter 1996). Another fracture was observed in an individual's femur at Newarke Street (Jacklin and Chapman 2009), providing a crude prevalence rate of 3% of the population affected by fractures. Finally, one rib fracture, two vertebral end plate fractures, one humeral fracture, one femoral neck fracture and a peri-mortem head trauma were observed at Clarence Street (Waldron 2005). The evidence suggests that in comparison to the other Roman cemeteries in Leicester, the Oxford Street individuals showed very little evidence for fracture.

Osteochondritis Dissecans

Trauma can damage the blood supply to part of a joint surface leading to localised death of the tissue, and this small piece can then become detached from the rest of the joint surface (Roberts and Manchester 2005). In skeletal remains the lesion manifests as a roughly circular, porous hollow in the joint surface.

SK 1 A.7 (old middle adult male) had osteochondritis dissecans on the antero-medial surface of the right tibial distal joint. The bone fragment had not reattached and the lesion appeared smooth and well-rounded. The frequency of osteochondritis dissecans on the distal tibia in the adult population was 5.9% (1/17 distal tibial articulations).

Skeleton 10 (young middle adult male) had two small depressed lesions on the proximal articular surface of the proximal phalanx for the left first metatarsal. The lesions penetrated the articular surface exposing the underlying trabecular bone. It is possible that they were the result of osteochondritis dissecans (or may have been developmental). The frequency of osteochondritis dissecans on the proximal articular surface of the proximal phalanx for first metatarsal in the adult population was 12.5 % (1/ 8 proximal articulations of proximal phalanx for MT1).

Myositis Ossificans Traumatica

Myositis ossificans traumatica is caused by the avulsion of tendons or muscle attachments (Aufderheide and Rodríguez-Martín 1998, 26); severe trauma to muscular tissue can sometimes result in the ossification of the muscle tissue itself (Ortner 2003, 133). The most commonly observed sites are on the femur at the insertion of the extensors and abductors, the humerus at the insertion of *deltoid* and *pectoralis* (major and minor) (*ibid*). These traumatic lesions are most commonly seen in young adults (*ibid*, 134).

Skeleton 8 (mature adult male) had a large bony projection of lamellar bone, with rough rugged undefined margins, located on the medial margin of the upper third of the shaft, at the insertion of *vastus lateralis* (responsible for extending the leg at the knee joint; Stone and

Stone 2006,179). The crude prevalence rate for *myositis ossificans traumatica* of the femur in the adult population, at Oxford and Newarke Street was 5.9% (1/17 adult femora present).

An alternative diagnosis might be an *osteochondroma*, however, although these benign tumours are most commonly seen on the femur and tibia, they are usually located on the metaphyses (growing ends of the long bones; Aufderheide and Rodríguez-Martín 1998, 381). Another alternative could be an ossified haematoma; haematomas can result from direct blunt force trauma or the tearing of muscle fibres, causing blood to collect and clot (Aufderheide and Rodríguez-Martín 1998, 27). If the damaged muscle is exercised too soon following the injury, the blood clot may ossify, producing a bony lump at the site of the haematoma.

Possible Trauma

Other lesions of unknown cause were observed, some of which may potentially be due to trauma. Skeleton 12 (mature adult male) exhibited alterations to four bones. It is possible that the lesions occurred in the same traumatic incident as the radial fracture described above, however, they were slightly more enigmatic in their appearance and could not confidently be classed as fractures, although some form of trauma was likely to have caused the alterations in the bones appearances.

The distal end of the right femur of Skeleton 12 exhibited degeneration of the articular surface; a groove had developed on the medial condyle, running from the patellar surface down the inferior surface of the condyle. The general appearance of the patellar surface of the articulation was also morphologically altered; having developed a topographic appearance with irregular but rounded surface morphology. The right proximal tibia articulation exhibited the same irregular surface morphology with associated osteoarthritis on the lateral condyle. It is possible that this was a condylar fracture. Complications that may arise from condylar fractures include the loss of blood supply to the fragments, which may 'lead to aseptic necrosis, collapse and a gross deformity. If the fragments are not repositioned exactly there will be a valgus or varus deformity, which may lead to osteoarthritis' (Dandy and Edwards 2003, 246).

The same individual also exhibited 'kissing' osteophytes (outgrowths of bone that form a joint) at the proximal ends of the lateral shafts of the right first and second metatarsals, superior to the articular facets, which were possibly trauma-related. Because the toes are susceptible to damage from dropped objects or being crushed, fractures to the region are not uncommon. Even today, they are frequently caused in industrial accidents (Dandy and Edwards 1998, 276). If the foot phalanges are fractured or crushed, then elevation of the foot for some days is required (*ibid*). Crushing injuries of the foot phalanges often cause persistent stiffness (*ibid*). In Skeleton 12, the florid osteophytic bone may have been in the process of fusing together, possibly as a result of a fracture or crushing injury.

Infectious Disease

Bone tissue cannot respond quickly to an infectious disease, so evidence of any acute illness with a quick resolution (i.e. the patient recovers or dies within a short space of time) will not be seen in the skeleton (Roberts and Manchester 2005). However, bone can respond to the presence of a chronic infection through laying down new bone. Initially, this new bone is disorganised and termed 'woven bone', but with time, as healing takes place, this bone is

remodelled and becomes tranSformed into more organised 'lamellar bone'. The presence of woven bone therefore indicates an infection that was active at the time of death, and lamellar bone indicates an infection that had healed; the presence of both together can suggest a recurring, or long-standing infection (Roberts and Manchester 2005). Although the new bone deposition may have been associated with a specific disease in life, it is almost always impossible to diagnose this from the bones alone.

Maxillary Sinusitis

Maxillary sinusitis commonly occurs as a result of upper respiratory tract infections, pollution, smoke, dust, allergies, or a dental abscess that has penetrated the sinus cavity (Roberts and Manchester 2005).

Very few sinuses were available for examination. Of the two non-adults three sinuses were available and all (100%) exhibited at least mild porotic or spicule bone formation within the maxillary antrum. Sinusitis was observed in two adults (40.0% of those with sinuses present to observe), and was only observed amongst the females (Table 19). These figures are much higher than the frequency of 1.8% given by Roberts and Cox (2003), but their figures are based on crude prevalence rates and so likely to be less accurate. Furthermore, the sample size here was small and as such will have affected the prevalence rates. It is possible that, at least in some cases, sinusitis was linked to dental caries or abscesses rather than to air quality in this population; Skeletons 1, 2, and 9 all exhibited poor dental health.

Table 21: Prevalence of maxillary sinusitis

Sex	Right Sinus			Left Sinus			Individuals		
	A	P	%	A	P	%	A	P	%
Males	0	1	0.0%	0	2	0.0%	0	2	0.0%
Females	1	2	50.0 %	1	2	50.0%	2	3	66.6 %
Juveniles	1	1	100%	2	2	100%	2	2	100%
Total	2	4	50.0 %	3	6	50.0%	4	7	57.1 %

A = affected (number of sinuses with sinusitis); P = present (number of sinuses present and observable)

Maxillary sinusitis was only recorded in three other individuals from Newarke Street (Wakely and Carter 1996), providing a crude prevalence rate of 8.3%. The average prevalence sinusitis reported by Roberts and Cox (2003) for the Roman period was of 1.3%.

Hypertrophic (Pulmonary) Arthropathy

Hypertrophic arthropathy is principally linked to cancer of the lungs, although cancer of other tissues and pleural and cardiac lesions may also initiate the condition (Ortner 2003, 354). Characteristic lesions of the condition include symmetrical new bone formation along the diaphyses of long bones, which is densest at the mid shaft and becomes less severe at the metaphyses. The bones most commonly affected include the radius, ulna, tibia and fibula, while less commonly involved are the femur, humerus, metacarpals and metatarsals (Aufderheide and Rodríguez-Martín 1998, 91). The ribs, clavicle and scapula, however, are only affected in the most advanced cases (*ibid*). In the early stages of the condition, bone

deposition is fibrous (woven) which later remodels into florid lamellar bone (Ortner 2003, 354). In modern cases the bony lesions disappear once the primary cause has been removed (*ibid*).

A young middle adult female (Skeleton 9) exhibited lesions which may be attributable to hypertrophic pulmonary arthropathy, with symmetrical new bone formation affecting many of the limb bones, including the tibiae, where well remodelled lamellar bone and disorganised active woven bone were present on the medial and latero-posterior portions of the shaft. Bilateral periosteal reactions on the fibulae, consisting of well remodelled lamellar bone, were recorded along the shaft and disorganised active woven bone was present on the distal third of the right fibula. Bilateral new bone formation was also evident on the femora, exhibiting a combination of well-remodelled lamellar bone and disorganised woven bone along the length of the shafts. Skeleton 9 also exhibited bilateral disorganised woven bone on the proximal humeral shafts, with well-remodelled lamellar bone on the left proximal shaft. Further disorganised woven bone was also present on the left ischium and porotic plaque like vascularised bone was present on the right calcaneus around the sustentaculum sulcus.

The same skeleton also suffered from a chronic lung infection, with localised patches of disorganised woven bone on the pleural surface of four right ribs. While in modern populations lung cancer is thought to be the main cause of hypertrophic pulmonary arthropathy, in pre-antibiotic populations chronic lung disease may have contributed to a greater number of cases than today (Mays *et al* 2002). This may be pertinent with regards to Skeleton 9, who exhibited evidence of a chronic lung infection, which may have led to the development of the disease.

Other conditions which may be worth considering when attempting a differential diagnosis are fluorosis and hypervitaminosis. Fluorosis, caused by increased fluoride levels in the body stimulates osteoblastic activity, resulting in new bone deposition (Aufderheide and Rodríguez-Martín 1998, 317). Fluorosis may develop in individuals exposed to the industrial processing of ore or indirectly through the drinking of contaminated water (*ibid*). The bony lesions are similar appearance to hypertrophic pulmonary arthropathy, fluorosis has a predilection for the axial skeleton, which was also the case in Skeleton 9. Hypervitaminosis also shares a similar pattern of lesions, however; it is an unlikely cause, being stimulated by an overdose of Vitamin A.

Endocranial Bone Formation

New bone formation on the endocranial (internal) surface of the cranium is more commonly seen in infants and young children, and is believed to result following inflammation or haemorrhage of the meningeal blood vessels. The possible causes identified include chronic meningitis, trauma, anaemia, neoplastic disease (cancer), metabolic diseases (scurvy and rickets), venous drainage disorders and tuberculosis (Lewis 2007).

Endocranial bone formation was observed in four adults and two juveniles; the lesions exhibited on one of the juvenile crania (Skeleton 7) may relate to a specific aetiology and have been discussed elsewhere with regards to scurvy. The second juvenile, Skeleton 2 (2-3 years old), had porotic plaque-like bone with vascular impression on the occipital (Figure 46). The endocranial lesions were located within the left cerebral fossa, sagittal sulcus and the cruciform eminence.

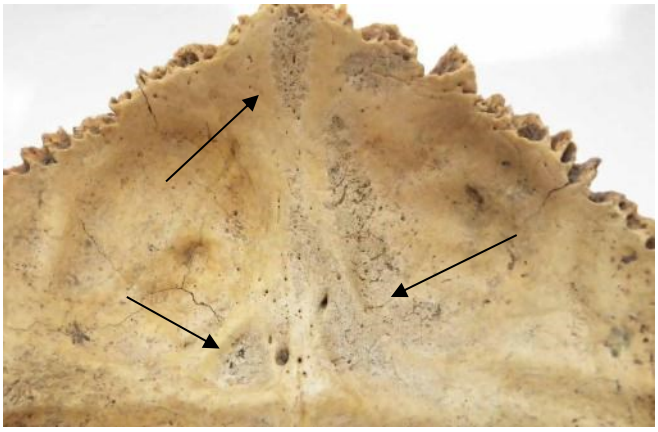

Figure 46: Endocranial lesions in Occipital, Sk 2

Skeleton 6 (young adult male) exhibited porotic and disorganised new bone formation on the endocranial surface of frontal bone, located within the most anterior portion of the sagittal sulcus.

Skeleton 10 (young middle adult male) exhibited endocranial periosteal reactions on the occipital frontal and both parietals in the form of plaque-like porotic bone with vascular impressions. The new bone on the occipital was located on the cruciform eminence transverse and sagittal sulcus, and appeared to be chronic, with a mixture of active and remodelled bone; vascular impressions also filled the left cerebral fossa. Bilateral new bone formation was evident in the sagittal sulcus of the parietals, which deviated from the sagittal sulcus in the frontal into the left frontal lobe.

Analysis of Skeleton 11 (mature adult female) revealed endocranial periosteal lesions on the frontal and parietals, within the sagittal sulcus, which consisted of porotic plaque-like bone with vascular impressions.

The last of the adults to exhibit endocranial lesions was Skeleton 12 (mature adult male). The new bone formation was located on the frontal within the posterior two thirds of the sagittal sulcus.

It would appear that at Oxford and Newarke Street males were more likely to be affected by endocranial lesions (75% of observable crania affected) than females (33.3% of observable crania affected). The frequency of involvement of the frontal bone was 66.6% in the adults (4/6 of frontal bones present). Bone formation on the inner surfaces of the parietals was bilateral when observed, and occurred in 28.6% of adult parietal bones (4/14). Finally, bone formation of the occipital occurred in 14.3% of the adult population (1/7 occipital bones present).
With regards to the juvenile population, if Skeleton 7 is ignored, lesions were only observed on the occipital (50% 1/2 observable occipitals).

The high prevalence of the endocranial periosteal reactions at Oxford Street was unexpected. The exact cause of the majority of lesions was not certain, however, it is possible that, in the case of Skeleton 9, the lesions were linked to hypertrophic pulmonary arthropathy, discussed above. In the other instances, meningitis, tuberculoid meningitis, trauma or other causes may be responsible for the lesions.

One other individual from Newarke Street (Jacklin and Chapman 2009), a 5-7 year old, revealed endocranial lesions, providing a crude prevalence rat of 6% of the population.

Periosteal inflammatory Lesions

An inflammation within the periosteum, a sheath of tissue that surrounds all bones, affects the surface of the bone, and is called periostitis (Ortner 2003). As with osteitis, the inflammation may be due to infection, but other causes are possible, including low-grade trauma, and chronic ulceration. The latter two changes are particularly common in the shaft of the tibia (Roberts and Manchester 1995; Ortner 2003). Initially, disorganised woven bone (active infection) is laid down on the surface of the bone, which later is remodelled into lamellar bone and incorporated into the bone cortex (Ortner 2003).

Such lesions are commonly observed in archaeological populations, particularly on the tibiae, and although they may have been associated with a specific disease in life, it is almost always impossible to diagnose this from the bones alone. The prevalence of periostitis has frequently been used as a general measure of stress in past populations (Ortner 2003).

Periosteal reactions were observed in the leg bones of two adults; one male and one female, or 22% of the adult population with observable lower limbs (Table 22). This figure is much higher than the mean prevalence of periosteal reactions in Roman Britain (6.7 %, Roberts and Cox 2003).

Table 22: Prevalence of periostitis in the adult population

Bone	Frequency (Bone)	Frequency (Individual)	Skeletons
Tibia	2/15 (13.3%)	2/8 (25.0%)	4 (ma f), 10 (yma m)
Fibula	0/13 (0.0%)	0/8 (0.0%)	-
Femur	2/15 (13.3%)	1/8 (12.5%)	10 (yma m),

Periosteal reactions were also recorded on the right medial calcaneal surface of Skeleton 5 (young middle adult male) and had a dense lamellar-like appearance. It appears that the infection had healed before the individual's death.

As is normally the case in archaeological populations, periosteal reactions of the tibia were most frequently observed, with one quarter of adults affected (see Table 7). Periosteal reactions of the femur were also observed, however, the fibula was not affected. In both instances, the lesions manifested as porotic disorganised woven bone, indicating that the inflammation was active at the time of death. Skeleton 10 (young middle adult, male) also exhibited a small patch of well remodelled lamellar bone on the posterior-lateral border of the right tibial mid shaft, suggesting that the infection had been longstanding. Prolific new bone formation was also observed amongst the remains of Skeleton 9 (female, young middle adult), however, the lesions may have had a specific aetiology and as such the individual has been excluded from the periosteal prevalence calculations. Further discussion of Skeleton 9 can be found above.

Figure 47: Ectocranial periosteal reaction, L parietal, Sk 10, young middle adult

At Newarke Street 7% of the population were affected by periosteal reactions (Jacklin and Chapman 2009).

Scalp Inflammation

Signs of inflammation were seen on the ectocranial surface of Skeleton 10 (young middle adult male). Porotic disorganised lesions on the external surface of the frontal and the anterio-medial portions of both parietals; the lesions did not extend onto the lateral portions of the parietals forming a clear border (Figure 47), which was probably caused by the insertion of the *temporalis* muscle. Such lesions could be caused by psoriasis, dermatitis or a head-lice infestation; all of which would cause the individual to scratch the affected area and could lead to the breaking of the skin, allowing infection to enter.

Figure 48: Pott's spine, 90^{o} anterior angulation of the spine, Sk 4, posterior view

Tuberculosis

The first published evidence for tuberculosis in Britain comes from the Roman period, affecting 0.2% of individuals, and individuals with tuberculosis of this date have been found in Dorset, Hampshire, Gloucestershire and Lincolnshire (Roberts and Cox 2003). Roberts and Cox (*ibid*) suggest that increased trade with the continent may have been responsible for its introduction to Britain. Santos and Roberts (2001) state that the earliest known individual with the disease in Britain dates to the fourth century AD.

Gastrointestinal tuberculosis is caused by *Mycobacterium bovis* and is contracted through the intake of meat or milk from infected cattle, thus transmitting the infection to the human gut (Roberts and Cox 2003, 119), though less commonly the disease can be transmitted through droplet infection (Roberts and Manchester 2005, 187). The initial stage is largely asymptomatic (Aufderheide and Rodríguez-Martín 1998, 119), but can be fatal. The

secondary stage of the infection can be due to re-infection with the bacilli, or through bacilli being released from a dormant primary lesion (*ibid*, 120).

Vertebral and rib lesions thought to be the result of *Mycobacterium bovis* were evident in the remains of Skeleton 4 (middle adult female). It is likely that this individual shows lesions from the secondary stage of the disease and thus had a good immune response to the primary stage of the disease; otherwise, she would probably have died quickly before skeletal lesions would have occurred. As bovine tuberculosis frequently affected children in the past, it is possible that this individual suffered from tuberculosis since childhood. It is probable that the infection eventually proved fatal in this individual: '*Untreated cases carry about 50% mortality after 5 years, about one-half of which is due to tuberculous infections of tissues other than the bone. Additional deaths occur secondary to the complications of paralysis of the trunk and legs (paraplegia), respiratory dySfunction…and others. Prior to available, effective treatment about one-third to one-half of patients with skeletal Tuberculous vertebritis underwent spontaneous healing, the rate being influenced by nutritional, socio-economic and hygienic factors…The remainder commonly lived sometimes for decades with their chronic but active disease, often deformed, and sometimes with multiple, perpetually draining sinuses while others suffered on with paralysed legs.*' (Aufderheide and Rodríguez-Martín 1998, 123-124).

Skeletal involvement only occurs in a small percentage of individuals with tuberculosis (Santos and Roberts 2001 cite skeletal involvement in 1-9% of cases) and archaeological examples are relatively uncommon. The most common region of the spinal column to be affected is the first lumbar vertebra, with the frequency decreasing with the distance on either side of it. The lower spine is the chief focal point in skeletal tuberculosis at all ages. The part of the vertebra involved is nearly always the vertebral body, most commonly it is the anterior portion that is involved. Even when lytic destruction is widespread, extension into the vertebral arches is uncommon (Ortner 2003, 230-231).

Vertebral and rib lesions thought to be the result of *Mycobacterium tuberculosis* were evident within the remains of Skeleton 4 (middle adult female). Alterations to the woman's spine were extensive; the second and third lumbar vertebrae were fused at the intervertebral space and articular facets, with well remodelled lamellar bone, although largely destroyed by taphonomy. The vertebral bodies appear to have undergone a degree of collapse; the combined height of the vertebral bodies of the second and third lumbar vertebrae was 32.4mm, whereas the height of the vertebral body of the fourth lumbar vertebra, which appeared unaffected, was 30.1mm. A lytic lesion penetrated the lateral body of second lumbar vertebra. Further fusion of vertebral bodies occurred between the first lumbar and twelfth thoracic vertebrae at the intervertebral space and articular facets; the bodies were fused together with porotic new bone in the process of remodelling. The body of the twelfth thoracic vertebra had been almost entirely destroyed, with irregular spicules of bone projecting from the left and right lateral portions of the remaining body. A pseudo articulation had developed on the spinous process of the twelfth thoracic vertebra, where it articulated with the spinous process of the eleventh thoracic vertebra. The articular facets have also extended as a result of the extensive degeneration of the eleventh thoracic vertebra's body. The superior articular facets had extended onto the lamina of the twelfth thoracic vertebra where osteoarthritis (OA) had developed in the pseudo articulations. The body of the eleventh thoracic vertebra had been entirely destroyed, some of the right pedicle remained, although this had a very gnarled appearance and the left pedicle was almost entirely eroded. Another pseudo articulation on the lamina/spinous processes where the tenth

thoracic vertebra spinous process would rest, both superior articular facets have undergone remodelling, the transverse processes have been subsumed into the articulations, possibly in an attempt to stabilise the spine. The superior and medial portions of the transverse process have developed superiorly and laterally to create an arch shaped articulation.

Due to the destruction of the eleventh thoracic vertebra's body the neural arch has rotated anteriorly 90 degrees, causing a 90 degree anterior angulation in the spine (Figures 48 & 49). Further fusion exhibited higher up in the spinal column was observed between the tenth and ninth thoracic vertebrae, which had fused at the intervertebral space and articular facets. The anterior and lateral surfaces of the vertebral bodies exhibited disorganised, hyper-porotic new bone with vascular impressions which created a rugged and uneven appearance. The inferior articular facets of the tenth thoracic vertebra had a posterior-lateral extension to their margins with associated moderate degenerative joint disease (DJD).

The seventh and sixth thoracic vertebrae were also fused between the intervertebral space and articular facets. The sixth thoracic vertebra was wedge shaped in appearance with an anterior body height of 8.1mm and a posterior vertebral body height of 21.0mm. The bodies were fused together with well remodelled, smooth, lamellar bone, which was indistinguishable from the rest of the vertebral body surface. The anterior body of the seventh thoracic vertebra appears to have developed osteophytic lipping; the osteophyte was indistinguishable from the rest of the body, not a typical osteophyte, possibly more of a syndesmophy. The left lateral portion of the body of the fourth thoracic vertebra exhibits a large lytic lesion.

Figure 49: Pott's spine, 90^{o} anterior angulation of the spine, Sk 4, posterior view

The edges of the lesion had begun to remodel. The third thoracic vertebra exhibited dense lamellar like well remodelled bone on the lateral portions of the body.

Associated lesions were also evident on the ribs, the anterior surface of the left and right vertebral ends of the fourth to tenth ribs of well remodelled lamellar bone.

Figure 50: Pott's spine, 90^{o} anterior angulation of the spine, Sk 4, anterior view

The prolific destruction of the woman's spine would have undoubtedly been de-habilitating. 'The tuberculosis victims of antiquity must have suffered the lingering ill health, the gnawing and unassuaged bone pain of infective involvement and the extreme emaciation of advanced tuberculosis.' (Roberts and Manchester 2005, 192). Further consequences of the disease were suggested by Luk (1999) to include 'Weakness, numbness or paralysis of the lower limbs and unsteady gait, with loss of urinary control.' The woman would have probably required care at least in the later stages of her life, indeed the advanced state of the disease within the spine suggests she survived for some time in a heavily deformed state.

The incomplete and taphonomically altered remains of a second individual, Skeleton 5 (young middle adult male), also exhibited possible tuberculoid changes to their spine. Fusion of the fourth and fifth lumbar vertebrae had occurred at the superior and inferior articular facets, while the joint space appeared to be preserved. Ligamentous ossification along the right lateral side of the pedicle appeared to involve the zygaphopysial joint, with smooth lamellar bone extending from the fourth and fifth lumbar vertebrae. When the two lumbar vertebrae were articulated with the first sacral vertebra, a degree of posterior and left lateral deviation of spine was observed. Due to the fact that very little of the spinal column of Skeleton 5 survived, it was not possible to definitively say whether or not the individual was also suffering from a tuberculoid infection caused by *Mycobacterium bovis*.
Alternative diagnoses for the young male could include a developmental defect, causing the failure of the neural arches to separate; or alternatively trauma, resulting in a crush fracture; or ankylosing spondylitis, a disorder which involves the calcification of ligamentous connective tissue and is seen in '*the spine, sacroiliac and peripheral major joints*'(Aufderheide and Rodríguez-Martín 1998, 102).

Only six adults and one of the juveniles had the bodies of the tenth thoracic to second lumbar vertebra and at least some ribs present, giving a minimum prevalence for tuberculosis of 14.1% (1/7) in the population. If Skeleton 5 is included, the frequency of tuberculosis within the population rises to 25% (2/8).

One individual recovered from previous excavations at Newarke Street (Wakely and Carter 1996) was also thought to have tuberculosis, providing a crude prevalence rate of 2.6% (1/38) of the population.

Degenerative Joint Disease

The term joint disease encompasses a large number of conditions with different causes, which all affect the articular joints of the skeleton. Factors influencing joint disease include physical activity, occupation, workload and advancing age, which manifest as degenerative joint disease and osteoarthritis. Alternatively, joint changes may have inflammatory causes in the *spondyloarthropathies*, such as sceptic or rheumatoid arthritis. Different joint diseases affect the articular joints in a different way, and it is the type of lesion, together with the distribution of skeletal manifestations, which determines the diagnosis (Rogers 2000, Roberts and Manchester 2005).

Figure 51: Central osteophyte on proximal R femoral articulation, Sk 1

Degenerative Joint Disease

Degenerative joint disease of the extra spinal joints did not follow the same distribution or frequency of joints affected as osteoarthritis (discussed below). The most commonly affected joint by DJD, in both females and males was the hip (88.2%), followed by the shoulder in females (71.4%) and knee and ankle in males (55.6%), the latter being frequently affected as one another. Although similar joints were affected in males and females, only males exhibited degenerative changes in their knee and ankle (Table 23).

Table 23: Prevalence of degenerative joint disease in the extra-spinal joints (joints affected)

Bone	Female			Male			Total		
	With DJD	N	%	With DJD	N	%	With DJD	N	%
TMJ	0	5	0.0%	0	4	0.0%	0	9	0.0%
Shoulder	5	7	71.4%	4	8	50.0 %	9	15	60.0%
Elbow	2	7	28.6%	3	9	33.3 %	5	16	31.3%
Wrist	2	6	33.3%	3	7	42.9 %	5	13	38.5%
Hip	8	8	100%	7	9	77.8 %	15	17	88.2%
Knee	0	8	0.0%	5	9	55.6 %	5	17	29.4%
Ankle	0	8	0.0%	5	9	55.6 %	5	17	29.4%

TMJ = temporomandibular joint; Shoulder = gleno-humeral joint; Elbow = distal humerus, proximal radius and proximal ulna; Wrist = distal radius, scaphoid and lunate; Hip = acetabulum and proximal femur; Knee = distal femur, patella and proximal tibia; Ankle = distal tibia and talus

Spinal degenerative changes were generally more common in adult females than males. A greater proportion of females exhibited degenerative changes in the cervical and thoracic regions (Table 24), whereas adult males were more likely to suffer from spinal DJD in the lumbar and sacral region.

Table 24: Prevalence of DJD of the vertebral articulations

Sex	Cervical Facets			Thoracic Facets			Lumbar Facets			Sacral Facets			Total Facets		
	With DJD	N	%	With DJD	N	%	With DJD	N	%	With DJD	N	%	With DJD	N	%
Female	3	89	3.4%	28	156	17.9%	12	88	13.6%	4	8	50.0%	47	341	13.8%
Male	1	52	1.9%	9	109	8.3%	10	47	21.3%	4	7	57.1%	24	215	11.2%
Total	4	141	2.8%	37	265	14.0%	22	135	16.3%	8	15	53.3%	71	556	12.8%

Overall, 12.8% (71/556) of vertebral apophyseal facets (joints between the vertebrae) were affected by DJD, with the highest prevalence seen in the sacral facets (53.3%), followed by the lumbar facets (16.3%) and thoracic facets (14.0%), with the lowest prevalence in the cervical facets (2.8%; see Table 9).

Spinal facet DJD was more prevalent in females (13.8. %) than in males (11.2%); this did not corresponded with the distribution of osteoarthritis in the population, discussed below.

Although ten adults (five females, five males) had some preserved vertebral bodies, only one adult had a complete spine (1 female), comprising the bodies of six cervical vertebrae (C1 was excluded as it does not have a body), twelve thoracic vertebrae, five lumbar vertebrae and the body of the first sacral vertebra. Most spines were incomplete, which, combined with the post-mortem fragmentation and erosion in some spines, made it difficult to identify specific vertebrae. For the purposes of calculating prevalence rates, any unidentified vertebral bodies that were present were counted, provided they could be identified to vertebra type (i.e. cervical, thoracic, lumbar or sacral). In total, 132 vertebral bodies were present (excluding the first cervical and including the first sacral), which gave an average of 13.2 vertebral bodies per skeleton (just over half of the expected 24). The sacral vertebrae were the best represented, with an average of 0.8 vertebrae per individual (80% of the expected number) lumbar vertebrae were second best represented, with an average of 2.9 (a little under two thirds of the expected five) vertebrae per individual and the thoracic and cervical vertebrae were the least well represented (just over half of the expected twelve and six respectively). The male spines were less well preserved with on average 9.2 vertebral bodies per individual (46 vertebrae of five individuals) compared to the 17.2 average number of bodies per female skeleton (86 vertebrae of five individuals).

The overall frequency of vertebral bodies affected by degenerative changes was 37.9% (Table 25). Overall, the thoracic (trunk) vertebrae were most frequently affected (46.8), followed by the lumbar (lower back) vertebrae, although the overwhelming majority of lumbar vertebrae affected were male. The least affected areas of the spine were the cervical (neck) vertebrae (Table 25), although the frequency was again heavily influenced by the male population. Overall, males and females were equally affected in the lumbar and thoracic vertebrae, while DJD in the sacral spines was exclusively a male affliction.

Table 25:Prevalence of DJD of the vertebral bodies

Sex	Cervical Bodies			Thoracic Bodies			Lumbar Bodies			Sacral Bodies			Total Bodies		
	With DJD	N	%	With DJD	N	%	With DJD	N	%	With DJD	N	%	With DJD	N	%
Female	2	19	10.5%	20	45	44.4%	5	18	27.8%	0	4	0.0%	27	86	31.4%
Male	3	12	25.0%	10	19	52.6%	8	11	72.7	2	4	50.0%	23	46	50.0%
Total	5	31	16.1%	30	64	46.8%	13	29	44.8%	2	8	25.0%	50	132	37.9%

N = Number of vertebrae with at least one body surface present

Prevalence rates for DJD and OA were combined at Newarke Street (Wakely and Carter 1996), while at Clarence Street and in the 2009 publication for Newarke Street the criteria of classification for DJD were not defined (Waldron 2005; Jacklin and Chapman 2009), preventing comparative analysis.

Osteoarthritis

Osteoarthritis (OA) is a degenerative joint disease of synovial joints characterised by the deterioration of the joint cartilage, leading to exposure of the underlying bony joint surface. The resulting bone-to-bone contact can produce polishing of the bone termed 'eburnation', which is the most apparent expression of OA. Other features associated with degeneration of the joint include osteophytes (bone formation) on the surface or around the margins, porosity on the surface, and the development of cysts (Rogers 2000; Roberts and Manchester 2005). OA is frequently associated with increasing age, but can be the result of mechanical stress and other factors, including lifestyle, food acquisition and preparation, social status, sex and

general health and body weight (Larsen 1997; Roberts and Manchester 2005). OA was recorded as present when at least three of the features associated with OA were present (e.g. osteophytes , porosity, joint contour change); eburnation, even if occurring alone, was always considered to be indicative of OA (Roberts and Manchester 2005).

Ten adults had vertebral apophyseal facets preserved (five females and five males). All unidentified facets (i.e. those which could not be identified to a specific vertebra) were still counted if they could be identified to a vertebra type (i.e. cervical, thoracic, lumbar or sacral). A normal skeleton would have 98 vertebral articular facets. However, the mean number of facets per skeleton at Oxford and Newarke Street was just over half of the norm (55.6). Male skeletons were less well preserved, with an average of 43 facets per skeleton compared to the female average of 68.2 per skeleton.

Overall, 3.1% (17/556) of apophyseal facets were affected by osteoarthritis, with the highest prevalence seen in the sacral facets (26.7%), followed by lumbar (3.7%) and thoracic facets (2.3%), with the lowest prevalence in the cervical facets (1.4%; Table 24). Osteoarthritis in the cervical facets affected females exclusively, although males exhibited a higher frequency of spinal OA overall. Roberts and Cox (2003, 145) calculated that on average 7.1% of the population were affected by spinal osteoarthritis during the Roman period. This figure is over twice the frequency observed at Oxford Street.

Table 26: Prevalence of osteoarthritis in the spine (facets affected)

Sex	Cervical Facets			Thoracic Facets			Lumbar Facets			Sacral Facets			Total Facets		
	With OA	N	%	With OA	N	%	With OA	N	%	With OA	N	%	With OA	N	%
Female	2	89	2.2%	4	156	2.6%	1	88	1.1%	2	8	25.0%	9	341	2.6%
Male	0	52	0.0%	2	109	1.8%	4	47	8.5%	2	7	28.6%	8	215	3.7%
Total	2	141	1.4%	6	265	2.3%	5	135	3.7%	4	15	26.7%	17	556	3.1%

N = Number of facets present

A total of twelve extra-spinal joints (i.e. joints other than those in the spine, discussed above) were affected by osteoarthritis. Males were exclusively affected, due at least in some part to the greater number of males surviving into mature adulthood. Due to time constraints it was not possible to calculate the frequency of osteoarthritis individually for all extra-spinal joints (i.e. joints other than those in the spine, discussed above). However, the prevalence of OA in a selection of major joints is provided in Table 25.

Table 27: Prevalence of osteoarthritis in the extra-spinal joints (joints affected)

Bone	Female With OA	N	%	Male With OA	N	%	Total With OA	N	%
TMJ	0	5	0.0%	0	4	0.0%	0	9	0.0%
Shoulder	0	7	0.0%	0	8	0.0%	0	15	0.0%
Elbow	0	7	0.0%	0	9	0.0%	0	16	0.0%
Wrist	0	6	0.0%	3	7	42.9 %	3	13	23.1 %
Hip	0	8	0.0%	3	9	33.3 %	3	17	17.6 %

Knee	0	8	0.0%	3	9	33.3 %	3	17	17.6 %
Ankle	0	8	0.0%	3	9	33.3 %	3	17	17.6 %

TMJ = temporomandibular joint; Shoulder = gleno-humeral joint; Elbow = distal humerus, proximal radius and proximal ulna; Wrist = distal radius, scaphoid and lunate; Hip = acetabulum and proximal femur; Knee = distal femur, patella and proximal tibia; Ankle = distal tibia and talus

The joint most frequently affected by OA was the wrist (see Table 27), which was approximately 10% more likely to be affected than any other joint in the male population. The joints of the hip, knee, and ankle exhibited a slightly lower prevalence of osteoarthritis at around 33.3%.

The hips and knees, being the weight-bearing joints of the lower limb, frequently develop OA in modern populations (Roberts and Manchester 2005), with over 50% of those over 60 years of age may suffer from degeneration of the hips (Aufderheide and Rodríguez-Martín 1998). Degenerative changes in the ankle are usually associated with trauma (*ibid*).

Schmorl's Nodes

Schmorl's nodes are another condition that can affect the spine. They manifest as indentations in the upper and lower surfaces of the vertebral bodies caused by the pressure of herniated vertebral discs (Aufderheide and Rodríguez-Martín 1998). Discs may rupture due to trauma, but vertebrae weakened by infection, osteoporosis or neoplastic disease may be more vulnerable (Roberts and Manchester 2005). Schmorl's nodes are often associated with degenerative changes to the vertebral bodies (Aufderheide and Rodríguez-Martín 1998, Hilton *et al.* 1976), and are most commonly seen in the lower thoracic vertebrae (Hilton *et al.* 1976).

Schmorl's nodes were observed in 13.6% of vertebral bodies, most frequently in the thoracic spine, where 20.3% of bodies were affected. The only other region of the spine to be affected was the lumbar vertebrae, with 17.2% of bodies affected (Table 26). No Schmorl's nodes were observed amongst the cervical or the first sacral vertebrae. Overall, men appeared to be affected more than women with 15.2% of male vertebrae expressing lesions, compared to 12.8% of females. Differences in the regions of the spine affected between the sexes were observed; males tended to be more frequently affected in the thoracic region, while females tended to be affected in the lumbar region of the spine, suggesting different activities being carried out by males and females.

Table 28: Prevalence of Schmorl's nodes (vertebrae)

Sex	Cervical Bodies			Thoracic Bodies			Lumbar Bodies			Sacral Bodies			Total Bodies		
	With SN	N	%	With SN	N	%	With SN	N	%	With SN	N	%	With SN	N	%
Female	0	19	0.0%	7	45	15.6%	4	18	22.2%	0	4	0.0%	11	86	12.8%
Male	0	12	0.0%	6	19	31.6%	1	11	9.1%	0	4	0.0%	7	46	15.2%
Total	0	31	0.0%	13	64	20.3%	5	29	17.2%	0	8	0.0%	18	132	13.6%

Roberts and Cox (2003, 145) calculate that on average 17.7% of the population were affected by Schmorl's' nodes during the Roman period. This is moderately higher than the prevalence rates observed at Oxford Street.

DISH (Diffuse Idiopathic Skeletal Hyperostosis)

Diffuse *idiopathic* skeletal *hyperostosis* (diffuse skeletal growth of unknown cause), also known as DISH, is characterised by additional bone formation at the attachment sites of muscle and ligaments, as well as on the right side of the spinal bodies. The spinal osteophyte formation often causes fusion of a number of vertebrae, and takes a candle wax-like appearance. Although osteoarthritis and DISH are often observed in the same skeleton, they are not associated (Rogers and Waldron 2001, 359).

DISH has been associated with excessive calorie intake, diabetes, obesity and ageing, but other theories suggest that DISH may be a response to skeletal stress, with ossified muscle and ligament attachments and extra bone formation at the spine to support a large figure and a deteriorating skeleton (Arriaza 1993, 275). Greater prevalence rates of DISH have been found in monastic populations (Rogers 2000, 171), which could be due to the fact that this condition is more common in males, or older age groups, or may be related to the better nutrition of monks compared with other populations.

One individual with Possible DISH was identified in the population from Oxford and Newarke Street the (16.6% 1/6 of the adult population with observable spines). Skeleton 8 (mature adult male) exhibited ossification of the anterior longitudinal ligament (Fig. 51), causing the fusion of the ninth to eleventh thoracic vertebrae, through a long, continuous, flowing syndesmophyte localised to the right lateral portion of the vertebral bodies. Further kissing, osteophytes between the seventh and eighth and eighth and ninth thoracic vertebrae were at the point of fusing. The articular facets and joint spaces were remained preserved.

Figure 52: Fusion of anterior longitudinal ligament, SK 8

General bone forming activity was also identified throughout the skeleton, with the ossification of rib cartilage, and further florid new bone on internal surface of the body of the sternum, which may represent the ossification of pleura. Numerous enthesopathies (bony outgrowths at the soft-tissue attachment sites) were also noted throughout the skeleton, including the right radial interosseus border for *flexor digitorum profundus* and radial tuberosity for *biceps*, attachments for *flexor digitorum profundus* on the left and right ulna, *brachialis* and *supinator* on the right ulna. The joint capsule of the right os coxa appears to have partially ossified. The ischio-femoral ligament, transverse ligament, reflected head of *rectus femoris* and right and left pectineal ligament, on both pelves also appear to be very well developed. The soleal line on the left and right tibia and patellar ligament of the left tibia, and *quadriceps* tendon of the right patella were also very rugged. Roberts and Manchester recommend that 'fusion of four contiguous vertebrae is necessary for a diagnosis' (2005, 160).

Skeleton 8 also exhibited what appeared to be the partial ossification of *vastus lateralis* on the left femur, while it is possible that this was a symptom of DISH, it is discussed in further detail above.

Symptoms of DISH largely consist of back stiffness; more severe effects, such as compression of the spinal cord or paraplegia are only found in few extreme cases (Rogers and Waldron 2001, 361).

An individual recovered from Clarence Street (Waldron 2005), a mature adult male, was also diagnosed with DISH. While these changes all indicate a probable diagnosis of DISH (Aufderheide and Rodríguez-Martín 1998).

Miscellaneous Pathology

A number of lesions were observed that either did not fit into the categories discussed above, or were ambiguous in terms of what caused them. Unfortunately, time constraints meant that it was not possible to present a full description of all lesions here (see Appendix A), but particular conditions have been addressed. Further research would be required into all these conditions, including the ones discussed below, as only a cursory consideration has been possible.

Rib Deformity

Three lower right ribs, possibly seventh to ninth, belonging to Skeleton 11 (a mature adult female) were not the usual shape (Fig. 53). The curvature of the affected ribs was compressed laterally, so the ribs did not curve outwards to the side as far as would be expected; instead they exhibited a tight angle, which caused them to deviate medially and posteriorly to a greater degree than normal and, the ribs also tended to deviate downwards from the angle.

Figure 53: Flattening of the lateral projection of the right ribs, at the angle, Sk 11

The shape changes could have been the result of well remodelled rib fractures, although no evidence of a bony callus was observed in any of the three ribs. Osteomalacia can lead to reduced curvature and anterior projection of the ribs (Ortner 2003, 399), and is worth bearing in mind, especially considering the individuals sex and age, however; in the case of Skeleton 11 the ribs appeared to be curving inwards rather than projecting anteriorly. If osteomalacia were the cause, then associated deformities would be expected in the spine. Skeleton 11 did exhibit a crush fracture in the vertebral body of the eleventh thoracic vertebra, creating a wedge shape appearance, however, spinal manifestations of the disease usually include flattening of the vertebrae, "…and display accentuated cupping of the endplates…"(*ibid*). Such alterations were not observed in the vertebrae of Skeleton 11. Other conditions to consider would include *pectus carinatum* ('pigeon chest') (Groves *et al* 2003) or the binding of the chest. Unfortunately, the woman's left ribs did not survive well enough to determine whether or not the deformity was bilateral, which would be expected, had the chest been tightly bound.

It was not possible to calculate a prevalence rate for rib deformity at Oxford and Newarke Street due to the high proportion of individuals with badly fragmented, incomplete ribs too poorly preserved to assess shape.

Humeral Bowing

Two adults from Oxford and Newarke Street both exhibited bowing of the humerus; Skeleton 10 (young middle adult male) exhibited asymmetry between the humeri; the right bone was 14mm longer than the left. The left humerus also revealed a degree of torsion in the proximal shaft, where there appeared to be antero-posterior bending within the shaft. Skeleton 12 (mature adult male) also exhibited degree of torsion in the proximal two thirds of the left humerus. The shaft appeared to have revolved antero-medially, with a degree of anterior posterior bowing in the proximal third.

Possible causes for bowing deformation of long bones, including congenital anomalies and greenstick (young bone) fractures. Stuart-Macadam *et al* (1998), suggest that some bowing deformities are due to childhood trauma which, in an adult with a less supple bone structure, would have fractured the long bone. This condition, also termed 'acute plastic bowing deformity', can also be associated with inflammatory bone formation, which was not seen at Oxford Street.

Conclusion

A wide range of pathological conditions were observed in the Oxford Street population, especially considering the relatively small size of the sample. Relatively minor congenital conditions were observed, including accessory ribs in a young middle adult female, as well as cleft neural arches in the sacrum two young middle adult males.

Evidence for nutritional and environmental childhood stresses were observed, with *cribra orbitalia* affecting half of the observable population. Skeletal changes exhibited in the skeleton of a juvenile may have been caused by scurvy (vitamin C deficiency). While these skeletal lesions were indicative of dietary deficiencies and environmental hardships, one mature adult male, exhibited lesions associated with dietary excess or possibly Type II diabetes in the form of spinal fusion, probably caused by DISH, suggesting high social status.

Two individuals had suffered traumatic injury to the skeleton, including one mature adult female with a crushed vertebra, possibly as the result of a fall. A mature adult male had fractured his forearm in a traumatic incident, which may have also involved the possible fracture of their knee, traumatic muscular damage to his thigh and damage to the foot.

Over half the adults had signs of infectious disease, in some cases associated with other conditions. Infections of the upper respiratory tract (in the form of sinusitis) affected over half of the observable population, although exclusively females and juveniles. Tuberculosis was also suspected; the remains of one middle adult female exhibited lesions consistent with the bovine strain of the disease, while the incomplete remains of a young middle adult male also revealed possible tuberculoid changes. In the case of the male the diagnosis is tentative, and DNA testing is suggested to verify or refute the presence of the disease. One individual, a young middle adult male, possibly had signs of scalp infection. Inflammation of the inside of the skull affected twice as many males as females, and was also present amongst the remains

of one juvenile. This could have been caused by an infection such as meningitis or tuberculosis, as a result of poor nutrition, trauma or may be due to a neoplastic disease.

Two males, a young middle adult and a mature adult, exhibited changes to their proximal humeral shafts. It is possible that the changes to the morphology of the bone were activity related, or possibly associated with trauma in childhood. Alternatively, they could have shared a developmental anomaly. Another individual, a mature adult female had three laterally flattened right ribs, which could have been the result of binding the chest or possibly osteomalacia.

Joint disease was extremely common in both males and females; it is likely that habitual activities had contributed to the high prevalence of the condition. Males and females were affected by degenerative changes to the hip, while females were more susceptible to DJD in the shoulder and spine, and men were more frequently affected in the knees and ankles. In some cases joint disease was associated with, and often secondary to injuries. Males showed a greater prevalence of spinal osteoarthritis. That the people in this group led an active physical life is further attested by presence of Schmorl's nodes, which were more prevalent in males, although the distribution of lesions were unique to each sex, possibly inferring that different types of activities caused these lesions.

Dental Health

Analysis of the teeth from archaeological populations provides vital clues about health, diet and oral hygiene, as well as information about environmental and congenital conditions. All teeth and jaws were examined macroscopically for evidence of pathological changes.

A total of ten individuals had jaws and or teeth preserved, eight of whom were adults and two were non-adults. Prevalence rates for individuals have been calculated as a percentage of tooth positions affected, where appropriate (e.g. AMTL, abscesses), and as a percentage of teeth affected (e.g. caries, calculus). In total there were 256 tooth positions (49 non-adult, 111 male, 98 female) and 235 teeth (47 non-adult, 99 male, 89 female). Overall, 9 teeth had been lost post-mortem (3.5%), seven from males and two from females.

A total of 28 teeth were deciduous and these mostly belonged to Skeleton 2 (juvenile). Skeleton 1 (juvenile) had 28 teeth, nine of which were deciduous and nineteen were permanent.

Calculus

Calculus (mineralised dental plaque) is commonly observed in archaeological populations whose dental hygiene was not as rigorous as it is today. If plaque is not removed from the teeth effectively (or on a regular basis) then these plaque deposits mineralise and form concretions of calculus on the tooth crowns or roots (if these are exposed), along the line of the gums. Mineralisation of plaque can also be common when the diet is high in protein (Roberts and Manchester 1995; Hillson 1996).

All individuals with teeth (100%) had accumulations of calculus on their teeth, with 163 (69.4%) teeth affected (Fig. 53). The proportion of teeth with calculus was similar for males (79.8% of teeth) and females (73.0%). Considering their young age, calculus was also prevalent in the non-adults, with 40.4% of non-adult teeth affected and Skeleton 1 (9-12 year old juvenile) even had moderately thick deposits on their teeth.

Figure 54: Thick calculus deposits on left lower and upper premolars and molars, Sk 10

The prevalence rates of calculus seen at Oxford Street were considerably higher than those given for the Roman period in Britain (26.8% of individuals, 43.4% of teeth, Roberts and Cox 2003), although it is possible that the latter figures do not include data on individuals with small amounts of calculus.

Dental calculus was not recorded at Newarke Street (Jacklin and Chapman 2009; Wakely and Carter 1996). Dental pathology was not commented on at Clarence Street (Waldron 2005)

Dental Caries

Dental caries (tooth decay) forms when bacteria in the plaque metabolise sugars in the diet and produce acid, which then causes the loss of minerals from the teeth and eventually leads to the formation of a cavity (Zero 1999). Simple sugars can be found naturally in fruits, vegetables, dried fruits and honey, as well as processed, refined sugar; since the latter three contain the most sucrose they are most cariogenic. Complex sugars are usually less cariogenic and are found in carbohydrates, such as cereals. However, processing carbohydrates, including grinding grains into fine powders or cooking them, will usually increase their cariogenicity.

One juvenile (50% of non-adults) and four adults (50% of adults with teeth) had carious lesions in one or more teeth, with cavities seen in fourteen teeth (6.0%), which is a slightly lower-than-average prevalence rate for the period (7.5%, Roberts and Cox 2003). Caries prevalence increased with age, but caries were also observed in a juvenile (Skeleton 1) and young adult male (Skeleton 6).

Sugars in the Romano-British diet would have come predominantly from fruits and berries, as well as honey, but there is some evidence that dried fruits (an additional source of sugar) were imported during this period (Moore and Corbett 1973) and these sugars would have helped to contribute to the formation of cavities.

Male teeth had a considerably higher caries prevalence (at 11.1.0%) than female teeth (2.2%), or non-adults (2.1%). This disparity is interesting, as in most populations a higher caries prevalence is seen in females. However, at Horncastle in Lincolnshire (Caffell and Holst 2008) a similar pattern was observed to that at Oxford Street. It is possible that males had greater access to cariogenic foods (perhaps including luxury imported dried fruits) than females. Alternatively, females could have consumed more foods that discouraged the

development of cavities, such as dairy products (Herod 1991). However, other factors may be influencing the prevalence rate: the lone young-adult male exhibited particularly poor dental health considering his relatively young age and in such a small sample this will have had a relatively large impact on the overall figures. Although dental caries were relatively uncommon in children in early populations, cavities were also observed amongst the Horncastle children, with 12.5% of individuals affected (Caffell and Holst 2008).

Wakely and Carter reported a frequency of 23.7% of dental caries at Newarke Street (1996), while 20% of the individuals studied at Newarke Street by Jacklin and Chapman (2009) were affected by two or more caries.

Abscesses

Dental abscesses occur when bacteria enter the pulp cavity of a tooth causing inflammation and a build-up of pus at the apex of the root. Eventually, a hole forms in the surrounding bone allowing the pus to drain out and relieve the pressure. Abscesses can form as a result of dental caries, heavy wear of the teeth, damage to the teeth, or periodontal disease (Roberts and Manchester 1995).

Only two of the adults had developed a dental abscesses (25.0%), with one tooth position affected (1.9%). This was lower than the Romano-British prevalence of 3.9% given by Roberts and Cox (2003).

Ante-mortem Tooth Loss

Ante-mortem tooth loss (AMTL), or the loss of teeth during life, can occur as a result of a variety of factors, including dental caries, pulp-exposure from heavy tooth wear, or periodontal disease (occurring when inflammation of the gums, gingivitis, spreads to the underlying bone). Gingivitis can result when deposits of calculus on the teeth aggravate the gums. Once the tooth has been lost, the empty socket is filled in with bone.

Half of the adults had experienced ante-mortem tooth loss, which had affected two females (50.0%) and three males (75.0%). Overall 4.7% of the teeth were lost ante-mortem, which is considerably lower than the Roman average of 14.1% reported by Roberts and Cox (2003). The usual increase in ante-mortem tooth loss with age was observed. A higher percentage of male tooth positions had experienced AMTL (10.1%) compared to females (2.2%).

Given the low prevalence rate of both dental caries and abscesses, these seem likely to have been two of the major contributing factors to AMTL in this population. Another possible contributor, periodontal disease, was also observed. Six adults showed resorption of the alveolar bone surrounding the teeth (75%).

Ante-mortem tooth loss was not recorded by Jacklin and Chapman at Newarke Street (2009). According to Wakely and Carter, 20% of teeth been lost ante-mortem at the earlier Newarke Street excavation (1996).

DENTAL Enamel Hypoplasia

Dental enamel hypoplasia (DEH) is the presence of lines, grooves or pits on the surface of the tooth crown, which occur as a result of defective formation of tooth enamel during growth

(Hillson 1996). Essentially, they represent a period when the crown formation is halted, and they are caused by periods of severe stress, such as episodes of malnutrition or disease, during the first seven years of childhood. Involvement of the deciduous (milk) teeth can indicate pre-natal stress (Lewis 2007).

Five of the adults (62.5%) and one non-adult (50.0%) showed some evidence of DEH, predominantly manifesting as faint lines in the teeth, with 27 teeth (11.5%) affected. This figure was only slightly higher than the 9.1% of Roman teeth reported by Roberts and Cox (2003). DEH was most frequent in the teeth from young middle adults. The presence of DEH has been associated with a lower life-expectancy in adults, perhaps suggesting that these individuals continued to experience stress beyond childhood (Lewis 2007). However, the prevalence rates have probably been influenced by the fact that there were only two young middle adults in this sample.

DEH affected males far more than females, with 7.9% of female teeth and three (75.0%) of the females affected, compared to 15.1% of male teeth and two (50.0%) males. This could either imply that males suffered more from poor nutrition and disease during childhood than females, or that females who suffered stress in childhood were less likely to survive into adulthood.

Enamel hypoplasia was also observed in five of the juvenile skeletons, all belonging to Skeleton 1(9-12 years old), with a prevalence rate of 10.6%.

Only one individual (5% of the observable population) exhibited dental enamel hypoplasia at Newarke Street (Jacklin and Chapman 2009).

Dental Trauma

Injuries to the teeth and surrounding tissues are relatively common in modern populations (Glendor *et al.* 2007, 224), and the causes cited include violence, sporting activities, traffic accidents, falls, rough play, use of teeth as a tool, and biting hard objects (*ibid*, 228-229). In modern populations most dental injuries occur before the age of twenty, and they are more common amongst boys than girls (*ibid*, 226); the causes range from falls, sports, fighting and abuse (*ibid*, 228-233).

Small enamel chips were observed in three (37.5%) , with seven teeth (3.0%) of the teeth affected. A total of 2.2% of female teeth and 5.1% of male teeth were affected by chipping. Upper teeth in general were more likely than lower teeth to display enamel chips, particularly the incisors. Enamel chips are not frequently reported. They were observed in the Horncastle population, where they affected eleven adults (84.6%) and 14.4% of the teeth (Caffell and Holst 2008, 50-51).

Dental Anomalies

Two adults (18.2%, 2/11 of the adult population), one females and one male, had teeth that were either congenitally absent or had failed to erupt. Nine teeth in total were affected (4.2% of all tooth positions present), most of which were third molars. Skeleton 11 (mature adult female) was missing her two lower third molars, and three of her second premolars (only the lower right was present) were also absent, leading to the retention of the left lower deciduous second molar. Skeleton 4 (middle adult female) also lacked all four of her third molars.

The third molars are the teeth most prone to congenital absence, impaction and variation in the timing of eruption, and Hillson (1996) has reported that up to a third of individuals may display congenital absence of the third molars. The figure for Oxford and Newarke Street was within this range, although it cannot be ascertained whether these teeth really were absent, or whether they had become impacted or been delayed in eruption.

Skeleton 9 (young middle adult female) exhibited a possible deformation on the buccal/distal portion of the mandibular right third molar crown, which may have been the result of a developmental defect of the enamel. Skeleton 10 (young middle adult male) exhibited mild v-shaped wear was evident on the occlusal surface of the right central maxillary incisor; this unusual wear may have resulted from a habitual activity.

Conclusion

Overall, the dental health of the individuals from Oxford Street was slightly better than the Roman average, with the exception of a high prevalence rate of dental calculus (mineralised plaque concretions). The poor oral hygiene of the older juvenile (Skeleton 1) and a young male adult (Skeleton 6) were unexpected, as dental health tends to become worse with increasing age. The fact that female dental health was better than that of the males, particularly with regards to caries was also unusual, as females usually have more cavities than males.

Funerary Practice

The skeletons from Oxford and Newarke Street were recovered from an organised, formally laid out cemetery. Burial position within graves varied, with the majority of burials laid out in supine extended positions (64%) and orientated west to east, with their heads to the west (64%; see Table 1). However, not all of the burials complied with this order; two, while aligned in the same direction, lay with their heads to the east (Skeletons 1 and 6). Skeleton 2 (juvenile) had been decapitated and was orientated north to south, with the skull placed by the feet at the south end of the grave. Skeleton 9 lay in a grave orientated north-west to south-east, with the head at the north-western end. Skeleton 7 was also afforded an unusual burial rite. This juvenile was believed by the excavator to consist solely of a skull interred in a box (Table 29).

Table 29: Summary of funerary results

Sk No	Age	Sex	Orientation	Position	Arm Position	Decapitation	Grave Goods	Coffin
1.A7	36-45 years	Male	West to east	Extended supine	Not present	Simple	Two granite rocks, on south edge of grave	-
1	9-12 years	-	East to west	Extended supine, right upper leg disturbed	Right hand on pelvis, left hand on chest, close to left shoulder	Simple, (nails found in fill may suggest coffined)	Tile and residual pottery fragments	Coffin
2	2-3 years	-	North to south (head south at feet)	Slightly flexed on left side, head on feet	Left hand on pelvis, right hand not present	Possibly coffined	Nene valley and grey ware broken pots at feet	Coffin
3	18+	Female?	West to east	Uncertain (only partial skull remains)	Not present	Simple	None	-
4	26-45 years	Female	West to east	Extended supine	Almost between knees	Coffined with stone packing around head of grave	Two rings on left hand, quern stone fragment used as packing, iron object beneath skull	Coffin with stone packing
5	26-35 years	Male	West to east	Extended supine	Right hand on right femur, left hand on left femur	Coffined with stone packing between the coffin and the grave cut	None	Coffin with stone packing
6	18-25 years	Male	East to west, head looking south	On left side	Not present	Coffined	Copper alloy disc above head (SF15) copper alloy object beneath head (SF 18) pottery in backfill	Coffin

7	1-3 years	-	Unclear (skull fragments only)	Unclear (skull only)	Not present	Coffined skull only, found in a much larger grave, nails around skull suggest skull in a box	Pottery in backfill	Skull in box
8	46+ years	Male	West to east	Extended supine	Left hand on right pelvis, right hand under left arm	Simple, possibly coffined but no nails recovered, stone packing around the edge of the cut.	Residual pottery and tile	Coffin with stone packing
9	26-35 years	Female	North-west to south-east	Extended supine	By the individual's side	Coffined	Hair pins near skull (SF22), hobnails near feet (SF19), residual pottery fragments in backfill	Coffin
10	26-35 years	Male	West to east	Extended prone	Right hand underneath right pelvis, left hand by side of left pelvis	Coffined	Bent pin on right shoulder (SF16) Bronze buckle (SF17) location unclear	Coffin
11	46+ years	Female	West to east (head looking north)	Extended, torso and skull on left side	Both hands on individuals left side adjacent to the chest	Simple, possibly coffined	Coin in pelvis (SF24)	Coffin
12	46+ years	Male	West to east (head looking south)	Extended supine	Arms folded, left hand on right pelvis, right hand on left pelvis	Coffined	Copper alloy hair pin (SF26) could belong to Sk 12 or Sk13	Coffin
13	26-35 years	Female	West to east	Extended supine	Left hand next to individuals left side right hand on right pelvis	Coffined	Copper alloy hair pin (SF26) could belong to Sk 13 or Sk12	Coffin

Two skeletons (14%; Skeletons 2 and 6) lay on their left side, while Skeleton 10 was interred in a prone extended position (7%).

Most of the burials contained grave goods. The grave of Skeleton 2 (a decapitated juvenile 2-3 years old) contained two pottery vessels by the feet of the child (one grey ware and one Nene valley ware vessel). Skeleton 4 (middle adult female) had two rings on her left hand, one of which was believed to bear a Christian inscription. Skeleton 11 (mature adult female) was buried with a coin in the pelvic region. Skeleton 10 (young middle adult male) had a bent copper alloy pin on his right shoulder and a bronze buckle. Skeleton 6 (young adult male) was interred with two enigmatic copper alloy objects placed by their head. Skeletons 9 (young middle adult female) and 12 (mature adult male) or 13 (young middle adult female) were buried with hair pins, while Skeleton 9 also had hob nails by her feet.

At Clarence Street all 91 burials appear to have been orientated east to west, in extended supine positions, with only two possible deliberate inclusions of grave goods (in both cases corroded Cu alloy objects; Gardner 2005). Burials excavated at Newarke Street in 2002 (Derrick 2009) also followed a similar pattern with west to east orientations, and grave goods were equally sparse. Only two individuals had been buried with grave goods; one skeleton had an animal tooth placed in each hand and two horn cores close to their head. A second individual had been interred with a lead object, which may have been a talisman (*ibid,* 78). Burials excavated from Newarke Street in 1993 also conformed to a similar pattern (Cooper and Buckley 1996).

It would appear that the burials from the current cemetery exhibit a greater mixture of burial rites. The reasons for this are unclear.

Decapatitation

Skeleton 2, a two to three year old juvenile, had the skull placed by its feet. Removal of the skull and placement of it in another part of the grave is not uncommon in the Roman period.

Quensel-von-Kalben (2000, 218-219) carried out a study of ten British Roman cemeteries. Of these, three contained individuals that had been decapitated; the prevalence of decapitated individuals in these cemeteries varied from 1% to 7%. The decapitations occurred in all cases in urban cemeteries that dated to the late 3rd and to the 4th century AD (*ibid*). Clarke (1979, 374), however, observed that decapitated skeletons could also be found in isolated graves and suggested that they were, in fact, more common in rural cemeteries.

Clarke (1979) examined the available data from Roman cemeteries at the time of his publication for evidence of decapitations. He found numerous examples, which were widely distributed throughout southern England, East Anglia, the Midlands and western England, although he does not list any examples in the southwest. Recent work at Driffield Terrace in York (Caffell and Holst 2012) has shown that decapitation can also occur in the northeast of England. In fact, 70.8% of skeletons from this cemetery were decapitated (*ibid*).

The majority of decapitated individuals in Roman cemeteries were adults of both sexes and all ages, although a small number of decapitated children have also been found (Merrifield 1987, 72).

In some cases, cut marks are obvious on the vertebrae of the neck. Occasionally, these cut marks are noted on the front of the neck, suggesting that the head was removed once the person was dead (Taylor 2003, 19). Clarke (1979, 415) found that all skulls at Lankhills, Winchester, had been removed from the front, with a careful cut using a knife, severing the windpipe and jugular vein. It has been suggested that such a cut could only be carried out after death (Taylor 2003).

At Driffield Terrace in York, the cut marks were most common on the cervical vertebrae (neck), particularly C4 to C6, but cuts to the neck could be associated with cuts to the mandible, temporal bones (part of the skull around the ear), scapulae, clavicles and first ribs (Caffell and Holst 2012). In most instances one to two vertebrae were affected. The majority of these cuts were delivered from the back of the victim, with only a small number being delivered from the front of side of the victim.

In other instances, no such evidence for beheading can be observed (Melikian 2004, *pers. comm.*; Barber and Bowsher 2000, 89) and it is presumed that the head was removed after the body was at least partly decomposed (Taylor 2003, 18). In some cases, the skull was removed while some of the vertebrae and the mandible were still attached (*ibid*). In other cases, as at Watling Street, the skull of a male was removed after decomposition without the mandible and placed on his chest (Mackinder 2000, 15). It is now thought that graves were often kept open for some time after disposal of the dead person to allow mourners to be able to visit the corpse (Barber and Bowsher 2000, 310). It is possible that the skull was only removed after the body had been viewed and was therefore partly decomposed.

In common with many other Roman decapitation burials, the dismembered skull from Leicester was placed by the feet of the skeleton. Clarke (1979, 373-374) also found that the majority of skulls were placed by or over the feet, or between the knees.

Interpretations for Roman decapitations have ranged from criminal execution to religious or superstitious motives. Execution of criminals through decapitation was a punishment in the Roman Empire, although it was apparently reserved for Roman citizens – the better rank of criminal (Taylor 2003, 19). At Lankhills, Winchester, a decapitated man with his skull placed on his knees had been buried above an empty coffin. This was interpreted as a substitute for a proper burial of the individual whose body could apparently not be recovered (Merrifield 1987, 67). It has also been suggested that individuals were decapitated, so that their recently deceased family members or leader could be provided with their dependents or relatives (Clarke 1979, 415). Other instances of decapitation have been interpreted as the dead person not being able to sever to links with the world of the living (*ibid*, 71) and this may clarify why the decapitation was sometimes carried out after decomposition. This might also be explained by the belief that the soul was thought to live in the head and the decapitation was a ritual separation of the body, which might have ensured that the individual could not return (*ibid*, 74-76). The position of the head between the legs has been interpreted as a possible rebirth ritual, with the head 'being born' (Robinson 1997, *pers. comm.*).

Removal of the skull in non-adults is relatively rare in a Roman context. However, the skull of a six year old from the Roman cemetery at America Street, London, had been placed onto the knees of an articulated eleven year old juvenile (Melikian 2004, *pers. comm.*). At Ashchurch, Gloucestershire, the skull of a thirteen to fifteen year old adolescent (Skeleton 705) had been placed by the feet, in this instance upside down.

Decapitation burials were not observed at the earlier Newarke Street excavation (Cooper and Buckley 1996 and Derrick 2009), nor at Clarence Street (Gardner 2005).

Hobnail Boots

Of the nine individuals with surviving feet two appeared to be wearing hobnail shoes, and one of these is a tentative assumption based on the number of iron nails found with the bones of the feet during analysis, belonging to Skeleton 13. The individuals were both adult females, Skeleton 13 was located in Trench 3, approximately two metres south of the civil war ditch and Skeleton 9 was located in Trench 2 immediately adjacent to a Roman north-west-south-east ditch. In ten Roman cemeteries studied by Quensel-von-Kalben (2000, 218-219), eight contained individuals with hobnails. Of these, the prevalence of individuals with hobnails varied from 1% to 33%. The highest percentages were found in urban cemeteries that dated to the fourth century (*ibid*).

It is thought that the dead were provided with or wore their shoes so that they were equipped for their journey into the underworld (Wardle 2000, 29). At Cirencester, a probable hob nail shoe makers was located at one of the cemeteries, suggesting that they might have been making the shoes especially for burial (Salway 1981, 705-706). This theory might be possible to test at Leicester, if the nails are examined for wear.

At Leicester, it appears that the hob nail shoes were not worn in all cases, however, they do not appear to have been restricted to the male population. In other cemeteries, women and children often wore lighter footwear, which was not nailed (Barber and Bowsher 2000, 137). However, this may not have been the case at Leicester. Apart from the shoes, there is little surviving evidence in most cemeteries that the dead were dressed. The accompaniment of a bronze buckle, however, with Skeleton 10 would suggest that this individual, at least, was clothed. Further evidence of adornment was noted in two of the female burials (Skeleton 9 and 13), from which hair pins were recovered.

Hobnails were not observed at any of the sites used for comparative analysis (Cooper and Buckley 1996; Derrick 2009; Gardner 2005).

Prone Burial

According to Philpott (1991), prone burials were more common in rural or small town cemeteries, particularly in the fourth century, although earlier prone burials do exist. Prone burial may be used to signify ‘outcast’ status and theses burials were often located at the periphery of an ordered cemetery. The term ‘outcast’ is difficult to apply to Skeleton 10, a young adult male, who to all intense and purposes had been treated no differently from the other interments, save for the fact that he had been placed in his coffin face down. In all other respects, his burial ritual seems to have been no different to that of some of the other interments in the cemetery.

Coffins

Extended coffin inhumations appeared in increasing numbers throughout much of Roman Britain in the third century AD (Philpott 1991). Coffins were found with several skeletons (Skeletons 1, 2, 4, 6, 7, 9, 10 and 13), and the quantity and location of the nails in many graves suggested burial within a coffin. Further possible coffined burials were inferred by the size and shape of the grave (Skeletons 5, 8 11 and 12). These possible coffin burials included four females, five males and all three juveniles (see Table 14).).

At Clarence Street 31 burials, or 31% of the population were identified as having been buried in coffins (Gardner 2005). A total of fourteen individuals, or 46.7 % of the population, could be positively identified as having been placed in a coffin at Newarke Street (Derrick 2009), and a further 21 (55.3%) coffined burials were identified at earlier excavations at Newarke Street (Cooper and Buckley 1996)

Conclusion

Burial practice at Oxford and Newarke Street appears to exhibit characteristics of both pagan and more typical Romano-British fourth century AD practices. The cemetery appeared to be arranged in relatively orderly rows, with little intercutting, individuals were predominantly interred east to west, extended and supine, although there were a few notable exceptions. The majority of individuals appeared to have been buried in coffins. Males and females were distributed throughout the excavated area, and there was no noticeable difference between the sexes in terms of funerary ritual. Foetuses and neonates were conspicuous in their absence and were most likely buried elsewhere. Grave goods were abundant, accompanying both sexes and the young and old.

Discussion and Summary

The osteological analysis of the skeletal remains from Oxford and Newarke Street has provided a glimpse into the lives of the people buried there. Fourteen individuals were recovered from the cemetery, although many were incomplete and suffered from moderate fragmentation, which limited the amount of information possible to retrieve. Nevertheless, it has been possible to reconstruct a surprising amount concerning the lives of these people and the use of the cemetery.

The cemetery population primarily consisted of adults, and most were young middle adults, aged 26 to 35, with more males surviving into mature adult hood. Both men and women were identified among the adults, and although there was a slightly higher percentage of men, the sample was too small for this to be statistically significant. Only three children were present, all of whom were juveniles (the youngest of which was 1-3 years old, and the oldest 9-12 years old). No evidence for infants or neonates was found. Children, particularly infants and neonates, are usually under-represented in the archaeological record despite the fact that mortality must have been high (Lewis 2007), and children under two years are not often found buried in Roman cemeteries prior to the fourth century AD (Watts 1989).

Like many other Roman cemeteries, the Oxford Street graves were ordered in rows and many of the graves respected the presence of earlier burials, which may imply that the location of

the graves was marked in some way, or simply that the mounds of soil covering the burials were still visible when later graves were dug.

The majority, but not all, burials were laid out in supine extended positions and orientated west to east, with the heads to the west. Although not all of the burials complied with this order, two lay with their heads to the east. One individual, a juvenile, had been decapitated and was orientated north to south, with the skull at their feet and with two pottery vessels. Evidence for decapitation was not observed at the comparative cemeteries in Leicester. Another juvenile burial appeared to consist of only a skull, which may have been interred in a box.

There was no noticeable difference in grave location, orientation or burial position between the men and the women. Coffins were commonly used in Roman Leicester. At Oxford Street, they appear to have been provided for men, women and children alike. Grave goods were widely distributed amongst the individuals interred at Oxford Street, unlike the other Roman cemeteries in Leicester. A middle adult woman wore two rings, one believed to bear a Christian inscription. It is worthy of note that the woman was suffering from the advanced stages of tuberculosis when she died, and would have required considerable care. The small size of the sample meant that comparisons between sexes and ages, in terms of burial rite, were not significant. However, the lone, prone burial of a young middle adult male does appear to distinguish him from the rest of the individuals at the cemetery; although in all other ways this resembles the other burials from the cemetery.

It is possible that further child burials within the cemetery were concentrated within an area not discovered during the excavations. It is not clear how much of the cemetery itself has been excavated, and partial excavation may account for some of the biases in age and sex observed.

A wide range of pathological conditions was observed amongst the Oxford Street population, especially considering the relatively small size of the sample. A small number of minor congenital anomalies were present, affecting two young middle adult males with *spina bifida occulta* and one young middle adult female with accessory lumbar ribs.

Evidence for childhood stress was observed, with *cribra orbitalia* affecting half of the population and suggesting at a lack of vitamin B_{12}. Further indicators of stress were preserved in the tooth enamel of a number of individuals, such lesions may indicate dietary, environmental or physical stress. New bone formation along the cranial vault margins of a juvenile may have been caused by scurvy (Vitamin C deficiency), which suggests the individual endured a considerable period where an adequate supply of fresh fruits and vegetables or marine fish was unavailable. Such skeletal manifestations infer dietary hardships and suggest that the majority of individuals were experiencing at least periods of inadequate nutrition. One mature adult male, however, appeared to have enjoyed dietary excess. Skeletal lesions probably consistent with DISH were evident in the individual's spine. The disease is associated with excessive calorie intake, Type II diabetes, obesity and advanced age. The potential access to an abundance of food, may intimate that the individual was of a higher social status or ranking than the majority of the population from Oxford Street, though his grave did not contain any grave goods.

Traumatic incidents also affected the lives of two individuals; one mature adult female had a crushed vertebra, possibly as the result of a fall onto their feet or bottom. Such an injury

would have caused pain, and probably reduced the individual's mobility for at least a short period after the incident, and stiffness of the back may have been a long term consequence. A mature adult male had a fractured forearm, probably in a traumatic incident, which may also have caused damage to his knee, ankle and involved soft tissue damage to his thigh. Changes observed in the knee revealed osteoarthritis, suggesting the individual continued to use the joint after the trauma.

Infectious disease was common; sinusitis affected over half of the observable population, although it appears that only women and children were affected. Tuberculosis was also observed in the remains of one middle adult female. The advanced state of the disease would have meant that the woman would have required care. The degree of spinal destruction that she endured suggests she survived for some time with the spine bent forward at a right angle. The incomplete skeleton of a young middle adult male also revealed possible tuberculoid changes, which could only be tentatively diagnosed. The high prevalence of inflammatory lesions on the inside of the skull could have been caused by an infection such as meningitis; interestingly, the incidence of these lesions in males was twice as high as females. A young middle adult female exhibited lesions which may be attributable to hypertrophic pulmonary arthropathy; principally linked to cancer or infection of the lungs

Joint disease was extremely common; and it is likely that habitual activities contributed to the high prevalence of the condition. Joint disease affected both sexes equally in the hips, although women appeared to be more susceptible to DJD in the shoulder and spine, while men were more commonly affected in the knees and ankles. However, men were more likely to develop spinal osteoarthritis, possibly due to males having greater longevity and thus being more likely to develop the condition. Schmorl's nodes were more prevalent in males, although the distribution of lesions differed between the sexes, possibly inferring that different types of activities caused them.

The general dental health of the individuals from Oxford Street was slightly better than the Roman average, with the exception of a high prevalence rate of dental calculus. Surprisingly, female dental health was better than that of the males, particularly with regards to caries.

Overall, the high frequency of metabolic disease and infection amongst the Oxford Street population suggests that poor nutrition and illness was common. However, the women were of average height for the period and men only slightly shorter, which could suggest the limited impact on their adult stature.

Considering the relatively small sample size, this group of skeletons displays a considerable quantity of pathological conditions, some of which, such as the severe tuberculosis, are rarely observed in other Roman populations.

The Animal Bones - Jennifer Browning

Introduction

This report presents the analysis of the animal bone which was hand-recovered during excavations at Oxford Street, Leicester. No bones were available from the bulk environmental samples. Three trenches were excavated on the site revealing both Roman and medieval activity.

Methodology

Specimens were identified with reference to comparative modern and ancient skeletal material held at the School of Archaeology and Ancient History, University of Leicester. Information was compiled directly into a *pro forma* spreadsheet with facility for recording data on preservation, taxa, bone element, state of epiphyseal fusion and completeness to elicit information on species proportions, skeletal representation, age and taphonomy. Where possible, the anatomical parts present for each skeletal element were recorded using the 'zones' defined by Serjeantson (1996), with additional zones ascribed to mandibles based on Dobney and Reilly (1988). Surface preservation was assessed after Harland et al (2003). The occurrence of burning, gnawing and pathologies was noted and described. Butchery was recorded using simple coding and description. Joining fragments were re-assembled and the resulting specimen counted as a single fragment, although a record of the original number of fragments was retained.

Provenance and Dating

Three trenches were excavated on the site, which each produced evidence for activity on the site during the Roman period and then from the late Saxon period onwards. Trench 1 produced no features of Roman date but a small assemblage of residual pottery and human bones, associated with Roman cemetery activity, were found within medieval pits. Roman remains in Trench 2 consisted of a large ditch, a pit and two burials. Trench 3 contained several Roman ditches, some of which were quite truncated. A gully [3067] contained 1st-2nd century Roman pottery, and a lava quern fragment. A large circular pit [3097] was also dated to this period. In addition, the remains of 11 Roman graves were revealed in Trench 3, associated with the southern cemetery of the walled Roman town.

Medieval activity in Trench 1 was characterised by pits associated with back-yard activity within properties fronting onto Oxford Street. The pits were of variable size and contained a range of fills and material culture assemblages.

In Trench 2, there were several medieval pits, including a large sub-rectangular example [2016], which produced a large quantity of bones and a stone-lined pit [2006], which may have been a cess pit. Medieval activity in Trench 3 included several, mostly late medieval, pits: [3022], [3024] [3011] and a fire pit/oven [3028]. A thick 'garden soil' (3008) overlay the pits. The remains of the post-medieval Civil War Ditch [3013] were also identified and a stone and brick built building (3003), floor (3006), cut the garden soil.

The Roman features on the site, predominantly graves, produced an eighth of the assemblage. Phases 8, 11 and 12 each produced less than 100 bones; therefore there is too little useful information to do more than comment about the exploitation of animal resources in these phases. The bulk of the assemblage derived from Phase 9 and 10 features, which produced

25% and 75% respectively (Table 30). This was almost all recovered from pits, but was unevenly distributed between them, suggesting that they did not all have the same function or possibly implying that they were cleaned out at intervals.

The pottery evidence indicates that there was a high degree of residuality in the late medieval phase. Although there is not necessarily a direct correlation between quantities of residual pottery and residual bones, it must be assumed that some animal bones in the late medieval features have been re-deposited from Roman or earlier medieval features. This is borne out by the presence of human bones in the later pits. Unfortunately, there are no reliable visual means of distinguishing between residual and non-residual bones, so this must be simply accepted as a constraint of the data.

Table 30: Provenance of the assemblage by feature type and phase (Number of Identified Specimens and %)

Phase/	pit	ditch	gully	layer	oven/	post	stake	grave	blank	Total	%
Roman:	17	1	32					99	9	158	12.7
8:	43									43	3.5
9:	235	74							1	310	25.0
10:	620				4	2			1	627	50.5
11:	25									25	2.0
12:	7	19								26	2.1
ND	20			12		5	15			52	4.2
Total	967	94	32	12	4	7	15	99	11	1241	100.0
%	77.9	7.6	2.6	1.0	0.3	0.6	1.2	8.0	0.9		

Preservation and Taphonomy

Surface condition was assessed for each specimen, following Harland et al (2003); overall 67% was ‘good: lacks fresh appearance but solid; very localized flaky or powdery patches’ with a smaller number of specimens, 30%, classed as ‘fair: surface solid in places, but flaky or powdery on up to 49% of specimen’. ‘Poor’, defined as ‘surface flaky or powdery over 50% of specimen’. A higher proportion of Phase 10 and 11 material had good preservation (83%) compared with other phases.

Gnawing occurred on a small number of specimens, in the assemblage. The proportion increased in the later phases (table) but still remained low. The evidence, coupled with that from preservation therefore suggests that few bones were available to scavengers and that waste was fairly rapidly disposed of, probably in purposely–dug pits.

Burnt bones were rare in the assemblage. These comprised three scorched bones (cattle ulna, patella and deer metapodial) in Phase 10 pits. Five other bones in pits of Phases 8, 9 and 10 were calcined. There were therefore too few to indicate patterns of use or disposal.

Table 31: Preservation by Phase (%). Preservation stage after Harland et al 2003)

	Excellent	Good	Fair	Poor	Total number of fragments
Roman	0	47	53	1	158
8	2	28	70	0	43
9	1	49	48	3	310

10	2	83	13	2	627
11	4	96	0	0	25
12	0	15	85	0	26
Total	2	67	30	2	1241

Table 32: Proportion of gnawed bones by Phase

Phase	No Gnawed	%
Roman	1	<1
8	1	2
9	5	2
10	22	4
12	1	4
Total	30	

Taxa and Carcass Representation

A range of mammals and birds were identified among the hand-recovered assemblage. These were primarily domestic but a small number of wild animals were also present. A greater number of species were identified in Phase 10, however there is a strong correlation between larger sample size and greater species diversity. In the Roman assemblage the only avian bone recovered belonged to domestic fowl. Throughout the assemblage, domestic fowl were the most common birds, although goose was nearly as frequent in Phase 10. Duck, swan and a corvid (cf crow) were also represented in Phase 10. Cod bones in Phases 9 and 10 are evidence for deep-sea fishing, which was on the rise in this period and the only identifiable elements, were cleithrum and post-temporal, found at the junction of head and neck. These are the parts generally found in fish which had preserved by drying or salting, as the heads were usually removed at the production site (Cutting 1955, 133). A single amphibian bone was recovered from the Phase 9 assemblage.

The proportions of the main domestic species, cattle, sheep/goat and pig were fairly consistent across most phases, with roughly even numbers of cattle and sheep bones but fewer pigs. It is likely that, in keeping with most Leicester sites of this period, the sheep/goat bones represent sheep rather than goats. Where distinction was possible (in this case using cranial elements), only sheep were identified. Cattle are more common than sheep/goat among the Phase 9 bones but there is a reversal of this situation in Phase 10. However, the small size of the assemblage means that this is really only reflecting the vagaries of individual features since there are not enough to obtain an 'average'. The sample size in most phases is too low to allow reliable comparisons between phases and with other sites.

Table 33: Number of Identified Specimens (NISP) by Phase

Taxon	Phase							
	Roman	8	9	10	11	12	N.D	Total
Mammals								
cattle	15	6	44	79	4	2	6	156
sheep/goat	15	7	25	97	4	3	3	154
ovis			3	4				7
pig	4	3	10	36	2	1	1	57

Taxon	Phase							
	Roman	8	9	10	11	12	N.D	Total
equid	2	1	9	6		1	3	22
dog	1		1	2		2		6
human	22		4	3		6	10	45
cf human	3					1	9	13
fallow deer				5				5
Cf red deer				1				1
fallow/roe deer				1				1
roe deer		1	1	2				4
hare	1			1				2
rabbit				4				4
Birds								
domestic fowl	1		8	17	1		2	29
duck			12	5				17
goose			1	15		1		17
Cf goose				2		1		3
swan				1				1
Cf crow				1				1
Fish and Amphibians								
cod				5				5
amphibian (cf frog)			1					1
Total identified	64	18	119	287	11	18	34	551
% identified	41	42	39	46	44	69	62	44
Indeterminate								
lge mml	52	16	76	124	7	3	11	289
med mml	23	9	65	151	7	2	10	267
smll mml				1				1
bird indeterminate			19	5		1		25
fish indeterminate				6				6
Mml indeterminate	17		30	53		2		102
Total	156	43	309	627	25	26	55	1241

Table 34: Minimum Number of Elements (MNE) and Minimum Number of Individuals (MNI) for the taxa represented

Taxa	Phase 9	Phase 9	Phase 10	Phase 10
	MNE	MNI	MNE	MNI
cattle	19	2	48	3
sheep/goat	15	2	57	4
pig	8	2	22	2
dog	1	1	2	1
human	4	1	3	1
horse	7	1	4	1
red deer				
fallow deer			5	1

Taxa	Phase 9	Phase 9	Phase 10	Phase 10
	MNE	MNI	MNE	MNI
roe deer	1	1		
hare			1	1
rabbit			4	1
domestic fowl	8	1	16	3
goose	1	1	15	
duck	12	1	3	
swan			1	
cod			2	
amphibian	1	1		

Table 35: Relative cattle, sheep/goat and pig proportions in Phases 9 and 10, based on MNE and MNI

	Phase 10	%	Phase 10	%	Phase 9	%	Phase 9	%
Phase 10	MNE		MNI		MNE		MNI	
cattle	48	38	3	33	19	45	2	33
Sheep/goat	57	45	4	44	15	35	2	33
pig	22	17	2	22	8	19	2	33

In most phases, there were too few bones to permit inferences regarding carcass representation. Even among the larger assemblages, the more robust elements seem to have been the ones represented, including metapodials, mandibles, loose teeth and the more durable limb bones such as tibia, humerus and radius. However, with the exception of pit 2016, which contained a number of sheep/goat mandibles and skull fragments, no concentrations of elements or body parts were identified (see Appendix).

Age and Sex Determination

An indication of age at death is normally provided by tooth eruption and wear and, from post-cranial bones, the state of epiphyseal fusion (see Methodology). There were insufficient numbers of limb bones and vertebrae where the state of fusion could be ascertained to provide clear age profiles, even among the large assemblages of Phases 9 and 10 (see Appendix 3 Tables). Evidence of tooth eruption and attrition was similarly sparse for both cattle and pig. Both elderly and immature cattle were represented. However, fully mature pigs were not, demonstrating that pigs were generally slaughtered as sub-adults for meat, in keeping with most comparable sites. The small number of mandibles available for sheep in Phases 8 and 9 suggest that slaughter occurred at a range of ages. However, the majority of the Phase 10 mandibles were recovered from a single pit, [2016]; these indicate that the sheep were mature adults at time of death and are likely to have provided several clippings of wool before reaching the food market.

Sex was established for a small number of bones of domestic fowl and pig. In pigs this was based on the distinctive morphology of the canine tooth (after Schmidt 19xx) or in domestic fowl the presence/absence of the spur on the tarso-metatarsus. While this latter criteria, is not a definitive distinction, spurs on female birds are rare and tend to be more weakly-developed than male examples (Serjeantson 2009, 276).

Table 36: Pig canines and domestic fowl tibio-tarsii in the assemblage

Phase	Feature	Cut	Context	Taxon	Element	Sex
8	pit	1140	1137	pig	lower canine	female
8	pit	1140	1139	pig	lower canine	male
9	ditch	2033	2034	pig	lower canine	male
10	pit	2016	2013	pig	lower mandible	male
9	pit	1179	1175	domestic fowl	tarso-metatarsus	female- no spur
nd	pit	3033	3020	domestic fowl	tarso-metatarsus	male - spur

Pathologies and Measurements

A small number of pathologies were observed within the assemblage, constituting 1% of the total assemblage and have been listed below. These were predominantly exostoses and congenitally-absent teeth. Some pathologies, such as alveolar recession, may be age-related. Attempts to diagnose particular diseases within a faunal assemblage can be problematic because elements are often found in isolation; therefore it is impossible to make an assessment of the extent of the symptoms within the skeleton. Also the possible responses that bone tissue can make to various types of infection are limited. Therefore conditions with widely different causes and prognoses could cause bone tissue to react in a similar way (Vann and Thomas 2006).

The measurements taken are recorded in the appendix. While there are insufficient numbers to use for intra-site comparisons in this case, they will be added to a larger dataset where they can contribute to wider studies of animal size and shape.

Table 37: Abnormal bones in the assemblage

Phase	Feature	Cut	Taxon	Elemen	Notes
8	pit	1140	pig	humeru	thin layer of periosteal bone covering shaft.
9	pit	1112	equid	atlas	thin layer of localised exostoses, periosteal
9	pit	1008	sheep/goat	mandib	p2 congentially absent.
10	pit	3024	dog	radius	osteophytes just below distal articulation
10	pit	3024	domestic	tibio-	osteophytes on side of distal epiphyses
10	pit	1128	equid	mandib	anterior cusp of 1st molar has very deep
10	pit	1128	equid	metacar	lateral metapodial ossified to shaft
10	pit	1128	med mml	cervical	smooth indentation in the centre of both
10	pit	3024	pig	mandib	thin layer of grey bone on periosteal
10	pit	2016	sheep/goat	mandib	alveolar recession below m2/m3
10	pit	2016	sheep/goat	mandib	p2 appears congenitally absent. There is
10	pit	3022	sheep/goat	mandib	p2 congenitally absent.
10	pit	1128	sheep/goat	metatar	anterior proximal shaft has 3 bumps with
11	pit	1158	lge mml	rib-	expansion of shaft
12	ditch	3013	equid	ulna	minor exostosis directly below articulation

Butchery and Articulated Bones

Butchery was most prevalent among the medieval and early post medieval bones of Phases 10 and 11. In Phase 10, almost half the cattle and a third of the sheep bones had been butchered. The marks are indicative of a range of processing activities. Butchery was predominantly seen on the bones of stock animals and associated with processing for food but there were also marks suggesting bone-working activities.

All of the Phase 8 bones were chopped with a cleaver or similar tool, with the marks indicating portioning of the carcass.

Butchery using a cleaver was also very common among the Phase 9 assemblage, however a combination of marks was observed on some bones. Due to the comparatively low numbers affected, repeated butchery marks indicating systematic processing were only really evident on vertebrae and ribs. Vertebrae were either split sagitally or transversely, indicating splitting of the carcass and division into manageable portions. Ribs from both cattle and sheep/goat were butchered in a similar way, divided transversely along the shaft, suggesting portioning of the rib slab into manageable cuts of meat. Limb bones of both cattle and sheep were generally chopped, presumably into joints. A sheep femur had fine cut marks running round the centre of the shaft, to cut through the meat before the bone was chopped with a cleaver.
The larger Phase 10 assemblage also had a far greater number of butchered bones indicating a range of butchery activities. There was evidence for the use of a saw for the first time in this phase. Interestingly this occurred on cattle and sheep limb bones probably intended for consumption (two tibiae and a femur), as well as bones associated with manufacture, such as a cattle horncore. The radius shaft of a large bird, identified on morphological grounds as mute swan, had been neatly severed through the proximal shaft.

Knife marks were relatively common on large mammal rib shafts, possibly indicative of filleting. Filleting marks were also seen on sheep tibiae and femora, as well as a cattle scapula and goose femur. Cut marks on a couple of sheep skull fragments and a sheep radius, as well as cattle, pig and deer metapodials, suggest skinning. Disarticulation seems to have been the aim of other cut marks on for example, a cattle ulna and duck humerus.

However, once again cleaver marks outnumbered tools and seems to have been used extensively on cattle, sheep and pig carcasses, perhaps suggesting that speed was an important factor in butchery. The vertebral evidence shows sagittal splitting, indicating professional facilities to hoist and process the carcasses. In most cases, bones appear to have been chopped in order to portion the carcass into manageable joints of meat. Repeated examples of sheep mandibles chopped through the diastema, removing the anterior portion, were observed in pit [2016], possibly to release meat from the jowl or access the marrow cavity (Landon 1996 69-70).

Table 38: Prevalence of butchery within the assemblage

		%		%		%		%		%		%	
Taxon	Roman		8		9		10		11		12		Total
cattle	1	7	2	33	9	20	39	49	1	25			52
sheep/goat	2	14			4	16	31	32	2	50	1	33	40
ovis					1	33	4	100					5
pig	2	50			1	10	7	19			1	100	11
fallow deer							1	20					1
fallow/roe deer							1	100					1

domestic fowl					1	12	1	6					2
duck							2	40					2
goose							2						2
swan							1	100					1
large mammal	3	6	4	25	9	12	33	32	1	14			50
medium mammal			3	33	7	10	20	13	2	28			32
Total	8	5	9	21	32	10	142	23	6	24	2	8	199

The Assemblage by Phase

Roman

A total of 108 bones were recovered from the fill of eleven Roman graves. These are unlikely to have been deliberately deposited and probably represent bones associated with earlier activity, which became incorporated in the grave during backfilling. Bones of a number of taxa were represented including cattle, sheep/goat, pig, hare dog, domestic fowl and horse. Disarticulated human bones were also recovered.

A smaller number of bones were recovered from non-grave features in trenches 2 and 3. However, these also included a small number of human bones, indicative of re-digging and residuality. For this reason, coupled with the small assemblage size, it is unlikely that they can provide much information on the use of animal resources in this period.

Table 39: Distribution of taxa within Roman graves

Taxon	Grave											
	SK 01 304 9	SK 05 306 2	SK 06 307 1	SK 07 202 530	SK 08 308 2	SK 09 202 7	SK 10 308 6	SK 11 308 8	SK 12 309 0	SK 13 309 2	3065	Total
cattle			1				1	1	6			9
sheep					1			1	6	1	3	12
pig						1				1	1	3
dog			1									1
horse				2								2
human		3	2		2		3		1	3	1	15
?human	1		1									2
hare									1			1
domestic							1					1
large mml			5	5	1	3	2	2	7	5	3	33
med mml						4			14	1	1	20
Indet.	5				2					2		9
Total	6	3	10	7	6	8	7	4	35	13	9	108

Table 40: Distribution of the assemblage within non-grave Roman features

	gully				linear feature	pit		Total
Taxon	3056	3067	3069	3080	3100	2025	3097	
cattle		1	1			1	3	6
sheep/goat			2	1				3
pig			1					1
equid	1						1	2
human			2			5		7
?human						1		1
lge mml	3	4	5	1	1	2	3	19
med mml			1	1		1		3
indeterminate			8					8
Total	4	5	20	3	1	10	7	50

Phase 8 (c.1100-1250)

The Phase 8 assemblage was recovered from four pits in Trench 1, including a possible cess pit [1119]. However, detailed analysis was not appropriate due to the low number of bones from each feature.

Table 41: Distribution of the assemblage within Phase 8 pits

	pit				Total
Taxon	1117	1119	1140	1155	
cattle	4	2			6
pig			3		3
sheep/goat		6	1		7
equid	1				1
roe deer	1				1
lge mml	9	2	4	1	16
med mml	2	4	2	1	9
Total	17	14	10	2	43

Phase 9 (c.1250-c.1400)

The Phase 9 bones were produced by six pits in Trench 1 and a ditch in Trench 2. Cattle were the dominant taxa, outnumbering sheep/goat bones by nearly 2 to 1. Re-deposited human bones were recovered from the ditch in Trench 2 indicating a degree of residuality. A single human bone was also found in pit [1114]. A roe deer mandible was recovered from pit [1008].

Table 42: Distribution of assemblage within Phase 9 features

	ditch	pit						Total
Taxon	2033	1008	1112	1114	1116	1163	1179	
Mammals								
cattle	12	5		5		22		44
sheep/goat	6	5	1	5		7	1	25
ovis		2				1		3
pig	3	5			1	1		10
dog		1						1

roe deer		1						1
human	3			1				4
Birds								0
domestic fowl		3		2		1	2	8
duck						12		12
equid	5	1	2	1	1			10
goose		1						1
amphibian (cf frog)		1						1
								120
Indeterminate								
lge mml	26	26	9	2	3	9	1	76
med mml	10	43	1	9		1	1	65
indeterminate	9	5		1		15		30
bird indeterminate		2				17		19
Total	74	101	12	26	5	86	5	309

Phase 10 c.1400-c.1550

The Phase 10 assemblage was derived from pits in all three trenches, as well as a Trench 2 posthole and an oven feature in Trench 3. Unsurprisingly the oven (cut 3028) did not produce an informative faunal assemblage as it is unlikely that the bones are associated with the use phase of the feature. The pits and post hole were very variable with possible cess pit [1143] and cuts [2040] and [2017] producing very little material. However, two pits, [1128] and a large sub-rectangular pit [2016] were particularly rich in faunal remains. Pit 1128 contained a wide variety of taxa including cattle, sheep, pig, rabbit deer, horse, domestic fowl, goose, crow (sp.) and fish (the size suggests cod). A fallow deer metapodial were butchered, displaying marks associated with skinning and primary butchery.

The taxa represented in pit [2016] included cattle, sheep, pig, rabbit, hare, horse, fallow deer, domestic fowl, goose, duck, swan and cod. Two human bones, presumably residual, were also recovered. A high proportion of the bones in pit [2016] (28%) were butchered.

Although it was not always possible to positively distinguish between sheep and goat, where criteria could be used only sheep were identified. The pit contained seven ageable mandibles, all of which were mature adults. With reference to modern data, it was possible to estimate the approximate age of these animals (Moran and O'Connor 1994). Two mandibles probably derived from animals aged approximately 2-4 years old, three were 4-5 years, while a further two were over 6 years old. These results suggest that the sheep would have yielded several shearings of wool before eventual slaughter. The number of cranial fragments suggests that the pit contains primary butchery waste.

The large and medium mammal fragments probably mostly belonged to cattle and sheep. Almost a quarter were rib fragments, which in many cases had been divided into sections, suggesting processing of joints of meat.

Goose and duck bones were both more numerous than domestic fowl, although in no case was more than a single individual represented. The duck bones compared in size and morphology to the eider duck, *Somateria mollissima*, which is a winter visitor. A large radius compared morphologically with mute swan, *Cygnus olor* and appeared to be sawn at one end, although it is not clear what this was used for. Fragments of a cod cleithrum and post-

temporal were identified, which could have derived from stockfish (preserved cod which was very popular in the period).

The deer bones from this pit consisted of antler and phalanges - bones that could have been respectively collected or brought in with a skin. Where diagnostic, they were identified as fallow deer.

Table 43: Distribution of assemblage within Phase 10 features

	oven/pit	pit						post hole	Total
Taxon	3028	1128	1143	2016	2040	3022	3024	2017	
cattle		24	1	27	3	9	15		79
sheep/goat	1	33	1	39	2	10	11		97
ovis				3		1			4
pig		5		22	1	5	3		36
rabbit		2		2					4
fallow deer		1		4					5
?red deer				1					1
fallow/roe deer		1							1
roe deer						1	1		2
dog							2		2
equid		2		1	1	1	1		6
hare				1					1
human				2		1			3
domestic fowl		9		1		1	4	2	17
goose		6		4		3	2		15
?goose		2							2
duck				5					5
swan				1					1
fish		1							1
cod				5					5
corvid		1							1
Total identified	1	87	2	118	7	32	39	2	288
lge mml	1	56		37		12	18		124
med mml	1	77		49		9	15		151
smll mml		1							1
indeterminate	1	12		36		4			53
bird indeterminate		2		1		2			5
fish indeterminate		5							5
Total	4	240	2	241	7	59	72	2	627

Phase 11 c.1500-c.1650

The Phase 11 bones derived from a single pit, [1158]. All the diagnostic bones belonged to domestic food species and six bones were butchered. The large and medium mammal bones almost certainly belong predominantly to cattle and sheep and comprise mainly rib fragments and vertebrae. On this basis it is likely that the assemblage represents domestic waste from butchery and consumption.

Table 44: Phase 11 pit

Taxon	pit 1158
cattle	4
sheep/goat	4
pig	2
domestic	1
lge mml	7
med mml	7
Total	25

Phase 12 c.1650-c.1750

Bones were recovered from a pit and a ditch in Trench 3. The specimens from pit [3015] were predominantly fragments of juvenile human bone and therefore probably re-deposited from earlier features. The feature also contained a butchered sheep humerus, cattle patella and an undiagnostic bird shaft fragment.

Pit 3013 contained a range of material from both food and non-food species. It is highly likely that the human bones were residual from the earlier use of the area as a cemetery. The assemblage therefore contains material from a variety of sources.

Table 45: Distribution of the assemblage within Phase 12 features

	ditch	pit	Total
Taxon	3013	3015	
cattle	1	1	2
pig	1		1
sheep/goat	2	1	3
equid	1		1
dog	2		2
goose	1		1
?goose	1		1
human	2	4	6
?human	1		1
lge mml	3		3
med mml	2		2
indeterminate	2		2
bird indeterminate		1	1
Total	19	7	26

Phase 13 Modern

A small assemblage of bones (n=52) was recovered from modern and undated features. These will not be discussed further due to lack of dating and, in the case of the modern features, probably a high proportion of residual material.

Table 46: Distribution of assemblage within Phase 13 and undated features

	layers	layer	pit			post hole		stake	Total
	(1165)	(3007)	3011	3033	3064	2019	2021	3042	
?human	1							8	9
human				10					10
cattle	1		1	1	1		1	1	6
sheep/goat	1					2			3
pig	1								1
domestic				2					2
lge mml	5		1	2	1		1	1	11
med mml	2	1			1	1		5	10
Total	11	1	2	15	3	3	2	15	52

Discussion

An assemblage of animal bones was recovered during an archaeological intervention at Oxford Street, Leicester. The features were dated to both the Roman and the medieval period. Many of the Roman bones were recovered from grave backfills and residual human bones were found within a number of medieval and post-medieval pits. Cattle dominated the Roman meat market, as observed at both Causeway Lane (Gidney 1999) and Bonners Lane (Baxter 2004). The limited evidence from Oxford Street indicates the prevalence of both cattle and sheep/goat.

The assemblages from medieval and post-medieval phases, 8, 11 and 12, were very small and unfortunately only able to provide limited information on diet, economy or use of animal resources in the period. Larger groups, with greater species variety, were recovered from Phases 9 and 10. However, the bones were not evenly distributed between features; the bulk of the assemblage was recovered from four pits. Therefore it is not possible to gain an overall insight into economic trends of the period by 'averaging' results. As far as can be ascertained the assemblage appears to represent the disposal of household waste, predominantly from butchering and consumption but including primary butchery and craft waste from small-scale activities, in the form of antler and horncore fragments.

The archaeological evidence indicates that both sides of Oxford Street were occupied by the 12th and 13th centuries, with pits and other features indicating back-yard activity (Finn 2004, 63). It may therefore be assumed that most of the medieval pits were for the disposal of household refuse. However, occupation is likely to have been patchy, some sites fronting onto Newark Street (eg. Cooper 1996; Derrick 2009, 93) appear to have been largely agricultural in the medieval period. Sites such as 61 Oxford Street/Grange Lane (Higgins 2010) have produced surprisingly little faunal material, possibly suggesting that rubbish was removed to adjacent sites. At the current site, features such as a possible cess pit and oven do suggest that there was both occupation and disposal on site in the later medieval period.

The site is located south of the Roman and medieval town. A number of small archaeological sites have been excavated in the vicinity in the last 20 years, producing small bone assemblages. Comparatively large faunal assemblages, including Bonner's Lane (Baxter 2004) and De Montfort University (Browning 2010) have helped characterise the faunal remains from the area. This work has provided evidence both for occupation and also for

manufacturing processes, such as tawyering, particularly in the early post-medieval period. A site at De Montfort University included an early post-medieval pit (1500-1650) containing an high concentration of sheep metapodials and phalanges, indicative of skin working (Browning 2010a) At Bonner's Lane, there is evidence for a dye works, grain processing and pig-keeping, in addition to tawyering, although much of this activity ceased around 1600 (Finn 2004, vi). Similarly, although many of the bones from the adjacent site at Grange Lane, located south of Bonner's Lane, represent discarded domestic waste from cooking and consumption, the utilisation of cattle, sheep and goat horncores indicate that small-scale craft activity was taking place from the 14th century (Browning 2010b).

Nearby sites also include Republic car park/York Road, excavated in 1998, which produced evidence for both Roman and medieval activity. Among the medieval bones were horncores (mostly cattle) and a small quantity of antler with cut or saw marks, indicating small scale craft work (Browning 1999). In common with the current site, rabbit and deer bones were present in small quantities, but wild game did not constitute a major part of the diet. It is clear that legal restrictions placed on the hunting of deer did not prevent some elements of the carcass reaching the urban market. However, only deer bones from the skull and antler, lower leg and feet were recovered. These are elements that could have remained with the hide, suggesting utilisation of skin rather than consumption. In Phase 10, the late medieval period, fallow deer is the most common deer species reflecting a trend seen across Leicester in this period.

At Republic car park/York Road, sheep bones were most common, similar to Phase 10 at the current site. The proportions of cattle and sheep, raised in a rural environment, compared with animals that could be reared in the, such as pig and domestic fowl suggests that the inhabitants subsisted primarily on meat from the market supplemented by locally raised stock. However the current site, unlike Republic car park/York Road, did not produce evidence for neonatal pigs.

The accumulating faunal evidence from Leicester's south suburb therefore suggests occupation as well as the development of specialised workshops in the medieval and post-medieval periods. The current assemblage helps to add to this body of knowledge and will hopefully contribute to larger studies.

The Plant Remains and other environmental evidence - Anita Radini

Introduction

During the excavation at Oxford Street, environmental samples were taken for the recovery of plant and animal remains, which could provide evidence of domestic and other activities conducted on site.

Materials and Methods

Samples

Samples were taken from a variety of features, including cess and pit fills, and from these, 11 samples were selected from medieval deposits dating between the 12th and 16th centuries AD, as shown in Table 47.

Table 47: Selected environmental samples

Sample	Context	Feature	Date C Ad
100	1126	cess pit	12th-13th
102	1133	pit	15th-16th
103	1139	pit	15th-16th
104	1010	pit	13th-14th
107	1176	pit	13th-14th
200	2011	cess pit	13th-14th
201	2012	cess pit	13th-14th
204	2014	pit	15th-16th
300	3023	pit	15th-16th
302	3027	pit	15th-16th
304	3020	pit	N/D

Additionally, four samples from the gut area of the Roman skeletal remains dated to the later 3rd or 4th centuries AD were also assessed for the presence of intestinal parasite ova, these were: sample **305** (3081), from Sk08; sample **306** (3085), from Sk10; sample **307** (3089), from sk12 and sample 308 (3091), from SK 13.

Lines of evidence

Two lines of evidence were investigated:

1) The plant macro-remains, which were retrieved in all the samples. The analysis was also complemented by preliminary analysis of the species of charcoal to identify the wood used for fuel during various human activities.
2) The presence and survival of intestinal parasites ova was also tested that may provide information of human and animal health

Extraction of the remains

The selected samples were processed in the following way. A sub sample of 250ml of soil was taken from each sample for intestinal parasite analysis and sealed in a polythene bag. For the recovery of plant macro-remains, charcoal, small animal bones and fish remains, 10 litres

of the bulk of the samples were sieved in a York tank with 0.5mm mesh and flotation into a 0.3mm mesh sieve. Residues were all air dried and separated on a 4mm mesh riddle and the coarse fraction (CF) over 4mm was sorted for all remains and finds. The fine fractions (FF) below 4mm were reserved for sorting during the analysis stage if required. The flotation fractions (Flots) were transferred from the sieve into plastic boxes and air dried. For the recovery of intestinal parasites, small samples of soil, of around 5g, (from the 250 ml of unprocessed soil) were treated in 15ml of 1M hydrochloric acid, and left for digestion in acid for a minimum of a week to a maximum of two weeks. After this length of time a swirling of the solution was produced to encourage further disaggregation and the formation of a suspension. This was sieved through a 20 micron aperture stainless steel sieve. A small volume of the suspension (between 0.2 and 0.15 ml) were pipetted on a microscope slide and a solution 50% glycerol and 50% ultrapure water was put a top of the suspension. Finally the mixture was covered with a coverslip, a drop of nail polish was places at each corner of the coverslip to maintain it *in situ*.

Quantification

All flots and coarse residues, where necessary, from the samples were scanned noting the species present and an indication of abundance of each category of remains was provided on a scale from 1 to 3: + present in low number, ++ moderate amount, +++ abundant. More detail about species distribution across the assemblage are provided in the results and discussion. The results of the analysis are represented in Table 48. The presence of root and rootlets was also recorded.

Identification

Plant macro-remains

The whole residue was examined with a stereo-microscope at magnifications of x20 to x40. Morphological criteria were used for the identification of plant species, based on modern reference material and seed identification manuals (e.g. Berggren 1981; Anderberg 1994; Cappers *et al*. 2006). Plants nomenclature follow Stace (1991). Soil requirements and plant ecology follow Hanf (1983) and Wilson and King (2003).

Charcoal

The best preserved charcoal fragments were observed at different magnifications, between x10 to x40 and grouped according to their morphology/type. The best preserved fragments of each type were then fractured to obatin the correct sections that allow the viewing of anatomical features needed for their identification. These were examined using an incident-light microscope at up to x400 magnification. Identifications were made following anatomical keys by Schweingruber (1990), and modern reference material.

Parasites

Identification was conducted using descriptions and measures from modern atlas and published data of modern and archaeological material successfully used in other studies for the identification of this type of remains (see Mitchel *et al*. 2013).

Results and discussion by category of remains

Preservation

The most common form of preservation found was by charring. Charred plant remains were found in all samples examined. Only a low number of mineralised remains were recovered, even from contexts were they are normally well-preserved, such as cess pits. Some uncharred seeds that were not mineralized or waterlogged were also recovered. These were mainly represented by elder (*Sambucus nigra L.)* and blackberry (*Rubus* spp.) pips, both of which are often found uncharred on archaeological sites. The archaeological origin of these remains is uncertain, and their presence is therefore recorded under one category of 'uncharred seeds', with an identification of their abundance, and will not be discussed further.

Table 48: Overall presence and relative abundance of plant remains recovered from the site

Sample	Context	Chaff	CGr	C/C	Arb/Dst	UnCl	Chr	Md Rt
100	1126		x		x	x	xx	xx
102	1133		x	x	x	x	xx	x
103	1139	x	xx		x	x	xxx	xx
104	1010		x	x		x	xx	x
107	1176		xx		x	x	x	x
200	2011	x	x	x	x	x	xxx	xx
201	2012		x	xx		x	xx	x
204	2014		x	x	x	x	xx	x
300	3023		x	x	x	x	xxx	xx
302	3027		x	x	x	x	x	xx

CGr=charred plant remains; C/C=cultivated and collected; Arb/Dst=arable and disturbed ground; UnCl=unclassified; Chr=charcoal and charcoal flecks; Md Rt=modern root fragments

Cereals chaff and grains

Cereal remains represented the bulk of the archaeobotanical record, and dominated the assemblage. Wheat chaff was found in two samples **103** (1339) and **200** (2011), which contined a very low amount of bread wheat rachis (*T. aestivum* L.). Cereal grains were found in all samples. Sample 107 (1176) had 30 grains, although many were broken and abraded. All other samples had less than 30 grains. The cereal assemblage was dominated by hulled barley (*Hordeum vulgare* L.), however a few grains of wheat were found in all samples. The identification of wheat grains is problematic because of the overlap of characteristics, distortion and loss of embryos or part of the grains during the charring process. However, some of the better preserved grains were consistent with free-threshing wheat (*Triticum aestivum/turgidum*) and the presence of bread wheat chaff, suggested bread wheat was the main type of wheat. This is consistent with other sites of the same periods in the city (e.g. Monckton 1999; Monckton and Radini 2009; Radini 2009).

Cultivated and collected

Only three samples contained remains of edible legumes; sample **200** (2011), **201** (2012) and **300** (3023). The remains were identified as edible species of *Vicia faba* var. *minuta* (field bean) in sample **200**. The identification was based on shape and length of the hilum in every case where the hilum was visibly preserved. Remains around 4mm in length, where the hilum

was not preserved were identified as *Vicia/Pisum* (beans/peas), in sample **201**. A low amount of small legumes were identified as vetches (*Vicia* spp.) in samples **300** and **201**. Small legumes have been recorded in medieval Leicester in several excavations and evidence of the practice of drying them was recently found at the site of Freeschool Lane (Radini 2009). Only one fragment of *Corylus avellana* (hazelnut) shell was recovered, in sample **201** (2012). Some species described under the category of arable and disturbed ground weeds may have been collected for their edible leaves, such as goosefoots (*Chenopodium* spp.), sheep sorrel (*Rumex* cf. *acetosella* L.), and for flavouring brassicas/cabbages (*Brassica* spp. and Brassicaceae), and all these were ubiquitous across the assemblage. Finally two mineralised grape pips were found in sample **300** (3023) and four damaged and small mineralised plum stones (*Prunus* spp.) were recovered in sample **200** (2011), dating to the 15th-16thC and the 12th-13th C AD respectively. These remains are common in Late Medieval and Early Post Medieval Leicester (Monkton 2006; Radini 2009) and are normally found in higher number.

Arable/disturbed ground and grassland

Many of the seeds found were arable weeds of the cereal crops such as stinking mayweed (*Anthemis cotula* L.), normally found on heavy soils, and scentless mayweed (*Tripleurospermum* spp.) which prefers lighter soils. Cleavers (*Galium aparine*) and corncockle (*Agrosemma githago* L.) were also recovered, but in low number. Cleavers is an autumn germinating species and when found associated with cereals suggests that they may have been autumn sown (Jones 1988). All samples except **104** (1010) and **201** (2012) had one or two seeds of the above species. Cabbages/Mustards seeds (*Brassica* spp.) and seeds belonging to the Cabbage Family (Brassicaceae, see unclassified) in general were recorded in almost every sample, often in low number or as a single item. The seeds are very small and the surfaces of the seeds did not survive well so further identification was not possible. Such finds are common in the medieval period (Dyer 2006).

Unclassified

The seeds recorded as unclassified belonged to plants that have no common habitat or they could not be identified to a specific level. In this category we find sedges (*Carex* spp), which are plants of damp ground and small leguminous seeds of clover type (*Melilotus /Medicago/ Trifolium)* which include many grassland plants. Seeds of Poaceae, grasses, large and small, were also recovered in all samples. Grasses are commonly found as weeds in the fields, and they can be hard to separate from the crop. Therefore they could have arrived on site with the crops, used as kindling, roofing and building material, fodder or grown in disturbed ground on site. These seeds are commonly scattered across the archaeobotanical record of all periods in archaeological sites in the city and surroundings.

Charcoal

The majority of the charcoal was preserved in very small fragments and flecks. The most common taxa identified were oak (*Quercus* spp.) and hazel (*Corylus avellana* L.), and were found in all samples. Fragments of willow/poplar wood (*Salix/Populus*), were found in sample **200** (2011) and sample **204** (2014). However, a large number of small fragments remain unidentified. The charcoal assemblage, like that one of seeds, is remarkably similar across the site. All the species found were native trees, and used for coppicing in the past. Oak and hazel are present in most samples, which indicates oak-hazel woodland to be exploited through the time. Oak and hazel would represent the best fuel for both domestic and industrial activities as they burn at a high and constant temperature. The presence of willow/poplar also indicates exploitation of wetland as those species are normally found on wetlands or near watercourses (Stace 1991).

Other remains
Root and rootlets fragments were found in all samples. Earthworm egg capsula were also present in few samples. These remains suggest a degree of soil disturbance.

Parasite Ova
No parasite ova were found in the samples analysed, therefore no further work is required on this line of evidence.

Conclusions

Overall the plant assemblage from Oxford St. was remarkably consistent across the site but with a lower amount of debris compared to other sites from within the walled town dating the same period. The higher quantity of cereal debris compared to other remains is very likely to represent accumulated domestic waste, for example food spillage, and possibly accidental burning during crop drying and/parching. In this situation, a wide range of weeds are less likely to appear, as they are removed during the cleaning of the crop, before consumption (Hillman 1981). The remains of cultivated and collected fruit, nuts, herbs and spices is very poor on site, when compared with the wide range fruit, herbs and nuts consumed during the Medieval periods, which left archaeological and written evidence (e.g. Dyer 2006; Moffet 2006; Monkton 1999; Monckton and Radini 2009; Radini 2009). This too is probably due to charring being the main form of preservation. The archaeobotanical assemblage from Oxford Street and its associated finds assessed during the analysis have provided useful information regarding the history of crop exploitation during medieval and early post-medieval occupation on the site, and is consistent with the existing picture of the use and consumption of plants during the period in the town (e.g. Monckton and Radini 2009; Radini 2009).

Discussion

The Archaeological Sequence

Prehistoric

Evidence for prehistoric activity comprised a small scatter of 6 worked flints with characteristics of Neolithic or Bronze Age date. All of these pieces were found residually in later features across the three areas, but with a slight bias towards Trench 3, where half the assemblage was recovered. A shallow pit containing Neolithic pottery was also revealed in Trench 3, its presence providing slightly more context to the scatter of similarly dated flints. These finds add to other discoveries from nearby excavations that have indicated a wider spread of prehistoric activity in the area. In the immediate area, similar thin scatters of flint tools and working waste have been retrieved during excavations on the Elfed Thomas site to the east (Cooper 1996, 5) and during excavations in advance of the PACE and Hugh Aston buildings for the De Montfort University (Morris 2010, 110). Further afield, evidence for local Neolithic activity includes a stone axe and flint scatter from Bonners Lane (Finn 2004), a flint scatter from Mill Lane (Finn 2002) and a sherd of Peterborough ware pottery from Oxford Street (Higgins 2000) all to the south-west of the present site.

Roman

Remains indicating a long span of Roman activity was revealed on the site, beginning in the later 1st century and ending in the 4th century, enabling a broad understanding of the character and changes in the sites use over time.

Late 1st – early 2nd century

Early Roman occupation on the site is indicated by a thin spread of features, mainly located in Trench 3. Stratigraphically these were the earliest archaeological remains revealed during the excavations, and were associated with pottery dating to the late 1st – early 2nd century AD.

A series of linear boundary features at the southern end of Trench 3 formed the bulk of the early Roman evidence. These were fairly shallow and may have been truncated by later activity, but had clearly been laid out following north-east – south-west and north-west – south-east alignments, possibly relating to a grid-like pattern of land allotment. The north-east – south-west boundaries lay very close together suggesting that one had replaced the other at some point and indicating persistence of the boundary line.

A slightly curving ditch at the northern end of Trench 3, closer to Newarke Street may have related to a separate enclosure but based on such sparse evidence interpretation is difficult. Slightly south of this was a large pit and cluster of post holes indicative of domestic type activity.

The nature of the early Roman remains from the site provides complementary evidence in relation to other excavated sites nearby. Evidence recovered to the north and east offered a similar picture of early land allotment associated with small-scale domestic activity. At the Elfed Thomas site to the east, a recut ditched boundary on a north-east – south-west alignment appeared to form the southern limit to an area containing limited evidence for domestic activity consisting of structural remains and pits, including a well-preserved cess

pit. The spatial organisation of these remains suggested that they lay within a 'backyard' location behind properties existing further to the north (Cooper 1996, 8-9).

To the north, excavations on the opposite side of Newarke Street suggested an early phase of similar activity, with limited domestic evidence including cobbled surfaces, make-up layers and pits, one containing charred plant remains and animal bones (Derrick 2009, 67). These existed within a layout of plots defined by gullies/ditches, also on a NE-SW orientation, indicating continuity of alignment with the boundaries to the south. These boundaries probably represent a series of laid out plots alongside the *Tripontium* Road (Oxford Street) which, evidence suggests, was formalised during the Late 1st – early 2nd century (Finn 2004, Thomas 2010).

A series of ditches also defined a series of plots or paddocks on the western side of the *Tripontium* Road (Morris 2010, 110). Here, a generally dispersed landscape was characterised by a lack of domestic activity or associated material culture, perhaps suggesting an agricultural focus. In general the evidence for early Roman activity in this part of the south suburb suggests a formative episode of 'ribbon' development characterised by the laying out of boundaries delineating rectilinear plots, within which agricultural and domestic activities were carried out. The focus of domestic activity at this time most likely was located adjacent to the Tripontium Road, and beyond the limits of the excavated areas to date.

2nd – 3rd Century

Evidence for 2nd-3rd century activity is characterised by the creation of a substantial landscape boundary observed in Trench 2 on a north-west – south-east alignment (Fig. 55). This large ditch evidently had a long history of use, with coin evidence suggesting it was becoming infilled by the later 3rd or early 4th century, indicating it held an important position in the landscape of the south suburb. A large ditch with similar characteristics and orientation has been revealed at other nearby excavations suggesting the presence of a significant 2nd/3rd century land division running parallel with the *Tripontium* Road, perhaps marking the eastward limits of plots situated adjacent to the road. To the north a short section of this boundary was revealed during excavations at 21-33 Newarke Street, where it was seen as part of a reorganisation of the site during the mid-late 2nd century (Derrick 2009, 70). A longer section of ditch was observed some 80m south of the present site during excavations at York Road and Oxford Street (Gossip 1999a, 1999b).

Figure 55: The 2nd-3rd century ditch in relation to other known contemporary boundaries

Lying adjacent to the ditch in Trench 2 were two burials that were probably broadly contemporary with the boundary, as they had been laid out in respect of its alignment. One contained a complete female adult inhumation while the second contained disarticulated remains of a child, both apparently buried in coffins. The adult was buried with hobnail boots laid next to her feet and two bone hair pins, one of which dates to the late 1st-early 2nd century. The second burial may have been disturbed, resulting in the disarticulation of the bones, as the grave cut was big enough to hold a complete body. Both burials appear to represent pagan tradition due to their orientation and the presence of grave goods, and contrast sharply with the burial evidence recovered from Roman cemetery excavations at the Elfed Thomas site (Cooper 1996) and at 21-33 Newarke Street (Derrick 2009) where the evidence overwhelmingly supported a Christian burial tradition with east-west oriented, supine inhumations containing no grave goods.

Similarities may be found however, at the York Road and Oxford Street excavations to the south, where a number of burials were located to the west of what appears to have been a prominent boundary feature (Gossip 1999a, 1999b). These burials did not appear to have been formally organised and lay on a variety of alignments, some in respect of the boundary and others a short distance from it. Grave goods were also present in these graves, in the form of pottery vessels and hobnail boots laid near the feet. Another human sized grave contained only the burial of a dog.

The large numbers of burials identified outside the southern town wall are all located within a large extra mural cemetery area, although the limits of this area are unclear. The majority of these burials have been found in the Newarke Street area but clearly there were other concentrations of burial activity further south, in plots adjacent to the *Tripontium* Road. This may reflect expansion of the cemetery area over time, or differences in burial tradition. The Trench 2 burials on the western side of the large boundary ditch may belong to a pagan tradition of peripheral burials located at the rear of domestic plots, as the York Road/Oxford Street examples also appear to reflect.

A 3rd-4th century date for the York Road & Oxford Street burials was assigned based on limited stratigraphic evidence and the dating of associated pottery vessels. Dating the two Trench 2 burials is difficult, but it is possible they could date between the 2nd-3rd centuries based on the available evidence.

3rd-4th Century

Further cemetery evidence dating to the 3rd-4th century was located in Trench 3, adjacent to Newarke Street. The burials in this area were superficially similar to those recorded at the Elfed Thomas site and at 21-33 Newarke Street, being formally laid out in rows and, with one exception, adopting a NE-SW alignment (Fig. 56). However excavation proved these burials to have other, very different characteristics, suggesting that pagan, as well as Christian rites were observed. Excavations of a Roman cemetery at Ashton, Northamptonshire identified two contemporary areas of a cemetery that apparently catered for Christian and non-Christian beliefs (Watts 1991). More locally it is clear from other cemetery excavations in different parts of Leicester that pagan traditions were observed in the later Roman period (Cooper 1998, Mathew Morris *pers comm*).

Although almost all of the graves were oriented in the same way as the nearby Christian burials, two of the bodies faced west rather than east, and another had been buried in a prone position. Whilst this may have been accidental during burial, other factors suggest different attitudes in this part of the cemetery.

Many of the burials contained grave goods, which contrasts sharply with the other nearby cemetery evidence where associated finds were absent. Finds from the burials included hair pins and a buckle, while one individual had been buried with two finger rings and a comb beneath her head. Evidence from two graves indicates the use of heirlooms as grave goods. The iron ring from SK 04 and a hairpin from SK 12 are both datable to the 1st or 2nd century, much earlier than the time of burial. Grave goods are also recorded as accompanying burials found during the construction of Allen House (Dare 1927, 33-57) suggesting this tradition was more widespread than just the current group and may have been a characteristic of this part of the cemetery, or this particular phase of its use. One burial in particular (SK 02) displayed distinctly pagan characteristics. SK 02 may have been one of the latest burials in the Trench 3 group as it cut through the top of SK 10 & SK 11. This was a N-S burial containing the decapitated remains of a child. The head had been placed near the feet along with two pottery vessels, one of which dated to the 4th century, the other much earlier, and may be another example of an heirloom included as a grave offering.

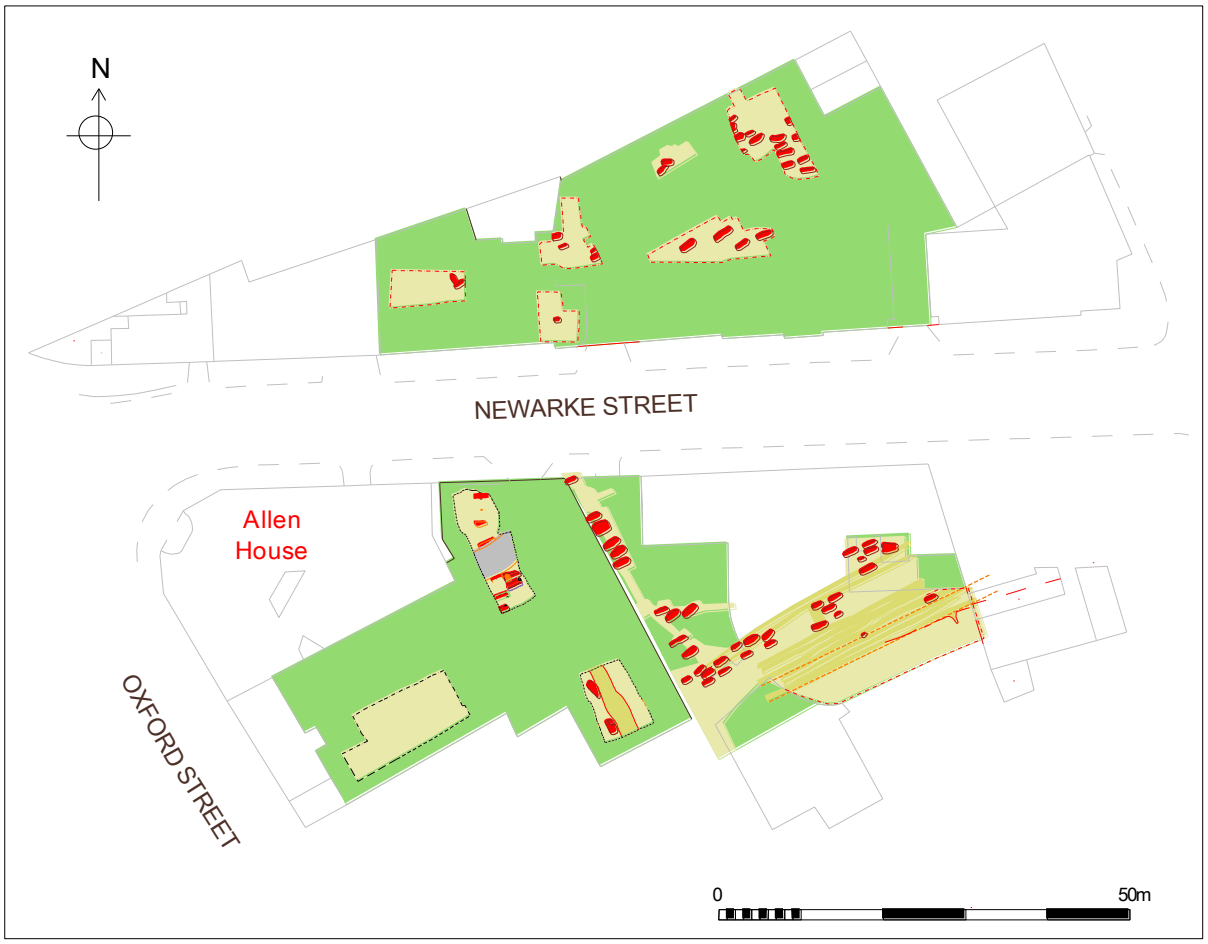

Figure 56: Roman burials from the excavations in the context of surrounding cemetery evidence (ditches in yellow and Civil War ditch in grey)

In other respects the burials had characteristics common to others from the nearby cemetery excavations. Iron nails arranged around the inside edge of the grave cuts indicated the use of wooden coffins. The edge of one coffin had been preserved within SK 05 as a clear line between different soils in the grave and the coffin. Many of the graves also contained partial stone lining, notably at points around the head and feet of the individuals. This can be interpreted as a deliberate effort to prevent disturbance from later burials and preserve the integrity of the body. It has also been suggested that inclusion of stone grave linings was a later 4th century practice (Cooper 1996, 23), which accords with the dating evidence associated with the graves. It is interesting to note however that of 91 graves excavated within the eastern town cemetery at Clarence Street, also thought to date to the 4th century, none contained stone lining (Gardner 2005, 34).

Dare mentions the discovery of a lead coffin in 1911 that was within the bounds of the excavation site (1927, Plate 2) and the Newarke Street area itself has a clear concentration of such finds, perhaps indicating a series of wealthy burials in the area and the importance of this cemetery. A curious sub-rectangular feature (Pit [3015]) dated to the 17th/18th century, was located precisely within the main group of burials in the southern side of the trench. It partly truncated the southern edge of grave SK 01 but otherwise respected the other nearby grave cuts. Given the concentration of lead coffins close to the excavation site it is worth

speculating that another example was discovered here, perhaps during works related to the Civil War defences, and removed.

The burials in Trench 3 perhaps represent an expansion of the cemetery area after the boundary ditch had gone out of use. This may have become necessary because of restrictions on space, but might also indicate zonation of the cemetery according to different beliefs or social groups (Cooper 1996, 28).

Medieval

A spread of pits across the three excavation areas, but particularly concentrating in Trench 1, presented clear evidence for medieval settlement between the 12th – 16th centuries (Fig. 57).

The pits appeared to be organised in linear rows projecting back from the medieval Southgate Street (now Oxford Street) where they would have been located in backyard plots of properties fronting the street. This was illustrated well by a sequence of 3-4 intercutting pits in Trench 1 ([1114], [1116] & [1179]) that formed a short east-west alignment indicative of the plot orientation. No evidence was recovered for buildings associated with this activity but it is likely that any surviving remains of this nature exist west of the excavations, towards the street frontage. The evidence fits with similar medieval activity on the western side of Oxford Street (Morris 2010) and accords with the documented presence of burgesses and peasant tenants living outside the South Gate of Leicester since *c.*1200 (Courtney 1998).

Cess pits and refuse pits were represented with concentrations of domestic waste, including pottery, animal bones and ridge tiles predominant in the finds groups. A number contained environmental remains indicative of general domestic activity.

A group of later medieval pits, dating to the 15th/16th century was revealed in Trench 3. This group also included an oven that may have been used for domestic bread-making. Iron slag from two of the pits indicated smelting and smithing was taking place nearby, suggesting the presence of a blacksmith operating nearby. It is unclear if the location of the later medieval pits relates to activity fronting South Gate Street or Hangman's Lane (now Newarke Street).

The medieval features add to similarly dated evidence from a number of excavations in the area for domestic and craft activity on either side of Southgate Street (Gossip 1999a, 1999b, Finn 2004, Morris 2010). Much of this evidence reflects backyard activity although associated structural remains have been revealed at the junction of Oxford Street and York Road (Gossip 1999a, 19-20). Limited medieval remains from excavations to the north and west of the present site (Derrick 2009, Cooper 1996 respectively) appear to indicate a fall off of activity moving away from Southgate Street, perhaps indicating a lack of settlement away from the main throroughfares.

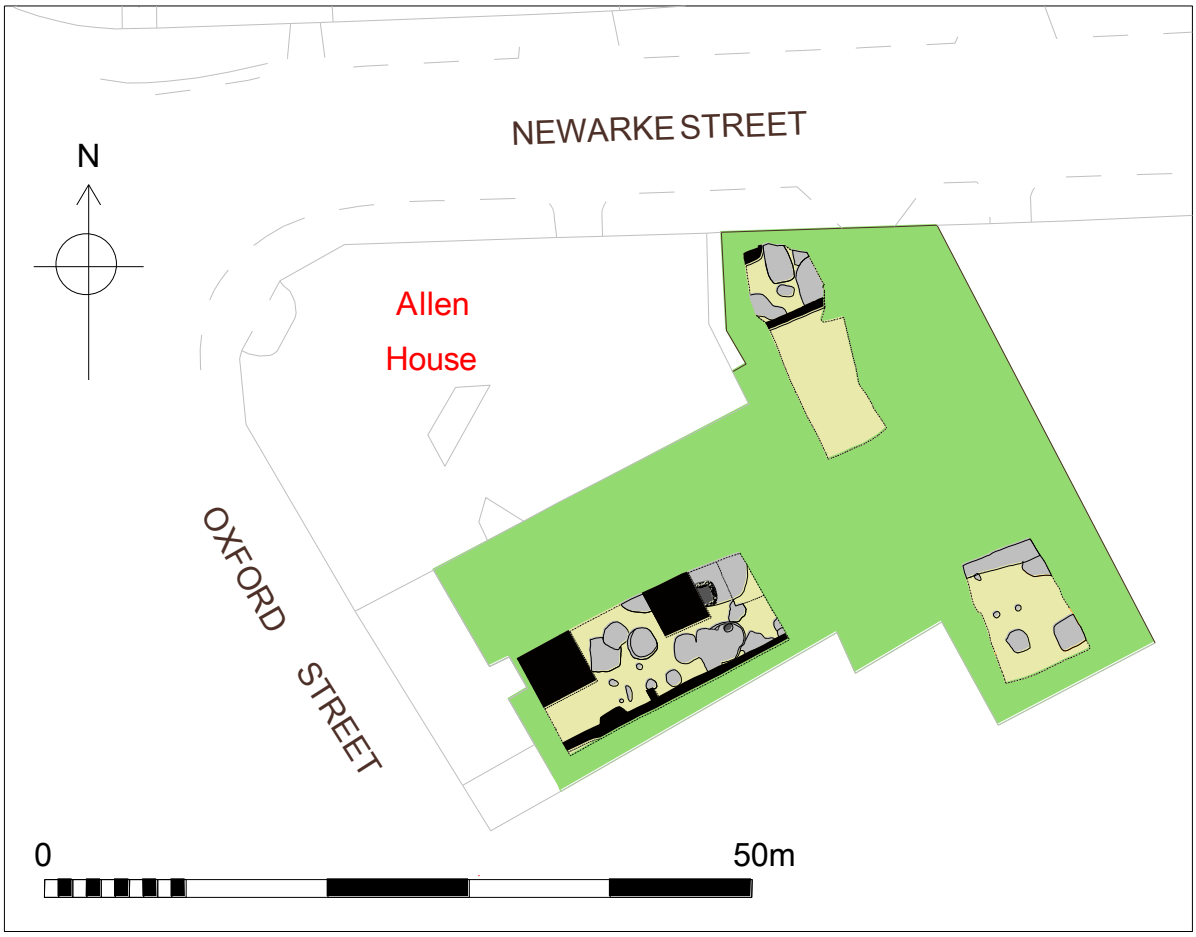

Figure 57: The medieval features across the site

Post-medieval

Evidence for activity during the 17th and 18th centuries is restricted to Trench 3, perhaps indicating a general decline in domestic activity during this period, or a change in the sites use. Excavations at 21-33 Newarke Street recorded two brick kilns (Derrick 2009, 93-6) and brick-making was recorded for this area on William Stukeley's map of 1722. Bedding trenches, perhaps indicative of market garden type activity, were also recorded on the Newarke Street site, and to the east, at the Elfed Thomas excavation (Cooper 1996, 32).

The large ditch crossing the centre of Trench 3 on a similar alignment to Newarke Street probably formed part of the towns Civil War defences, lengths of which have also been found on other excavations in the area (Fig. 58). Two sieges of Leicester (one Royalist and one Parliamentarian) took place in 1645. Excavated evidence from the town's south suburb has gradually pieced together archaeological evidence for the two documented phases of large-scale defensive earthworks that were erected at this time, following clearance of buildings and plots to make way for them. Most recently a *c.*37m length of Civil War ditch was uncovered during excavations at De Montfort University, running along what would have been the western street frontage of Southgate Street (Morris 2010, 94-5). The ditch on the present excavations probably relates to this phase of the defences, which although not closely dated, are thought to represent the second phase earthworks (Neil Finn *pers comm* - shown in red on Fig. 58).

The majority of the Civil War ditch was infilled with a thick layer of mixed clay, presumably reflecting rapid backfilling after the defences were no longer needed, most likely using materials from an associated bank. Following the backfilling of the ditch a building was constructed along the frontage of Hangman's Lane (Newarke Street). The western gable end of this structure was revealed during the excavations and it was clear that it had made use of re-cycled materials, possibly accumulated during the pre-Civil War clearance of the south suburb. Re-used bricks and curved sandstone blocks, possibly originating from a tower construction or newel staircase, formed the footings of the building, which also incorporated a lowered floor, possibly a shallow cellar. It is impossible to know the source of the building materials but the quality of the stonework suggests they came from a building of some status.

It is also difficult to discuss the function of the Newarke Street building based on such minimal evidence, but it does appear to have related to the re-establishment of occupation in the south suburb following the Civil War. A building in a similar location is depicted on the 1741 Roberts map of the town but it is unclear if it is an accurate representation of the one revealed in the excavation.

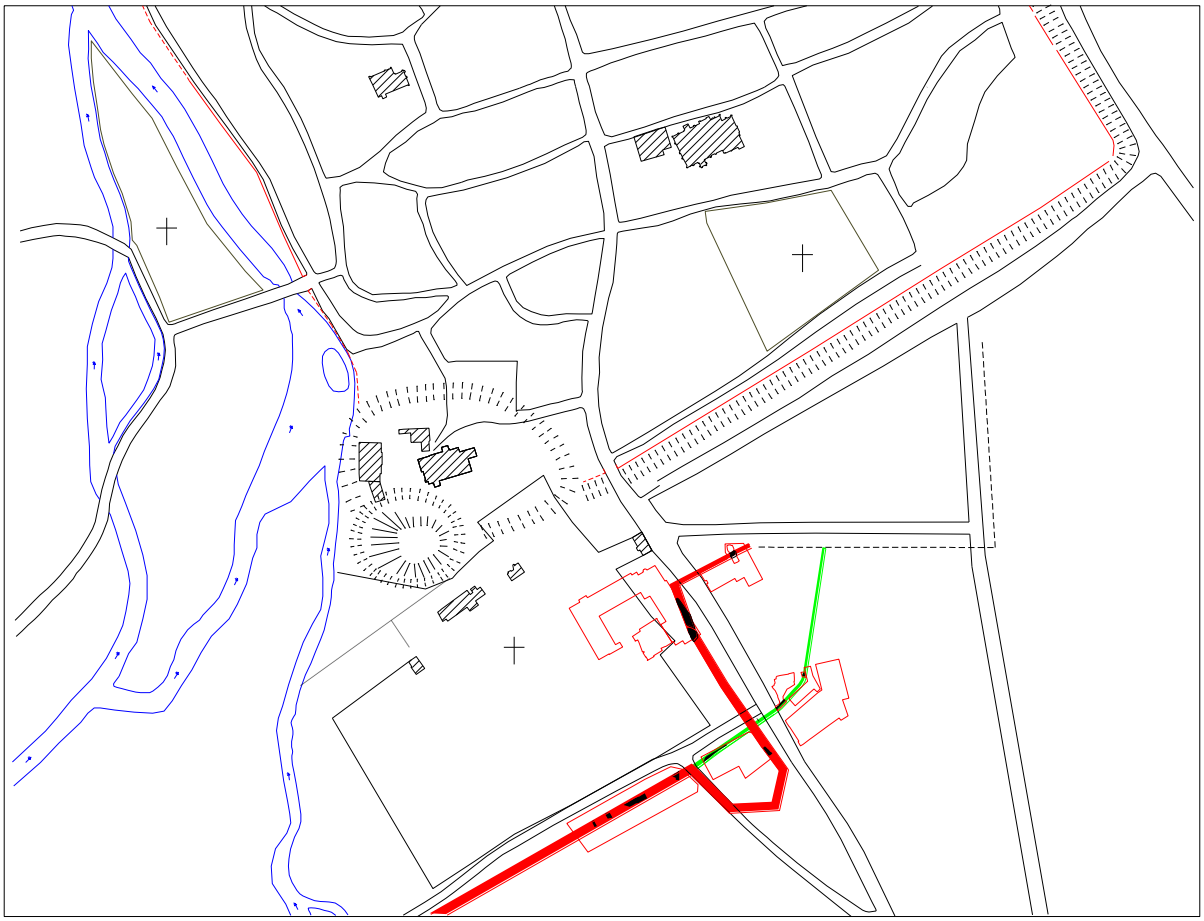

Figure 58: The Civil War defences based on archaeological evidence from the south suburbs

Conclusion

The excavations have added considerably to current understanding of the growth and development of Leicester's southern suburb. Importantly the results have built upon findings from a growing number of sites in the area which, between them, have shown the great potential for archaeological survival in the area.

Perhaps most importantly the excavations have revealed more about the Roman cemetery that existed in the area beyond the southern limits of the walled town. Previous excavations had recorded details of a 4th century cemetery that had characteristics associated with a Christian burial tradition. New information gathered during the present excavation has shown a very different picture, including a range of burial characteristics that appear to follow pagan traditions. These included prone and decapitated burials and a range of grave goods, contrasting sharply with previously excavated burials within the cemetery. Despite the contrasting traditions, many of the burials from this site follow the same orientation and spatial arrangement as the Christian burials. This may indicate that certain areas of the cemetery area were allocated to different social groups or beliefs.

Information relating to the medieval and post medieval use of the south suburb has also provided complementary evidence to that recovered from nearby excavations at De Montfort University to illustrate the growth and decline of medieval activity close to the towns South Gate. Later evidence has added information on the defensive earthworks relating to the towns Civil War defences, revealing a previously unrecognised alignment. Information relating to the re-occupation of the south suburb following the Civil War has also been added.

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Appendix 1: OASIS Information

INFORMATION REQUIRED	EXAMPLE
Project Name	16-26 Oxford Street/28 Newarke Street, Leicester
Project Type	Archaeological Excavation
Project Manager	Vicki Score/John Thomas
Project Supervisor	John Thomas
Previous	DBA, Evaluation
Current Land Use	Car Park (disused warehouse)
Development Type	Residential (Student Flats)
Reason for Investigation	NPPF (Section 12)
Position in the Planning Process	As a condition
Site Co ordinates	SK 585 040
Start/end dates of field work	March-April 2013
Archive Recipient	Leicester City Museum
Study Area *	0.1ha

Appendix 2: OSTEOLOGICAL AND PALAEOPATHOLOGICAL CATALOGUE

Skeleton Number	1.A7
Preservation	Good surface preservation, with moderate erosion to humerus, ulna and femur
Completeness	30%
Age	36-45 years
Sex	Male
Stature	163.3cm ± 2.99cm
Pathology	Degenerative joint disease(DJD) in the right shoulder ,elbow, hip, knee, ankle and foot Possible OD on the right tibial distal articulation on the antero-medial surface. Generally robust; muscle excavation on right ulna at the attachment for supinator, right humerus attachment for deltoid, latissimus dorsi, lateral head of triceps, right patella for part of the quadriceps tendon. Possible fracture to the right MT5 or could just be pronounced attachments for fourth palmar interosseus and opponens digiti minimi. Moderate DJD in the right shoulder and wrist, hip knee and ankle
Dental Health	No teeth present

Skeleton Number	1
Preservation	Moderate. Skull and vertebrae in good condition; Ribs in moderate condition; Limb bones moderate to poor, with flaky surfaces on many of the long bones. Moderate fragmentation of skull and ribs
Completeness	90%
Age	9-12, juvenile
Sex	-
Stature	-
Non-Metric Traits	Mastoid foramen extrasutural (bilateral)
Pathology	Bilateral *cribra orbitalia* in the middle intermediate sectors exhibiting small and large isolated foramina. Mild maxillary sinusitis in the left maxillary antrum (right not present). Mild periosteal reaction on the external surface of left maxilla, located immediately superior to deciduous second molar on the external alveolar process, inferior to the zygomatic process, consists of disorganised porotic new active bone. Anomaly; small spicule of bone on the right frontal, inferior to the supra orbital notch on medial surface of orbit, consists of dense bone; unsure aetiology.
Dental Health	26/28 teeth present, calculus on 18/28 teeth present, caries affected 1/28 teeth 1 small caries was present on the distal surface of the right maxillary canine at the junction of the root and the cusp, enamel hypoplasia affected 5/28 teeth, lines and grooves were evident on the maxillary anterior teeth and the right maxillary molar and right mandibular molar.

	Right Dentition								Left Dentition							
Present	-	E	P	PM	P	P	PM	P	P	P	P	P	P	P	E	-
Calculus	-	-	Sm	-	-	Sb	-	Fb	Fb	Fb	-	-	Sb	Fb	-	-

DEH	-	G	-	-	-	L	-	-	L	G	L	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	-	1	1	1	1	1	-	2	2	1	-	4	-	1	-	-
Maxilla	-	7	6	5	4	3	2	1	1	2	C	D	E	6	7	-
Mandible	-	7	6	E	D	C	2	1	1	2	C	D	E	6	7	-
Present	-	E	P	P	P	P	P	P	P	P	P	P	P	P	E	-
Calculus	-	-	Fdl	Slb	Mb Sl	Mb	Fl	Sm d Ml	Sb md Ml	Fm	Sl	Sl	Sm	Fd	-	-
DEH	-	-	-	-	-	L	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	-	-	1	4	4	3	1	2	2	1	3	5	5	1	-	-

Skeleton Number	2
Preservation	Good, some erosion to lower limbs
Completeness	90%
Age	2-3 years, juvenile
Sex	-
Stature	-
Non-Metric Traits	Double anterior condylar canal (left), Bridging of supraorbital notch (right), Accessory infraorbital foramen (bilateral)
Pathology	Endocranial lesions on the occipital within the left cerebral fossa, sagittal sulcus and the cruciform eminence, consists of porotic plaque like bone with vascular impressions, measures 43.6mm a/p by 27.7mm m/l. New bone formation is also present on the external surface of the left ascending ramus, the new bone is porotic and plaque like and is located immediately inferior to the mandibular notch, measuring 4.5mm x 8.4mm. Bilateral new bone formation is also present on the internal surface of both ascending ramus, anterior to the mandibular foramen left measures 18.4mm x 8.1mm right measures 12.2mm x 8.5mm. Further new bone formation is evident on the right side of the sphenoid, infero-lateral to the hypopyseal fossa, consists of a small patch of porotic woven bone measuring 4.1mm x 4.0mm. Hyper-porotic pinhole porotic bone is evident bilaterally on the posterior surface of both maxilla, inferior to the zygomatic process, covering the entire surface. Pinhole porotic plaque like bone is also evident bilaterally in the inferior orbital surfaces of the maxilla on the anterior margin, left measures 12mm x 3.6mm and right measures 12.6mm x 4.1mm
Dental Health	19/20 teeth present, 1/20 lost post mortem (a right mandibular central incisor). 1/19 teeth affected by calculus, flecks on the mesial surface of left maxillary central incisor.

	Right Dentition								Left dentition							
Present	-	-	-	P	P	P	P	P	P	P	P	P	P	-	-	-
Calculus	-	-	-	-	-	-	-	-	Fm	-	-	-	-	-	-	-
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Wear	-	-	-	1	1	1	1	2	2	1	1	1	1	-	-	-
Maxilla	-	-	-	E	D	C	B	A	A	B	C	D	E	-	-	-
Mandible	-	-	-	E	D	C	B	A	A	B	C	D	E	-	-	-
Present	-	-	-	P	P	P	P	PM	P	P	P	P	P	-	-	-
Calculus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	-	-	-	1	1	1	1	-	2	1	1	1	1	-	-	-

Skeleton Number	3
Preservation	Good, taphonomic damage to spinous process
Completeness	5%
Age	18+ years, adult, however the individual is probably considerably older
Sex	Female?
Stature	-
Non-Metric Traits	Transverse foramen bipartite (bilateral)
Pathology	Osteoarthritis on left superior articular facet of C7 and mild DJD within C5 & 6 and T1
Dental Health	12/14 teeth present, 2/14 lost post mortem, a further 20 positions not present. Mild periodontal disease evident, slight alveolar resorption on the left mandible. 10/12 teeth affected by calculus, slight to moderate deposits, largely on the lingual and buccal surfaces. 2/12 teeth affected by enamel hypoplasia, two lower anterior teeth exhibit lines.

	Right Dentition								Left dentition							
Present	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-
Calculus	-	-	-	-	-	-	-	-	Mb	-	-	-	-	-	-	-
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-
Maxilla	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
Mandible	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
Present	-	-	-	-	-	PM	PM	P	P	P	P	P	P	P	P	P
Calculus	-	-	-	-	-	-	-	Hl	Mbl	Mbl	Sl	Sl	Smd	Slb	FbMl	SbMl
DEH	-	-	-	-	-	-	-	-	-	L	L	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	-	-	-	-	-	-	-	4	5	3	2	2	2	3	3	2

Skeleton Number	4
Preservation	Poor, loss of surface detail on lower limbs
Completeness	80%
Age	26-45 years, middle adult
Sex	Female
Stature	159.4 ± 4.30cm
Non-Metric Traits	Mastoid foramen extrasutural (right), Precondylar tubercle, Accessory lesser palatine foramen (right), lateral tibial squatting facet (left)
Pathology	Very mild *cribra orbitalia* in the right anterior intermediate portion of the orbit, exhibiting pinhole porosity. Maxillary sinusitis evident in the left and right maxillary antrum. Mild DJD in the cervical and upper thoracic spine, right wrist, and both hips. Osteoarthritis in the lower lumber spine, sacrum and distal right radius. Tuberculoid lesions within the spine; fusion of L2 and L3 at the intervertebral space and articular facets, the vertebral bodies appear to have undergone a degree of collapse. Bodies fused with well remodelled lamellar bone, although largely destroyed by taphonomy. A lytic lesion penetrates the lateral body of L2. Fusion of L1 and T12 fusion occurs at the body and articular facets, bodies fused using porotic new bone in the process of remodelling. Body of T12 has been almost entirely destroyed , with irregular spicules of bone projecting from the left and right. A pseudo articulation had developed on the spinous process of T12, where it articulates with T11, the articular facets have also extended, due to the extensive degeneration of T11's body, the superior articular facets have extended onto the lamina of T12 where OA has developed in the pseudo articulations. The body of T11 has been entirely destroyed by some of the right pedicle remains, although has a very gnarled appearance and the left pedicle is almost entirely eroded. Osteoarthritis on left superior articular facet of C7 and mild DJD within C5 and 6 and T1
Dental Health	28/32 teeth present, 4/32 congenitally absent. No evidence of periodontal disease. 23/28 teeth affected by calculus, slight to moderate deposits, largely on the lingual and buccal surfaces of anterior teeth, with heavy deposits on the posterior teeth

	Right Dentition								Left dentition							
Present	CA	P	P	P	P	P	P	P	P	P	P	P	P	P	P	CA
Calculus	-	Mb	Ml	-	-	-	-	-	Sb	Fl	Fl	Fbl	Sl	Mbl	Hbd	-
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	-	4	4	3	3	5	6	4	4	4	3	2	2	3	3	-
Maxilla	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
Mandible	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
Present	CA	P	P	P	P	P	P	P	P	P	P	P	P	P	P	CA
Calculus	-	Sdm	MlSb	SlMb	Sl	Smd	Sl	Sl	Sml	Sml	FbMl	MlFb	HlFb	Hbl	Hbol	-
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	-	3	3	2	2	3	4	4	4	4	3	2	2	3	3	-

Skeleton Number	5
Preservation	Moderate; detail of limb bones largely eroded, upper body more affected than lower
Completeness	80%
Age	26-35 based on teeth only
Sex	Male
Stature	179.8 ± 2.99cm
Non-Metric Traits	Mastoid foramen extrasutural (left); precondylar tubercle, double atlas facet (bilateral), septal aperture (left), peroneal tubercle (right), double anterior calcaneal facet (right)
Pathology	Spina bifida occulta, S1 open. DJD in the left wrist, right hip and left ankle. Fusion of L4 and L5, both left and right inferior articular facets of L4 have fused to left and right superior facets of L5. Possible ligamentous ossification along the right lateral side of the pedicle involving the zygaphopysial joint, the joint space between the vertebral bodies does not appear to have been affected. When L4 and 5 are articulated with S1 there is a degree of posterior and left lateral deviation of spine Calcaneus extremely rugged topography of plantar and lateral surfaces-attachment for long plantar ligament and bifurcate ligament, muscles *digitorum brevis* and *flexor accessorious*. Entire surface of medial side exhibits periosteal reaction , well remodelled dense lamellar like appearance (not active) MSM's generally robust
Dental Health	30/32 teeth present, 2/32 teeth lost ante mortem, calculus on 27/30 teeth present, heavy to moderate deposits on posterior dentition, enamel hypoplasia affected 13/30 teeth, lines evident on the anterior teeth. Periodontal disease evident with moderate alveolar resorption on maxilla and mandible

	Right Dentition								Left Dentition							
Present	P	P	P	P	P	P	P	P	P	P	P	P	P	AM	P	P
Calculus	S/Ml	Sb	Mb	Sb	Fb	Mb	Fb	-	-	-	Mb	Fb	-	Ml	Sl Mb	Hbd
DEH	-	-	-	-	-	L	L	L	L	L	L	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	3	4	4	3	3	3	2	3	3	2	3	3	-	4	4	3
Maxilla	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
Mandible	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
Present	P	P	P	P	P	P	P	P	P	P	P	P	P	AM	P	P
Calculus	M/Hbl	M/Hbl	M/Hbl	Sl	Sl	Sl	Sl	Sl	Sl	Fl	Fb	Sl	Sl	-	Mb Hl	Mb
DEH	-	-	L	-	L	L	L	-	L	L	L	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	4	4	4	2	2	4	4	4	4	3	3	3	3	-	4	3

Skeleton Number	6
Preservation	Good to excellent, ribs exhibit some flaking and erosion
Completeness	15-20%
Age	18-25
Sex	Male
Stature	-
Non-Metric Traits	Cranial traits; parietal foramen (bilateral), foramen of Huschke (bilateral), mastoid foramen extrasutural (bilateral); precondylar tubercle; bridging of supraorbital notch (left) accessory supraorbital foramen (right) Post cranial traits; posterior atlas bridging (left)
Pathology	Mild *cribra orbitalia*, antero-lateral and central intermediate sectors exhibit vascular impressions. Porotic and disorganised new bone formation on the endocranial surface of frontal bone, lesion measures 40.7mm (A/P) x 19.0mm (M/L) Located within the most anterior portion of the sagittal sulcus MSM's generally robust.
Dental Health	12/32 teeth present, 2/32 teeth lost ante mortem, 18/32 positions not present. Calculus on 12/12 teeth present, slight to moderate deposits on lower dentition, tended to be below the cusp/ root junction, 3 caries were present on 2/12 teeth; 1 small caries on the buccal surface of the left mandibular canine below the cusp root junction, another small caries on the mesial cusp of the 1st mandibular molar and the distal cusp of the same tooth. Chipping on medial edge of left lateral incisor and distal edge of central incisor. Moderate periodontal disease.

	Right Dentition								Left Dentition							
Present	-	-	-	-	-	-	-	-	P	P	P	P	-	-	-	-
Calculus	-	-	-	-	-	-	-	-	Fl	Fl	Fl	Fl	-	-	-	-
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	-	-	-	-	-	-	-	-	4	4	5	5	-	-	-	-
Maxilla	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
Mandible	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
Present	-	-	-	-	-	-	P	P	P	P	P	P	P	P	A M	M
Calculus	-	-	-	-	-	-	Sb	Sb	Mb	Mb	Sl	Sl	Sl	Ml	-	-
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	Sm Md	-	-
Wear	-	-	-	-	-	-	5	5	5	5	5	4	4	3	-	-

Skeleton Number	7
Preservation	Good surface preservation, with moderate fragmentation
Completeness	<10%
Age	1-3 years
Sex	-

Stature	-
Pathology	Ectocranial new bone formation around the sutural margins of the right temporal, occipital, left and right parietal frontal and four non identifiable fragments, consists of porotic plaque like bone. Endocranial new bone formation on the frontal bone, along the frontal crest also consists of porotic plaque like bone
Dental Health	No teeth present

Skeleton Number	8
Preservation	Moderate, taphonomic damage to vertebral bodies, and epiphyses of upper limbs heavily damaged
Completeness	75%
Age	46+ Mature Adult
Sex	Male
Stature	164.4 ± 2.99cm cm
Non-Metric Traits	Post cranial traits; acetabular crease (left), femoral plaque (right), Exostosis in Trochanteric Fossa (right), Peroneal tubercle (right), double anterior calcaneal facet (bilateral), double inferior talar facet (bilateral), Os Trigonum (right)
Pathology	Bilateral DJD on the manubrium hamates, proximal femurs, distal tibias, distal fibular, and calcaneus, left distal radius, right lunate1 Schmorl's node on inferior body of T8 S1 exhibits what may be a peri-mortem fracture to the spinous process of S1,With no evidence of remodelling, the diagonal breaks run superiorly medially to inferiorly laterally, inferior to the right articular facet and slightly through the left facet round into the pedicle Bifid spinous process of S, left lamina partially overlies right Possible DISH; fusion of anterior longitudinal ligament of T11-9, with kissing osteophytes between T9-8 and T8-7, ossification localised to the right lateral portion of the vertebral bodies. The articular facets and joint spaces were preserved. General bone forming activity, ossification of rib cartilage, sternum also exhibits florid new bone on internal surface of the body, either rib cartilage/ pleura/ transverses thoracis, pronounced development of right radial interosseus border for flexor digitorum profundus and radial tuberosity for biceps, attachments for flexor digitorum profundus on the left and right ulna, brachialis and supinator on the right ulna. The joint capsule of the right Os coxa appears to have partially ossified, the ischiofemoral ligament, transverse ligament, reflected head of rectus femoris and right and left pectineal ligament also appear to be very well developed. The soleal line on the left and right tibia and patella ligament of the left tibia, quadriceps tendon of the right patella are also very rugged. Possible ossification of vastus lateralis on the left femur, possibly myositis ossificans or an ossified haematoma, lesion consists of lamellar bone, with rough rugged undefined margins measuring 54.1mm x 17.1mm, located on the medial margin of the upper third of the shaft. Possible new bone formation on a number of limbs, doesn't appear to be consistent in appearance with woven bone, periosteal reaction or lamellar bone; plaque like linear like striations evident on medial and lateral surfaces of the left and right tibial shafts, most densely located on the distal third and the distal two thirds of the anterior surface of the femoral shafts, bone striations also present on the lateral surface of the pubis and medial surface of

	left and right ischium.
Dental Health	No teeth present

Skeleton Number	9
Preservation	Good, some loss of surface detail and erosion around the epiphyses. Slight fragmentation, most long bones broken, more heavy in the ribs
Completeness	95%
Age	26-35 years
Sex	Female
Stature	158.8 ± 3.55cm
Non-Metric Traits	Cranial traits; Ossicle in Lambdoid (bilateral), Foramen of Huschke (bilateral), Mastoid foramen extrasutural (bilateral), posterior condylar canal open (right), double anterior condylar canal (bilateral), Mandibular torus (bilateral), bridging of supraorbital notch (bilateral) Post cranial traits; double atlas facet (right), suprascapular foramen (left), Septal aperture (right), Acetabular crease (right), Allen's fossa (bilateral), Poirier's facet (left), Hypotrochanteric fossa (right), Exostosis in trochanteric fossa (bilateral), Third trochanter (left), Medial tibial squatting facet (right), Double anterior calcaneal facet (left), Double inferior talar facet (left)
Pathology	Lumbar ribs (bilateral). Mild DJD within mid thoracic vertebrae, both shoulders and left arm. Two Schmorl's nodes on T12 and one on L1. Bilateral periosteal reaction on the tibiae, consists of well remodelled lamellar bone and disorganised active woven bone. Bilateral periosteal reaction on the fibulae, consists of well remodelled lamellar bone along the shaft and disorganised active woven bone on the distal third of the right fibula. Porotic plaque like vascularised bone present on the right calcaneus around the sustentaculum sulcus. Bilateral new bone formation on the femora, exhibiting a combination of well remodelled lamellar bone and disorganised woven bone. Disorganised woven bone on the left Ischium. Bilateral disorganised woven bone on the proximal humeral shafts, with well remodelled lamellar bone on the left proximal shaft. Localised patches of disorganised woven bone on the pleural surface of four right ribs. (Possibly Pulmonary Osteoarthropathy)
Dental Health	25/29 teeth present, 4/29 lost post mortem, a further 3 positions not present. Moderate periodontal disease evident, with moderate alveolar resorption on the mandible and maxilla. 25/25 teeth affected by calculus, slight to moderate deposits, largely on the lingual and buccal surfaces. 3/25 teeth affected by enamel hypoplasia, two lower and one maxillary anterior teeth exhibit lines. Chips to buccal surface of right maxillary canine and the distal inferior portion of the 1st premolar cusp. Another possible deformation was present on the buccal/distal portion of the mandibular right third molar cusp.

	Right Dentition								Left dentition							
Present	P	P	P	P	P	P	P	P	PM	PM	PM	P	PM	P	P	P
Calculus	Sb Sl	Sb Sl	Mb Fl	Sl Ml	Sb Sl	Mb Sl	Sl Mb	Mb	-	-	-	Ml	-	Ml b	Sb Fl	Sb Md
DEH	-	-	-	L	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	3	3	3	2	2	2	2	3	-	-	-	2	-	3	3	3

Maxilla	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
Mandible	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
Present	P	P	P	P	P	P	P	-	-	P	P	P	P	P	P	-
Calculus	Sb dl	Sb Ml	Ml Sm	Ml b	Ml b	Sl Mb	Sl Mb	-	-	Sb Ml	Mb l	Sm Ml	Sb Ml	Mb l	Sld b	-
DEH	-	-	-	-	-	L	-	-	-	-	L-	-	-	-	-	-
Caries	Sd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	3	4	4	3	2	2	2	-	-	2	2	2	2	4	4	-

Skeleton Number	10
Preservation	Poor, heavy erosion to the appendicular skeleton. Moderate fragmentation to the skull and ribs
Completeness	95%
Age	26-35 years, very varied age dental wear =17-25 years, auricular surface =40-45, and jugular growth plate is still un-fused = <34 years
Sex	Male
Stature	172 ± 2.99 cm
Non-Metric Traits	Cranial traits; Ossicle in lambdoid (bilateral), Mastoid foramen extrasutural (bilateral), Sutural mastoid foramen (left), Posterior condylar canal open (bilateral), Precondylar tubercle, Double anterior condylar canal (right), Open foramen spinosum (bilateral), Mandibular torus (left), Accessory supraorbital foramen (bilateral) Post cranial traits; Circumflex sulcus (bilateral), Poirier's facet (right), Femoral plaque (right) Hypotrochanteric fossa (left)
Pathology	Surface preservation is poor and may have destroyed some pathological lesions Eight Schmorl's nodes on five thoracic vertebrae out of twelve and one on one out of five lumbar vertebrae. Mild DJD in the cervical and upper thoracic vertebrae, the left arm and right hip. Endocranial new bone formation on occipital frontal and both parietals appears to be plaque like porotic bone with vascular impressions The new bone on the occipital is located on the cruciform eminence transverse and sagittal sulcus, appears to be chronic with a mixture of active and remodelled bone, vascular impressions also fill the left cerebral fossa. Bilateral new bone formation in the sagittal sulcus of the parietals. New bone formation deviates from the sagittal sulcus in the frontal into the left frontal lobe. Possible O.D on the proximal articular surface of the proximal phalanx for the left MT1, two areas of pitting are evident, could also be DJD. Spina Bifida Occulta present in S2,3 and 4 with mal-unification of the arch of S1 Asymmetry of transverse foramina of C6; the right is approximately three times bigger than the left. Bilateral new bone formation on the proximal femurs at the intertrochanteric line around the capsular ligament, consists of disorganised woven bone. Possible new bone formation on the anterior surface of the right femur, immediately superior to the articular surface, consists of disorganised woven bone. Possible patch of well remodelled lamellar bone on posterior lateral border of the mid shaft. New bone is also evident on the proximal end of the right humeral shaft, immediately inferior to

	the articular surface. Plaque like new bone formation on the antero-medial surface of the proximal end, around the capsular ligament. Ectocranial periosteal new bone formation on the parietals and frontal, located medially, reaction is not present where temporalis attaches. Possible scalp inflammation. Medio-anterior margin of the left mandibular condyle exhibits a spicule of bone continuous with the articular surface, may have affected movement of the joint and may relate to heavy calculus deposits. Asymmetry between the humeri; the right is 14 mm longer than the left. The left also exits a degree of torsion in the proximal shaft, where there appears to be antero-posterior bending within the shaft, possible healed fracture
Dental Health	31/31 teeth present, 1 position not present. Slight periodontal disease evident, with slight alveolar resorption on the right maxilla and mandible. 17/31 teeth affected by calculus, heavy deposits are restricted to the right maxillary and mandibular dentition, focused on all surfaces, surprisingly the left side of the dentition bears little to no calculus. Three caries present on 2/31 teeth, the right maxillary 1st premolar exhibited 1 large caries on the distal surface of the crown and a further small caries on the mesial margin at the interface between the cusp and root. 2/31 teeth affected by enamel hypoplasia, two lower anterior teeth exhibit grooves. An externally draining abscess was present on the apex of the right maxillary first premolar. Chipping was evident on the buccal surface of both maxillary central incisors, the right central incisor and the right canine. Mild v-shaped wear was evident on the occlusal surface of the right central maxillary incisor

	Right Dentition								Left dentition							
Present	P	P	P	P	P	P	P	P	P	P	-	P	P	P	P	P
Calculus	-	-	-	-	-	Fb	-	-	-	Fb	Hbl Mo	Hbl Mo	Hblo	Hblo	Hblo	Hb Mb
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	Mm	-	Sm Lo	-	-	-	-	-	-	-	-	-	-	-
Wear	1	2	3	-	-	2	3	3	3	2	-	1	1	-	-	-
Maxilla	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
Mandible	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
Present	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Calculus	-	-	-	-	-	-	Fb	Fmd	Fm	Fb	Sb Ml	Hbl Mo	Hbl Mo	Hbl Mo	Hbl Mo	Hom
DEH	-	-	-	-	-	G	-	-	-	-	G	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	1	2	-	-	2	3	3	3	3	3	2	2	1	1	1	1

Skeleton Number	11
Preservation	Moderate; some erosion of limb bones. Skull and ribs moderately fragmented
Completeness	90%
Age	46+ years

Sex	Female
Stature	159.6 ± 3.55cm
Non-Metric Traits	Parietal foramen (left), Double anterior condylar canal (right), Accessory infraorbital foramen (right), Accessory supraorbital foramen (right), transverse foramen bipartite (bilateral), suprascapular foramen (bilateral), Allen's fossa (left), Hypotrochanteric fossa (bilateral), Double anterior calcaneal facet (left), Double inferior talar facet (bilateral)
Pathology	Mild DJD in the spine, shoulders and hip. Wedge shaped vertebrae, T11 anterior height 22.9mm posterior height 29.5mm, possible crush fracture. Endocranial lesions on the frontal and parietal, within the sagittal sulcus consist of porotic plaque like bone with vascular impressions. Measures 30.3mm x2.5mm on the frontal and 50.1mm x 11.1mm on the parietal. Right lower ribs, possibly 9-7, exhibit an acute angulation at the angle of the rib.
Dental Health	26/32 teeth present, 5/32 congenitally absent, including three second premolars and two third molars. 1/32 teeth lost post-mortem, 2/32 teeth lost ante-mortem, both mandibular second molars. Retention of two deciduous teeth including left mandibular second molar and right maxillary canine. Moderate periodontal disease evident, with moderate alveolar resorption on the mandible and right maxilla and considerable resorption on the left maxilla. 7/32 teeth affected by calculus, slight to moderate deposits, largely on the lingual and buccal surfaces. 2/32 teeth affected by enamel hypoplasia, two maxillary central incisors exhibit grooves. 3/32 teeth affected by caries, two affecting the maxillary dentition, one so large it had destroyed the entire crown of the right maxillary first premolar and another located on the root, just below the cusp of the mandibular right second molar.

	Right Dentition								Left dentition							
Present	P	P	P	CA	P	P	P	P	P	PM	P	P	CA	P	P	P
Calculus	-	-	-	-	-	Mb	-	-	-	-	-	-	-	Mbl	Slb	Slb
DEH	-	-	-	-	-	-	-	G	G	-	-	-	-	-	-	-
Caries	-	Fb	-	-	L	-	-	-	-	-	-	-	-	-	-	-
Wear	2	2	2	-	2	2	2	3	3	-	2	3	-	4	2	1
Maxilla	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
Mandible	8	7	6	5	4	3	2	1	1	2	3	4	E	6	7	8
Present	CAAMUE	AM	P	P	P	P	P	P	P	P	P	P	P	P	AM	AMCAUE
Calculus	-	-	ML	-	-	-	-	-	-	-	-	-	Sl	Slb	-	-
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	Sl	-	-	-
Wear	-	-	2	2	2	2	2	3	3	2	2	2	4	4	-	-

Skeleton Number	12
Preservation	Poor; Good on upper body, very poor on lower body

Completeness	85%
Age	46+ years
Sex	Male
Stature	161.8 ± 2.99cm (Caucasian) or 165.8 ± 3.53cm (African)
Non-Metric Traits	Cranial traits; Parietal foramen (bilateral), Ossicle at the parietal notch (left), Mastoid foramen extrasutural (left), Incomplete foramen spinosum (bilateral), Palatine torus, Maxillary torus (bilateral), Accessory supraorbital foramen (bilateral), Anterior ethmoid foramen extrasutural (left) Suprascapular foramen (bilateral), Circumflex sulcus (left), Poirier's facet (right), Femoral plaque (left)Hypotrochanteric fossa (left), Third trochanter (left), Peroneal tubercle (left), double anterior calcaneal facet (bilateral), double inferior talar facet (bilateral)
Pathology	Well healed fracture to the right distal radius, appears to be a spinal fracture. Right femur distal end, degeneration of the articular end, a groove has developed on the medial condyle, running from the patella surface down the inferior surface of the condyle. The patella surface is also morphologically altered, having developed a topographic appearance, with irregular surface morphology with smooth edges; possibly related to trauma/ fracture of condyles, or developmental, osteoarthritis in the joint appears to be secondary. The right proximal tibia articulation exhibits the same irregular surface morphology, with associated osteoarthritis on the lateral condyle. Left mandible exhibits periosteal reaction associated with an abscess, consists of porotic plaque like bone 17mm x 15mm immediately inferior of the alveolar margin. Zygomas exhibit bilateral porotic new bone formation with vascular impressions along the zygomatic border from the masseteric origin to temporal process. Maxillae exhibit bilateral new bone formation, with periosteal reaction superior to the alveolar margin at the location of M2/3, medial and posterior to the zygomatic process, more severe on the right, probably related to the AM loss of second molars. Right first and second metatarsals exhibit kissing osteophytes at the proximal ends if the lateral shafts, superior to the articular facets, possibly trauma related. Extremely robust in upper limbs, humerus; pectoralis major, biceps and lateral lip of intra-trabecular groove, radius and ulna; supinator, biceps and brachialis. A degree of torsion is evident in the proximal two thirds of the left humerus, appears to have revolved antero-medially. There is also a degree of anterior posterior bowing in the proximal third, immediately inferior to the proximal epiphysis, bows out anteriorly, possibly a well healed fracture, same as skeleton 10. Endocranial new bone formation on frontal bone within posterior two thirds of the sagittal sulcus 34.4mm x 13.9mm
Dental Health	26/32 teeth present, 6/32 lost ante-mortem of M2s and M3s. Considerable periodontal disease evident, with severe alveolar resorption on the maxilla and mandible. 23/26 teeth affected by calculus, heavy deposition on the buccal surfaces of the anterior teeth, with only slight deposits on the lingual surfaces if these teeth. Four externally draining abscesses, three on the left and right maxilla, one on the left mandible. Five caries on four teeth, two large on the left maxillary M2 and left mandibular M1

	Right Dentition								Left dentition							
Present	AM	AM	P	P	P	P	P	P	P	P	P	P	P	AM	P	AM
Calcul	-	-	Md	Ml	Hb	Fl	Hb	Hb	Hb	Hb	Sbl	Mb	-	-	-	-

us			b Hl	b	Sl	Hb		Sl	Sl			Sl				
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	Md	-	Lo	-
Wear	-	-	4	4	4	3	4	4	4	4	3	3	3	-	-	-
Maxilla	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
Mandible	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
Present	AM	P	AM	P	P	P	P	P	P	P	P	P	P	P	P	P
Calculus	-	Hld Mlm	-	Mbl	MbSl	Mlb	HbMl	Hbl	HbSl	Mbl	Mml	Mbd	Fl	-	Sbl	Sbl
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	Ld	L?	-	-
Wear	-	4	-	4	4	3	3	5	4	3	3	4	4	-	4	4

Skeleton Number	13
Preservation	Moderate; damage to vertebral bodies and surface erosion on all bones
Completeness	70%
Age	26-35 years,
Sex	Female
Stature	158.2 ± 3.55cm
Non-Metric Traits	Suprascapular foramen (right), Femoral plaque (right), Exostosis in the Trochanteric fossa (left), Peroneal tubercle (right), Double anterior calcaneal facet (bilateral), Double inferior talar facet (bilateral)
Pathology	Three Schmorl's nodes on 2/9 thoracic vertebrae (one on T7 two on T8), three Schmorl's nodes on 3/5 lumbar vertebrae (one on L2, L3 and L4). DJD in spine, right shoulder, right and left hip. Right clavicle has a deep sulcus on the inferio-lateral surface, medial to the conoid tubercle and lateral to the subclavian sulcus; appears as if the bone has resorbed away from the coracoids process.
Dental Health	No teeth present

KEY:

Present - Tooth presence; am - ante-mortem tooth loss; pm - post-mortem tooth loss; p - tooth present; p (u) – tooth present but unerupted - - jaw not present

Caries - Calculus; F - flecks of calculus; S - slight calculus; M - moderate calculus; H - heavy calculus; a - all surfaces; b - buccal surface; d - distal surface; m - mesial surface; l - lingual surface; o - occlusal surface

DEH - dental enamel *hypoplasia*; l - lines; g - grooves; p - pits

Caries - caries; s - small lesions; m - moderate lesions; l - large lesions

Wear - dental wear; numbers from 1-8 - slight to severe wear

Appendix 3: Animal Bone Tables

Table 49: Breakdown of the assemblage by phase and cut

	Phase							Total
Feature/cut	8	9	10	11	12	ND		
ditch		74			19			93
2033		74						74
3013					19			19
grave SK 01							6	6
3049							6	6
grave SK 05							3	3
3062							3	3
grave SK 06							10	10
3071							10	10
grave SK 07							7	7
2025							5	5
3054							2	2
grave SK 08							6	6
3082							6	6
grave SK 09							8	8
2027							8	8
grave SK 10							7	7
3086							7	7
grave SK 11							4	4
3088							4	4
grave SK 12							35	35
3090							35	35
grave SK 13							13	13
3092							13	13
gully							32	32
3056							4	4
3067							5	5
3069							20	20
3080							3	3
layer						11		11
(blank)						11		11
layer (demolition)						1		1
(blank)						1		1
linear feature							1	1
3100							1	1
oven/pit			4					4
3028			4					4
pit	43	235	620	25	7	20	17	967
1008		101						101
1112		12						12
1114		26						26
1116		5						5

1117	17							17
1119	14							14
1128			239					239
1140	10							10
1143			2					2
1155	2							2
1158				25				25
1163		86						86
1179		5						5
2016			241					241
2025							10	10
2040			7					7
3011						2		2
3015					7			7
3022			59					59
3024			72					72
3033						15		15
3064						3		3
3097							7	7
post hole			2			5		7
2017			2					2
2019						3		3
2021						2		2
stake hole						15		15
3042						15		15
(blank)		1	1				9	11
1112		1						1
1128			1					1
3065							9	9
(blank)								
Total	43	310	627	25	26	52	158	1241

Table 50: Cattle tooth wear stages (after Grant 1982) with age stage (after O'Connor 2003)

ID	Phase	F	cut	Cxt	Taxon	Element	dp4	p4	m1	m2	m3	Age
729	Roman		3066	3066	cattle	lm3					j	E
99	8	pit	1117	1118	cattle	mandible				k	j	E
780	8	pit	1117	1118	cattle	mandible	g		c			I
293	9	pit	1163	1162	cattle	mandible	k					
388	10	pit	2016	2013	cattle	mandible	b					J
521	10	pit	3024	3017	cattle	mandible			k	j	g	A3

Table 51: Sheep tooth wear stages (after Grant 1982) with age stage (after O'Connor 2003)

ID	Phase	F	cut	Cxt	Taxon	Element	dp	p	m	m	m	Age	
58	Roma	ditc	203	2034	sheep/go	lm3					g	A3	
27	8	pit	111	1126	sheep/go	lm3					g	A3	
27	8	pit	111	1125	sheep/go	mandibl			g	e		SA	
13	9	pit	100	1009	sheep/go	mandibl		j	j	h	g	A3	
13	9	pit	100	1009	sheep/go	mandibl				f	E	SA2	
13	9	pit	100	1009	sheep/go	mandibl		g	g	g	E	SA2	

19	9	pit	117	1178	sheep/go	mandibl		g	g				
24	10	pit	112	1124	sheep/go	mandibl			g	e	E	SA2	
34	10	pit	201	2014	sheep/go	mandibl		j	j	h	g	A3	4-
40	10	pit	201	2013	sheep/go	mandibl			k	g	g	A3	4-
56	10	pit	201	2014	sheep/go	mandibl			l	j	h	A3	6+yr
56	10	pit	201	2014	sheep/go	mandibl				g	f	A3	2-
56	10	pit	201	2014	sheep/go	mandibl			h	g	f	A3	2-
56	10	pit	201	2014	sheep/go	mandibl			j	g	g	A3	4-
56	10	pit	201	2014	sheep/go	mandibl				j	g	A3	6+yr

Table 52: Pig tooth wear stages (after Grant 1982) with age stage (after O'Connor 2003)

ID	Phase	Feature	cut	Cxt	Taxon	Element	dp4	p4	m1	m2	m3	Age
133	9	pit	1008	1009	pig	mandible		E	d	a	C	SA1
394	10	pit	2016	2013	pig	mandible				b/c	E	SA2
399	10	pit	2016	2013	pig	mandible		a	d	a		I2
522	10	pit	3024	3017	pig	mandible			f	b	V	SA1
523	10	pit	3024	3017	pig	mandible	a		C			J

Table 53: Minimum Number of Elements (MNE) for mammals in Phase 9

Anatomical Region	Element	cattle	horse	pig	sheep/goat	roe deer
Head	horncore				1	
	zygomatic				1	
	occipital				1	
	maxilla				1	
	mandible	4	1	1	4	1
Neck and Trunk	atlas	1	1			
	axis	1				
	thoracic vertebra		1			
	sacrum					
Shoulder/hip girdle	scapula	1				
	pelvis	1	1			
Forelimb	humerus					
	radius	1	1	1	3	
	ulna	2				
Hind limb	femur	1				
	tibia	1		3	3	
	Patella					
	patella					
Feet	carpals/tarsals					
	astragalus					
	calcaneum	1				
	metacarpal	2		1	1	
	metatarsal	1	1	1		
	1st phalanx					
	2nd phalanx	2				
	3rd phalanx					

	metapodial		1	1		

Table 54: Minimum Number of Elements (MNE) for birds in Phase 9

Anatomical Region	Element	MNE		
		domestic fowl	duck	goose
Head	cranium			
	premaxillary			
	mandible			
Spine/sternum	atlas			
	axis			
	vertebrae			
	sternum	1	1	
Pectoral/hip girdle	furcula	1		
	scapula		1	
	coracoid	1		
	pelvis		1	
	synsacrum		1	
Wing	humerus		1	
	radius		1	
	ulna	1	1	
	carpo-metacarpus		1	
	digits			
Hind limb	femur	1	2	
	tibiotarsus	1	2	
Feet	carpals/tarsals			
	tarso-metatarsus	1	1	1
	1st phalanx			
	2nd phalanx			
	3rd phalanx			

Table 55: Minimum Number of Elements (MNE) for mammals in Phase 10

Anatomical Region	Element	cattle	horse	pig	sheep/goat	fallow deer	dog	roe deer	rabbit	hare
	antler					2				
Head	horncore	1								
	zygomatic	1		2	4					
	occipital	1			2					
	maxilla	1			1					1
	mandible	2	1	4	8				2	
Vertebrae	atlas	1		1						
	axis	1			2					
	sacrum									
Shoulder/hip girdle	scapula	2		2	5					
	pelvis	2	1	1	5					
Forelimb	humerus	3	1		4					
	radius	2		1	7		1			

	ulna	4			4					
Hind limb	femur	1		1	3				1	
	tibia	2		1	8					
	fibula			1						
	patella	1								
Feet	carpals/ tarsals	2								
	astragalus	2								
	calcaneum				2					
	metacarpal	6	1		2	2	1	1		
	metatarsal	4		2	4				1	
	1st phalanx	2		1		2				
	2nd phalanx	4				1				
	3rd phalanx	1								
	metapodial			1	1					

Table 56: Minimum Number of Elements (MNE) for birds in Phase 10

Anatomical Region	Element	MNE		
		domestic fowl	duck	goose
Head	cranium			
	premaxillary			
	mandible			
Spine/sternum	atlas			
	axis			
	vertebrae			
	sternum	1		
Pectoral/hip girdle	furcula		1	
	scapula	1	1	
	coracoid	2		
	pelvis			
	synsacrum			
Wing	humerus	2	1	
	radius	1		
	ulna	1		
	carpo-metacarpus			
	digit			1
Hind limb	femur	2		
	tibiotarsus	6		
Feet	carpals/tarsals			
	tarso-metatarsus			
	1st phalanx			
	2nd phalanx			
	3rd phalanx			

Table 57: Medium and large mammal elements in Phases 9 and 10 (fragment number n)

Phase	9	9	10	10
	Large mammal	Medium mammal	Large mammal	Medium mammal
skull frag	5	1	4	2

cervical vertebra	5		2	1
thoracic vertebra	6	1	3	5
lumbar vertebra	1		2	3
vertebra frag	3		1	2
rib frag	16	14	36	35
sacrum	2		1	
scapula	2	3		3
humerus				2
radius				1
ulna				1
pelvis	2		1	
femur			1	
tibia				1

Table 58: Location and frequency of butchery marks

Taxa	Chop	Saw	Cut	Total
Cattle				
Phase 8				
tibia	1			1
Phase 9				
axis	1			1
calcaneum			1	1
femur	1			1
mandible	1		1	2
metatarsal	1			1
pelvis	1			1
radius	1			1
tibia	1			1
Phase 10				
astragalus	2			2
axis	1			1
femur	4	1	1	6
horncore		1		1
humerus	3		1	4
mandible	2			2
metacarpal	1			1
metapodial	4			4
pelvis	2			2
radius	2			2
scapula	3		1	4
tarsal	1		1	2
tibia	3	1		4
ulna	3		1	4
skull	1			1
domestic fowl				
Phase 9				
coracoid	1			1
Phase 10				0
tibio-tarsus	1			1
fallow deer				
Phase 10				
metacarpal	1			1

Taxa	Chop	Saw	Cut	Total
fallow/roe deer				
Phase 10				
metacarpal			1	1
goose				
Phase 10				
carpo-metacarpus	1			1
femur			1	1
large mml				
Roman				
rib			1	1
skull frag	1		1	2
Phase 8				
rib	1			1
thoracic vertebrae	1			1
vertebra frag	1			1
Phase 9				
cervical vertebra	4			4
rib	2		1	3
shaft frag	1			1
vertebra frag	1			1
Phase 10				
cervical vertebra			1	1
lumbar vertebra	1		1	2
rib	11		11	18
sacrum	1			1
shaft frag	2			2
tarsal	1			1
thoracic vertebrae	3			3
vertebra frag	6			6
medium mml				
Phase 9				
rib	1		5	6
thoracic vertebrae	1			1
Phase 10				
femur			1	1
lumbar vertebra	3			3
rib shaft	14			14
thoracic vertebrae	2			2
pig				
Roman				
humerus	1			1
Phase 9				
tibia	1			1
Phase 10				
atlas	1			1
mandible	3			3
metapodial			1	1
partial skull	1			1
scapula	1			1
Sheep				
Phase 9				

Taxa	Chop	Saw	Cut	Total
horncore			1	1
Phase 10				
partial skull			2	2
skull frag	1			1
zoned skull	1			1
sheep/goat				
Roman				
radius	1			1
Phase 9				
femur	2		1	3
radius	1			1
tibia	1		1	2
Phase 10				
axis	2			2
femur	1		2	3
humerus	3		1	4
mandible	4		1	5
metacarpal	1			1
metatarsal	1			1
pelvis	2			2
radius	1		1	2
skull frag	2			2
tibia	2	1	3	6
zoned skull	4		1	5
Total	140	4	46	190

Table 59: Fused and unfused bones (after Silver 1969)

Cattle		Phase 9		Phase 10	
Bone	Age (mo)	Fused	Unfuse	Fused	Unfuse
Pelvis (acet)	7-10	1			2
Scapula D	7-8	1		1	
1st Phal P	13-15	1	1	2	
Humerus D	15-18			2	
Radius P	15-18	1		1	
2nd Phal P	18			3	1
MetaC D	24-36	1		2	
Tibia D	24-30	1		1	
Metat D	27-36			1	
Femur P	42	1	1	1	1
Calc P	36-42	1			
Radius D	42-48			1	1
Ulna P	42-48			2	
Humerus P	42-48				
Femur D	42-48			1	
Tibia P	42-48				
Vertebrae		7	6	2	3
Total		15	8	20	8
Sheep					

Bone	Age (mo)	Fused	Unfuse	Fused	Unfuse
Pelv (acet)	6-10			4	1
Scapula D	6-8			3	
Humerus D	10			3	1
Radius P	10	1		5	
1st Phal P	13-16				
2nd Phal P	13-16				
Metac D	18-24			2	1
Tibia D	18-24	1		3	2
Metat D	20-28			2	
Ulna P	30				
Femur P	30-36				
Calc P	30-36			1	
Radius D	36			1	
Humerus P	36-42				1
Femur D	36-42			2	
Tibia P	36-42			1	
Vertebrae				4	1
Total		2	0	31	7
Pig		Phase 9		Phase 10	
Bone	Age (mo)	Fused	Unfuse	Fused	Unfuse
Scapula D	12				1
Humerus D	12				
Radius P	12		1	1	
Pelvis (acet)	12				
2nd Phal P	12			1	
Metac D	24				1
Tibia D	24		2	1	
1st Phal P	24				
Calc P	24-30				
Metat D	27		1		2
Ulna P	36-42				
Humerus P	42				
Radius D	42				
Femur P	42				
Femur D	42				
Tibia P	42		1		
Total		0	5	3	4

Table 60: Tooth measurements (mm) after Payne and Bull 1988 and von den Driesch (1976)

Phase	Cut	Context	Taxon	Element	L	W/WA	WP	H
10	1128	1123	equid	p2	29.3	18.5		
10	1128	1123	equid	m3	35.8	14.7		
10	1128	1123	equid	p3	25.8	19.1		
10	1128	1123	equid	p4	25.2	19.8		
10	1128	1123	equid	m1	23.4	17.2		
10	1128	1123	equid	m2	24.9	16.5		
8	1117	1118	cattle	lm2	23.2	13.5		
8	1117	1118	cattle	lm3	35.2	14.2		
9	1008	1010	dog	lm1	18.3	6.5		
9	1008	1010	dog	lm2	7.7	5.8		
9	1008	1009	pig	lm1	15.6	9.2	9.6	
9	1008	1009	pig	lm2	19.6	11.4	11.9	
9	1008	1009	sheep/goat	lm1	10.9	7.4		
9	1008	1009	sheep/goat	lm2	13.8	8.1		
9	1008	1009	sheep/goat	lm3	23.5	7.9		
9	1008	1009	sheep/goat	lm1	13.1	7.5		
9	1008	1009	sheep/goat	lm2	16.7	7.4		
9	1179	1178	sheep/goat	lm1	11.5	7.4		
10	1128	1124	sheep/goat	lm1	13.2	7.3		
10	1128	1124	sheep/goat	lm2	15.8	6.9		
10	1128	1124	sheep/goat	lm3	21.9	7.6		
8	1119	1126	sheep/goat	lm3	19.2	8.3		
8	1119	1125	sheep/goat	lm1	12.6	7.5		
8	1119	1125	sheep/goat	lm2	15.6	7.5		
9	1163	1162	cattle	ldp4	30.6	12.1		
9	1163	1162	sheep/goat	um1	13.5	10.8		
9	1163	1162	sheep/goat	um1	10.9	10.5		
9	1163	1162	sheep/goat	um2	14.9	10.5		
10	2016	2014	sheep/goat	lm1	10.4	6.6		
10	2016	2014	sheep/goat	lm2	13.6	7.7		
10	2016	2014	sheep/goat	lm3	21.2	7.4		
10	2016	2013	cattle	ldp4	33.8	10		
10	2016	2013	pig	lm3	35.6	15.4		
10	2016	2013	pig	lm1	16	10.2	11	
10	2016	2013	pig	lm2	23	13.8	13.8	
10	2016	2013	sheep/goat	lm1		7		
10	2016	2013	sheep/goat	lm2	13.9	8.4		
10	2016	2013	sheep/goat	lm3	22.5	8.3		
10	2016	2013	sheep/goat	um3	18.7	11.2		
10	2016	2013	?red deer	antler				
10	3024	3017	cattle	lm1	23.6	14.8		
10	3024	3017	cattle	lm2	26.1	13.8		
10	3024	3017	cattle	lm3	37.1	14.7		
10	3024	3017	pig	lm1	15.9	10.9	12.6	
10	3024	3017	pig	lm2	21.4	14.1	14.2	
10	3024	3017	pig	ldp4	19.4	6.4	8	
10	2016	2014	sheep/goat	lm1	9.2	7		

Phase	Cut	Context	Taxon	Element	L	W/WA	WP	H
10	2016	2014	sheep/goat	lm2	12	8.5		
10	2016	2014	sheep/goat	lm3	20.4	8.1		
10	2016	2014	sheep/goat	lm2	14.1	7.9		
10	2016	2014	sheep/goat	lm3	21.7	7.9		
10	2016	2014	sheep/goat	lm1	10.3	7.4		
10	2016	2014	sheep/goat	lm2	14.9	8.3		
10	2016	2014	sheep/goat	lm3	21.4	8.2		
10	2016	2014	sheep/goat	lm1	10.1	6.6		
10	2016	2014	sheep/goat	lm2	14.3	7.8		
10	2016	2014	sheep/goat	lm3	21.6	7.3		
10	2016	2014	sheep/goat	lm2	11.9	8.1		
10	2016	2014	sheep/goat	lm3	20.9	8.3		
10	2016	2014	sheep/goat	um1	12.7	11.6		
10	2016	2014	sheep/goat	um2	14.5	11		
10	2016	2014	sheep/goat	um3	17.8	11.2		
10	2016	2014	sheep/goat	um2	16.2	10.6		
10	2016	2014	sheep/goat	um3	16.9	9.9		
9	2033	2034	cattle	um3	27.1	19.2		
10	3022	3021	equid	lm3	28.9	11.2		
Roman	3067	3066	cattle	lm3	36.5	15.6		
10	2033	2034	equid	lm3	33.5	14.1		46.3
8	1117	1118	cattle	ldp4	30.7	10.7		

Table 61: Bird bone measurements (mm) after Cohen and Serjeantson 1996

ID	Pha	cut	Cx	Taxon	Element	GL	D	Bp	Bd	S	D	Sp	Di	Di	Di	Bf
79	10	1128	1122	goose	carpometacarpus	85		20.4							11.6	
80	10	1128	1122	domestic fowl	humerus	78.1	21			7.5						
83	10	1128	1122	domestic fowl	ulna	62.3		8					10.8		8.5	
117	9	1008	1010	domestic fowl	ulna	62.1		7.6					9.9		8.7	
118	9	1008	1010	goose	tarso-metatarsus	85.1		18.1	18.2	8.8						
161	10	1128	1123	domestic fowl	scapula									12.7		
162	10	1128	1123	domestic fowl	radius	65			6.6							
194	9	1179	1178	domestic fowl	femur	74.3		14.1	13.3	6.4						
197	9	1179	1175	domestic fowl	tarso-metatarsus	62.1		11.3	11	5.1						
249	10	1128	1124	domestic fowl	femur			14.9								
250	10	1128	1124	domestic fowl	coracoid	51.9									11.5	
253	10	1128	1124	goose	scapula									13.5		
312	9	1163	1162	duck	femur	52.5		12.1	12.6	5.2						

ID	Pha	cut	Cx	Taxon	Element	GL	D	Bp	Bd	S	D	Sp	Di	Di	Di	Bf
313	9	1163	1162	duck	femur	52.4		12	12.7	5.3						
314	9	1163	1162	duck	humerus	91.2		21.6	15.3	7.1						
315	9	1163	1162	duck	tibio-tarsus	92				4.1	11.2		16.4			
316	9	1163	1162	duck	tibio-tarsus	92.1				4.6	11.6		16.3			
317	9	1163	1162	duck	ulna	77.7		10.7					11.7		11.1	
318	9	1163	1162	duck	radius	71.3			6.9	3.1						
319	9	1163	1162	duck	carpometacarpus	56		14.1							8.2	
320	9	1163	1162	duck	tarso-metatarsus											
321	9	1163	1162	duck	scapula	47.7		11	11.4					13		
450	nd	2017	2018	domestic fowl	tibio-tarsus								18.7			
457	nd	3033	3020	domestic fowl	tarso-metatarsus	93.3		16.1	14.7	8.7		26.6				
530	10	3024	3017	domestic fowl	tibio-tarsus	126.2			13	6.3	13.3				23.4	
531	10	3024	3017	domestic fowl	tibio-tarsus				12.6	7.1	13.8					
532	10	3024	3017	domestic fowl	femur	100.2		20.7	20.3	8.6						
534	10	3024	3017	goose	femur		74.1									
649	Roman	3086	3085	domestic fowl	ulna			9.4					13.4			
695	10	3022	3021	domestic fowl	tibio-tarsus		54.1									
697	10	3022	3021	goose	tibio-tarsus								26.6			
755	10	2016	2013	goose	humerus			33.7								
758	10	2016	2013	domestic fowl	coracoid											12.4

Table 62: Mammal bone measurements (mm) after Payne and Bull 1988 and von den Driesch (1976)

Phase	cut	Context	Taxon	Element	GL	Bp	Bd	SD	Dd	Dp	GLP	SLC	Bt	HTC	LA	DC	L	H	BFcr	maxbasalD	minbasalD	Basalcirc	ASG	Bfd
10	1128	1122	sheep/goat	metatarsal			23.3		15.9															
10	2016	2013	?red deer	antler																42	40.8	134		
10	1128	1122	sheep/goat	scapula								19.8											19.3	

Phase	cut	Context	Taxon	Element	GL	Bp	Bd	SD	Dd	Dp	GLP	SLC	Bt	HTC	LA	DC	L	H	BFcr	maxbasalD	minbasalD	Basalcirc	ASG	Bfd
10	1128	1122	sheep/goat	humerus			30.4						28.6	14.1										
10	1128	1122	sheep/goat	metatarsal	129	18.6	21.9	10.8	14.6															
10	1128	1122	sheep/goat	scapula							32.3	19.9											19.6	
10	1128	1122	rabbit	femur	80.5		13.3																	
10	1128	1122	fallow deer	metacarpal			29.5		19.1															
8	1117	1118	cattle	tibia			52																	
8	1117	1118	equid	humerus			73.7						70.1											
8	1117	1118	roe deer	humerus			25.7																	
9	1008	1010	dog	mandible	112																			
10	1128	1123	sheep/goat	scapula							34.2	22.9											21	
10	1128	1123	equid	metacarpal	216		49.1	34																
9	1112	1111	equid	atlas															79.8					
9	1114	1113	sheep/goat	tibia			24.9		17.9															
9	1114	1113	equid	metatarsal	247	42.2	39.8	25.3	32.6	34.2														
9	1163	1161	ovis	horncore													120			39.2	26.3	111		
10	1143	1141	sheep/goat	metacarpal	121	21.6	23.9	12.3																
10	1128	1124	cattle	humerus									65	31										

Phase	cut	Context	Taxon	Element	GL	Bp	Bd	SD	Dd	Dp	GLP	SLC	Bt	HTC	LA	DC	L	H	BFcr	maxbasalD	minbasalD	Basalcirc	ASG	Bfd
10	1128	1127	sheep/goat	metacarpal			25.6																	
11	1158	1159	sheep/goat	metacarpal			23.7																	
10	2016	2014	sheep/goat	pelvis											27.3			5.3						
10	2016	2013	sheep/goat	tibia			25.7		20.4															
10	2016	2013	sheep/goat	calcaneum	57.1	13.1																		
10	3024	3017	cattle	femur												43.3								
10	3024	3017	sheep/goat	humerus			29.8						29.8	15.8										
10	3024	3017	sheep/goat	pelvis											28.1									
10	3024	3017	cattle	metacarpal	2.5	54.3	54.7	29.4	30.9															
10	3024	3017	sheep/goat	metatarsal	127	20.1		12.1	15.7															
10	3024	3017	dog	radius	159	18.9	24.1	13																
10	3024	3017	sheep/goat	tibia			30.4		24.3															
10	2016	2014	sheep/goat	radius	152	30.5	28.1																	22.5
9	2033	2034	cattle	metacarpal			65.2		34															
9	2033	2034	cattle	tibia			62.6																	
Roman	3097	3101	equid	scapula							78.2													
Roman	3097	3021	pig	tibia			30.3																	

Phase	cut	Context	Taxon	Element	GL	Bp	Bd	SD	Dd	Dp	GLP	SLC	Bt	HTC	LA	DC	L	H	BFcr	maxbasalD	minbasalD	Basalcirc	ASG	Bfd
Roman	3071	3070	dog	humerus			20.7																	

Contact Details

Richard Buckley or Patrick Clay
University of Leicester Archaeological Services (ULAS)
University of Leicester,
University Road,
Leicester LE1 7RH

T: +44 (0)116 252 2848
F: +44 (0)116 252 2614
E: ulas@le.ac.uk
w: www.le.ac.uk/ulas

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