Archaeological Investigations at Parcel F Framework Plan 5, Quedgeley Urban Village

Worcestershire Archaeology

for RPS Heritage

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PARCEL F
FRAMEWORK PLAN 5
QUEDGELEY URBAN VILLAGE
GLOUCESTERSHIRE

Archaeological excavation report

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SITE INFORMATION

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Summary

An archaeological excavation was undertaken by Worcestershire Archaeology on land at Parcel F, Framework Plan 5, Quedgeley Urban Village, Gloucester (NGR SO 81244 13371). In addition to the excavation, a further five trial trenches were also excavated, two of which were located within Parcel E, to the immediate east of Parcel F. The project was commissioned by RPS Heritage on behalf of their client Quedgeley Urban Village Ltd.

Previous evaluation trenching across the Framework Plan site identified features of Romano-British origin within Parcel F. An excavation at Parcel G, located immediately south-west of Parcel F, identified a site dating from the later Iron Age to early Romano-British periods. Iron Age and Romano-British remains comprised large pits and ditches associated with a possible drove-way.

The archaeological investigations identified archaeological remains predominantly dating from the late Iron Age and Romano-British periods. Prehistoric activity pre-dating the Iron Age was represented by residual flint artefacts, though a crouched inhumation could date from this period.

Later Iron Age activity was characterised by several large pits, likely functioning as waterholes. Two of the pits contained organic-rich deposits and a section of preserved wattle hurdle survived within one such deposit. Dating evidence from the pottery assemblage indicated a later Iron Age date, which was confirmed by radiocarbon dating undertaken on the wattle hurdle. The animal bone assemblage was dominated by cattle, and environmental evidence indicated the surrounding landscape was predominantly a pastoral one. There was some evidence of votive activity within the pits, comprising the deliberate deposition of a dog skull, cow skull and a loom-weight. This mirrors the deposition of a bone weaving comb and a dog skull within a similar pit in the nearby Parcel G excavations.

Romano-British activity could tentatively be split into two separate phases, with some evidence of early (1st to mid-2nd century AD) land-use which continued through to the early 4th century AD. The Romano-British element appeared agrarian in character, predominantly comprising small boundary ditches, with no direct evidence of settlement identified within the site. Two inhumations and a cremation deposit, which produced a radiocarbon date of 30-210 cal AD, were located adjacent to a boundary ditch. The crouched inhumation and associated calf burial are also likely to be early Roman in date and could represent a continuation of later prehistoric funerary activity. The two additional evaluation trenches in Parcel E identified the presence of a small Roman gully, which may be associated with a potential drove-way in the north of Parcel F.

The finds assemblage suggested that the site lay within the vicinity of settlement, probably a small, rural farmstead. The presence of some high-status pottery, dating from the 1st and 2nd centuries and including an exceptional sherd of mortarium, indicated some level of wealth. The presence of Spanish amphora may provide evidence of trade and finds of tegula and stone roof tile may be associated with a late 3rd century villa site identified 800 metres to the north at the Olympus Business Park.

Archaeology post-dating the Roman period was confined to a large post-medieval boundary ditch and modern truncation associated with 20th century military use of the site, initially as a munitions factory, and later an RAF base.

Report

1 Introduction

1.1 Background to the project

An archaeological excavation was undertaken by Worcestershire Archaeology (WA) from August to November 2019 on land located within Parcel F, Framework Plan 5, Quedgeley Urban Village (NGR SO 81244 13371). This comprised the excavation of an area some 9473m^2 and a further five trial trenches measuring between 15m-30m in length (Fig 1). Two of the trenches were located within the area of Parcel E, to the immediate east of Parcel F.

The project was commissioned by Neil Wright of RPS Heritage on behalf of their client Quedgeley Urban Village Ltd, who are carrying out an approved scheme of development of a site known as Quedgeley Framework Plan 5, Gloucester, part of a former RAF base. A planning application was initially submitted in 2000 and was granted subject to a programme of archaeological works (00/00479). A renewal of outline consent was submitted and approved in 2013, also subject to a programme of archaeological works (13/00585).

The archaeological advisor to the local planning authority considered that the proposed development has the potential to impact upon possible heritage assets. Work undertaken for earlier phases included a desk-based assessment (DBA) which identified the potential for archaeological remains of Roman and medieval origin. Subsequent geophysical survey across the wider site identified modern structures thought to be associated with the former RAF base and munitions factory, with earlier features confined to evidence for ridge and furrow. An archaeological evaluation of the site was undertaken by Worcestershire Archaeology in 2016 which identified features of Romano-British origin in the west of the site, and features thought to be post-medieval field boundaries in the central and eastern sections of the site (Walsh and Iliff 2016).

In 2017, Worcestershire Archaeology undertook an archaeological excavation of Parcel G, located immediately south of Parcel F. The investigations identified a site dating from the later Iron Age to early Romano-British periods. Iron Age features comprised large pits with well-preserved organic remains and appeared confined to the eastern portion of the site. Romano-British remains comprised ditches, including some which may have formed a drove-way (Walsh 2017).

Following consultation between Andrew Armstrong (archaeological planning advisor to Gloucester City Council) and RPS Group an excavation area was agreed and a Written Scheme of Investigation (WSI) was prepared by Worcestershire Archaeology and approved by Andrew Armstrong.

The archaeological investigations conform to industry guidelines and standards set out by the Chartered Institute for Archaeologists in *Standard and guidance: for archaeological evaluation* and *Standard and guidance: for archaeological excavation* (CIfA 2014a; 2014b).

1.2 Site location, topography and geology

The Framework Plan 5 site is located within the former HQ site of RAF Quedgeley. It lies approximately 4km south of Gloucester and east of the historic settlement of Quedgeley. Much of the HQ site around the Framework Plan 5 area has been redeveloped in recent years.

Parcel F lies centrally within the Framework 5 plan, immediately north-east of Parcel G and *c* 150m west of Parcel J, both of which have recently been subject to archaeological works (Fig 1; Walsh 2017; Iliff 2018; Arnold 2020). The site is on broadly level ground and sits approximately 20m *above ordnance datum* (AOD).

The geology of the site is mapped as undifferentiated Blue Lias Formations and Charmouth Mudstone Formations, overlain by superficial deposits of Cheltenham Sand and Gravel (BGS 2020).

2 Archaeological and historical background

2.1 Introduction

The archaeological background to the site is largely derived from the extensive archaeological work previously undertaken within the Quedgeley area. This section also draws upon the historic background given in the previous Parcel G archaeological works (Walsh 2017). As a result, a brief summary of the archaeological and historical background is presented below.

2.2 Prehistoric (Mesolithic to Bronze Age)

Earlier prehistoric evidence within Quedgeley is limited and largely represented by residual finds. A Neolithic polished stone axe-head was recovered during an evaluation *c* 1km south of Parcel F (Arnold 2016). The artefact was recovered from the topsoil but had likely been disturbed via modern agricultural practice. The axe showed no signs of use-damage and so was likely deliberately deposited within the ground prior to disturbance. A notched blade of Mesolithic or early Neolithic date was also recorded. Residual flint artefacts were also recovered at Quedgeley East, Haresfield (CA 2019).

There is some limited evidence for Bronze Age activity within Quedgeley. Within the RAF Quedgeley site, an earlier phase of trial trenching identified three enclosure of possible Bronze Age or Iron Age date. Further afield, an isolated pit containing middle Bronze Age pottery was identified at Sellars Farm, approximately 1.30km west of Parcel F (CA 2016).

2.3 Iron Age

There is considerably more evidence for later prehistoric activity within the Quedgeley area. Several areas of Iron Age activity have been recorded within the RAF site. Earlier trial trenching identified a pit which yielded pottery sherds of a middle to late Iron Age date (Northamptonshire Archaeology 2001). Furthermore, archaeological investigations at Parcel G of the Framework plan (discussed in section 2.6) identified later Iron Age activity in the form of probable waterholes (Walsh 2017).

Within the wider locale several rural Iron Age sites have been identified. Investigations at Mayo's Land *c* 500m south-west from site, recorded the presence of a later Iron Age field system which was followed by an unenclosed settlement of late Iron Age to early Romano-British date (CA 2015). An archaeological evaluation at Hunts Grove, approximately 1km south of the site, identified evidence of a double ditched enclosure that dated from the middle to late Iron Age but likely continued in use to the end of the Roman period (OA 2005).

Nearby to Hunt's Grove, at Quedgeley East Haresfield, residual sherds of middle to late Iron Age pottery were recovered from later features, nearby to an undated, but probably later prehistoric ring-ditch (CA 2019).

2.4 Roman

Evidence for Roman activity within the Quedgeley area is extensive and recent commercial work has identified several rural sites and a probable villa. The Parcel F site lies approximately 4km south of the Roman legionary fortress at *Glevum* (Gloucester). In AD97 *Glevum* was given *colonia* status and subsequently the region surrounding *Gelvum* was settled and 'Romanised'.

The site is also situated *c* 800m east of the proposed route of the Roman road which linked *Glevum* to *Abonae* (Sea Mills, Bristol). An archaeological evaluation in 1994 tentatively identified a section of the Roman road below a petrol station (Sermon 1995).

Within the Quedgeley RAF base, several previous investigations have identified evidence of early Roman activity dating between the 1st and 2nd centuries. Evaluation trenches to the west of Manor Farm identified substantial ditches associated with a 1st century AD settlement. A fragment of tegula was also recovered, though no *in situ* evidence for structural remains was identified (Northamptonshire Archaeology 2001). Early Roman activity, in the form of a possible drove-way, was

identified during Parcel G works of the Framework Plan and is discussed in more detail in Section 2.6 of this report (Walsh 2017).

A substantial, high-status site, provisionally identified as a villa, was recorded below the Olympus Business Park, some 800m north of site (Sermon 1996; 1997). Structural remains included walls, a hypocaust and a possible kiln. A large number of high-status finds were present, including tegula, tesserae, box flue tile and coins. The site also recorded a high-status burial comprising a stone coffin containing a female inhumation with six jet pins (Sermon 1996; 1997). Analysis of the finds indicated that the structures were likely to date from the late 3rd to early 4th centuries, but that the site had been occupied since at least the 1st century AD.

Other Roman sites identified within the Quedgeley area include a small 1st to 2nd century AD Roman rural settlement and field system at Sellars Farm (CA 2016). A ditched enclosure, dating from the 1st to 2nd centuries AD was also identified at Mayo's Land (CA 2015). This site also recorded a single inhumation burial on the inside edge of the enclosure, which was tentatively dated from the 1st to 3rd centuries AD. An isolated Roman inhumation burial was also identified during works at Quedgeley East, Haresfield. Radiocarbon dating gave the burial a date range of between cal. AD 125-251 (CA 2019).

2.5 Medieval and later

The most significant archaeological feature within the RAF site is Manor Farm, comprising a group of listed farm building and the moat which is a scheduled monument (SM13805). Manor Farm is situated approximately 300m north-east of Parcel F.

There is also evidence of a medieval agricultural landscape within the RAF site, in the form of both ploughed out and extant ridge and furrow, along with drainage and boundary ditches, one of which was dated to the 11th century AD (Northamptonshire Archaeology 2001).

Agricultural use of the site extended through the post-medieval period. The site was established as a munitions factory during the First World War with the Parcel F portion of the site incorporated into the facility during the Second World War. The base was in use as an RAF supply depot until 1995 until its sale for redevelopment.

2.6 Previous archaeological work on the site

In 2016 Worcestershire Archaeology undertook an archaeological evaluation of the Framework Plan 5 site, which comprised the excavation of 22 trenches (Walsh and Iliff 2016). Six trenches were excavated across the Parcel F area, which identified a series of ditches which contained Romano-British pottery typical of rural sites in the area.

Two trenches excavated within the Parcel G site also identified features of Romano-British origin. Following this, an archaeological excavation was undertaken in the south of Parcel G in 2017 (Walsh 2017). The investigations identified a site dating from the later Iron Age to early Romano-British periods. Iron Age features comprised large pits with well preserved organic remains and appeared confined to the eastern portion of the site. Romano-British remains comprised ditches, including some which may have formed a drove-way (*ibid*).

Two small additional areas within Parcel G were excavated by Foundations Archaeology later in 2017. The investigation recorded two ditches; one of which was identified as the continuation of a Romano-British ditch previously recorded by Worcestershire Archaeology (Foundations Archaeology 2017).

An archaeological evaluation was undertaken on Parcel J of the Framework plan, located *c* 100m west of Parcel F (Iliff 2018). A single ditch, containing abraded Roman pottery, was identified and may have been associated with the features present with Parcel G. Subsequently, an archaeological watching brief was undertaken on ground works in this area. No features or deposits predating the

modern period were identified: however, a Second World War air raid shelter was recorded (Arnold 2020).

3 Project aims

The aims and scope of the project were to locate and sample archaeological deposits and record their nature, extent and date, with the aim of preserving these assets by record to mitigate the effects of the proposed development.

National guidance for planning and the historic environment is set out in the National Planning Policy Framework published in 2012 and revised in 2018. Section 16 addresses, entitled 'Conserving and enhancing the historic environment' includes paragraph 199 which states:-

Local planning authorities should require developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence (and any archive generated) publicly accessible. However, the ability to record evidence of our past should not be a factor in deciding whether such loss should be permitted.

The project references the South West Archaeological Research Framework Resource Assessment (Webster 2008) and, where possible, addresses research aims set out in the Research agenda including the following:

- Research Aim 20: Improve our understanding of wild and cultivated plants in the past
- Research Aim 21: Improve our understanding of the environmental aspects of farming
- Research Aim 29: Improve our understanding of non-villa Roman rural settlement.
- Research Aim 42: Assess the impact of the Roman Empire on farming

4 Project methodology

A Written Scheme of Investigation (WSI) was prepared by Worcestershire Archaeology (WA 2018). Fieldwork was undertaken between 14 August and 11 November 2019.

The archaeological investigations into Parcel F comprised an open-area excavation, measuring some 9473m^2 in area, and a further three trial trenches to the north (26-28). The trial trenches, measuring between 16m-28m in length, were excavated to test the archaeological potential of the northern limit of Parcel F, the results of which were used to determine the limits of the excavation area. The trenches were numbered in sequence following on from earlier evaluation work undertaken at the site.

A further two trenches (29-30) were excavated to the east of Parcel F, and within the area designated as Parcel E. The trenches were located within the footprint of a demolished RAF building, which was still extant during the original 2016 evaluation (Walsh and Iliff 2016). The trenches measured between 25m-33m in length.

The Parcel F excavation area and associated trenching is shown in Figure 1.

The strip of the Parcel F excavation area was undertaken in challenging conditions arising from poor weather, site logistics, the presence of contaminated ground and extensive modern rubble overburden, and abundant modern truncation. The strip was started in the south of the area and continued to the north, but had to be undertaken in five distinct phases as each phase required backfilling before the next could be opened. Subsequently, at no point were all of the archaeological features exposed together. An area in the north of the strip had to be delayed as contaminated soil was sent for testing, but following negative results was completed after the area around it had been investigated and recorded.

An island in the centre of Parcel F remained unexcavated as this formed part of an exclusion zone centred around a tree.

Modern truncation comprising numerous concrete service culverts and footings pads, associated with the former RAF base, were present in high number across the entirety of the site. The removal of the concrete structures often caused further disturbance to the surrounding area.

Several archaeological features, including grave cuts containing human remains, were not initially visible and weathered out during the course of the project. Consequently, and following the poor site conditions, an area in the west of the excavation was re-stripped by mechanical excavator at the request of Gloucester City Archaeologist with the intention of identifying any further inhumations.

Deposits considered not to be significant were removed under constant archaeological supervision using a 360º tracked excavator employing a toothless bucket. Subsequent excavation was undertaken by hand. Clean surfaces were inspected and selected deposits were excavated to retrieve artefactual material and environmental samples, as well as to determine their nature. Deposits were recorded according to standard Worcestershire Archaeology practice (WA 2012) and trench and feature locations were surveyed using a GNSS device with an accuracy limit set at <0.04m. On completion of excavation, trenches were reinstated by replacing the excavated material.

All fieldwork records were checked and cross-referenced. Analysis was undertaken through a combination of structural, artefactual and environmental evidence, allied to the information derived from other sources.

The project archive is currently held at the offices of Worcestershire Archaeology. Subject to the agreement of the landowner it is anticipated that it will be deposited at the Museum of Gloucester.

5 Archaeological results

5.1 Introduction

The features recorded in the excavation area and evaluation trenches are shown in Figures 2-8 and Plates 1-24.

5.2 Phasing

5.2.1 Natural deposits

The natural geology varied across the site. In the south of Parcel F, the natural geology comprised a brownish-orange gravelly-sand consistent with that which was observed within the Parcel G excavations to the south-west.

A change in the geology was observed within the northern half of Parcel F (Fig 2). The gravelly-sand gave way to a blue and yellow silty-clay, consistent with the Charmouth Mudstone Formation shown on geological survey mapping (BGS 2020).

5.2.2 Phase 1: Prehistoric

Activity pre-dating the Iron Age was represented by residual flint artefacts, one of which, a worked blade, was recovered from Roman boundary ditch CG23. The blade is likely to be of Mesolithic or early Neolithic origin. No features were securely identified as pre-Iron Age in origin, although an undated crouched inhumation (CG16) may also represent prehistoric activity (see below).

5.2.3 Phase 2: Late Iron Age

Several features within the south of Parcel F were dated to the late Iron Age, comprising a series of large intercutting pits and an associated ditch. These were confined to an area of sand and gravel geology (Fig 2).

Two small pits (CG05) on the south edge of ditch CG03 were stratigraphically the earliest features in this area (Fig 3). The pits were heavily truncated by the ditch, and although no dateable material was

recovered, are thought to date from the Iron Age based on their association with the nearby pit clusters (CG01/CG04).

Ditch CG03 was aligned broadly north-west to south-east and was visible for approximately 22m within the excavation area (Fig 3). It was heavily truncated by modern disturbances at both its north-west and north-east edges, and as such it remains unclear whether the ditch deliberately terminated in the north-west. It measured 0.86m at its deepest and was filled predominantly by a sandy-clay from which a small assemblage of late Iron Age pottery and animal bone was recovered (Plate1; Fig 4). The ditch was truncated by a number of the Iron Age pits (CG01; CG04) but was observed to truncate the smaller pits in CG05.

5.2.3.1 Pit Groups

A large pit cluster (CG01) was located on the north-east edge of ditch CG03 (Fig 3). The cluster appeared to contain at least four pits which may have been contemporary as they were observed to share several upper fills. Pit 4037 was the central and largest pit, measuring 5.40m by 3.70m. It was at least 0.94m deep (Fig 4). The upper fills were in the main sterile but did contain a small assemblage of pottery and animal bone. Several of the lower fills, however, were more organic-rich in nature and comprised blackish-grey clay (Plates 2-3). A preserved section of collapsed wooden hurdle was present at the base of the pit, sealed by the waterlogged clay deposits. The wattle hurdle measured 0.37m by 1.39m and the surviving section comprised approximately 18 rows of roundwood interwoven between 5-7 vertical roundwood staves (Plates 4-5). A section of the wooden hurdle provided a radiocarbon date of 190-10 cal BC. It is unclear whether the hurdle had collapsed into the pit, or whether it functioned as a lining or partition within the open pits in the cluster.

Two other pits were also of some size. Pit 4039 was located in the north-east of the cluster and measured 2.10m by 2.50m. Similarly pit 4040, located to the west, measured 2.00m by 3.40m. An assemblage of late Iron Age pottery and animal bone was recovered from these features but unlike central pit 4037, no organic deposits were identified. No distinct relationship was observed with 4037 and they are thought to be contemporary.

The fourth pit in the cluster (4041) was not as clear and defined a space between pits 4037 and 4040. At the base of the pit, and seemingly deposited deliberately, was a complete cow skull and a possible loomweight fragment (Plate 6). The cow skull was positioned facing south and given the size, was likely of a juvenile animal. The loomweight fragment was located on the eastern side of the skull and may have been broken prior to deposition.

Pit CG04 was located immediately west of, and likely associated with, pit cluster CG01. Although not clear in plan, the pit was observed to truncate both ditch CG03 and pits CG05 in section. A small assemblage of late Iron Age pottery was recovered from the pit.

A large pit (CG06), possibly a waterhole, was located approximately 24m north-east of CG01 (Fig 3). The pit was of considerable size measuring 2.40m wide, 5.10m long and 0.90m deep. It had a sequence of seven fills indicative of deliberate backfilling interspersed with periods of natural infilling (Plate 7; Fig 4). A number of the fills comprised dark blue-grey clays, similar to those present in CG01, which suggests some waterlogging and anaerobic conditions during formation. A small assemblage of later Iron Age pottery and animal bone was recovered from the pit including a dog skull close to the base, which may be of some interest.

Pit CG06 was heavily truncated to the south by a modern drainage run and so was not fully exposed in plan. It was also truncated by a smaller pit (4019) on its eastern edge. Pit 4019 measured 1.00m wide, 1.10m long and 0.38m deep. No finds were recovered but it is likely to be Iron Age in date. Additionally, a small gully was identified to the north of pit CG06. The gully appeared to be truncated by CG06 to the south and by modern activity to the north. As such it was only visible for a length of 1.23m. No finds were recovered but the gully is likely to be Iron Age in origin.

5.2.4 Phase 3: Romano-British

Features dating from the Romano-British period were largely, though not completely, confined to the north of the Parcel F excavation area. The archaeology of this period primarily comprised boundary ditches, associated post-holes and two burials. Many of the ditches were re-cut and so combined stratigraphic and artefactual evidence suggests that there were two different periods of activity within the wider phase. Several features, however, could only be broadly dated to the Roman period, and may have been associated with either period of activity. These features are described at the end of Section 5.2.4.

5.2.4.1 Phase 3.1: Early Roman (1st to mid-2nd century)

5.2.4.1.1 *Southern ditches*

Ditch 4010 was located in the southern limit of the excavation area (Figs 2-3). It followed a north-west to south-east alignment and was heavily truncated by modern disturbances. Subsequently, it was only visible for a combined length of 3.85m and had a maximum depth of 0.16m. No dating evidence was recovered, though ditch 4010 represents a continuation of *Ditch 5* which was excavated in the Parcel G archaeological works. *Ditch 5* was dated to the early Roman period following the recovery of a small assemblage of pottery, including a sherd of samian ware (Walsh 2017).

A small gully (4008) was located *c* 0.60m south-west of ditch 4010 (Fig 3). It ran parallel to the ditch and was also heavily truncated by modern activity. No dating material was recovered, but it appeared to be associated with ditch 4010, and subsequently the earlier Roman activity identified within Parcel G.

5.2.4.1.2 *Northern ditch sequence*

Within the north of Parcel F, several ditches were tentatively dated to the early Roman period and may have formed a small paddock or enclosure continuing north-east outside of the excavation area (Fig 2, 5). Ditch 4161 was located in the north of the strip and was aligned north-west to south-east for a length of 9.40m. It was 1.60m at its widest and 0.36m deep (Fig 6; Plate 8). The ditch was backfilled with a silty-clay deposit from which a small assemblage of pottery and animal bone was recovered. Several sherds of a probable upright tankard date from the late 1st to early 2nd century AD.

Ditch 4161 did not appear to continue south past the tree exclusion area but may have been associated with two ditches (CG28/CG30) of similar date to the south. Ditch CG28 was aligned north-west to south-east and was visible for *c* 14m before it was truncated by boundary ditch CG25 in the south (Fig 5). The ditch was flat bottomed and shallow, measuring between 0.14m-0.32m deep. Several pottery sherds of 1st to mid-2nd century were recovered from the backfill.

Ditch CG30 was located on the northern edge of ditch CG28 and was observed to truncate it (Fig 6). Initially the two ditches followed a similar alignment south-east from the tree exclusion zone for *c* 10m, but then CG30 diverged north-east for a further 23m, possibly creating the corner of a small paddock or enclosure (Fig 5). The ditch was in better preserved to the west, measuring 0.52m in depth. It had a U-shaped profile and was backfilled with a silty-clay from which a single sherd of 2nd century pottery was recovered (Fig 6; Plate 9).

A small gully (CG11) was located in the west of the site (Fig 2). The gully appeared segmented, however, whether this was intentional or due to later modern truncation is not known (Fig 5). The westernmost segment measured 3.85m long, 1.10m wide and 0.36m deep, It was truncated by a modern concrete culvert to the west, and was observed to truncate a probable tree-bowl 4207. A longer segment of CG11 was located *c* 4m to the east. It measured 12m long and contained a sherd of 1st to mid-2nd century pottery. The gully was aligned north-east to south-west and was situated parallel to the larger boundary ditches CG23 and CG24. Gully CG11 was observed to truncate the northern edge of a crouched burial (CG16), likely removing the upper section of the skeleton (Fig 6-7). No human bone was recovered from the backfill of the gully, however.

5.2.4.1.3 *Cremation pit and crouched inhumation*

A possible cremation burial (CG17) was located in the west of the excavation area, on the northern edge of boundary ditch CG23 (Fig 5, 7). The cremation deposit (4214) was buried in an irregular pit or hollow, which measured 0.60m by 0.88m and was 0.14m deep. The southern extent of the pit was truncated by CG23 and the cremation deposit comprised a brownish-grey, silty-clay containing moderate calcined bone fragments and charcoal (Plate 10). A single sherd of early Roman pottery was recovered from the bulk sample and radiocarbon dating provided a calibrated date of 30-210 cal AD (88.4%).

A crouched inhumation burial (4223, CG16) was identified in the west of the excavation area, *c* 7m west of the probable cremation pit (CG17). It was situated between Roman ditches CG23 and CG11 and was heavily truncated by both features (Figs 2, 5, 7; Plate 12). What remained of the grave cut suggested it had been aligned broadly north-west to south-east. The bone preservation within the grave was poor and only the partial remains of the femurs, tibias, fibulas and feet had survived truncation (Plates 11-12). However, enough of the skeletal remains survived to suggest they were of an adult male. The legs were bent at the knee with the right leg sitting on top of the left, suggesting the individual was laid on their left side. The feet were positioned in the southern extent of the grave. No grave goods were identified, and no dating evidence was recovered from the backfill. Despite this, the burial is thought to date from the early Roman period, based on an association with cremation pit (CG17), however a prehistoric date cannot be precluded. An attempt was made to date the burial via radiocarbon dating but failed due to the poor preservation of collagen within the bone.

Detailed analysis of the cremation deposit and crouched inhumation is presented in Section 7 of this report.

5.2.4.1.4 *Animal burial*

A small pit containing a partial animal burial was located in the western limit of the site, approximately 0.40m south of ditches CG23 and CG24, and *c* 3.80m south of crouched burial CG16 (Fig 5, 7). The grave cut measured 0.75m by 1.34m and was 0.10m deep, likely having been truncated by the overlying modern activity. The semi-articulated and poorly preserved skeletal remains of a juvenile cow were present at the base of the pit. The surviving skeletal remains included the tibias, metatarsals, metacarpals and several ribs (Plate 13). A single sherd of early Roman pottery was recovered from the bulk sample.

5.2.4.2 Phase 3.2: Mid to Late Roman (mid-2nd to late-3rd/early-4th century)

Central Ditch sequence

A large boundary ditch (CG23) ran broadly north-east to south-west through the central portion of the site (Fig 2, 5). It was visible for approximately 84m and continued past the western limit of the excavation area. In the east, it was subjected to heavy truncation by later post-medieval and modern activity. The boundary ditch had an average depth of 0.55m and a fill sequence which indicated some initial natural infilling followed by a potential deliberate final ‘closing’ deposit (Fig 6; Plates 14-16). Pottery recovered from the ditch primarily comprised 2nd to 3rd century material, however, 84 sherds of a black burnished ware vessel in the final fill indicates backfilling was not completed until the late 3rd or early 4th century. Additional finds comprised fragments of tegula, stone roof tile, and iron hobnails.

A small segment of ditch (4133) was observed on the southern edge of, and truncated by, the boundary ditch CG23. It only survived for a stretch of *c* 7m and may reflect an earlier boundary prior to the instatement of CG23.

Boundary ditch CG23 was recut on the southern edge by CG24, possibly suggesting some continuity into the 4th century (Figs 5-6; Plates 12 and 16). The recut was only observed in the western half of CG23 and was observed for approximately 33m. Similar to CG23, pottery recovered from the recut primarily comprised 2nd century material, though one sherd of potentially later Roman pot was present.

A small spur of ditch (CG27) extended north-east from boundary ditch CG23 (Fig 2 and 5). It measured *c* 8m in length and was 0.32m deep. Modern truncation rendered the relationship between the two unclear however the ditches are thought to be relatively contemporary. Pottery evidence provided a date ranging from the 2nd to 3rd centuries AD. Ditch CG27 was recut by a curvilinear ditch CG25, which also truncated boundary ditch CG23 (Figs 5-6, Plate 15). No relationship was visible, but this recut is thought to be contemporary with boundary ditch recut CG24.

Ditch CG08 was the latest ditch in the sequence and was observed to truncate the main boundary ditch CG23 and recuts CG24/CG25. It was aligned north-west to south-east for *c* 11m in the centre of the site, before turning east for 32m and continuing past the excavation area (Figs 2 and 5). The ditch was shallow, measuring between 0.14m-0.20m deep (Fig 6). No direct dating evidence was recovered, however, some animal bone was present and is consistent with other Roman assemblages seen across site.

5.2.4.2.1 *Postholes*

A group of three postholes (CG26) were located on the southern side of boundary ditch CG23. The postholes measured between 0.50-0.60m in diameter and 0.26m-0.39m deep (Figs 5-6; Plate 16). No dating evidence was recovered from these features, however, they were truncated by boundary re-cut CG24 and so are thought to be contemporary with the earlier boundary ditch CG23.

A second group of postholes (CG12) was located 2.70m north of boundary ditch CG23 (Fig 7). This comprised a pair of postholes, broadly aligned north-east to south-west. No dating material was recovered from the postholes and it is unclear if they were associated with the postholes CG26 to the south of the boundary ditch.

5.2.4.2.2 *Layer*

A large spread of material in the centre of site sealed the top of a number of boundary ditches (CG23/CG24/CG25/CG27). The deposit comprised a yellowish-brown sandy-clay from which eight sherds of mid-2nd century pottery was recovered (Fig 5). The deposit appeared to fill a natural hollow in the landscape, and there was some evidence to suggest it had formed in anaerobic conditions, possibly via flooding.

Phase 3.3: Roman

The following features are thought to date from the Romano-British period but contained assemblages that could not refine the chronology further.

5.2.4.2.3 *Burials*

Two graves were identified in the centre of the site, on the northern edge of boundary ditch CG23 (Figs 5 and 7; Plates 17-19). Grave CG14 measured 0.98m by 0.47m and was truncated at the northern end by a 20th century concrete footing pad. The grave was shallow at 0.14m deep and held the poorly preserved skeletal remains of a probable juvenile or adolescent (4244; Plates 17-28). What little bone remained indicated the skeleton was supine with the head located at the southern end of the grave. The left arm was straight, with the right arm laid across the abdomen to meet it. The lower legs had been truncated by the concrete footing. No grave goods were identified, neither was any dating material recovered from the backfill of the grave. Detailed analysis of the human bone is presented in Section 7.

A second possible grave (CG15) was located approximately 2m north-east of the juvenile burial (Fig 7; Plate 19). Grave CG15 was sub-rectangular, measuring 2.10m by 0.68m, and also followed a north-west to south-east alignment. No skeletal remains were present but the grave was just 0.08m deep and may have been subjected to heavy truncation.

5.2.4.2.4 *Drove-way*

A pair of parallel ditches, located in the north of the excavation area, may have formed a drove-way (Fig 5). The ditches were aligned broadly north-west to south-east and were positioned approximately 4.30m apart. Both ditches were heavily truncated by modern activity and so appeared segmented. The northernmost ditch (CG31) had a maximum depth of 0.10m and was visible for *c* 11m. The

southern ditch (CG32) was slightly longer at *c* 49m but had also suffered heavy truncation, measuring between 0.01m-0.17m in depth. No dating material was recovered from either ditch during the excavation; however, a small amount of Roman material was recovered from CG32 during the 2016 evaluation stage.

5.2.4.2.5 *Other features*

A series of ditches in the north-west of the site were broadly dated to the Roman period (Figs 2 and 5). Ditch CG21 was aligned east-west and was present for a length of *c* 13m. It was truncated at the western end my modern activity, but likely continued past the excavation area. It was recut on the northern edge by a small segment of ditch (CG22), measuring 5m in length. Both features were filled with an orangey-brown silty-clay and contained Roman pottery. A fragment of tegula was also recovered from ditch CG21.

Ditch CG20 was located *c* 4m south of, and ran parallel to, ditch CG21. It survived for approximately 11m and was also truncated at the western end. No finds were recovered but it is thought to be Roman in origin. Ditch CG20 was truncated by a north-south aligned ditch CG18. This ditch was visible for *c* 14m and may have been associated with a small segment of ditch (CG19) located 5m to the north-west. No dating material was recovered from either of these features but are presumed Roman given their association with nearby ditches CG21/CG22.

Two ditches in the east of the excavation area have also been tentatively dated to the Roman period. Ditch CG09 was located 1.70m north of boundary CG23, and 2m south of probable boundary CG30. The ditch measured 11m in length and between 0.03m-0.16m in depth. Despite the lack of any datable material, it is likely the ditch is Roman in origin and associated with the boundary formed by either CG23 or CG30.

Ditch 4106 was located north-east of post-medieval boundary ditch CG33. No relationship was visible as the ditch appeared to terminate north of CG33. No dating material was recovered but it appeared to be of some antiquity and is likely associated with the Roman activity observed in the area.

5.2.5 Phase 4: Post-medieval

A very large boundary ditch (CG33) was located in the north of Parcel F (Figs 2 and 5). The ditch was aligned north-west to south-east and was visible for 91m. Despite modern truncation, the ditch measured 6.90m wide and was 0.98m in depth (Plates 20-21). The ditch was re-cut at least four times indicating the feature had some longevity. No dating evidence was recovered, however, the ditch aligns with a boundary visible on the 1st edition OS mapping.

5.2.6 Phase 5: Modern

Parcel F was subjected to substantial modern truncation and intrusions (Fig 2). Concrete footing pads and service culverts crossed the entirety of the site. In addition to this, there appeared to be some level of scarping or truncation from above, likely following the construction and subsequent demolition of the former RAF building.

The overlying deposits covering Parcel F primarily comprised modern rubble and demolition material. This was observed to directly overlay the natural geology and archaeological horizon. Some topsoil was present in the south-west of the site, above a thin band of subsoil which in turn sealed the natural substrate.

5.2.7 Undated

A small number of features could not be convincingly allocated to a specific phase (Fig 5). A small, north-east to south-west aligned gully (CG10) in the west of the site was truncated by Roman boundary ditch CG24. No datable material was recovered from the gully, but a Roman date is likely.

Two small gullies (CG02/4071) in the centre and east of the site were aligned north-west to south-east. The two gullies, though undated, are likely to be associated with the Roman activity in the north of Parcel F. Gully (4071) was observed to truncate an earlier curvilinear gully (CG07) which was also

undated. CG07 measured approximately 5.80m in length, curved towards the south-west and had an unknown function.

A shallow pit (4105) was located in the centre of the site and 2m north of ditch CG30. The pit was sterile, contained no cultural material, and may not have been of anthropogenic origin.

5.3 Parcel F evaluation trenching

Three evaluation trenches (26-28) were excavated in the north of the Parcel F excavation area (Fig 1). The trenches measured between 16m-30m long and were excavated to test the archaeological potential in the northern limit of Parcel F. In the instance, no archaeological features or deposits were identified within the trenches, with further considerable modern truncation identified.

5.4 Parcel E evaluation trenching

Two evaluation trenches (29-30) were excavated within Parcel E, immediately east of Parcel F (Fig 1; Plates 23-24). The trenches measured between 25m-33m long and were located within the footprint of a former RAF building which was extant during the 2016 archaeological evaluation.

No archaeological features or deposits were identified within Trench 29, however, a small gully was identified in the easternmost Trench 30 (Fig 8). The gully was located in the south of the trench and was aligned north-west to south-east. It remained unexcavated; however, a sherd of Roman Severn valley ware pottery was recovered from the backfill.

6 Artefactual evidence by C Jane Evans

The artefact report conforms to standards and guidance issued by the Chartered Institute for Archaeologists (CIfA 2014c), as well as further guidance on pottery analysis, archive creation and museum deposition created by various pottery study groups (PCRG/SGRP/MPRG 2016), the Archaeological Archives Forum (AAF 2011), and the Society of Museum Archaeologists (SMA 1993).

6.1 Aims

The finds were analysed with reference to the wider project aims, defined in section 3 above. The focus was on identifying, quantifying, dating and characterising the finds, contributing to the overall interpretation of the site.

This report covers artefacts of predominantly later Iron Age and Roman date.

6.2 Methodology

6.2.1 Recovery policy

Artefacts were recovered according to standard Worcestershire Archaeology practice (WA 2012).

The majority of artefacts collected in the field were recovered by hand but a small quantity of further material was retrieved from environmental samples (see below).

6.2.2 Method of analysis

All hand-retrieved finds were identified, quantified and, where possible, dated to period. A *terminus post quem* date was produced for each stratified context, used for determining the broad date of phases of activity on the site. Artefacts from environmental samples were examined and are included in the tables below. All information was recorded on a Microsoft Access 2007 database, with tables generated using Microsoft Excel.

The pottery was examined under x20 magnification, with reference to the Gloucestershire fabric type series (Ireland 1983, Appendix B1; http://glospot.potsherd.net/docs/) and, where appropriate, to the national Roman fabric reference collection (Tomber and Dore 1998). The pottery was quantified by count, weight and Estimated Vessel Equivalent for rims (Rim EVE); diameters and percentages extant were not recorded for bases. Decoration and evidence for manufacture, use and discard were

recorded, where evident. Detailed fabric analysis was not undertaken for the small assemblage of ceramic building material.

Classification of worked flint follows conventions outlined in Ballin (2000), Inizan et al (1999), and Butler (2005); the material was catalogued according to type and dated where possible. Visible retouch, edge-damage, cortex, raw material characteristics and quality, burning, and breakage were noted.

The finds were recorded during the COVID-19 lock-down, when access to the WA offices was restricted and all staff were working from home. Unfortunately, as a result the small assemblage of iron nails has not yet received specialist attention. Further specialist comment could be added at a later stage, though this is unlikely to add significantly to site interpretation or dating. Also due to COVID-19 restrictions Kay Hartley carried out her analysis from a drawing of the mortarium, photographs and a stamp rubbing.

Where possible, the results from analysis of this assemblage have been compared to assemblages from other local and regional sites. The diagnostic sherds of later Iron Age pottery and the stamped mortarium rim are illustrated, along with the Iron Age loomweight fragments (Figures 9-11).

6.2.3 Discard policy

Artefacts from topsoil and subsoil and unstratified contexts will normally be noted but not retained, unless they are of intrinsic interest (e.g. worked flint or flint debitage, featured pottery sherds, and other potential 'registered artefacts'). Large assemblages of post-medieval or modern material, unless there is some special reason to retain (such as local production), may be noted and not retained, or, if appropriate, a representative sample will be retained. Discard of finds from post-medieval and earlier deposits will only be instituted with reference to museum collection policy and/or with agreement of the local museum.

6.3 Results

The results are summarised in Tables 1 to 6.

The assemblage totalled 773 finds (see Table 1). Artefacts were recovered from only 40 of the contexts excavated. They mainly dated to the later Iron Age and Roman periods, associated with Phase 2 and 3 activity, though a Mesolithic/early Neolithic flint was also recovered, residual in a later context. Apart from a handful of Roman pottery in the topsoil, no finds were recovered from post-medieval or modern deposits (Phases 4 and 5).

The results below provide a summary of the finds and their spatial and chronological associations. Dates have been allocated where possible and significant individual finds are commented upon where appropriate. Pottery was by far the most common find.

Using pottery as an index of artefact condition, this was generally poor; Iron Age and Roman sherds were abraded and often fragmentary. The average sherd weight for the assemblage was only 7g; for some stratigraphic groups it was even lower (Table 2). As might be expected, the Iron Age pottery was more fragmentary than the Roman. Most of the Iron Age and Roman assemblage, therefore, seems likely to represent redeposited rubbish, incorporated in various fills. This reflects interpretation on site, which described a number of fills as re-deposited natural incorporating finds or gradual backfilling of features resulting from weathering.

Average sherd weights, however, should be interpreted with caution. The Group 23 ditch produced a single amphora sherd weighing 119g (ditch 4217, fill 4219) and a mortarium rim weighing 113g (ditch 4149, fill 4153); these significantly raise the average sherd weights for the features in which they occur. An upper fill of the Group 23, SW-NE boundary ditch (4225, fill 4204) produced 85 sherds (267g) of Black-burnished ware (BB1) with an average sherd weight of only 3g. But all sherds were from a single jar. 39% of the rim survived, giving this stratigraphic group one of the highest percentages of pottery by rim EVE (Table 5). Other contexts produced handfuls of joining sherds, but

none contained similar quantities. The BB1 jar was the only diagnostically later Roman vessel in the assemblage, so this may represent a different pattern of deposition in this later period.

The Iron Age pottery was primarily associated with pit fills (Groups 1, 4 and 5), the biggest group coming from a large Group 6 pit (Pit 4012). Further sherds came from a ditch cut by the Group 1 pits (Group 3). The Roman pottery, in contrast, was recovered predominantly from ditch fills, and particularly the Group 23 boundary ditch which accounted for over half of the Roman assemblage. Only handfuls of Roman sherds were recovered from other feature types and layers.

Period	Material	Material subtype	Object specific type	Count	Weight (g)
Mesolithic/ early Neolithic	Stone	Flint	Blade	1	4
Prehistoric	Stone	Flint	Debitage	2	0.5
Iron Age	Ceramic	Earthenware	Pot	119	228
Late Iron Age	Ceramic	Earthenware	Pot	111	519.5
Iron Age	Ceramic	Fired clay	Loomweight fragment	16	1848
Iron Age	Ceramic	Fired clay	Loomweight fragment?	10	83
LIA/ERB	Ceramic	Earthenware	Pot	5	48
Roman	Ceramic	Earthenware	Pot	293	2879
Roman	Ceramic	Fired clay	Tegula	2	1056
Roman	Metal	Iron	Hobnails	1	
Roman	Stone	Sandstone	Tile	1	225
Roman?	Stone	Limestone	Tile	1	129
Undated	Ceramic	Fired clay	Fragment	202	304.5
Undated	Metal	Iron	Nail	1	
Undated	Metal	Iron	Tack	1	
Undated	Organic	Fuel ash slag	Fragment	1	1
Undated	Slag	Slag(fe)	Fragment	4	54.3
Undated	Stone	Heat-cracked stone	Fragment	2	21

Table 1: Quantification of artefact assemblage by period and material

6.3.1 Prehistoric knapped stone, by Rob Hedge

Three pieces of prehistoric worked flint were recovered. One, from fill 4219 of ditch 4217, was a blade weighing 4g. The flint was of moderate quality, and wholly re-corticated with a mottled light brown to blue-grey patina. No post-depositional edge-damage was observed. The blade was soft-hammer struck, the striking platform carefully prepared, and the distal end obliquely truncated. Dating individual residual artefacts can be problematic, but on typological grounds this piece is most likely to

be Mesolithic or early Neolithic in date. The other two flints, weighing <1g, came from fill 4014 of pit 4012. These were undiagnostic debitage, only broadly datable to the prehistoric period.

6.3.2 Iron Age and Roman pottery

The Iron Age and Roman pottery is quantified by phase in Table 2 and by fabric in Table 3. In the report that follows the Iron Age and Roman assemblages are discussed separately.

Phase number	Pottery period	Feature type	Count	% Count	Weight (g)	% Weight (g)	Average weight (g)	Rim EVE	% Rim EVE
2	Iron Age	Ditch	56	11%	59	2%	1	0	0%
	Iron Age	Pit	63	12%	169	5%	3	0	0%
	late Iron Age	Pit	111	21%	519.5	14%	5	0.15	9%
	LIA/ERB	Pit	2	0%	41	1%	21	0.03	2%
3	Roman	Ditch	6	1%	34	1%	6	0.09	5%
3.1	Roman	Burial	1	0%	1	0%	1	0	0%
	Roman	Cremation	1	0%	2	0%	2	0	0%
	Roman	Ditch	45	9%	371	10%	8	0.19	11%
	Roman	Gully	2	0%	7	0%	4	0	0%
3.2	LIA/ERB	Ditch	3	1%	7	0%	2	0	0%
	Roman	Ditch	221	42%	2285	62%	10	1.07	62%
	Roman	Gully	5	1%	66	2%	13	0.19	11%
	Roman	Layer	8	2%	51	1%	6	0	0%
Unphased	Roman	Topsoil	4	1%	62	2%	16	0	0%
Total			528	100%	3674.5	100%	7	1.72	100%

Table 2: Quantification of the pottery by phase, pottery period and feature type

period	fabric code G	Fabric common name	NRFRC (Tomber and Dore 1998)	Count	% Count	Weight(g)	% Weight	Average weight (g)	Rim EVE	% Rim EVE
Iron Age/late Iron Age	TF216	Palaeozoic Limestone		230	44%	747.5	20%	3	0.18	10%
LIA/ERB	TF18	Malvern A	MAL RE A	3	1%	9	0%	3	0	0%

LIA/ERB	TF2	Grog-tempered ware		1	0%	2	0%	2	0	0%
LIA/ERB	TF216	Palaeozoic Limestone		1	0%	37	1%	37	0	0%
Roman	TF10A	Dressel 20 Amphora	BAT AM 2	1	0%	119	3%	119	0	0%
Roman	TF11B	Severn Valley ware	SVW OX	93	18%	994.5	27%	11	0.09	5%
Roman	TF11B	Severn Valley ware reduced		5	1%	32	1%	6	0	0%
Roman	TF11B?	Severn Valley ware reduced		2	0%	82	2%	41	0	0%
Roman	TF11D	Severn Valley ware	SVW OX	71	13%	885	24%	12	0.72	42%
Roman	TF11E	Severn Valley ware	SVW OX	1	0%	4	0%	4	0	0%
Roman	TF23	Severn Valley ware	SVW OX	2	0%	39	1%	20	0.14	8%
Roman	TF232?	Sandy reduced ware		15	3%	246	7%	16	0	0%
Roman	TF4	BB1	DOR BB 1	100	19%	355	10%	4	0.46	27%
Roman	TF6	Savernake ware	SAV GT	1	0%	9	0%	9	0	0%
Roman	TF8B	Samian	LGF SA	1	0%	0.5	0%	1	0	0%
Roman	TF9D	Mancetter Hartshill	MAH WH	1	0%	113	3%	113	0.13	8%
Total				528	100%	3674.5	100%	7	1.72	100%

Table 3: Quantification of the pottery by period and fabric

6.3.2.1 The Iron Age pottery

All the Iron Age pottery was associated with Phase 2, Iron Age deposits, though only 11 contexts attributed to this phase produced pottery. The Iron Age pottery was primarily associated with pit fills (Tables 2 and 4). This is similar to the deposition pattern noted for Quedgeley Area G (Evans 2017). The biggest assemblage, unsurprisingly, came from the pit with multiple fills (Group 6, Pit 4012).

Group number	Group register description	Pottery period	count	% count	weight (g)	% weight	average wt (g)	Rim EVE	% Rim EVE

1	Cluster of inter-cutting pits with wattle in base	Iron Age	22	9%	102	13%	5	0	0%
		late Iron Age	43	19%	136.5	17%	3	0.1	56%
		LIA/ERB	2	1%	41	5%	21	0.03	17%
3	Ditch running E-W cut by Group 1 pits	Iron Age	56	24%	59	7%	1	0	0%
4	Pit cutting Group 3 ditch and Group 5 paired pits	Iron Age	2	1%	9	1%	5	0	0%
6	Large pit multiple fills	Iron Age	39	17%	58	7%	1	0	0%
		late Iron Age	68	29%	383	49%	6	0.05	28%
Total			232	100%	788.5	100%	3	0.18	100%

Table 4: Quantification of the Phase 2 pottery by Group

Only one fabric was represented (Table 3); Palaeozoic limestone-tempered ware (Peacock 1968, group B1; Gloucestershire fabric TF216). Previous petrological analysis of this ware and analysis of its distribution has indicated a source in the Woolhope Hills area of Herefordshire (Morris 1983, 116-22, figs 4.17-4.18). The fabric is typical of sites dating broadly from the Middle Iron Age to the Late Iron Age and earliest Roman periods, going out of use *c* AD 60/75. 62 sherds (208.5g), including some diagnostic rims, were recovered from Group 1 Pit 4037 and an upper layer covering this and other associated pits (4043). The forms (Fig 9.1, 2) are typical, later Iron Age types paralleled, for example, at Blackstone in Worcestershire (Morris 2010) and *Ariconium* in Herefordshire (Willis 2012). A sample of preserved wattle from this pit (fill 4065) was submitted for radiocarbon dating, providing a calibrated date of 190-10 cal BC. This is consistent with dating from Area G, where one of the diagnostic forms was associated with a radiocarbon date of 160 cal BC – 20 cal AD (Evans 2017). Most of the Iron Age sherds were fragmentary and undiagnostic so could not be closely dated. However, they were often fired black and the less-abraded sherds showed evidence of burnishing, both characteristic of later Iron Age vessels (Morris 2010, 4.2.3.6, Surface treatment). The dominance of Palaeozoic limestone-tempered ware is consistent with evidence from other later Iron Age to early Roman sites in the region, for example Elms Farm, to the north of Gloucester, where similar forms were also represented (McSloy 2006, 43, fig 22.5). One body sherd from Pit 4037 had linear tooling (not illustrated). Elaine Morris has suggested a 2nd century BC start date for this, based on the evidence from Croft Ambrey in Herefordshire (Morris 2010 4.2.3.5 Decoration; Stanford 1974, fig 104), but the end date is less certain. There was, therefore, no clear evidence for earlier vessels in the assemblage, so even the least diagnostic sherds in this fabric, recorded as broadly 'Iron Age', are most likely contemporary. None of the Palaeozoic limestone tempered ware was associated with Roman pottery, supporting a pre-Roman date.

Figure 9 Iron Age pottery

1 Fragmentary, gently everted rim from a necked jar. Fired black and with burnished external surface. Similar to later Iron Age forms recorded at Blackstone, Worcestershire (Morris 2010, fig 38.13, 39.37, fig 40.57) and *Ariconium* in Herefordshire (Willis 2012, fig 4.2.5). Fabric TF216. Diameter uncertain (c 4%). Pit 4037, fill 4043 Database Rec 7

2 Fragmentary, short-upright rim from a barrel-shaped jar. Similar to later Iron Age forms recorded at Blackstone, Worcestershire (Morris 2010, fig 38.14) and *Ariconium* in

Herefordshire (Willis 2012, fig 4.2.17). Fabric TF216. Diameter uncertain (c 4%). Pit 4037, fill 4044 Database Rec 2

6.3.2.2 The Roman pottery, with stamped mortarium by Kay Hartley

Apart from a handful of sherds, all the Roman pottery was recovered from Roman deposits (Phase 3, 3.1 and 3.2). The assemblage came predominantly from ditch fills, particularly the Group 23 boundary ditch which accounted for over half of the assemblage (Tables 2 and 5). Only handfuls of Roman sherds were recovered from other feature types and layers. As with the Iron Age pottery, this reflects a similar pattern of deposition as noted for Quedgeley Area G (Evans 2017).

Phase number	Group number	Group register description	Pottery period	Count	% Count	weight(g)	% Weight	Average weight (g)	Rim EVE
3	-	-	Roman	4	1%	31	1%	8	0.09
	21	E-W ditch, re-cut by Group 22 ditch	Roman	2	1%	3	0%	2	0
3.1	-	-	Roman	28	10%	186	7%	7	0.12
	11	Small gully parallel to large ditch	Roman	2	1%	7	0%	4	0
	13	Animal burial	Roman	1	0%	1	0%	1	0
	17	Pit with possible cremation deposit	Roman	1	0%	2	0%	2	0
	28	Shallow ditch E-W aligned	Roman	16	5%	157	6%	10	0
	30	Ditch, NE-SW aligned, parallel to Group 9 and Group 23	Roman	1	0%	28	1%	28	0.07
3.2	23	Main SW-NE large boundary ditch	LIA/ERB	2	1%	5	0%	3	0
	23	Main SW-NE large boundary ditch	Roman	201	69%	2005	71%	10	0.84
	24	Recut across Group 23 ditch	Roman	19	7%	276	10%	15	0.23
	25	Curving recut ditch, cuts Group 27	LIA/ERB	1	0%	2	0%	2	0
	25	Curving recut ditch, cuts Group 27	Roman	1	0%	4	0%	4	0
	27	Earlier curving ditch, cut by Group 25	Roman	5	2%	66	2%	13	0.19

	29	Layer of material across ditches, former soil horizon?	Roman	8	3%	51	2%	6	0
Total				292	100%	2824	100%	10	1.54

Table 5: Quantification of the Phase 3, 3.1 and 3.2 pottery by Group

6.3.2.2.1 *Roman pottery fabrics*

The assemblage was dominated by a range of Severn Valley ware fabrics. These accounted for more than half of the assemblage by weight and rim EVE (Table 3). They included a significant proportion of sherds in a fabric dated at Gloucester to the 1st to early 2nd century (Gloucestershire Fabric TF11D), as well as fabric variants dated more broadly from the mid-1st century to *c* AD 410. The presence of two overfired and warped sherds is of particular interest, hinting at the presence of a kiln relatively close to the site. Both vessels represented are likely to be earlier Roman, perhaps late 1st to 2nd century. One, a foot-ring base in Gloucester Fabric TF11B, was from the Group 23 ditch (4211, fill 4212). The other, a bead rim from a large storage jar in Fabric TF11D, was from a Group 24 re-cut of this ditch (4250, fill 4252). Similar jars are published from Gloucester (Ireland 1983, fig 70.2) and in the early Roman assemblage from St John's Worcester (Evans 2014, fig 19.30). No kilns have as yet been identified in the Quedgeley area, though Severn Valley ware is known to have been produced in Gloucester and elsewhere in the region (Swan 1984). The Severn Valley wares included a narrow range of utilitarian forms; jars, a tankard/carinated bowl, and lids.

Other earlier Roman fabrics were also present, in very small quantities. These included body sherds in handmade Malvernian ware (Fabric TF18), Savernake ware from Wiltshire (Fabric TF6), a grog-tempered ware (Fabric TF2), and samian imported from La Graufesenque in southern Gaul (Fabric TF8b). The latter was too fragmentary to identify the form. Grog-tempered ware was also recorded from the Area G assemblage, though the sherds were too fragmentary to date with any confidence. The sherd from Area F was also very fragmentary but is likely to be latest pre-Roman Iron Age or very early Roman in date.

Black-burnished ware from south-east Dorset (BB1, Fabric TF4) made up a significant proportion of the Roman assemblage though, as noted above, this mainly comprised sherds from a single jar found in an upper fill of the Group 23, SW-NE boundary ditch (4225, fill 4204). Most sherds from other contexts were also from jars; only two sherds from bowls/dishes were recorded. BB1 indicated a *tpq* of *c* AD 120 for the context in which it was found, some sherds with diagnostic forms or decoration providing more secure dating. A reduced fabric (TF232?), probably more-locally sourced, was represented by a single vessel copying a BB1 form. Another widely traded ware was Mancetter-Hartshill mortaria (Fabric TF9D), represented by a single stamped rim (Fig 10, see Hartley below). Apart from the South Gaulish samian noted above, the only imported ware was a body sherd of Dressel 20 amphora. These vessels were produced in southern Spain and used principally for transporting olive oil. They are one of the most common and widely distributed amphora types, found on Romano-British sites dating from the 1st to mid-3rd centuries (University of Southampton 2014).

Figure 10 The mortarium stamp

Bead and flange rim of a Mancetter-Hartshill mortarium. Kay Hartley reported as follows:

The incompletely impressed potter's stamp is at the right-angles to the rim. Although the stamp reads from left to right, it was impressed with the end of the name, next to the bead, so that you read the name from the edge of the flange towards the bead. The name reads]VNIVSF, in finely defined letters, the first V being only faintly impressed. This is a stamp of *Iunius 2* who worked in the Mancetter-Hartshill potteries in Warwickshire. More than 140 of his mortaria have now been recorded, excluding those found at the Mancetter-Hartshill potteries, which suggests that he was one of the most important of the potters who stamped mortaria.

He belonged to the latest generation of potters in these potteries to stamp their mortaria, and he was the only one of these late potters to have any stamps recorded from the Antonine occupation of Scotland. He was also one of the small number of stamping potters who began using the new, near hammerhead rim-profiles, which were to become more and more popular after the practice of stamping ceased. The rim-profiles he sometimes used also make it possible to believe that he may have continued producing mortaria after the practice of stamping had ceased. The evidence as a whole indicates production within the period AD145-175, with an optimum date of AD145-170+.

What is most surprising about this potter is the number of dies used; at least 23, a much higher number than any other potter, including the much more important, Flavian potter *Albinus* who has more than 500 mortaria recorded. However, this example is only the third stamp recorded from Die 23.

Further fabric details and a comment on evidence for ware will be noted in Kay Hartley's stamp archive, when she has had an opportunity to see the sherd. Fabric TF9D. Diameter 26cm (13%). Group 23, Ditch 4149, fill 4153. SF2. Database Rec 22

6.3.2.2.2 *Roman pottery by phase and feature group*

Two periods of Roman activity were identified, based on a combination of stratigraphic and finds evidence; Phases 3.1 and 3.2. A very small quantity of pottery also came from Roman features that could not be phased more securely (Phase 3). Much of the Roman pottery could only be broadly dated. There is relatively little pottery from Phase 3.1, and there is clearly residual material in the Phase 3.2 assemblage. For these reasons it is difficult to characterise the two assemblages with any confidence.

Phase 3.1 is dated to the early Roman period, c AD 43 to the mid-2nd century. Features attributed to this phase produced only 49 sherds (381g), all but one in an earlier Severn Valley ware fabric (TF11D). These included the rim from a carinated bowl or upright tankard (Webster 1976 fig 9.H59-60, fig 7.E38 respectively), a form that is consistent with this date range. One sherd of fabric TF11D was associated with a possible cremation deposit (Group 17) which had a radiocarbon date of 30 to 210 cal AD. The only other fabric represented was the rim of a BB1 jar, from the Group 30 ditch (4111, fill 4112). This form was produced from the mid-to-late 2nd century (Gillam 1976, fig 3.39), so could mark the end of Phase 3.1 activity or be intrusive from Phase 3.2.

Phase 3.2 is dated broadly from the mid-2nd to late 3rd-to-early 4th century. Features attributed to this phase produced a larger assemblage (235 sherds, 2407.5g), the majority of which came from the large boundary ditch (Group 23). Some early Roman fabrics must be residual, the grog-tempered ware (Fabric TF2) and South Gaulish samian (Fabric TF8b). Other fabrics may also be residual; the early Severn Valley ware (Fabric TF11D), handmade Malvernian ware (Fabric TF18) and Savernake ware (Fabric TF6). The best dating evidence for Phase 3.2 came from a stamped Mancetter-Hartshill mortarium (Fabric TF9D, Fig 10). This has been identified by Kay Hartley as a stamp of the potter *Iunius 2,* who was working between *c* AD 145-170+. Other fabrics and forms were less closely datable, but most could be consistent with a 2nd-century date. The Group 23 ditch produced a handful of Severn Valley ware forms: a narrow-mouthed jar of a type produced throughout the Roman period (Webster 1976, fig 1.A1) but dated by fabric (TF23) to the 1st to 2nd-century; another narrow-mouthed jar dating to the 2nd to 3rd centuries (Webster 1976, fig 2.A7); and a 2nd century, wide-mouthed jar (Evans *et al* 2000, 32, fig 23 JWM5). A bowl or dish in a reduced sandy fabric (TF232?) is likely copying a BB1 form dated to the mid-to-late 2nd century (Gillam 1976 fig 4.52). The ditch was, therefore, infilling at least by the second half of the 2nd century. The upper fill of this ditch (4202) contained a BB1 jar (SF1), now fragmentary but deposited substantially complete. It was also the only diagnostic, later-Roman vessel from the site; the splayed rim and use of obtuse cross-hatch decoration suggest a later 3rd to early 4th-century date (Gillam 1976 fig 2.11). Due to its relative completeness, this seems to reflect a different pattern of deposition to the rest of the assemblage, which was most likely re-deposited from elsewhere. It seems to be the only indication of a separate,

later Roman sub-phase, not distinguishable from the stratigraphic evidence. A re-cut of this ditch (Group 24) produced the large storage jar waster discussed above, presumed to be residual.

The only other forms came from the Group 27 ditch: a Severn Valley ware, narrow-mouthed jar of a 1st -to-2nd century type (Webster 1976, fig 2.A3) and a lid, both in early Fabric TF11D and likely to be residual.

The proportions of fabrics by phase were analysed, to identify chronological trends. No clear patterns emerged; the assemblage is relatively small, there is clearly some level of residuality, and biases are introduced by the presence of individual heavy amphora and mortarium sherds, and the single, very fragmented, later Roman BB1 jar.

6.3.3 Other ceramic finds

Phase number	Group number	Group register description	Period	Material	Material subtype	Object specific type	Count	Weight
2	1	Cluster of inter-cutting pits with wattle in base	Iron Age	ceramic	fired clay	loomweight fragment	16	1848
						loomweight fragment?	8	51
			undated	ceramic	fired clay	fragment	1	8
	6	Large pit multiple fills	Iron Age	ceramic	fired clay	loomweight fragment?	2	32
			undated	ceramic	fired clay	fragment	80	28
3			undated	ceramic	fired clay	fragment	1	30
3	21	E-W ditch, re-cut by Group 22 ditch	Roman	ceramic	fired clay	tegula	1	547
3.1	28	Shallow ditch E-W aligned	undated	ceramic	fired clay	fragment	92	147
3.2	23	Main SW-NE large boundary ditch	Roman	ceramic	fired clay	tegula	1	509
			undated	ceramic	fired clay	fragment	25	72.5
	8	Linear gully, may = eval slot [105]	undated	ceramic	fired clay	fragment	3	19

Table 6: Quantification of the other ceramic finds by phase and group

Other ceramic finds comprised fragments of loom weight, ceramic building material and miscellaneous fired clay (Table 1). They were associated with Iron Age and Roman deposits (Table 6).

Fragments of triangular loom weight were recovered from three of the Phase 2, Group 1 pits. Ten joining fragments were recovered from a layer filling the top of Pit 4042. These were from the top of a loomweight, with a perforation for suspension set at an angle to the surviving surface (Fig 11.1). More fragments, not joining but with a similar clay and firing, were recovered from the layer below this (4043). Another large fragment (Fig 11.2), with three surviving surfaces, and assorted small fragments were found in a neighbouring pit (4041, fill 4066), where they were associated with a cow skull. Two fragments from Pit 4012 (fill 4014) are also likely to be from a loomweight, based on the similarity of fabric and firing. Triangular loomweights are common finds on Iron Age sites, going out of use in the early Roman period. Their presence here adds to the evidence for later Iron Age craft working, and specifically weaving, in the vicinity. One of the more significant finds from the neighbouring Area G excavations (Evans 2017) was an antler weaving comb, with an associated radiocarbon date of 160 cal BC-20 cal AD. The remaining fired clay from Phase 2 deposits was less diagnostic: a vitrified fragment and a fragment of possibly accidentally fired clay.

Small quantities of fired clay were also recovered from Roman deposits, but there was nothing diagnostic. Fragments from the upper fill of Ditch 4217 (fill 4219) were vitrified and may be associated with the fragments of iron slag discussed below. Of more interest were two fragments of tegula, which may hint at a Roman structure somewhere in the vicinity. One came from the Phase 3 large boundary ditch (Group 21, Ditch 4149, fill 4153) and the other from a Phase 3.2 ditch (Group 23, Ditch 4149, fill 4180). Both were in fine-sand tempered fabrics. The clay used in one was poorly mixed with elongated voids and occasional clay pellet inclusions; the other had more common sand. It is not possible to say, based on only two fragments, whether these represent two fabrics or variations of manufacture within one fabric. Both pieces had rounded flanges, but no flange cutaways survived.

6.3.4 Metalwork and industrial residues

A small assemblage of iron finds was recovered from upper fills of the Group 23 ditch. These were identified on site but have not been seen by a specialist, due to COVID-19 related difficulties of access. A corroded group of hobnails (SF2) was found in the upper fill of ditch 4225 (fill 4204), associated with the later 3rd to early 4th-century, BB1 jar described above (SF1). The only other finds were a small tack (SF3) and a nail (SF4), both from the upper fill of ditch 4149 (fill 4153). These were associated with a chronologically mixed pottery assemblage, including the sherd of 1st century, South Gaulish samian and the stamped Mancetter-Hartshill mortarium, produced between *c* AD 145/50 and 165/70.

Four fragments of iron slag were recovered, all from Roman deposits. Two were incorporated in the backfill of the Group 14 grave of a child (4242, fill 4243). One had the distinctive flow marks characteristic of tap slag, a by-product of smelting. The other was less diagnostic, vesicular but relatively heavy for its size. Other undiagnostic fragments came from the Phase 3.2, Group 23 ditch (4217, fill 4219 and 4149, fill 4153). No hammerscale was noted from environmental samples, so there is no evidence for smithing on the site.

6.3.5 Stone building material and other finds

Two fragments of possible roof tile were recovered from the Phase 3.2, Group 23 ditch (4211, fill 4212); one in limestone and one in sandstone. The only other finds comprised a tiny fragment of fuel ash slag, from a Phase 2, Group 5 pit (4035, fill 4035), and fragments of heat-cracked stone, also from the Group 23 ditch.

6.4 Discussion

The finds provide evidence for activity on the site in the later Iron Age and Roman periods. The pattern of deposition was similar to that noted for Area G, with the Iron Age pottery dumped in pits and the Roman pottery predominantly in ditches (Evans 2017).

All the later Iron Age pottery was from the Woolhope Hills area of Herefordshire, also the most common fabric at Quedgeley Area G (*ibid*). The evidence for weaving is also paralleled in Area G; here provided by triangular loomweights, there by a bone weaving comb.

The Roman pottery is associated with two, or perhaps three, phases of activity. Features attributed to Phase 3.1 produced a small assemblage, dated between *c* AD 43 and the mid-2nd century. Residual sherds of this date were also included in the Phase 3.2 assemblages. The Phase 3.2 assemblage dates from the mid-2nd century, the best dating evidence provided by the stamped Mancetter-Hartshill mortarium. It may be that the bulk of the assemblage dates to the mid-to-late 2nd century, but this is difficult to prove; most forms and fabrics could only be dated broadly to the 2nd to 3rd century. The later Roman BB1 jar, from the upper fill of the Group 23 ditch, is the only vessel that can be dated to the late 3rd to 4th century and the only vessel for which a substantial proportion has survived.

The bulk of the Roman pottery was probably produced fairly locally, some perhaps even in the vicinity of the site. Severn Valley wares and sandy reduced wares account for 79% of the Roman assemblage by weight and 62% by rim EVE. The Severn Valley wares included a couple of wasters, hinting at a kiln nearby. But traded wares and imports were also reaching the site; BB1 cooking wares from Dorset, a mortarium from Mancetter-Hartshill in Warwickshire, samian from southern Gaul, and an amphora from southern Spain. This reflects a level of trade, perhaps via the nearby road or the River Severn. The presence of some vessels; samian tableware, mortaria for food preparation, and Dressel 20 amphora used for transporting olive oil; also suggest an engagement with Roman patterns of consumption, albeit at a low level. Two fragments of roof tile may have come from a demolished structure in the vicinity, though tiles could equally have been brought to the site for a range of secondary uses. The finds assemblage also provides some evidence for low level iron working nearby. Overall, the Roman assemblage appears to represent domestic rubbish, including the sole of a shoe. The focus of this rubbish dumping seems to have been the Group 23 ditch.

6.5 Significance

The finds are of local and regional significance, building on evidence from the Area G excavations to create a picture of Iron Age and Roman activity in this area. The association of radiocarbon dates with diagnostic later Iron Age forms, both here and for Area G, enhances regional understanding of ceramic types and chronologies. The mortarium stamp is one of only three examples of this die used by the potter *Iunius 2* and is a particularly clear example. This will be added to Kay Hartley's national stamp archive. Much of the Roman assemblage appears to be redeposited rubbish from nearby occupation. Despite this, it has potential to add to the growing body of data from Roman rural settlements in the region.

6.6 Recommendations

6.6.1 Further analysis

No further analysis is required.

6.6.2 Discard/retention

The Iron Age and Roman finds should be retained.

7 Environmental evidence

7.1 Plant macrofossils and waterlogged wood by Elizbeth Pearson

7.1.1 Introduction

The environmental project conforms to guidance by CIfA (2014b) on archaeological excavation, further guidance by English Heritage (2011) and the Association for Environmental Archaeology (1995).

The underlying soils consist of freely draining lime-rich loamy soils of moderate fertility (Cranfield and Agrifood Institute 2020) and surrounding these are lime-rich loamy and clayey soils, of high fertility, with impeded drainage. The underlying geology comprises bedrock of as undifferentiated Blue Lias Formations and Charmouth Mudstone Formations, overlain by superficial deposits of Cheltenham Sand and Gravel (BGS 2020).

7.1.2 Methodology

7.1.2.1 Sampling policy

Samples were taken according to standard Worcestershire Archaeology practice (2012). A total of 16 bulk samples (each of up to 40 litres) were taken from the site (Table 7), along with six samples of waterlogged wattle wood for species analysis.

7.1.2.2 Processing and analysis

As the samples were processed under COVID-19 conditions, and flotation tanks were not available, a wash-over technique was used as follows. The sample was broken up in a bowl of water, in batches of 2 to 3 litres, to separate the light organic remains from the mineral fraction and heavier residue. The water, with the light organic faction was decanted onto a 300µm sieve and the residue washed through a 1mm sieve. The remainder of the bulk sample was retained for further analysis.

This allowed for the recovery of items such as small animal bones, molluscs and seeds.

The residues were scanned by eye and the abundance of each category of environmental remains estimated. A magnet was also used to test for the presence of hammerscale. For initial assessment, the flots were scanned using a low power MEIJI stereo light microscope and plant remains identified using modern reference collections maintained by Worcestershire Archaeology, and a seed identification manual (Cappers *et al* 2012). Nomenclature for the plant remains follows Stace (2010).

The cell structure of all the non-oak waterlogged wood from the wattle hurdle lining of pit 4037 (CG01) was examined in three planes under a high power microscope (up to X400) and identifications were carried out using reference texts (Schweingruber 1978 and Hather 2000) and reference slides housed at Worcestershire Archaeology.

Following an initial assessment, limited charred cereal crop remains were noted, and abundant waterlogged remains, similar in character to organic remains recorded from pits within Parcel G (Walsh 2017). Insect and mollusc remains were also recorded. However, in order to make the best use of resources, analyses were focused on animal bone, human bone, and waterlogged plant remains and wood from three pits. The following samples were selected for analysis of plant remains, or more detailed scanning to provide further information:

- As waterlogged organic material appeared to be of similar composition to material analysed from waterlogged pits within Area G, excavated previously, scanning of flots in order to confirm composition and extend the range of species identified was carried out. Dried flots processed by a wash-over technique, were used in order to allow rapid scanning of large volumes of material. As a result, there may be some bias against very small, delicate seeds which can be damaged by drying. Flots from waterlogged pit fills 4017 (CG06), 4045 and 4049 (CG01), of pits 4012, 4037 and 4040 respectively, were scanned.
- Species identifications were carried out on samples of wattle hurdle lining of pit 4037.

Context	Sample	Spit/Sub-sample	Feature type	Context register description	Fill of	Context Group (CG)	Phase number	Sample volume (L)	Volume processed (L)
4014	1		Pit	Dark compacted fill	4012	6	2	20	20
4016	2		Pit	Mid grey clay fill	4012	6	2	10	10
4017	3		Pit	Light mottled grey clay fill	4012	6	2	10	10
4045	4		Pit	Fill of pit	4037	1	2	40	40
4049	5		Pit	Fill of pit	4040	1	2	40	40
4065	6		Pit	Wattle wood within pit	4037	1	2	n/a	n/a
4065	7		Pit	Wattle wood within pit	4037	1	2	n/a	n/a
4065	8		Pit	Wattle wood within pit (upright)	4037	1	2	n/a	n/a
4065	9		Pit	Wattle wood within pit (horizontal)	4037	1	2	n/a	n/a
4065	10		Pit	Wattle wood within pit (upright)	4037	1	2	n/a	n/a
4065	11		Pit	Wattle wood within pit (horizontal)	4037	1	2	n/a	n/a
4120	12		Ditch	Fill of ditch [4119]	4119	28	3.1	20	20
4145	13		Burial	Fill of 4144	4144	13	3.1	10	10
4212	14		Ditch	Fill of 4211	4211	23	3.2	40	40
4214	15	N- Half	Cremation	Cremation deposit	4213	17	3.1	20	20
4214	16	S-Half	Cremation	Cremation deposit	4213	17	3.1	20	20
4224	17		Grave	Fill of grave [4222]	4222	16	3.1	30	30
4239	18		Ditch	Fill of 4238	4238	23	3.2	20	20
4243	20	around head	Burial	Fill of grave 4242	4242	3	3.1	10	10
4243	22	around pelvis and legs	Burial	Fill of grave 4242	4242	3	3.1	10	10
4243	21	around chest	Burial	Fill of grave 4242	4242	3	3.1	10	10

4246	19		Grave	Fill of 4245	4245	3	3	40	40

Table 7: List of bulk samples and wood samples

7.1.3 Results

7.1.3.1 Plant macrofossils and waterlogged wood

The results are summarised in Tables 8 to 11.

7.1.3.1.1 *Phase 2: late Iron Age*

Assemblages of waterlogged plant remains from pits 4012 (CG06), 4037 and 4040 (CG01) were similar to those reported on for Area G. The pits are likely to have been at least seasonally waterlogged, with vegetation on muddy or marshy margins, such as crowfoot (*Ranunculus* sect *Batrachium*), which was abundant in the fill 4045 of wattle containing pit 4037, sedges (*Carex* sp), common clubrush/bulrush (*Schoenoplectus lacustris*), and water mint (*Mentha aquatica*). The pit with preserved wattle (4037) showed the most evidence of wet conditions, whereas fills 4017 and 4049 indicated only limited aquatic or marshy vegetation.

Seeds of bramble (*Rubus* sect *Glandulosus*), elderberry (*Sambucus nigra*), dogwood (*Cornus sanguinea*) and sloe (*Prunus spinosa*) suggest woody scrub margins surrounded the ponds, or that hedgerows were in the immediate vicinity. Wild strawberry may have been growing as understory vegetation around pit 4012, and grassy or meadowland areas are suggested by docks (*Rumex* sp), selfheal (*Prunella vulgaris*) and white horehound (*Marrubium vulgare*).

Weeds common on nitrogen-rich ground were also common, for example, fat hen (*Chenopodium album*), orache (*Atriplex* sp) and nettle (*Urtica dioica*), probably as a result of soils enriched from livestock dung or manure heaps nearby. The only cornfield weed present was bread-fruited cornsalad (*Valerianella rimosa*), which is only an occasional component of plant assemblages in the region, and an endangered plant today. There were, however, many weeds common on disturbed, cultivated ground, such as knotweed (*Polygonum aviculare*).

The results were consistent with pits on a rural settlement, showing minimal evidence of general domestic or agricultural waste.

A low level of charred cereal crop waste was also recorded in fill 4014 of pit 4012 (CG06), demonstrating the use of emmer or spelt wheat (*Triticum dicoccum*/*spelta*) and hulled barley (*Hordeum vulgare*) grain. Occasional weed seeds, presumably growing with the crop, included vetch/pea (*Vicia*/*Lathyrus* sp), corn spurrey (*Spergula arvensis*), fat hen (*Chenopodium album*), orache (*Atriplex* sp) and common clubrush (*Schoenoplectus lacustris*). Organic remains, of similar composition to pit fills described above also survived, although these were not selected for analysis.

Latin name	Family	Common name	Habitat	4017	4045	4049
Waterlogged plant remains						
Ranunculus acris/*repens*/*bulbosus*	Ranunculaceae	buttercup	CD		++	++
Ranunculus sbgen *Batrachium*	Ranunculaceae	crowfoot	E		++++	
Prunus spinosa	Rosaceae	sloe	C		+	+++

Rubus sect *Glandulosus*	Rosaceae	bramble	CD	++	+++	++/+++
Fragaria vesca	Rosaceae	wild strawberry	C	+		
Urtica dioica	Urticaeae	common nettle	ABCD	+++	++/+++	++++
cf *Mercurialis* sp	Euphorbiaceae	Dog's/annual mercury	ABC		+	
Brassica nigra	Brassicaceae	black mustard	ABF	+		
Persicaria hydropiper	Polygonaceae	water-pepper	E			+
Polygonum aviculare	Polygonaceae	knotgrass	AB	++	+++	++
Rumex sp	Polygonaceae	dock	ABCD	+++		
Stellaria media	Caryophyllaceae	common chickweed	AB	++	++	++++
Silene sp	Caryophyllaceae	campion	AB	+		
Chenopodium ficifolium	Amaranthaceae	fig-leaved goosefoot	AB	++		
Chenopodium album	Amaranthaceae	fat hen	AB	+++		
Atriplex sp	Amaranthaceae	orache	AB		++/+++	
Cornus sanguinea	Cornaceae	dogwood	CD		+	
Solanum nigrum	Solanaceae	black nightshade	AB			+++
Galeopsis tetrahit	Lamiaceae	common hemp-nettle	AB			++
Prunella vulgaris	Lamiaceae	selfheal	D	+		
Mentha aquatica	Lamiaceae	water mint	E	+		
Arctium sp	Asteraceae	burdock	ABC	+		
Carduus sp	Asteraceae	thistle	BCD			+
Sonchus asper	Asteraceae	prickly sow-thistle	ABD	+		++
Sambucus nigra	Caprifoliaceae	elderberry	BC		++/+++	++
Valerianella rimosa	Valerianaceae	bread-fruited cornsalad	AB	+		
Aethusa cynapium	Apiaceae	fool's parsley	AB	+		
Schoenoplectus lacustris	Cyperaceae	common club-rush	E	+		
Eleocharis sp	Cyperaceae	spike-rush	E	+		
Carex sp (3-sided) nutlets	Cyperaceae	sedge	CDE			++

unidentified leaf scar	unidentified			+		
unidentified fruit fragments	unidentified			+		
Charred plant remains						
Bromus sp grain	Poaceae	brome grass	AF			+

Table 8: Pant remains from waterlogged pits (scanned results)

Preservation	**Quantity**
ch = charred	+ = 1 - 10
wa = waterlogged	++ = 11- 50
	+++ = 51 - 100
	++++ = 101+

Samples were taken of the waterlogged wattle lining of pit 4037. Oak (*Quercus robur/petraea*) and willow (*Salix* sp) roundwood was used for both upright rods and horizontal stems. Sloe/plum/cherry (*Prunus* sp) wood was also identified.

Context	**Sample**	**Position in wattle lining**	**Species**
4065	6		*Prunus* sp wood
4065	7		*Quercus robur*/*petraea* leaf
4065	8	upright	*Salix* sp wood
4065	9	horizontal	*Salix* sp wood
4065	10	upright	*Quercus robur*/*petraea* wood
4065	11	horizontal	cf *Quercus robur*/*petrae*a wood

Table 9: Wattle roundwood species identifications from (4065), pit 4037

7.1.3.1.2 *Phase 3.1 early Roman (1st to mid-2nd century)*
Few identifiable environmental remains were noted in bulk samples from this phase, with the exception of moderately abundant molluscs in cremation fill (CG17; 4214). However, as these were dominated by slum water species (Andrew Mann pers comm) and seemingly not related to the human cremation, no further work was carried out on these.

Occasional charred cereal crop remains, including free-threshing wheat (*Triticum* sp free-threshing) and unidentified cereal grains (Cereal sp indet) were noted from fill 4246 of grave 4245. However, it is uncertain whether these are contemporary with the human remains.

7.1.3.1.3 *Phase 3.2 mid to late Roman (mid-2nd to late-3rd/early-4th century)*
A single uncharred plum stone was recovered fill 4212 of ditch 4211 which may have survived as a result of waterlogging, and hence could be contemporary with the feature.

A low level of charred cereal crop waste was noted in fill 4239 of ditch 4238, consisting of emmer/spelt wheat and hulled barley grain, along with small weed grass grain and occasional emmer/spelt wheat chaff (glume bases).

context	sample	Preservation type	Species detail	Category remains	Quantity/diversity
4014	1	ch	*Triticum dicoccum*/*spelta* grain, *Triticum* sp grain, *Hordeum vulgare* grain (hulled), *Avena* sp grain, *Bromus* sp grain, Poaceae sp indet grain, Poaceae sp indet grain (small)	grain	+/low
4014	1	ch	*Triticum spelta* glume base, *Triticum dicoccum/spelta* glume base, *Triticum dicoccum/spelta* spikelet fork	chaff	+/low
4014	1	ch	*Vicia/Lathyrus* sp, Rosa sp, *Spergula arvensis*, *Silene* sp, *Chenopodium album*, *Atriplex* sp, *Schoenoplectus lacustris*	seed	+/low
4239	18	ch	*Triticum dicoccum*/*spelta* grain, *Triticum* sp grain, *Hordeum vulgare* grain (hulled), Cereal sp indet grain, Poaceae sp indet grain, Poaceae sp indet grain (small)	grain	+/low
4239	18	ch	*Triticum dicoccum*/*spelta* glume base	chaff	+/low
4239	18	ch	*Vicia*/*Lathyrus* sp	seed	+/low
4246	19	ch	*Triticum* sp (free-threshing) grain, Cereal sp indet grain	grain	+/low

Table 10: Charred plant remains (scanned results)

Context	Sample	Large mammal	*Small mammal	Mollusc	Insect	Charcoal	Charred plant	Waterlogged plant	Unch*
4014	1	occ	occ			mod	occ	abt	
4016	2	occ		occ		mod		abt	
4017	3	occ		occ	occ	occ		abt	
4045	4	occ	occ	occ	occ	occ		abt	
4049	5		occ		occ-mod	occ	occ	abt	
4120	12		occ	occ		occ			occ
4145	13					occ			abt

4212	14	occ		occ	abt	occ		occ	abt
4214	15			mod-abt		occ			abt
4239	18	occ		abt		occ	occ		abt
4246	19			occ-mod		occ	occ		abt
4224	17			occ					occ

*Table 11: Summary of environmental remains; occ = occasional, mod = moderate, abt = abundant, * not included in animal bone analysis*

7.1.3.2 Discussion

Blue Lias clay and Charmouth Mudstone underlying the site has resulted in waterlogged soils, in which organic plant remains and wood of late Iron Age date has survived well. These remains are consistent with pollen and waterlogged plant remains from pits interpreted as waterholes, excavated in Area G, of comparable date.

Organic remains from both areas indicate meadow and disturbed grassland, with some hedgerow, scrub and marshy ground in the immediate vicinity of the pits. Of note, is the limited evidence of arable cultivation, despite the site being situated on moderately fertile soils, and being surrounded by soils of high fertility, albeit suffering from impeded drainage.

The limited amount of charred plant remains is also a sign of limited arable activity and a predominantly pastoral landscape.

The contents of the pits provide little indication of their function, although the low level of agricultural or domestic waste suggests that they are most likely to have been used as waterholes, despite limited evidence of aquatic vegetation.

7.2 Animal bone by Alison Foster

7.2.1 Introduction

Bone submitted for analysis was derived from Phases 2 and 3 as follows:

Phase 2 – Late Iron Age

Phase 3 – Romano British

3.1 - Early Roman (1st to mid-2nd century)

3.2 - Mid to late Roman (mid 2nd to late-3rd/early 4th century)

7.2.2 Methodology

Data were recorded onto Excel sheets. Subjective records were made of the state of preservation, colour of the fragments, and the appearance of broken surfaces (‘angularity’), with additional information recorded concerning the number of (refitted) fragments per bone, carnivore gnawing, burning, butchery and fresh breakage, where appropriate. A bone ID number was allocated to one or more fragments representing individual identified skeletal elements.

Fragments were identified to species or species group using the author’s comparative reference collection and published works (e.g. Schmid 1972). Distinctions between sheep and goat bones were undertaken using comparative material, with reference to Prummel and Frisch (1986) and Zeder and Pilaar (2010). Equid remains were also examined with reference to Johnstone (2004; chapter 4), and horses were differentiated from mules and donkeys where possible. Fragments that could not be identified to species were grouped into categories: large mammal (assumed to be cattle, horse or

large deer (cervid), medium-sized mammal 1 (assumed to be sheep/goat (caprine), pig or small deer), medium-sized mammal 2 (from a cat or hare-sized mammal) and completely unidentifiable. Skeletal elements which could be identified to species or size-category were recorded using the diagnostic zones method described by Dobney and Rielly (1988).

Cattle and pig tooth wear stages were recorded using the scheme outlined by Grant (1982): there were no caprine (sheep/goat) mandibles with tooth rows present. Age categories follow those defined by O'Connor (2003). Where present, epiphyseal fusion data were recorded and ages estimated following Silver (1969). Mammal bones were described as 'juvenile' if the epiphyses were unfused and the associated shaft fragment appeared spongy and porous. Metrical data was collected where possible, following the systems established by von den Driesch (1976) and Harcourt (1974). Withers heights for cattle were estimated using calculations devised by Fock (1966).

7.2.3 Results

Excavations at Quedgeley (Parcel F) produced a small assemblage of vertebrate remains (approx 9.5 kg) comprising 1117 fragments which represented 599 bones after refitting, together with an additional 80 fragments from the partial skeleton of a sub-adult cow. A single left oyster (*Ostrea edulis* L) valve from an unstratified deposit was also submitted but is not included in the analysis. The animal bone was recovered from features dated to two phases, the earliest being a series oflate Iron Age pits. Later ditches and gullies, including a large boundary ditch, were dated from the 1st to the early 4th centuries. The vertebrate remains from both Phases 2 and 3 were dominated by cattle bone. Some sheep/goat remains were present, mostly from Phase 2, together with a dog skull (plus two additional small skull fragments) also from Phase 2. A few equid bones, some identified more closely as horse, were also recovered from both phases (Table 12). There were no bird bones or wild species. A high proportion of the assemblage could only be categorised as large or medium-sized mammal but it was clear from the fresh breaks and consistent colour and preservation of these small fragments that many were part of broken bones already recorded. Table 13 indicates the Context Groups where breakage was most severe, together with counts for the few bones affected by gnawing or butchery. No pathological lesions were noted.

Table 12 presents a summary of the hand-collected vertebrate remains identified to species (NISP – number of identified specimens) by Phase. Table 13 shows the MNI – minimum number of identified individuals – from each context by Phase and Context Group. Table 13 quantifies the vertebrate remains by Phase and Context Group and gives information on preservation and taphonomic processes. Table 14 presents the anatomical representation for each taxon by Phase. Table 15 gives tooth wear stage data. Table 16 presents the metrical data and Table 17 the measurements specifically for the dog skull.

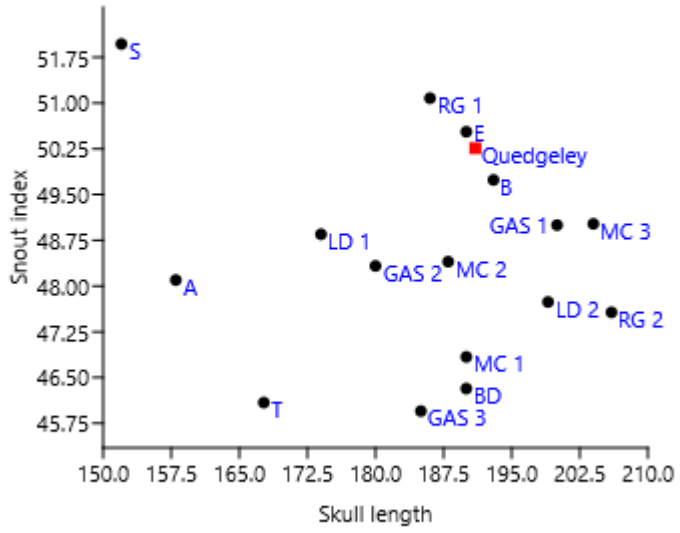
7.2.3.1 Phase 2 (Late Iron Age)

Most of the bone from Phase 2 was derived from CG01, a cluster of intercutting pits with wattle in the base preserved by waterlogging. Vertebrate remains were recovered from the lower fills of Pits 4037 and 4040 (Contexts 4044 and 4045) and the shared upper fills of the pit group CG01 (Contexts 4042 and 4043). Much of the material was fragile and disintegrated during recovery. The waterlogged fill (4045) above the wattle produced fragments of a cattle mandible together with loose teeth of juvenile and adult cattle. Additional cattle remains from this context included a scapula, astragalus, and a thoracic vertebra with unfused physes while evidence for other species was limited to an equid pelvis and a very small and porous metacarpal from a lamb or kid. Immediately above, fill 4044 contained a complete but fragmented cattle mandible (Bone ID 282); the reconstructed tooth row showed attrition of the third molar to be at wear stage 'j', categorised as 'elderly'. Material from the shared upper fills of the pits was also very fragmented and the poorer preservation of some bones within these deposits suggested they had lain exposed before burial. A very large number of smaller fragments from these two contexts showed fresh breaks and, while refitting was not possible, most of them were clearly pieces of the larger, identified elements. Material from 4043 which could be identified to species included an almost complete horse radius, cattle long bones (two distal tibiae, one with knife cuts, and

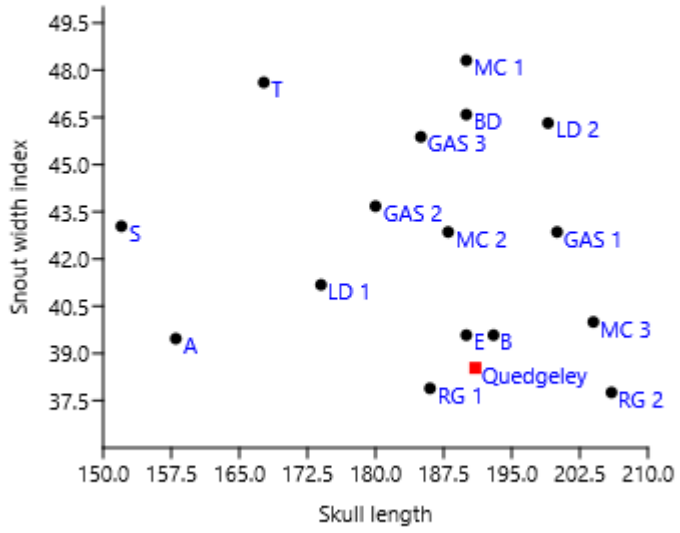
several metapodials) and a sheep/goat upper molar. Context 4042, which filled the tops of the pit group, also produced cattle remains including several long bones and isolated teeth from adults and a juvenile. An equid tibia and sheep/goat bones comprising a horn core, mandible, loose molars and a humerus were also present, together with a skull fragment and a maxillary premolar from a dog. A tiny piece of calcined bone from 4043 was the only burnt fragment in the entire assemblage.

Most of the material from CG03 deposits (from a ditch cut by the CG01 pits) was fragmented and few identifications could be made. Fill 4060 contained several small pieces of cattle cervical vertebra and a cattle femur caput chopped through the neck to remove the hind leg from the carcass. Context 4005 produced two large mammal long bones which had been split, probably to access the marrow. An almost complete horse radius was recovered from context 4030.

Context Group 6 (CG06) comprised multiple fills of a large pit (4012). Most of the vertebrate remains were recovered from the upper (4014) and lower (4016) fills. A mandible from an adult pig (wear stage ‘e’ on 3rd molar) was found in the upper fill, together with several cattle bones including two radii, a scapula fragment and some isolated teeth. The well-preserved bone from the lower fill included a small, severely gnawed cattle metacarpal and a cattle mandible with first molar, a sheep/goat tibia with tooth indentations from a scavenging carnivore and some fragments of sheep horn core. A dog skull (Bone ID 26) was also found in this lower fill. The mandibles were not present and there was some damage to the zygomatic arches but the skull was otherwise complete. Metrical data was gathered following both von den Driesch (1976) and an earlier system established by Harcourt (1974) (see Table 17), the latter to enable comparison with earlier studies of Iron Age dogs. A dataset was constructed using measurements from Harcourt (1974), Baxter and Nussbaumer (2009) and the Quedgeley dog. Due to the damage to the zygomatic arches of the Quedgeley skull a cephalic index (relative breadth) was not possible. The snout and snout width indices were calculated and plotted (Graphs 1 and 2).



Graph 1: Snout index (snout length/total length) v total length. Key: A = Aikerness, Orkney; BD = Barham Down, Kent; B = Barley, Herts; E = Ewell, Surrey; GAS = Gussage All Saints, Dorset; LD = Longbridge Deverill, Wilts; MC = Maiden Castle, Dorset; RG = Rowie Gar, Orkney; S = Swallowcliffe, Wilts; T = Trumpington, Cambs. All measurements in mm



Graph 2: Snout width index (snout width/total length) v total length. Key: A = Aikerness, Orkney; BD = Barham Down, Kent; B = Barley, Herts; E = Ewell, Surrey; GAS = Gussage All Saints, Dorset; LD = Longbridge Deverill, Wilts; MC = Maiden Castle, Dorset; RG = Rowie Gar, Orkney; S = Swallowcliffe, Wilts; T = Trumpington, Cambs. All measurements in mm

It can be seen from Graphs 1 and 2 that the Quedgeley skull has a comparatively high snout index, and a low snout width index, which would have given the dog a relatively longer, slimmer muzzle than that of the shorter-faced dogs in this dataset, for example, the one from Trumpington (Baxter and Nussbaumer 2009). The most similar skulls to the Quedgeley dog are those from Ewell, Barley and one of the Rowie Gar skulls.

Context 4066, the fill of a pit with preserved wattle (pit 4037), contained a cattle skull (Bone ID 343) placed upside down in the bottom of the pit. The horn cores were broken and not measurable but it is clear from the recovered fragments and from a photograph of the skull *in situ* (Plate 6) that the animal was of a short-horned variety, consistent with other cattle of this period (Armitage and Clutton-Brock 1976). A part of the frontal and a full set of maxillary teeth survived intact, the worn third molar giving an age estimate of over three years (Grigson 1982) but not 'elderly'. There was no evidence that the mandibles had been deposited with the skull and no other bone was recovered from this pit.

7.2.3.2 Phase 3 (Romano-British)

Only two of the Romano-British bone-bearing deposits could not be assigned to one of the two subphases 3.1 (early Roman: 1st to mid-2nd century) and 3.2 (mid to late Roman: mid 2nd to early 4th century). Gully fills 4070 and 4141 yielded a much-fragmented sheep/goat tooth and a piece of large mammal thoracic vertebra, respectively.

7.2.3.3 Phase 3.1 (early Roman: 1st to mid-2nd century)

Grave 4144 contained the articulated lower hind limbs of a sub-adult cow (animal skeleton 4146) comprising metatarsals and phalanges. The left and right hind legs of the cow were positioned almost parallel but with the feet slightly splayed and the medial aspect of both limbs uppermost. Several ribs, positioned near the hooves, and a small fragment of unfused distal metacarpal shaft indicate that more of the carcass was originally present. It is entirely possible therefore, given the shallow nature of the grave and the development of the site during the 20th century, that these few bones represent a complete carcass and most of the skeleton has been displaced and lost through truncation of the

grave. Additionally, the skeletons of animals buried without evisceration often decay more completely owing to the post-mortem transmigration of gut bacteria to the bones through the vascular system. Of the surviving elements, the unfused first phalanges suggest the age-at-death to be younger than 1.5 years (Silver 1969). Refitting the unfused distal condyles of the left metatarsal gave an approximate greatest length of 200 mm, representing an estimated withers height of 109 cm, just a little shorter than the mature individual from Phase 3.2 (below). The only other remains identified to species from this phase were the distal shaft of a calf femur and a very well-worn permanent equid incisor, from 4159 and 4228, respectively.

7.2.3.4 Phase 3.2 mid to late Roman (mid-2nd to early 4th century)

The bulk of the material from this phase was recovered from a group of fills from a large boundary ditch (CG23), with 4219 yielding the most bone. The majority of the cattle remains consisted of abundant mandible fragments and several loose teeth. These could not be assigned to tooth rows but examination of the wear stages indicated that sub-adult, adult and elderly individuals were represented. A cattle metacarpal gave an estimated withers height of 112.5 cm: this was the only mature element from the entire assemblage suitable for calculating height. Other cattle bones from this context comprised fragments of long bone, tarsals, scapula, pelvis and axis. Six equid bones were present including long bone fragments, an unworn permanent incisor from a sub-adult and two cheek teeth identified as horse. Bone identified to species from the other contexts from this group was sparse but included a few fragments of cattle bone and an equid metacarpal.

A recut across the boundary ditch (CG24) produced rather less identifiable material but did include a few fragments of sheep/goat bone and a pig metacarpal as well as cattle and equid remains. Bone from CG29 (Context 4261, a layer of material across the ditches) was very fragmented and it was only possible to make identifications to size group.

Species		Phase 2	Phase 3	Phase 3.1	Phase 3.2	Total
Canis f. domestic	dog	3				3
Equus f. domestic	horse	3			3	6
Equus sp.	equid	1		1 (1)	6	8
Sus f. domestic	pig	2			1	3
Bos f. domestic	cattle	56		1 + 1 skel*	40	98
Ovis f. domestic	sheep	1				1
Caprine	sheep/goat	12	1 (1)		3	16
Large mammal		76	1	1	93	171
Medium-sized mammal 1		11			1	12
Unidentified		176		1	104	281

Total		341	2	4 + 1 skel*	251	599

*Table 12: Quedgeley Parcel F - Hand-collected vertebrate remains (NISP – number of identified specimens) from Phases 2, 3, 3.1 and 3.2; * skeleton comprises 80 fragments from a partial sub-adult cattle skeleton (animal burial 4146), counted as 1*

Phase	Context Group	Species				
		Cattle	Horse/equid	Sheep/goat	Pig	Dog
2	1	6	3	3	1	1
	3	2	1	-	-	-
	4	-	-	-	-	-
	6	3	-	2	1	1
	(4066)	1	-	-	-	-
Phase 2 total		**12**	**4**	**5**	**2**	**2**
3	2	-	-	1	-	-
	10	-	-	-	-	-
Phase 3 total		**-**	**-**	**1**	**-**	**-**
3.1	11	1	1	-	-	-
	13	1	-	-	-	-
	(4011)	-	-	-	-	-
Phase 3.1 total		**2**	**1**	**-**	**-**	**-**
3.2	8	1	-	-	-	-
	23	7	3	-	-	-
	24	3	2	3	1	-
	29	-	-	-	-	-
Phase 3.2 total		**11**	**5**	**3**	**1**	**-**
Grand total		**25**	**10**	**9**	**3**	**2**

Table 13: Quedgeley Parcel F - Hand-collected vertebrate remains. MNI (minimum number of identified specimens) from each context by Phase and Context Group

Phase	Context Group	Group description	Weight (g)	No of bones	Fragment count	Preservation	Gnawed	Burnt	Butchered
2	1	Cluster of inter-cutting pits with wattle in base	4057	269*	433	Variable preservation and high level of fragmentation from bottom waterlogged deposit to upper layers	4	1	4
	3	Ditch running E-W cut by Group 1 pits	602	46	61	Fair preservation, poorer in (4060)	-	-	3
	4	Pit cutting Group 3 ditch and Group 5 paired pits	10	1	3	Poor	-	-	-
	6	Large pit multiple fills	683	24	48	Mostly good	2	-	1
	(4066)	Fill of wattle-lined pit containing cattle skull	974	1	150	Highly fragmented	-	-	-
3	2	Shallow gully running approx SE-NW	4	1	20	Poor	-	-	-
	10	N-S gully cut by large ditch	5	1	1	Fair	-	-	-
3.1	11	Small gully parallel to large ditch	56	2	2	Fair	-	-	-
	13	Cattle burial (sub-adult)	382	1	80	Fair	-	-	-
	(4011)	Single fill of ditch 4010	37	2	17	Fair	-	-	-
3.2	8	Linear gully, may = eval slot [105]	39	2	6	Poor	-	-	-

	23	Main SW-NE large boundary ditch	1821	166*	189	Mostly fair, high fragmentation and some poorer preservation in (4219)	2	-	1
	24	Recut across Group 23 ditch	679	38	56	Fair	-	-	-
	29	Layer of material across ditches, former soil horizon?	169	45	50	Fair	-	-	-
Total			9518	599	1117				

*Table 14. Quedgeley Parcel F - Hand-collected vertebrate remains. Quantification, preservation and taphonomy by Phase and Context Group/Context; * Bone count includes many fragments which could not be refitted but were almost certainly part of recorded elements from the same context*

		Phase 2 Late Iron Age					Phase 3	Phase 3.1		Phase 3.2			
	Element	**Cattle**	**Sheep/goat**	**Pig**	**Equid**	**Canid**	**Sheep/goat**	**Cattle**	**Equid**	**Cattle**	**Sheep/goat**	**Pig**	**Horse/Equid**
	Skeleton							1					
Head	Skull/ horncore	3	4			2							
	Mandible with teeth	4		1									
	Mandible without teeth	4	1							2			
	Loose mandibular tooth	10	2	1						14			2
	Loose maxillary tooth	2	2			1				12			2
	Tooth	3					1		1		1		1
Upper Fore	Scapula	2								1			
	Humerus	2	1							3	1		
	Radius	3	1		2					1			1
	Ulna	2											1
Upper hind	Pelvis	2			1					1			1
	Femur	1						1					

	Tibia	5	1		1								
	Calcaneus									1			
	Astragalus	1								2			
	Tarsal									1			
Lower	Metacarpal	3	1							1	1	1	1
	Metatarsal	7											
	Phalanx	1											
	Vertebra	1								1			
Total		**57**	**13**	**2**	**4**	**3**	**1**	**1**	**1**	**40**	**3**	**1**	**9**

Table 15: Quedgeley Parcel F – Hand-collected vertebrate remains. Anatomical element representation for each taxon, by Phase

Bone ID	Context	Phase	Species	Side	dp2	dp3	dp4	P2	P3	P4	M1	M2	M3	Age category
11	4014	2	pig	l						e	lost	lost	e	adult
28	4016	2	cattle	l				lost	lost	lost	l	lost		adult
282	4044	2	cattle	r				well worn	well worn	f	k	j	j	elderly
294	4045	2	cattle	r	sl wear	worn	j				f	d	U	sub-adult
295	4045	2	cattle	l			broken	E	U		k	g		adult

Table 16: Quedgeley Parcel F - Hand-collected vertebrate remains. Tooth-wear stages recorded for cattle and pig mandibles. Key: 'lost' = empty alveolus; 'sl wear' = slight wear discernible on the occlusal surface; 'worn' = wear apparent over entire occlusal surface; 'well worn' = tooth wear advanced; wear stage e.g.'a' = Grant (1982) notation; 'C' = perforation in crypt visible; 'V' = tooth visible in crypt but below head of bone; 'E' = tooth erupting through bone; '½' = tooth half erupted; 'U' = tooth erupted but unworn; empty cell indicates that part of mandible not present.

Von den Driesch	Measurement ref no	
Condobasal length	2	180.8
Basal length	3	171.6
Upper neurocranium length	7	89.2
Facial length	9	111.1
Palatal length	13(a)	96.4
Mastoid GB	23	65.8
Occipital condyles GB	25	36.3
Neurocranium breadth	29	63.3
Least breadth	31	36.0
Frontal breadth	32	50.5
Least palatal breadth	35	37.0
Skull height	38	59.0
Harcourt		
Occipital protuberance to medial incisor alveoli	I	191.0
Occipital protuberance to junction of nasal and frontal (nasion)	II	104.4
Nasion to alveolare	III	96.1
Palatal length	IX	95.5
Palatal width between PM4 and M1	X	63.0
Maxillary cheek tooth row length	XI	68.0
Width across the outer margins of the canine alveoli	XII	36.6

Table 17: Quedgeley Parcel F - Hand-collected vertebrate remains. Metrical data (following von den Dreisch 1976 and Harcourt 1974) for dog skull (Bone ID 26) from Context 4016. All measurements are in mm

7.2.4 Discussion

The excavations produced an assemblage of moderately well-preserved animal bone consisting entirely of the remains of domestic mammals: cattle remains are prevalent in both the Late Iron Age and Romano-British phases (Tables 12 and 13) suggesting continuity of husbandry practices, although any interpretation on the basis of such a small assemblage should be viewed with caution. Butchery marks were scarce: those recorded were all seen on cattle bones and, with the exception of the distal tibia with cut marks (Context 4043) and the chopped proximal femur (Context 4060), all the fragments affected were small pieces of long bone split to access the marrow. Tooth marks were also rare: this may mean that the bones had been incorporated into the deposits before scavenging animals could access them but it is also possible that the widespread breakage and poorer preservation in some contexts may have obscured some of the evidence. The wear stages of the few mandibles with complete tooth rows together with the isolated teeth and epiphyseal fusion data,

where available, showed that age-at-death of the cattle ranged from juvenile and sub-adult to elderly with most categorised as 'adult' but there was insufficient data to construct meaningful mortality profiles. The equid bones and teeth were, with the exception of the erupting incisor from Phase 2 (Context 4219), all from skeletally mature animals. Although slight differences can be seen in the material from earlier and later phases, any variation is likely to be an artefact of the sample size and interpretation on the basis of such a small amount of material is not advisable. However, some individual deposits warrant discussion.

The late Iron Age dog skull from context 4016 (CG06) was well preserved, with no cut marks on the occipital condyles to suggest decapitation. There was no sign of the mandibles, suggesting these had been intentionally removed or disarticulated and lost before the skull was deposited. Very minor damage had been sustained: both zygomatics had been broken in antiquity and the first, second and third premolars, canines and incisors lost post-mortem but not recovered with the skull. This suggests that, like the mandibles, these teeth were missing at the time of deposition and the skull may have been skeletonised for some time before being placed in the pit. It is not unusual to find 'special deposits' of partial or complete dog skeletons placed in storage pits or wells in the Iron Age and it is notable that excavation of the neighbouring area (Parcel G) recovered the partial skeleton of a "large, muscular, adult dog" without skull but with mandibles from the bottom of a pit dated to the Late Iron Age (Holmes 2017). These remains have been variously interpreted as offerings or closure deposits, associated with the role of the dog as guardian, hunting companion and messenger to the gods (Cunliffe 2003:146-147; Livarda *et al* 2017; Morris 2017). There was some morphological variation in dogs at this stage of prehistory and this one seemed to have a comparatively long, slim muzzle although, with a snout index of 50.1, it still falls within the range that Harcourt considered to be plain, "unmodified dog" (Harcourt 1974).

The single cattle skull placed upside-down in the base of a Late Iron Age pit (4041) is also likely to be a special deposit. The mandibles were not present, and no other bone was recovered from the pit, although a triangular loom weight had also been placed by the skull. Structured deposits of skulls – individually, in groups, or collectively with other skeletal elements or species – are not uncommon in the Late Iron Age and examination for skinning/scraping, weathering, tooth loss and other taphonomic evidence can sometimes show them to have been curated for a period before deposition (Hambleton 2013). Unfortunately, this skull was so fragmented that examination for evidence of cleaning, decapitation or the removal of the mandibles was not possible, although the presence of the maxillary teeth indicates that these were *in situ* as the skull was placed in the pit.

The partial skeleton of a sub-adult cow was recovered from a grave dated to the Early Roman period (Phase 3.1). The articulated metatarsals and phalanges of both lower hind limbs were present, together with a small piece of metacarpal and a few fragments of ribs. It is possible that this burial represents the remains of 'fallen stock' – an animal that had died of disease and, not being considered suitable for consumption by humans or dogs, was buried quickly to deter scavengers. It is plausible that the rest of the skeleton has been destroyed and dispersed during recent construction works on the site. Alternatively, the original deposit may have consisted solely of lower limbs and ribs and, given the early date, it may signify some continuity of practice from the Late Iron Age votive activity nearby. However, the dimensions of the grave suggest it was prepared for a complete carcass.

7.2.5 Summary

The excavations produced a small assemblage of animal bone from features dated to the late Iron Age and Romano-British periods. Species present were restricted to domestic mammals, mostly cattle. A dog skull and a cattle skull from late Iron Age pits may represent structured deposits while the part skeleton of a sub-adult cow dated to the early Roman period is more likely to indicate disposal of fallen stock.

7.2.6 Retention/disposal

Although it would be ideal to keep the vertebrate remains in the event further archaeological investigations are required in additional parcels of the Quedgeley Framework Plan, a complete record of the assemblage has been undertaken and retention is not imperative.

7.3 Human bone by Gaynor Western

7.3.1 Introduction

During the course of the archaeological excavation, the articulated skeletal human remains of two individuals (SK4223 and SK4224) were exhumed from individual graves. One of the inhumations, SK4223 was a crouched burial (cut 4213; CG16), likely to date to the late Iron Age or the early Roman period. SK4244 in contrast was an extended burial (cut 4245; CG14). Though the bone was very poorly preserved the skeleton appeared to be in a supine position and on a N-S alignment. In addition, a small amount of cremated human bone was recovered from a shallow pit (cut 4213; CG17) that had been truncated by a later ditch (4225) dating to the Roman period. Radiocarbon dating of a sample of the cremated bone indicated a date of 30-210 cal AD (95.4% probability). A sample of bone from SK4223 was also submitted for radiocarbon dating but failed due to poor collagen preservation.

Osteoarchaeological analysis of the inhumated and cremated skeletal human remains was undertaken to assess the condition and completeness of the remains recovered as well as to determine the age, sex and stature of this individual. Any non-metric traits, skeletal and dental pathologies were also recorded. An overview of the observations is presented here in addition to a summary catalogue of the human remains.

7.3.2 Methodology

7.3.2.1 Inhumated Human Remains

The skeletal material was analysed according to the standards laid out in the guidelines recommended by the British Association of Biological Anthropologists and Osteologists in conjunction with CIfA (*Guidelines to the Standards for Recording Human Remains*; Brickley and McKinley 2004, updated 2017) as well as by English Heritage (*Human Bones from Archaeological Sites: Guidelines for producing assessment documents and analytical reports*, Centre for Archaeology Guidelines, 2002).

Recording of the material was carried out using the recognised descriptions contained in *Standards for Data Collection from Human Skeletal Remains* by Buikstra and Ubelaker (1994). Full recording forms are supplied separately to be archived with any other archaeological recording forms. All skeletal data has been recorded using an MS-Access database(s).

The material was analysed macroscopically and where necessary with the aid of a magnifying glass for identification purposes. Where relevant, digital photographs have been used for illustration and a full digital image archive of all pathologies and any other features of interest has been provided.

The material was analysed without prior knowledge of associated artefacts so that the assessment remained as objective as possible.

Comparison of the results was made with published osteological data from contemporary skeletal populations where relevant.

7.3.2.2 Cremated Human Bone

The cremated material 4214 was analysed according to the standards laid out in the guidelines recommended by the British Association of Biological Anthropologists and Osteologists in conjunction with the IFA (Guidelines to the Standards for Recording Human Remains, Brickley and McKinley (eds) 2004) as well as by English Heritage (Human Bones from Archaeological Sites: Guidelines for producing assessment documents and analytical reports, Centre for Archaeology Guidelines, 2002).

- The material was analysed macroscopically and where necessary with the aid of a magnifying glass for identification purposes.
- The material was sorted into three fractions of 10mm, 5mm and 2mm using UKAS accredited calibrated sieves.
- The material was weighed using calibrated digital scales to an accuracy of 0.1g.
- The material was analysed without prior knowledge of associated artefacts
- The material was recorded on an Access database, a copy of which was provided for the archive.

7.3.3 Discard policy

Remaining soil sample and residues (post scanning) will be discarded after a period of three months following submission of this report unless there is a specific request to retain them.

7.3.4 The Inhumated Skeletal Remains

7.3.4.1 Reasons for the Analysis

- Inventory of the skeletal material
- Condition of bone present
- Completeness of the skeleton
- Age Assessment
- Sex Determination
- Non-metric Traits
- Stature and Morphometric Data
- Skeletal Pathology
- Dental Pathology

7.3.4.2 Skeletal Inventory

An inventory of the skeletal elements present is undertaken to assess the completeness of the skeletal remains and identify the number of individuals present. An inventory also provides information on the specific elements within the skeleton that are present and can be assessed for pathological changes. Each element is recorded as present or absent. The long bones are recorded according to the presence or absence of the proximal (upper), middle and distal (lower) sections as well as the proximal and distal joint surfaces. The completeness of the bones of the axial skeleton (with the exception of the spine) is recorded according to the categories of <25%, 25-50%, 50-75% and 75%>.

A summary inventory of the skeletal elements present for the inhumated skeletons is provided in the skeletal catalogue below (see Section 5). A full inventory can be found on the MS Access database.

SK4223 was mainly represented by the long bones of the legs and the lower arms, with some bones from both feet also present. SK4244 was particularly depleted of skeletal elements, with only a few fragments of the long bones and crania represented.

7.3.4.3 Condition of the bone present

The condition of the bone was assessed macroscopically according to the categories and descriptions provided by the Guidelines to the Standards for Recording Human Remains (Brickley and McKinley, eds, 2004). Since most skeletons exhibit more than one grade of state of preservation, these categories are simplified into 4 main groups of preservation: Good (grades 0-2), Fair (grades 2-4),

Poor (grades 4-5+) and Varied (more than 4 grades of condition). The condition of human bone can be influenced by both extrinsic (i.e. taphonomic conditions) and intrinsic (i.e. robustness) factors (Henderson 1987).

SK4223 was found to be in 'fair' condition and was scored as being grades '2' and '3' while SK4244 was found to be in 'poor' condition and was scored as grades '4' to '5'. Overall, only the densest bone had survived and both individuals were highly fragmented.

7.3.4.4 Completeness of Skeletons

This is a guide to the overall completeness of the individual's skeletal remains and is calculated according to the percentage of the bones present in relation the total number of bones in a complete human skeleton. Completeness of remains is gauged through an assessment of the amount of material representing different areas of the body. A complete skeleton comprises of:

Skull = 20%
Torso = 40%
Arms = 20%
Legs = 20%

Each area of the skeleton was assessed and then placed into the following four categories of completeness: <25%, 25-50%, 50-75% and 75%> (Buikstra and Ubelaker 1994).

Recording the completeness of the individual can allow an insight to be gained into how much post-depositional activity has occurred as well as to assess how much information can potentially be gained from the remains.

Both the skeletons were significantly incomplete and only <25% of each individual was present.

7.3.4.5 Age Assessment

Establishing the age and sex of individuals from an archaeological assemblage not only provides an insight into the demographic profile of the population but can also be used to inform us of patterns in pathological distributions in a skeletal assemblage.

The age of sub-adults is assessed using both dental development (Smith 1991) and eruption (Ubelaker 1989) as well as long bone lengths (Schaefer *et al* 2009) and epiphyseal fusion (Scheuer and Black 2004). These methods can usually provide a reasonably accurate age estimation due to a relatively narrow range of variation in normal sub-adult development. Thus, sub-adults can be placed into the following age categories: Foetal (<36 weeks), Neonate (0-1 month), Young Infant (1-6 months), Older Infant (6-12 months), Child (1-5 years), Juvenile (6-12 years) and Adolescent (13-17 years).

Assessment of adult age at death, unfortunately, results in much less specific age estimates due to a much greater individual variation in the features exhibited by the examined elements at particular ages (Cox 2000). Age estimation of adults was assessed from analysis of the auricular surface (Lovejoy *et al* 1985) and the pubic symphysis (Brookes and Suchey, 1990). Each of these methods examines the deterioration of these surfaces and categorises them accordingly. This deterioration is due in part to due to the health status of the individual but can also be influenced by life-style and so the variation produced by these factors results in much wider age categories: Very Young Adult (18-24), Young Adult (25-34), Middle Adult (35-49) and Old Adult (50+) (Buikstra and Ubelaker, 1984).

Sex is assessed using the criteria laid out by Buikstra and Ubelaker (1984) in the analysis of morphological features of the skull and pelvis. In addition, metric data is also used where possible, taking measurements of sexually dimorphic elements such as the femoral and humeral head (Bass 1995). Categories ascribed to individuals on the basis of this data were 'Male', Possible Male', 'Indeterminate', 'Possible Female', 'Female' and 'Unobservable'. Sex may be ascribed on the basis of metrics alone where no sexually dimorphic traits are observable. Where sex was not observable be

either metric or morphological observations, it was recorded as 'Unobservable'. No sexing of sub-adult material is attempted due to the lack of reliable criteria available.

The poor preservation and lack of complete skeletal elements limited the osteological observations regarding the age and sex of the individuals that could be made. However, the size of the skeletal elements present in SK4223, in tandem with the presence of large muscle attachments, suggested that these remains were those of a robust adult, and were possibly those of a male individual.

Evidence of age was observed in SK4244, where an unfused epiphysis was present, likely to be an unfused distal femoral epiphysis. The distal femoral epiphysis fuses to the diaphysis of the femur between the ages of 14 and 20 years of age, and therefore, these remains represent a sub-adult individual. The overall size of the remains *in situ* in combination with this observation suggests that this sub-adult was either a juvenile or young adolescent.

The results of the age and sex assessment can be seen in Table 18 below.

Context	Age	Age Category	Sex
4223	Unobservable	Adult	?Male
4244	<14-20 years	Sub-adult	Unobservable

Table 18: Demographic profile of the Inhumated Human Skeletal Remains

7.3.4.6 Non-Metric Traits

Non-metric traits are morphological features that occur both in bone and dentition. These features have no specific functional purpose and occur in some individuals and not in others. The origins of non-metric traits have now been shown to be highly complex, each having its own aetiology, and each being influenced to differing extents by genetics, the environment and by physical activity. A review of the current literature suggests that the undetermined specific origins of these traits and the fact that there is more genetic variation within populations than between them can prevent useful conclusions regarding their presence or absence in skeletal remains from being drawn (Tyrell 2000).

The presence of any non-metric traits is noted in the skeletal catalogue below (see below).

7.3.4.7 Stature and Morphometric Analysis

Stature of adult individuals can be reconstructed from measurements of long bones of the skeleton. Since the long bones of sub-adults have not yet fully developed it is not possible to provide an estimate of stature for immature remains. Stature is the result of many factors including genetics and environmental influences (Floud *et al* 1990), such as malnutrition and poor health. Height can be used as an indicator of health status and there is a wide range of literature on the relationships between height, health and social status. Estimated stature was calculated by taking the measurements of the individual long bones and using the formula provided by Trotter (1970). Variation in estimated stature can be up to 3cm.

Metric analysis of the long bones, cranium and mandible may also be undertaken on adult remains to provide comparative information on morphological variability.

Stature could not be estimated for SK4223 due to the lack of completeness of the long bone elements present.

A summary of the morphometric data is provided in the skeletal catalogue (see below).

7.3.4.8 Skeletal Pathology

Palaeopathology is the study of diseases of past peoples and can be used to infer the health status of groups of individuals within a population as well as indicate the overall success of the adaptation of a population to its surrounding environment. Pathologies are categorised according to their aetiologies; e.g. congenital, metabolic, infectious, traumatic, neoplastic etc. (Roberts and Manchester 1997). Any

pathological modifications to the bone are described. The size and location of any lesion is also noted. Distribution of lesions about the skeleton should be noted to allow diagnosis. A differential diagnosis for any pathological lesions should also be provided.

No skeletal pathology was observed in either individual, at least in part due to the poor preservation and incompleteness of the skeletal remains.

7.3.4.9 Dental Pathology

Dental diseases include conditions that not only directly affect the teeth but also the soft tissue surrounding them, sometimes observable in changes to the underlying alveolar bone (Hillson 1986). Each condition can give an indication of different aspects of lifestyle and health of the individual. For example, caries is associated with diets high in sucrose content. The presence of calculus can inform us about dental hygiene whilst enamel hypoplastic defects testify to developmental stresses that an individual has undergone in childhood (Goodman and Armelagos 1985, Hutchinson and Larsen 1988, Dobney and Goodman 1991). The analysis of dental disease, therefore, not only informs us of specific oral conditions but provides complimentary data regarding overall health status and cultural practices. A summary of dental inventories and pathology is provided below.

No dentition was present in either individual and therefore no dental disease was observed.

7.3.5 The Cremated Human Bone

7.3.5.1 Methods and Process

The cremated material 4214 was analysed according to the standards laid out in the guidelines recommended by the British Association of Biological Anthropologists and Osteologists in conjunction with the IFA (Guidelines to the Standards for Recording Human Remains, Brickley and McKinley (eds) 2004) as well as by English Heritage (Human Bones from Archaeological Sites: Guidelines for producing assessment documents and analytical reports, Centre for Archaeology Guidelines, 2002).

- The material was analysed macroscopically and where necessary with the aid of a magnifying glass for identification purposes.
- The material was sorted into three fractions of 10mm, 5mm and 2mm using UKAS accredited calibrated sieves.
- The material was weighed using calibrated digital scales to an accuracy of 0.1g.
- The material was analysed without prior knowledge of associated artefacts
- The material was recorded on an Access database, a copy of which was provided for the archive.

7.3.5.2 Reasons for the Analysis

- Osteological analysis was carried out to ascertain:
- The type of deposit
- Total weight of the bone
- Identification and quantification of human bone
- Demographic data
- Pathology data
- Degree of fragmentation
- Efficiency of the cremation
- Presence and type of pyre goods
- Presence and type of pyre debris

7.3.5.3 Type of Deposit and Disturbance

Recording of the type of deposit of cremated bone is necessary to make fair comparisons between different deposits from across a site, between one site and another and between cremated bone deposits from different historical contexts. It allows inferences to be made about the state of preservation of the material interred and how this may have affected bone content and fragmentation. This information is essential for accurate analysis of cremation processes due to diagnostic analytical techniques being based upon the weight and size of bone fragments present.

Cremated bone deposit 4214 consisted of an un-urned deposit or a cremation related-deposit placed in a shallow pit. Some disturbance had occurred due to being truncated by a Roman ditch (4225).

7.3.5.4 Identification and Quantification of Cremated Bone

Cremated bone deposits have been found on frequent occasions to contain both human and animal bone remains. Often, particularly if the bone fragments are very small, it is not possible to identify whether bone is categorically human or animal. However, it is clear from the analysis of cremated bone deposits that the deposition of both types of bone together is intentional and, therefore, it is imperative to approach the assessment of the cremated bone present holistically, as well as to attempt to identify human and animal elements.

An assessment of the quantity of bone recovered may give an indication of the state of preservation of the associated feature in which the bone was interred or, if recovered from relatively undisturbed context, may provide valuable information regarding cremation processes. This may relate not only to the actual pyre technology itself but also to the collection and ritual deposition of bone after the process was complete. McKinley (1993) found that modern cremation processes resulted in the production of between 1227.4g and 3001.3g of bone from adult individuals. From this she inferred that the cremation of a whole body and deposition of the remains in an archaeological context would realistically produce between 1001.5g and 2422g of cremated human bone. In contrast, Whal (2015) found that average weights for cremated bone deposits dating to the Imperial Roman period from Baden-Württemberg, Germany were significantly lower, however; for men, 638g, for women, 479g and for children 106g.

Identification of particular elements of the human body serves to confirm the presence of human material and also may give an insight into any particular areas of the body which may have been purposefully collected following cremation. The absence of elements, especially those that are smaller, may be due to the lack of their survival as a result of fragmentation during the cremation, post-depositional preservation conditions or may be due to their loss during the cremation itself.

The results of the quantification analysis are summarised in Table 19 below:

Context	**4214**
Total Weight of Cremated Materials (g)	36.6
Total Weight of Identifiable ?Human Fragments (g)	10.9
Minimum Number of Individuals	1

Table 19 Results of the quantification of total bone present

The total weight of the fragments is very low and therefore represents only a small proportion of burnt remains expected from a complete individual. No repeated identified skeletal elements were present, and therefore only one individual was represented by the cremated bone deposit.

Fragments of bone were identified from three of the main areas of the body i.e. torso, upper and lower limbs. Neither the skull nor the extremities (i.e. hand and feet) were represented.

7.3.5.5 Demographic Data

Demographic data recorded from human cremated bone gives an indication as to the age and sex of the individual. This information is derived from the macroscopic examination and metric assessment sexually dimorphic elements (e.g. Gejvall 1981, Van Vark (1975) and Whal (1982) as well as analysis of dental and bone development recommended by Buikstra and Ubelaker (1994). A large sample of well-preserved cremated bone deposits can provide a valuable insight into the demographic structure of the archaeological population and also into any ethnocentric funerary practices associated with the age and sex of the individual cremated.

The age and sex of the individual could not be confirmed by osteological analysis. The thickness of the cortices of the long bone present suggested that the individual was older than younger sub-adult, and perhaps was an adolescent or adult, but no further, more accurate observations could be made.

7.3.5.6 Pathology Data

Palaeopathology is the study of diseases of past peoples and can be used to infer the health status of groups of individuals within a population as well as indicate the overall success of the adaptation of a population to its surrounding environment. Pathologies are categorised according to their aetiologies; e.g. congenital, metabolic, infectious, traumatic, neoplastic etc. Any pathological modifications to the bone are described. The size and location of any lesion is also noted. Pathology data is usually restricted, however, by intrinsic nature of cremated bone, although if fragment size is large enough, pathological changes may be observed.

No pathological changes were observed in the remains.

7.3.5.7 Bone Fragmentation

The observation and quantification of bone fragmentation is essential in assessing its impact on the quality of the overall data retrieved from the analysis of cremated bone. It may also be an indicator of practices carried out during the cremation process and give and insight into pyre technology. Fragmentation of bone is assessed by sorting all bone fragments into three sieve fractions (10mm, 5mm and 2mm) and comparing the proportion of bone in each fraction (Brickley and McKinley 2004). Measurement of the maximum bone fragment length is also recorded.

The fragmentation of bone can occur for several reasons, i.e. from the raking of the remains during the cremation process, the collection and the subsequent interment of the remains, making it difficult to assess whether bone was deliberately fragmented as part of the cremation ritual (McKinley 1994b, 2001). It is, however, generally believed that both the excavation and post-excavation processes can lead to the largest amount of damage caused to the remains (Lange *et al* 1997, McKinley 1994b).

The majority of the fragments were between 5mm and 10mm in size, though a substantial proportion of the fragments measured over 10mm, with the maximum length being 80.3mm (Table 20). One fragment could be reconstructed from two individual pieces, suggesting that the fragment has been either broken after their deposit in the ground, or possibly during a raking process (Plate A).

Plate A: Reconstructed cremated bone fragment from deposit (4214)

Context	4214
>10mm Weight (g)	10.1
>10mm Percentage of Total	30.0
>5mm Weight (g)	18.9
>5mm Percentage of Total	56.1
>2mm Weight (g)	4.7
>2mm Percentage of Total	13.9
Assessment of Bone Content Percentage <2mm residue	0
Total Weight (g)	33.7

Table 20: Quantification of bone present according to fraction

7.3.5.8 Efficiency of the Cremation

Effective cremation of a human body requires basically two elements: burning at high temperatures and a sufficient length of time of the application of this heat. Differences in temperature and length of time of exposure will result in variation in how the bone is burned. Complete burning will result in complete oxidation of the organic element of bone, leaving the mineral portion remaining (McKinley 1994a, Lange *et al* 1987).

Holden *et al* (1995a and 1995b) reports that generally, the range of colours seen in burnt bone relates to the temperature to which the bone was exposed:

Brown/Orange = Unburnt
Black = Charred (c.300□)
Blue/Grey = Incompletey Oxidised (c.600□)
White = Completely Oxidised (>600□)

The colour may vary from bone to bone as different elements of the body may be exposed to different temperatures for different lengths of time. It is, therefore, essential to record any differences in colouration according to skeletal elements affected and to the aspect of the element (i.e. interior, exterior) affected. The extent of the burning or oxidation of the bone represents the relative success of the cremation processed applied and contemporary knowledge of pyre technology. Body mass has been observed to also contribute towards the level of oxidation of bone, with males (i.e. larger individuals) exhibiting a greater range of variability of bone oxidation (McKinley 2015) while females (i.e. smaller individuals) tend to be more homogenous in complete oxidation of bone (Whal 2015).

Observations of dehydration of the bone should also be recorded. Shrinkage of bone due to dehydration can amount to a 25-30% decrease in cross-section width and accordingly approximately a 5% decrease in length (Lange *et al* 1987). Evidence of dehydration presents itself on the bone fragments in the form of fissuring, transverse, concentric and parabolic cracking, especially on articular surfaces of long bones and cranial vault fragments (Lange *et al* 1987, McKinley 1994a). These are generally interpreted as occurring due to the result of cremating the bone when soft tissue was still present on the bone.

Overall, it was estimated that approximately 90-95% of the bone present was white in colour and that most elements were completely oxidised. Most of the variation seen outside of this were blue/grey changes that were mainly observed on the inside (endosteal) surfaces of dense long bones. A small amount of bone that consisted of small fragments of very robust long bones with dense cortices was consistently blue/grey. The density of the bone suggested that these fragments were likely to be animal bone.

Some transverse and longitudinal fissuring was observed in long bone fragments.

7.3.5.9 Presence and Type of Pyre Goods

Pyre goods are those items that were placed on the pyre and have been deliberately included for interment along with the cremated human bone. These can consist of objects manufactured from glass, ivory or metal, for example, which may have formed items of personal adornment. Metal items may only leave a trace of their presence in the form of staining on the bone, especially those manufactured from copper alloys.

It is most common for animal bone to be included with deposits of human bone (e.g. Wells, 1960). It is generally perceived that these represent animal sacrifice or food offerings to the dead (McKinley 1994b, Bond 1994). Williams (2005) has suggested, furthermore, that the deliberate admixture of animal and human cremated remains is deeply significant and may be associated with shamanistic rituals often observed ethnographically whereby not only can animals symbolically represent totemic ancestor lineages and but also both human and animal beings are seen to dynamically and mutually co-exist: “Animals were more than symbols of identity but agents of transformation, enabling the dead to be reconstituted into a new social status in death." (Williams 2005).

A small amount of bone fragments of bone was identified as likely to be non-human but given the small fragment sizes could not be identified to a specific species.

7.3.5.10 Presence and Type of Pyre Debris

The presence and type of pyre debris is analysed in order to ascertain the nature of pyre technology and can be used to provide an insight into the type of deposit. Recent experimental reconstructions of pyre sites have determined that distinct features and types of debris can be left by former pyre sites and in particular that the use of different materials alters the type and form of deposit (Marshall 2005).

Pyre debris was observed to be present throughout the fill of the pit containing cremated bone deposit 4214, which was noted to contain charcoal. No charcoal or other pyre debris was present in the sample analysed here.

7.3.6 Conclusion

Excavation at the site known as Parcel F, in Quedgeley, Gloucestershire revealed two inhumation burials of articulated individuals in addition to a small deposit of cremated human bone. One individual, SK4222, was interred in a crouched position and was an adult, possibly male, though less than 25% of the skeleton was present and only consisted of lower arms, leg bones and feet. Osteological analysis was therefore very restricted and it was not possible to undertake any metric analysis or to observe the presence or absence of many skeletal or dental pathologies. This was also the case for SK4244, which was additionally compounded by poor bone preservation. Nonetheless, it was possible to confirm that this individual was a sub-adult, likely a juvenile or young adolescent in age (8-*c*.16 years old at death).

The crouched burial containing SK4222 is thought to date to the early Roman period or possibly earlier; there were no associated finds and radiocarbon dating of this burial failed due to insufficient collagen present in the sample of human bone submitted for testing. It was therefore not possible to attribute a more specific date for the burial. However, radiocarbon dating of the cremated bone 4214 returned a date of between 30-210 cal AD (95.4% probability), confirming an early Roman date. It is possible that the sub-adult skeleton 4244 also represents further evidence for Roman burial activity at the site Roman due to being interred in an extended position and on a N-S alignment; a comparable feature to this grave, only 2m to the east and on a similar alignment, was identified as a grave of Roman date.

Reports of inhumations in Gloucestershire dating to the Iron Age are uncommon compared to other periods (King *et al* 1996; Moore 2013) and Hey *et al* (1999) suggest that some Iron Age burials may remain undetected through a lack of dating. While those burials identified Iron Age in the Cotswolds area of Gloucestershire commonly feature crouched inhumation (Holbrook 2013), the archaeological evidence suggests that crouched burial continued as a burial practice from at least the Late Iron age into the Roman period up to the 2nd century AD in Gloucestershire (Thomas *et al* 2003). A continuation of funerary activity throughout this transitional period also occurred at several sites. At Bourton-on-the-Water (O'Seaneachain 2012), for example, a crouched burial from the Iron Age as well as a further 18 inhumation burials from the Roman period were discovered alongside settlement activity. A further 24 crouched burials dating to the late Iron Age in association with an enclosure dating to the 1st century AD at Henbury (Holbrook 2013). Evidence for continuity of burial from the Iron Age through to the Roman period was also present at Frocester Court, where at least two late Iron-Age or early Roman crouched inhumations were found. Mid third century cremated bone deposits were also present (Holbrook 2013). At Hucclecote, prehistoric cremation burials were succeeded by a settlement consisting of roundhouses with a crouched burial nearby. The area subsequently became the focus for Roman settlement and featured a series of enclosure ditches and gullies in addition to a small inhumation cemetery. The burials dated to the 1st-2nd century AD and several contained skeletons with legs flexed or in a crouched position (Thomas *et al* 2003).

Burial in the Roman period is generally purported as more common in the late period, when agriculture intensified and settlements became more nucleated, generating the creation of discrete burial grounds for interments, albeit small and often still dispersed (Smith *et al* 2018). In Gloucestershire, 531 rural Roman inhumation burials are recorded on the Rural Settlement of Roman Britain database, originating from 66 different sites (https://archaeologydataservice.ac.uk/archives/view/romangl). Unfortunately, many inhumation burials of the period have no evidence from associated artefacts for a more precise categorisation than 'Roman' and have not undergone any radiocarbon dating. As the evidence stands, however, 38.3% (n=97) of the 253 inhumations more closely dated belong to the early-mid Roman period whereas the remaining 61.7% (n=156) date to the mid-late Roman period, reflecting the general trends across England for increased numbers of recorded inhumations in the later period.

Nonetheless, the evidence for burial in the early Roman period and for its variation is well documented across the West Midlands. From the 19 sites firmly dated to the early Roman period across the county, 61% of funerary sites feature inhumation burials, with cremation burials being present on the remaining 39% of sites recorded (https://archaeologydataservice.ac.uk/archives/view/romangl). This suggests that there is growing evidence for a much wider range of burial practices in the rural areas of the region than was perhaps recognised before. The vast majority of early-mid Roman inhumations from Gloucestershire are those of adults (82.5%), seemingly represented equally by males and females. The sites range from comprising a single isolated burial to up to 12 inhumations, the majority consisting of between one and four burials, with grave goods present at 56% of sites. Twenty one individuals (21.6%) from eight sites were buried in coffins, similar to the national average of 20% (Smith *et al* 2018). Burials have been associated with a bathhouse, the peripheries of enclosures, track way ditches, ditches enclosing timber buildings, quarry pits, hilltops and upper valley slopes. Similar to the site at Parcel F at Quedgeley, both cremated bone and inhumation burials were found in close proximity at 13 of the 21 sites (61.9%) currently recorded as having cremated bone burials present.

At a national level, circa 60% of Roman cremation burials are recorded as 'urned' and these are most commonly associated with settlements of denser populations, roadside settlements, military vici, defended small towns and in some case larger villages (Smith *et* al 2018). Unurned burials are generally more common on farmsteads or more isolated rural sites (Smith *et al* 2018). The form of the Roman cremation burials across Gloucestershire is very varied, from simple, unaccompanied burials to those elaborately furnished, suggesting quite an idiosyncratic approach to cremation rituals. At Westerleigh, three unurned and unfurnished human cremation burials thought to date from the 1st-2nd century AD were discovered in addition to a pit containing cremation related material. Two similarly unurned cremation burials found at Kempsford and dating to the early Roman period were of adults, one of which was identified as male and also contained hobnails thought to represent shoes placed in the burial after cremation. Two further cremated burials at the site were unusual; one overlay a horse burial in a pit and the second appeared to be a bustum burial, where the cremated remains fall into a pit dug beneath the cremation pyre, which is then filled in as a grave. In contrast at Wells' Bridge, Barnwood, three urned cremation burials were discovered, two in black-burnished pots and one in a Severn Valley ware pot. In the vicinity, a second ditched enclosure contained a further 23 inhumations and two cremation burials, one of which was a high-status male adult whose cremated remains had been placed in an ossauria (a lead canister) that was contained in a limestone sarcophagus buried in a square pit. A similar cremation burial within an interred ossauria was discovered at Harnhill Villa, Driffield, which contained the remains of an adult female, aged between 20 and 40 years, as well as a small amount of charcoal and iron nails (https://archaeologydataservice.ac.uk/archives/view/romangl). The cremation burial excavated at Quedgeley only contained a small amount of bone and clearly does not represent a complete individual. The deposit may have been disturbed post-deposition or could represent a token burial, possibly as a cremation related deposit rather than a grave of a cremated person per se. Being an unurned burial, this appears to conform to the general observation of more unurned Roman cremation burials being present at more rural sites and less densely populated sites.

Although poorly preserved, the burials discovered at Quedgeley add to our expanding evidence for Roman and possibly earlier burial practice in Gloucestershire, in particular for the diversity of rites including inhumation and cremation. The provision of a radiocarbon date for the cremation burial at Quedgeley also provides an opportunity for the future collation of the growing archaeological evidence for cremation practices in the Roman period, to help understand their heterogenous nature and their context within the evolving landscape and settlement of Gloucestershire during this pivotal period in Britain's history.

7.3.7 Catalogue of Human Remains

A summary of the osteoarchaeological observations are presented below. A full inventory and recording of the human skeletal remains can be found on the MS Access database.

SK4223

Inventory: Some fragment of left and right distal humerii, left and right femora, tibiae and fibulae; incomplete and fragmented feet.

Completeness: <25%

Condition: Fair (Grades 2 and 3)

Dental Inventory and Pathology:

4223	Observable dentition	Observable tooth sockets	Ante-mortem loss	Caries	Calculus	Periodontal disease	Enamel hypoplasia	Abscess
n	0	0	-	-	-	-	-	-

Age Assessment: Possible Adult (large, robust elements)

Sex Determination: Possible male

Stature: Unobservable

Non-Metric Traits: None

Skeletal Pathology: None

SK4244

Inventory: Some cranial fragments; Humerii, possible radii and possible ulnae fragments; Some femoral fragments.

Completeness: <25%

Condition: Poor (Grades 4 and 5)

Dental Inventory and Pathology:

4244	Observable dentition	Observable tooth sockets	Ante-mortem loss	Caries	Calculus	Periodontal disease	Enamel hypoplasia	Abscess
n	0	0	-	-	-	-	-	-

Age Assessment: Subadult; <14-20 years

Sex Determination: Unobservable

Non-Metric Traits: Unobservable

Skeletal Pathology: None

7.3.8 Acknowledgements

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8 Radiocarbon dating by Elizabeth Pearson

A total of two radiocarbon determinations have been achieved from a fragment of waterlogged oak roundwood taken from the wattle hurdle lining of pit 4037 and from cremated human remains (4214). The results indicated a late Iron Age date for pit 4037 and an early Roman date from the cremated human bone. The date for pit 4037 overlaps with radiocarbon dates from waterlogged pits in Area G (Pearson 2017).

Samples were dated at Beta Analytic, Florida by AMS.

The results are conventional radiocarbon ages (Stuiver and Polach 1977) and are listed in Table 21. The calibrated date ranges for the samples have been calculated using the maximum intercept method (Stuiver and Reimer 1986), and are quoted with end points rounded outwards to ten years. The probability distributions of the calibrated dates, calculated using the probability method (Stuiver and Reimer 1993) are shown in Graphs 6 and 7 in Appendix 2. They have been calculated using OxCal v4.2 (Bronk Ramsey 2009) and the current internationally-agreed atmospheric calibration dataset for the northern hemisphere, IntCal13 (Reimer *et al* 2013).

8.1.1 Results

Laboratory code	Context number	Material	δ13C (‰)	Conventional Age	OxCal calibrated age (95.4% probability or 2 sigma)
Beta-561330	4214	Human bone (Cremated)	-22.9	1900 +/- 30BP	30 to 210 cal AD
Beta-561332	4065	Wood (Oak roundwood)	-26.8	2080 +/- 30BP	190 to 10 cal BC

Table 21: Radiocarbon dating results

8.2 Stable isotope analysis

Samples from human bone were sent to Beta Analytic laboratory, Florida for radiocarbon (AMS) dating, as a result of which an oxygen isotope (IRMS δ18) result of -18.00 was obtained (Table 22).

The results show a geographical range that appears to fringe the western and southern parts of the British Isles, and hence suggest that the individual resided to the west or south of Quedgeley during later years of life. . , although the entire range could include a large block of land that extends predominantly westwards into mid-Wales, though north-west England, and becoming more scattered northwards into Scotland. There are also smaller areas that, for instance, follow sand and mudstone formations lying on the north (windward) side of the chalk and limestone Chilterns.

This result provides only a guideline for the geographic origins of the individual and is presented here as data which may be useful for comparison with data from other sites. More precise interpretation would be possible if oxygen and strontium results were available from animal bone or teeth from this same locality. However, it was not possible to include animal remains within the scope of this project.

Sample Type	Species Dated	Context ID	Sample ID	$\delta^{18}OPO4$

Human remains (bone)	Human	4214	P5611/4214/16	18.00

Table 22: Oxygen stable isotope results from cremation (4214)

9 Discussion

The investigations at Parcel F of the Quedgeley Framework Plan identified archaeological remains dating from the prehistoric, Roman, post-medieval and 20th century military use of the site. Prehistoric activity was largely characterised by late Iron Age pitting however a pre-Iron Age landscape is represented by residual flint artefacts and possibly by a heavily truncated, poorly preserved crouched inhumation. Romano-British activity could tentatively be split into two separate phases, with some evidence of early (1st to mid 2nd century AD) land-use which continued through to the early 4th century AD. The Romano-British element appeared agrarian in character, with no direct evidence of settlement identified within the site. Post-medieval activity was present in the form of a large field boundary ditch, observed to align with a boundary of the 1st edition OS mapping.

Considerable modern truncation, both horizontal and vertical, effected the site. It was clear from the overlying rubble deposit and condition of the natural substrate that the area had been subjected to soil removal or 'scarping', likely as a result of the construction and subsequent demolition of the RAF buildings. Additional truncation was present in the form of concrete service culverts and footing pads which adversely affected the preservation of the archaeological remains.

9.1 Prehistoric (Mesolithic to Iron Age) activity

Evidence for early prehistoric activity on site was limited to a residual worked flint blade and two flint flakes, recovered from a Romano-British ditch. The blade is thought likely to be Mesolithic or early Neolithic in date and its presence reflects some activity from this period within the immediate locale.

It cannot be discounted that the undated, crouched inhumation (CG16) pre-dates the Iron Age or Romano-British periods. Crouched inhumation is a burial practice common from the Neolithic to Iron Age, though given the location and association with other burials, an early Roman date seems more likely (see below).

9.2 Later Iron Age activity and landscape

Iron Age activity at Parcel F was limited to the south of the site and was primarily represented by a series of large pits. A single ditch, also dated to the late Iron Age, was present, and though truncated by several of the pits, is thought to be broadly contemporary. Comparatively, the Iron Age features recorded on this site are consistent with, and undoubtedly represent a continuation of, the later Iron Age activity observed within the Parcel G investigations, immediately south-west (Walsh 2017).

Datable finds were recovered from three of the pit groups (CG01, CG04, CG05) and included pottery, fragments of triangular loom-weight and animal bone. Organic-rich deposits, including a preserved section of wattle hurdle, were present within pit 4037(CG01) and CG06. Bulk samples were taken from the organic deposits and the wattle hurdle was radiocarbon dated.

Analysis of the pottery indicated that all sherds were a Palaeozoic limestone-tempered ware of late Iron Age date. The fabric is known to continue into the 1st century AD, but a late Iron Age date is supported by the results of the radiocarbon dated wattle hurdle. This provided a calibrated date of 190-10 cal BC and places the pits firmly within the later Iron Age. This remains consistent with the large pits within Parcel G, which were dated to 350-50 cal BC and 160 cal BC – 20 cal AD respectively.

Several factors hint that these large pits likely functioned as waterholes. The size and depth of the pits is consistent with prehistoric waterholes seen at a wealth of other sites, but perhaps more important is the presence of preserved organic remains. The organic-rich deposits seen towards the base of two of the pits (4037/CG06) indicate anaerobic conditions, presumably resulting from waterlogging, were

present for some time during formation. This also provided conditions allowing for the preservation of the wooden wattle hurdle. The large pits within Parcel G were similarly interpreted and the pollen analysis undertaken on one of the pit samples is of some interest. Evidence for meadowsweet pollen was identified, which as a species, is generally absent from permanently waterlogged sites and is typically present at sites with fluctuating water levels. This hints that the surrounding area may only have been waterlogged periodically and questions whether the waterholes were only in use seasonally.

A function other than the storage of water cannot be precluded, however. It is notable that the pit groups are entirely located within the area of sand and gravel geology in the south of Parcel F. Sand is not conducive to holding water and there was no evidence of any lining, clay or otherwise. It is possible that these pits may have functioned as quarries in order to access the localised sand deposits.

The preserved section of wattle hurdle represents the second to be found within the Quedgeley Framework Plan site area. An almost identical section of hurdle was recovered from the base of a pit during the Parcel G investigations (Walsh 2017). No stake-holes or *in situ* upright posts were identified and so it is likely that the hurdle collapsed into the pit following the abandonment of the feature, rather than it representing a pit-lining or internal partition. The wattle hurdle was constructed out of oak, willow and sloe/plum/cherry (*prunus*) with no discernible pattern between the upright staves and horizontal stems, possibly suggesting the use of nearby material to hand. The hurdle was radiocarbon dated to 190-10 cal BC, and this combined with the pottery evidence suggests that the feature went into disuse during the late Iron Age.

Environmental evidence from pits CG01 and CG06 were consistent with that recorded from the Parcel G investigations. Plant macrofossils suggested the pits were surrounded by a landscape of mixed woody-scrubland, possibly comprising hedgerows, and open meadow. Interestingly, weeds that thrive on nitrogen-rich soil may suggest the presence of livestock dung or manure heaps. Unlike Parcel G, however, there was some evidence of arable crops in the charred remains of emmer or spelt wheat and hulled barley. In all, the environmental evidence appears to point towards a surrounding pastoral landscape, with perhaps some limited arable farming within the wider area. This is broadly supported by the animal bone assemblage which, although limited in size, was dominated by cattle. There was some evidence of butchery on the long bones, typically in the form of ‘splitting’ in order to access the marrow. Deposition of the bone within the Iron Age features is predominantly thought to be as refuse, and so the bone assemblage, in conjunction with previous plant macrofossil analysis, may suggest that cattle were being farmed, butchered and consumed nearby.

It is interesting to note, however, that some of the assemblage may not have been deposited as refuse. The cow skull with the associated loomweight found at the base of pit 4041 (CG01) and the dog skull found near to the base of pit CG06 are interesting finds and may signify a pattern of late Iron Age structured deposition across Parcel G and F. Deliberate deposition of artefacts at, or near to, the base of pits was a well-established practice in the British Iron Age and often these special deposits are associated with ‘watery places’ (Cunliffe 2005). The Parcel G investigations recovered a dog skull and a bone weaving comb from the base of a similar pit in 2017. It was suggested that these may represent a deliberate, votive deposit within the pit (Holmes 2017).

The bone weaving comb from a pit in Parcel G, combined with the loomweight from pit 4041 (CG01) may indicate that these deliberate deposits had a particular emphasis on weaving. It could however, simply reflect the craft-working and economy of the local later Iron Age inhabitants. The deposition of cattle and dog bones are common and whilst the presence of cattle bones could be interpreted as a sign of wealth, the presence of the dog skull may reflect its role as guardian (see above). Ritualistic deposition of dog skulls remains as a practice following the Roman conquest and are recorded at sites such as Shiptonthorpe and Wyre Piddle (Millet 2006; Hurst 2017).

No direct evidence for later Iron Age settlement was identified within Parcel F. Indirectly, the presence of pottery, butchered animal bone and loom-weights suggest a domestic site is located nearby. The

lack of any evidence for roundhouses or settlement may be accounted for by the semi-waterlogged character of the site. As mentioned above, the presence of loom-weights, and a bone comb from Parcel G, suggest some craftworking was taking place nearby.

The Iron Age activity observed within Parcel F broadly fits into a pattern of dispersed, low intensity later prehistoric activity previously identified within the former RAF base (Northamptonshire Archaeology 2001; Walsh 2017). It is likely an Iron Age settlement lies nearby, as evidenced by the pottery and animal bone discarded as refuse. Any later Iron Age settlement may be similar in character to others seen within Quedgeley (CA 2015; OA 2005).

9.3 Romano-British activity and landscape

Romano-British activity at Parcel F was primarily focussed in the north of the site, however two ditches in the south represented a continuation of the activity recorded in Parcel G. Activity in the north was focussed on a series of ditches and gullies which it is suggested are primarily agrarian in character, though the finds assemblage hints that the site sits within the vicinity of a settlement. Dateable evidence indicates the Roman activity could be broadly be split into two phases, though a third, separate late Roman phase is possible. Funerary activity, comprising two inhumations and a cremation deposit, were located on the internal edge of an east-west boundary. A nearby animal burial may be associated with this activity.

9.3.1 Romano-British activity at Parcel F

The earliest evidence for Roman activity on the site dated from the 1st to mid-2nd centuries AD and comprised a few small field boundary ditches, a cremation deposit, and an animal burial. Other, more broadly dated Roman features, may also date from this period and the residuality of early Roman pottery within later ditches hints at a moderate level of activity from this period. Three ditches in the north of the site could form the south-western corner of a small enclosure or paddock, though based on the residuality of much of the material, the dating is tentative.

Roman activity appeared to intensify from the mid-2nd century and this period saw the construction of a large boundary ditch (CG23) which traversed the site in a broadly north-east to south-west alignment. This activity appeared to shift the land-use slightly further south, and there was some evidence that it functioned, in part, as a re-establishment of the early Roman paddock to the north-east. An overall function of the boundary is hard to discern however, as it continued past the western limit of site, and was heavily truncated in the east. Despite significant horizontal truncation the ditch had an average depth of 0.55m, suggesting it may have been fairly substantial when initially constructed. The majority of the Roman assemblage was recovered from this ditch and the dateable evidence indicates the ditch was primarily backfilled with refuse of 2nd and 3rd century AD date. Perhaps the best dating evidence is provided by an exceptional find comprising a stamped mortarium sherd (see above). The sherd is stamped with mark of the potter *Iunius 2*, who worked at the Mancetter-Hartshill potteries in Warwickshire and it is suggested that the mortaria was produced between AD145-170. Significantly, the sherd recovered from this project represents only the third stamp recorded from Die 23 (see above).

Boundary ditch CG23 appears to have been backfilled by the late 3rd or early 4th centuries AD, as evidenced by the presence of a near-complete black burnished ware vessel in the final fill. This vessel may have been deposited as a deliberate ‘closing’ deposit, though it did not appear to be within a separate cut. The boundary was re-cut several times however (CG24/25/08), suggesting that land-use continued into the late Roman period. However, no other late Roman material was recovered from these ditches with the assemblage primarily comprising 2nd century material. This is presumed to be residual, however, it may suggest some contemporality with the original boundary CG23, or alternatively, a change in the character of the site. This may coincide with the establishment of the probable villa site at the Olympus Business Park in the late 3rd century AD (Sermon 1996; 1997).

Other ditches and gullies in the north of Parcel F were broadly dated to the Roman period, based either on association, stratigraphic relationships or pottery dating that could not be further refined. It is

assumed that many of these features functioned as drainage or boundary ditches, however a probable drove-way (CG31/32) was present in the north of site. Like much of the archaeology seen across site, the drove-way ditches were heavily truncated but were aligned north-west to south-east and continued past the northern limit of the excavation area. Two parallel ditches (CG20/21) in the west of the site may also represent similar activity but they were only visible for *c* 10m and so interpretations are limited.

No direct evidence of settlement was identified within the Parcel F site, and no remains of structures were encountered. Evidence suggests that the site sits on the periphery of a Roman settlement, likely a small farmstead, and the alignment of the ditches indicates this may lie somewhere to the north-west. The majority of the pottery appears to be locally produced in the Severn Valley, however, there is some evidence for a smattering of high-status activity. The presence of south Gaulish Samian ware, the stamped mortarium sherd, and an amphora sherd suggest some level of wealth and trade in the vicinity of the site, though clearly at a low intensity. It is interesting to note, however, that these finds date from the 1st and 2nd centuries and so are likely to pre-date the villa site to the north (Sermon 1996; 1997). The amphora sherd is of a type produced in Spain for the transportation of olive oil and so indicates some level of trade. This is perhaps unsurprising given the location of the site, near to the River Severn and the Roman road linking *Glevum* to *Abonae* (Margary 1973).

Tegula and stone roof tile fragments recovered from a boundary ditch (CG23) provide further evidence for some high-status activity, and hint that the site was located in the vicinity of a substantial Roman building. It is not inconceivable that these may have originated at the Olympus Business Park villa site, *c* 800m north, particularly considering stone roof tiles may be a later Roman characteristic (Perring 2002). The presence of some Severn Valley ware wasters suggests a kiln was present nearby and could possibly be linked to that which was tentatively identified at the Olympus Business Park (Sermon 1996).

Environmental evidence for the Romano-British period was limited in comparison to the Iron Age, suffering from a lack of any organic-rich deposits like those seen within the waterholes to the south. There was however, some limited evidence for emmer or spelt wheat and hulled barley grain within the boundary ditch CG23, which appears to show some continuity in crop use from the late Iron Age. The limited presence of arable crops within the samples may also indicate a continuation in pastoral farming practices. This is broadly supported by evidence from the animal bone assemblage, which was once again dominated by cattle bone, however there was some limited evidence for pig, cow and horse. Generally, however, the bone assemblage is too small to provide any conclusive evidence.

The Roman funerary activity on site comprised two inhumations, a cremation deposit, and a possible third grave. The graves were all located on the northern (internal) edge of the primary boundary ditch CG23 but may date from the 1st and 2nd centuries AD. The cremation pit is securely dated to this period and as well as containing a sherd of early Roman pottery, produced a radiocarbon date of 30-210 cal AD. This is consistent with general Roman funerary practice with cremation burials more prevalent in the early Roman period, whereas inhumations become more common after the mid-2nd century AD (Pearce 2013).

Whilst clearly representing some form of funerary activity, the cremation deposit may only represent a token burial (see above). Only a small quantity of cremated human bone was recovered from the pit and so the deposit may more accurately be described as a ‘cremation related deposit’. It is possible, however, that truncation by a Roman boundary ditch (CG23) removed much of the cremated remains and so influences this interpretation. What little bone was present indicated that the deposit contained the remains of one individual, and though the age or sex could not be determined, stable isotype analysis indicated the individual resided to the south or west of Quedgeley in their later years of life. Of particular interest is the presence of cremated animal bone mixed within the deposit. This is not an uncommon practice, and whilst the species could not be identified, it may hint that the nearby calf burial (CG13) is associated with the cluster of funerary activity observed against boundary ditch CG23.

The crouched inhumation may be associated with the cremation pit and so could also be early Roman in date. It was positioned similarly to the cremation pit, located on the northern (internal) edge of the boundary ditch CG23, just 7m west. Unfortunately, the burial was heavily truncated by two ditches and only the lower half of the remains survived. However, these suggested the burial was of an adult, male. The practice of crouched inhumation is typically a prehistoric one, and recent examples include those excavated at Bourton-on-the-Water, and Broadway on the Gloucestershire/Worcestershire border (CA 2017; Bradley 2020). However, archaeological investigations at nearby Hucclecote (7km north-east) identified several mid-2nd century AD burials of crouched inhumation type, which have been interpreted as a continuation of later prehistoric funerary practice (Thomas *et al* 2003). It is possible that the crouched inhumation excavated in this project represents a similar continuance.

A second inhumation was also located north of boundary ditch CG23 and was likely part of the funerary activity including the cremation pit and crouched inhumation. The bone preservation was extremely poor and whilst a sex could not be identified, the remains are thought to be of an adolescent or juvenile. It was located immediately west of a rectilinear cut, and whilst no skeletal remains were present, may have been another grave. Though no dating material was present, the juvenile inhumation is almost certainly of Roman origin, based on an association with the cremation pit (CG17) and the Roman boundary ditch (CG23). Burials on, or often in, the boundary ditches of Roman rural settlements are not uncommon, and examples from Quedgeley include that excavated at Mayo's Land (CA 2015).

The burial of a calf, located just 3m south of the crouched inhumation, may represent some element of votive activity. An early Roman date seem likely based on pottery evidence and an association the burials to the north. The burial, though truncated, likely contained the entire remains of a juvenile cow and so could be more mundane in character, simply reflecting the disposal of fallen livestock. However, there is some nearby evidence of cattle remains as grave offerings in the Roman period at Kingswood, approximately 22km south (Cornah forthcoming). Alternatively, it may represent a continuation of late Iron Age practices, particularly when considering the intentionally deposited cattle skull within pit 4037 (CG01) in the south of the site. It is also curious to note that the human graves appear to be located inside of the boundary ditch (CG23) and if the calf burial is associated with this activity, its location south (external) of the boundary may be intentional.

9.3.2 The Parcel F site within the wider Roman landscape

As established above, the Parcel F site at Quedgeley sits within a heavily Romanised landscape. The Roman urban centre of Gloucester (*Glevum*) lies just 4km to the north. *Glevum* was established as a legionary fortress in the mid-1st century AD, and was granted *colonia* status in *c* 97 AD. This would have invariably led to veteran legionaries resettling the surrounding landscape and subsequently would have expressed significant cultural influence over Quedgeley. Notably, the Parcel F site also sits within a kilometre of the proposed route of the Roman road linking *Glevum* to *Abonae* (Margary 1973). Access to maritime trade was available from *Abonae*, as well as an established sea-route with legionary fortress at Caerleon (*Isca Augusta*) across the Severn estuary.

Activity dating from the Romano-British period at Parcel F appears to reflect some small-scale rural, probably agricultural, land-use. This perhaps reflects the sites position in the agricultural hinterland of Gloucester. No direct settlement evidence was identified within the excavation area; however, it is likely the site sits on the periphery of one, possibly a small farmstead. Comparatively, this is consistent with previous investigations undertaken around Quedgeley, with several nearby sites comprising field systems and enclosures, predominantly dating from the 1st and 2nd centuries AD (CA 2015; 2016; 2019; OA 2005). Two of these sites, at Quedgeley East and Mayo's Land, also recorded Roman inhumations against boundary features, which as discussed earlier, is not uncommon for rural sites.

The vast majority of the pottery assemblage from Parcel F dates from the 2nd century AD and may represent more intensive occupation or land-use during this period. This may suggest the area was becoming more heavily 'Romanised' during this period, possibly following the resettlement of

legionary veterans from Gloucester. The presence of late 3rd or early 4th century pottery within the final backfill of a boundary ditch hints that the site may have gone out of use, or undergone significant change at this time, possibly coinciding with the establishment of a probable villa site to the north (Sermon 1996; 1997). If so, this could reflect a general trend of structural, social and economic change seen across much of Britain, including the South West, during the later Roman period (Dark and Dark 1997).

9.4 Post-medieval and modern

There was no evidence of any medieval remains within the Parcel F excavations and the post-medieval period was represented by the substantial boundary ditch CG33, visible as a boundary on the 1st edition OS mapping. The site is susceptible to flooding and this may account for the size of the boundary, which may have been designed to hold large volumes of water during winter months. This could also account for the abundant re-cutting of the ditch as frequent maintenance would presumably have been necessary.

The modern truncation which dominated the site relates to the former RAF buildings and services. This caused a significant level of truncation to much of the archaeology and undoubtedly influences the interpretation of the site.

9.5 Parcel E Trenching

A single gully, likely Roman in date, was identified within the Parcel E trenching. The gully was not excavated, but a sherd of Roman Severn valley ware pottery was recovered from the fill. The gully appeared to align with the probable drove-way ditch (CG32) seen in the north of Parcel F suggesting a continuation of this activity. The gully was not present in Trench 29, however, hinting at some level of truncation.

10 Conclusions

The archaeological investigations at Parcel F of the Quedgeley Framework Plan identified archaeological remains predominantly dating from the late Iron Age and Romano-British periods. Prehistoric activity pre-dating the Iron Age was represented by residual flint artefacts, though a crouched inhumation could date from this period.

Later Iron Age activity was characterised by several large pits, likely functioning as waterholes. Two of the pits contained organic-rich deposits and a section of preserved wattle hurdle survived within one such deposit. Dating evidence from the pottery assemblage indicated a later Iron Age date, which was confirmed by radiocarbon dating undertaken on the wattle hurdle. The animal bone assemblage was dominated by cattle, and environmental evidence indicated the surrounding landscape was predominantly a pastoral one. There was some evidence of votive activity within the pits, comprising the deliberate deposition of a dog skull, cow skull and a loom-weight. This mirrors the deposition of a bone weaving comb and a dog skull within a similar pit in the nearby Parcel G excavations.

Romano-British activity could tentatively be split into two separate phases, with some evidence of early (1st to mid-2nd century AD) land-use which continued through to the early 4th century AD. The Romano-British element appeared agrarian in character, predominantly comprising small boundary ditches and gullies, with no direct evidence of settlement identified within the site. The presence of funerary activity is common for Roman rural sites, and a cremation deposit produced a radiocarbon date of 30-210 cal AD. A nearby crouched inhumation and associated calf burial are also likely to be early Roman in date and could represent a continuation of later prehistoric funerary activity.

The finds assemblage hinted that the site lay within the vicinity of a settlement, probably a small, rural farmstead. A level of high-status pottery, dating from the 1st and 2nd centuries and including an exceptional sherd of mortarium, indicated some level of wealth. The presence of Spanish amphora may provide evidence of trade and finds of tegula and stone roof tile may be associated with the late 3rd century villa site to the north.

Archaeology post-dating the Roman period was confined to a large, post-medieval boundary ditch and modern truncation associated with the 20th century military use of the site. The two additional evaluation trenches in Parcel E identified the presence of a small Roman gully, which may be associated with a potential drove-way in the north of Parcel F.

10.1 Research Frameworks

The archaeological results of the Parcel F investigations have the potential to contribute to several of the research aims identified in the South-West Archaeological Research Framework (Webster 2008; Section 3 of this report). The aims are as follows:

- Research Aim 20: Improve our understanding of wild and cultivated plants in the past
- Research Aim 21: Improve our understanding of the environmental aspects of farming
- Research Aim 29: Improve our understanding of non-villa Roman rural settlement.
- Research Aim 42: Assess the impact of the Roman Empire on farming

The results also have the potential to contribute to the following aim, not originally set out in Section 3:

- Research Aim 58: Widen our understanding of Roman burial traditions

10.2 Statement of confidence in methods and results

The methods adopted allow a high degree of confidence that the aims of the project have been achieved. Conditions were suitable in all of the trenches to identify the presence or absence of archaeological features. However, such was the level of modern truncation seen across the site that it is considered that the nature, density and distribution of archaeological features may not provide an accurate characterisation of the development site as a whole.

11 Project personnel

The fieldwork was led by Richard Bradley, MCIfA, Peter Lovett, ACIfA and Andrew Walsh, ACIfA. They were assisted by Graham Arnold, PCIfA, Jem Brewer, PCIfA, Elspeth Iliff, PCIfA, Adrian Robins, Jesse Wheeler, ACIfA, Hazel Whitefoot, PCIfA, Beth Williams and Ed Pearson. Fieldwork assistance was also provided by Chris, Agi, and Ruby from Cotswold Archaeology.

The project was managed by Tom Rogers, MCIfA. The report was produced and collated by Jamie Wilkins, ACIfA. Specialist contributions and individual sections of the report are attributed to the relevant authors throughout the text.

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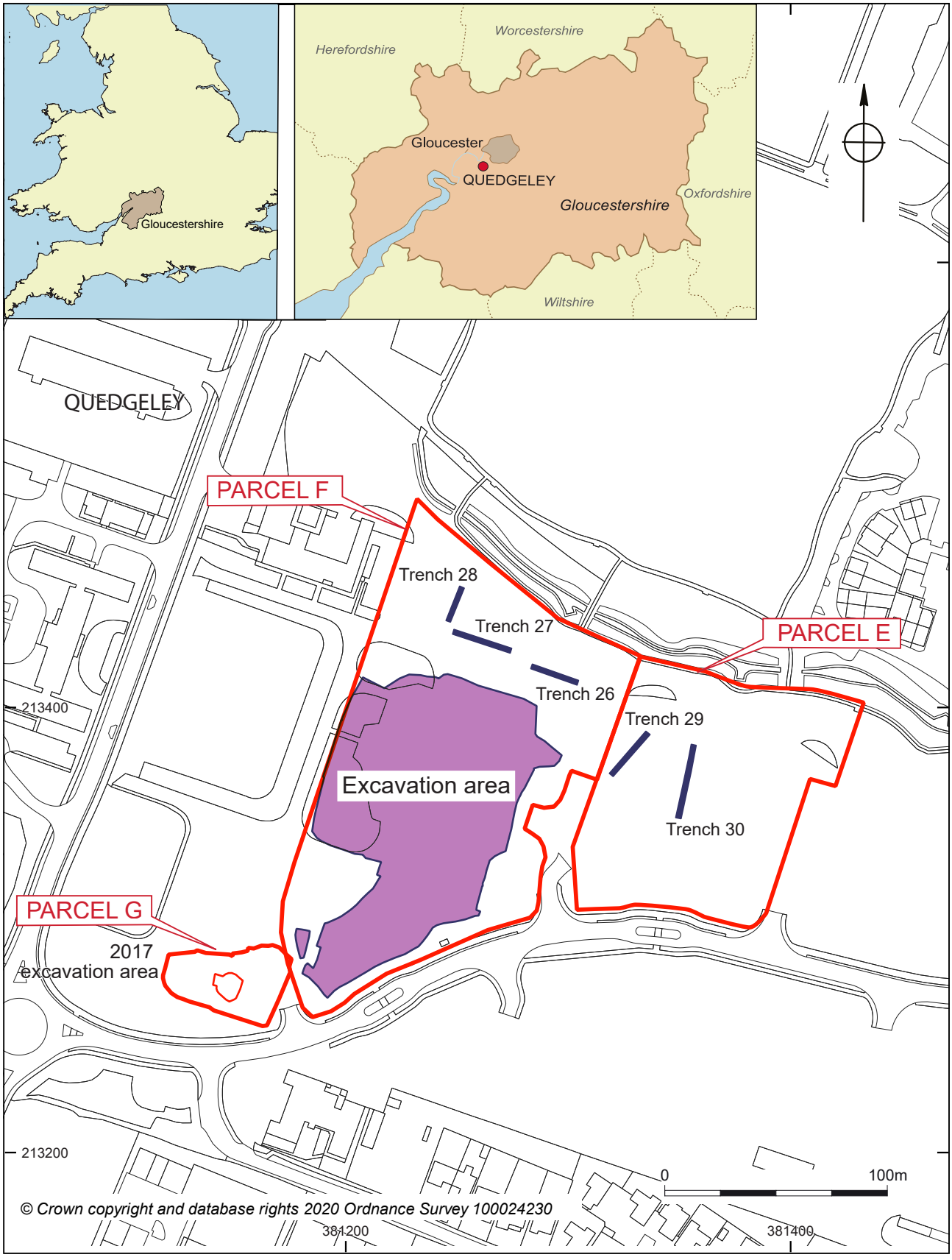
Figures



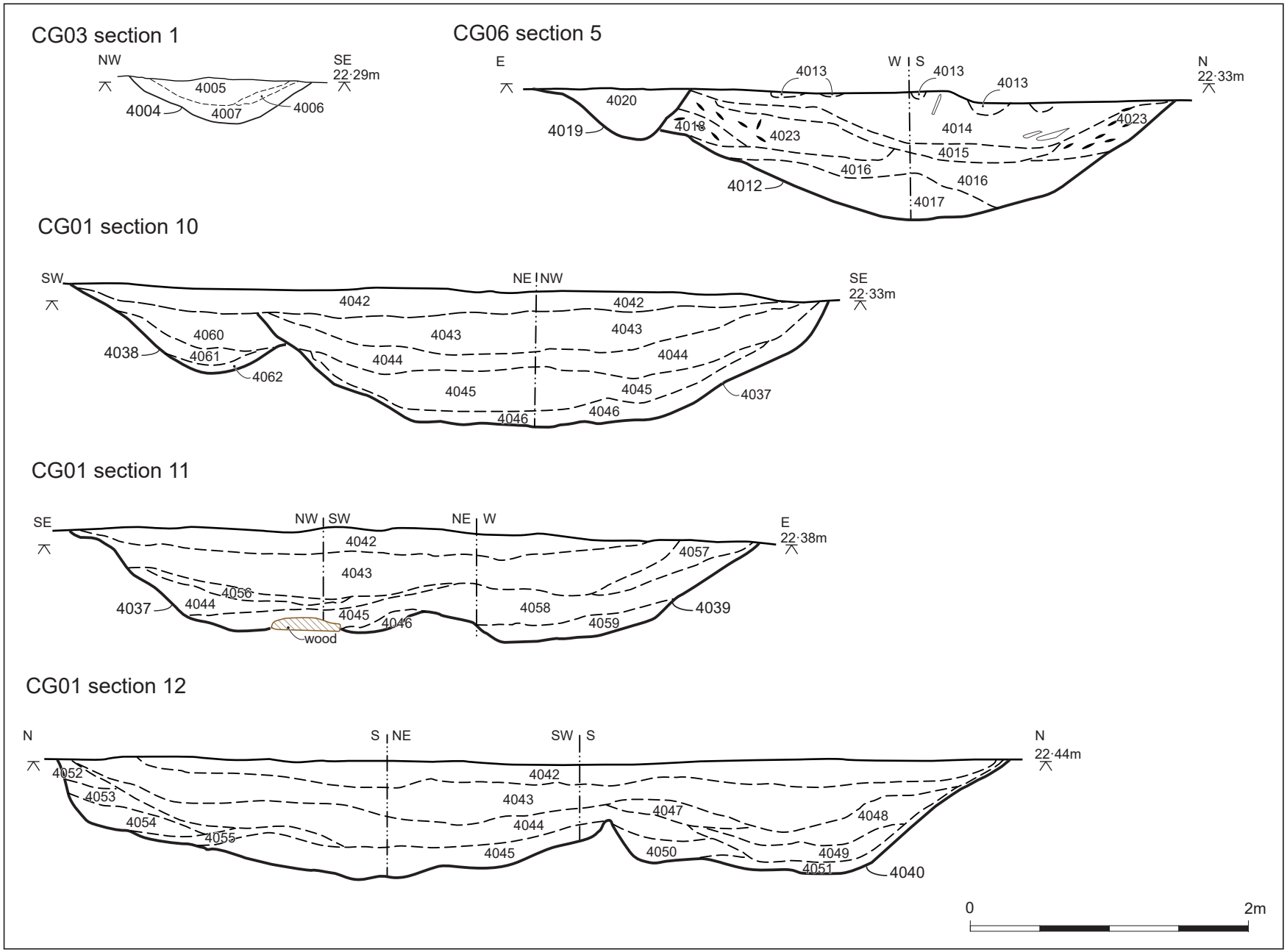
Site location: excavation area and evaluation trenches *Figure 1*

All features with phasing

Figure 2

Archaeological features in the south of Parcel F

Figure 3

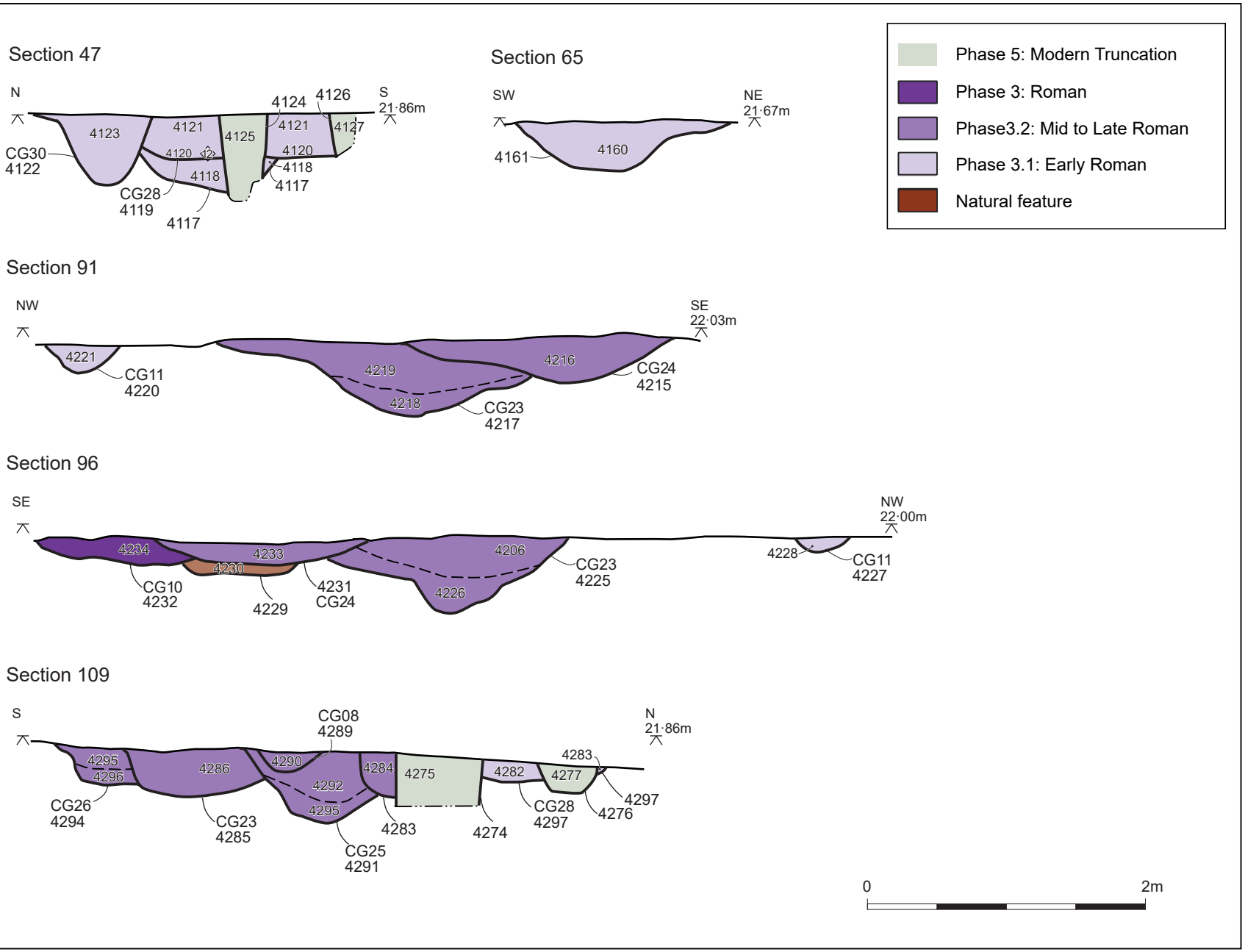


Sections: Iron Age features

Figure 4

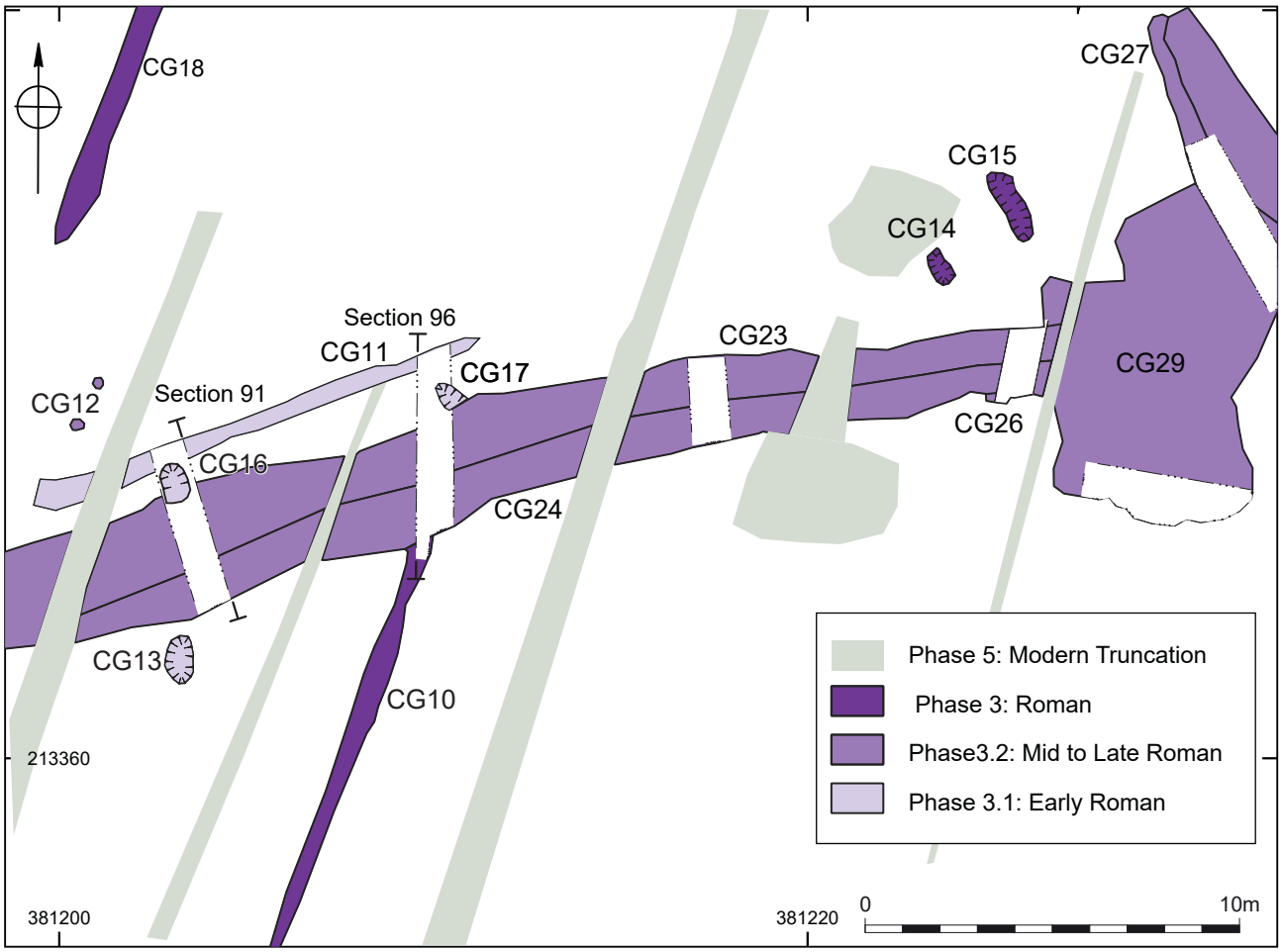
Archaeological features in the north of Parcel F

Figure 5

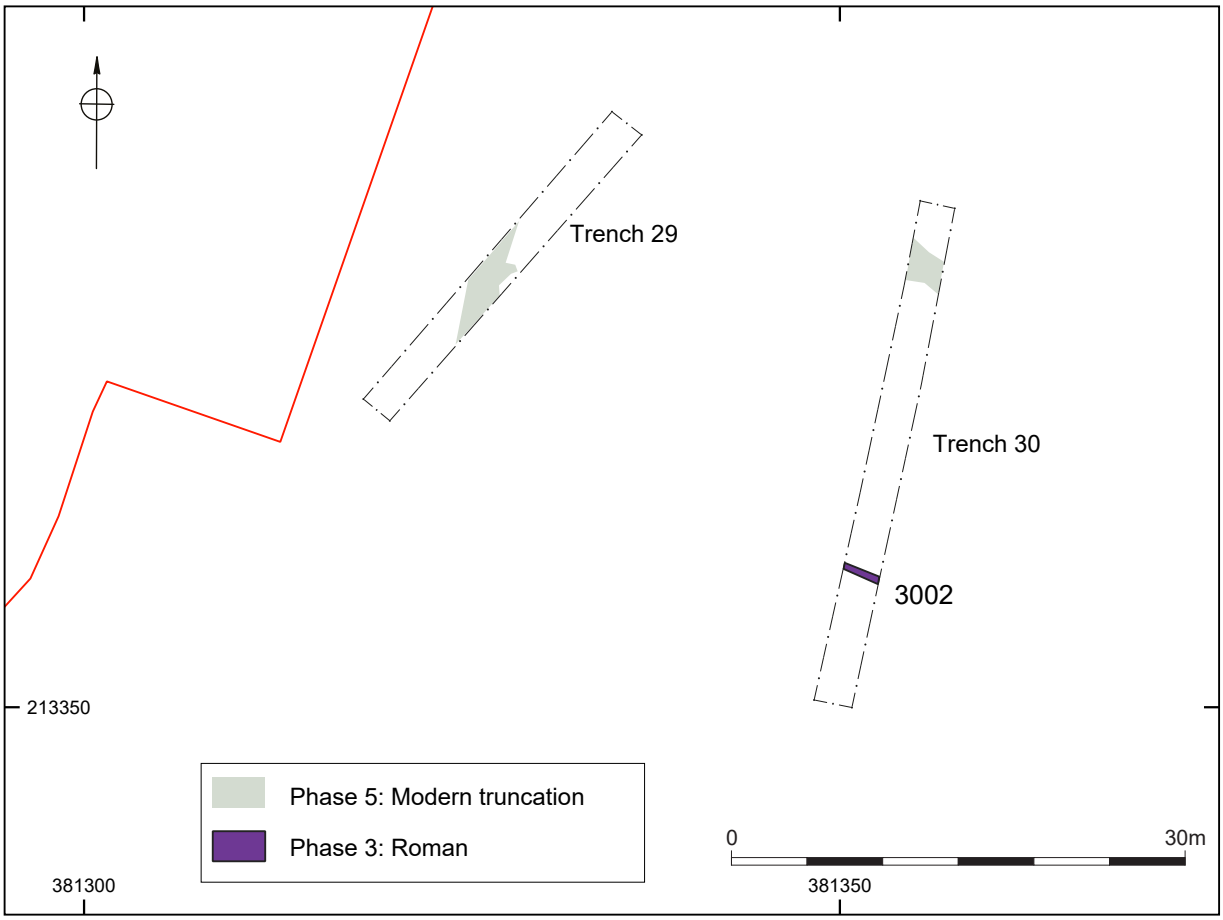


Sections: Roman features

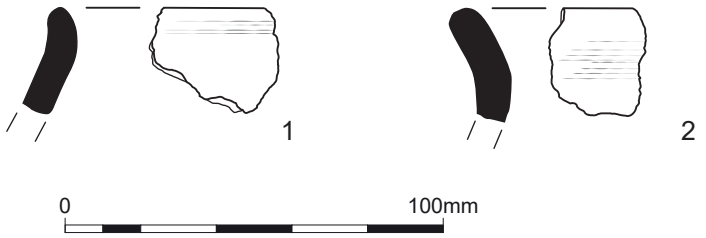
Figure 6



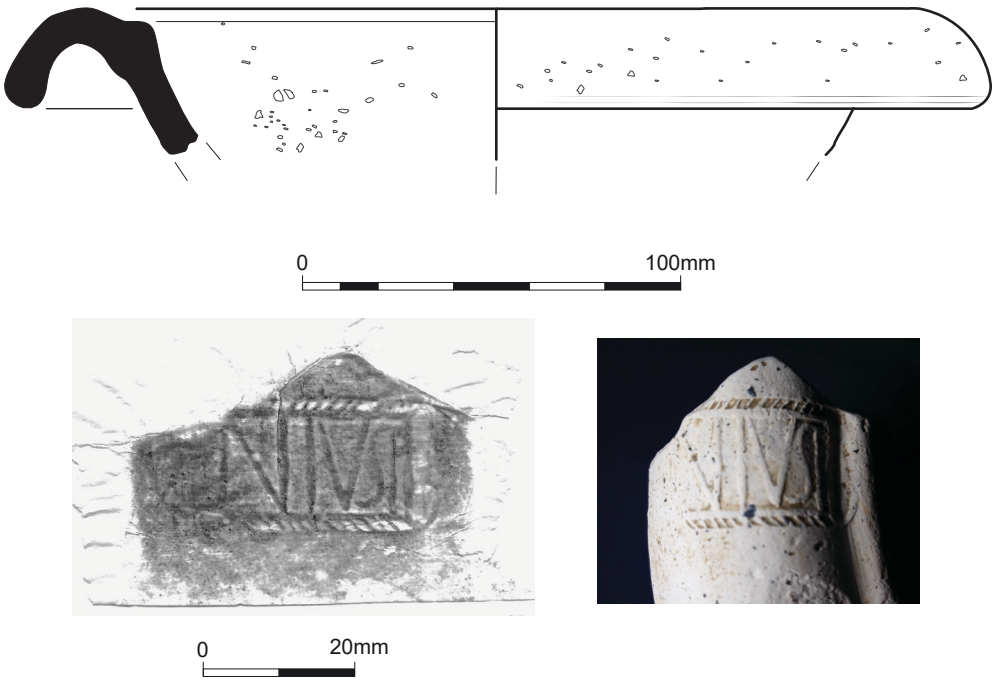
Graves: CG13, 14, 15, 16 and 17 *Figure 7*



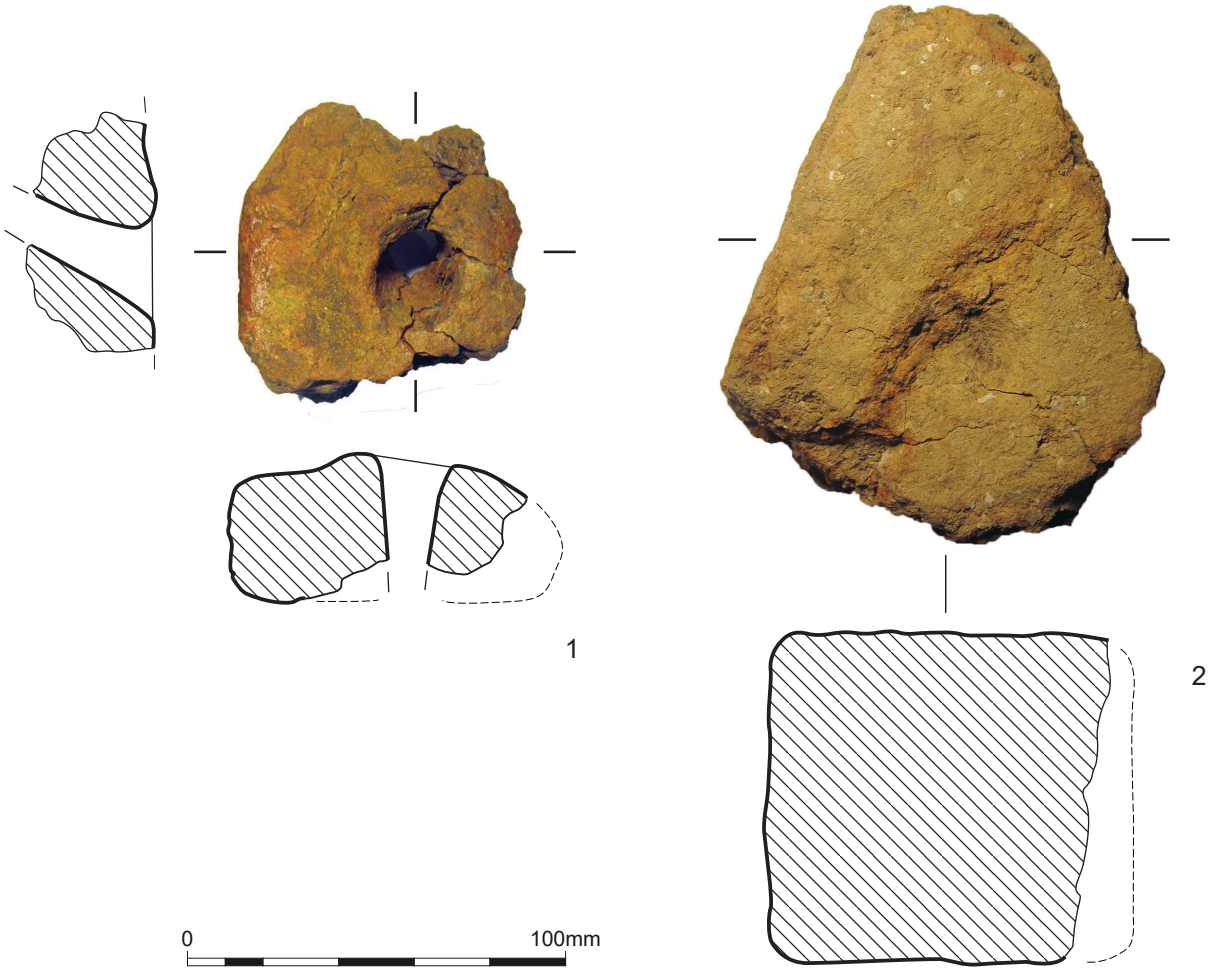
Evaluation trenches 29-30 in Parcel E *Figure 8*



Iron Age pottery *Figure 9*



Mortaria *Figure 10*



Loomweights *Figure 11*

Plates

Plate 1: North-west facing section of later Iron Age ditch 4004 (CG03) in the south of Parcel F, 1m scale.

Plate 2: Looking north-west across excavated slots within pit cluster CG01. Pit 4037, containing the dark, organic-rich deposits, is visible in the foreground. 1m scales.

Plate 3: Looking west across the late Iron Age pit cluster CG01, 1m scales.

Plate 4: The exposed, preserved wattle hurdle at the base of late Iron Age pit 4037 (CG01). Horizontal rows of roundwood are interwoven between vertical staves. It is thought the hurdle collapsed into the pit following the abandonment of the feature and was preserved by the anaerobic conditions present towards the base. View south, 1m scale.

Plate 5: Looking south-west towards the preserved section of wattle hurdle at the base of pit 4037 (CG01). Radiocarbon dating of the hurdle provided a calibrated date of 190-38 cal BC. 1m scale.

Plate 6: The cow skull and loom-weight fragment (right) at the base of pit 4041 (CG01) may have been deliberately deposited and could form part of a sequence of structured deposition seen in late Iron Age pits across the site. 0.50m scale.

Plate 7: East facing section of an excavated quadrant within later Iron Age pit 4012 (CG06). Dark, organic-rich deposits can be seen within the pit. Scales 1m.

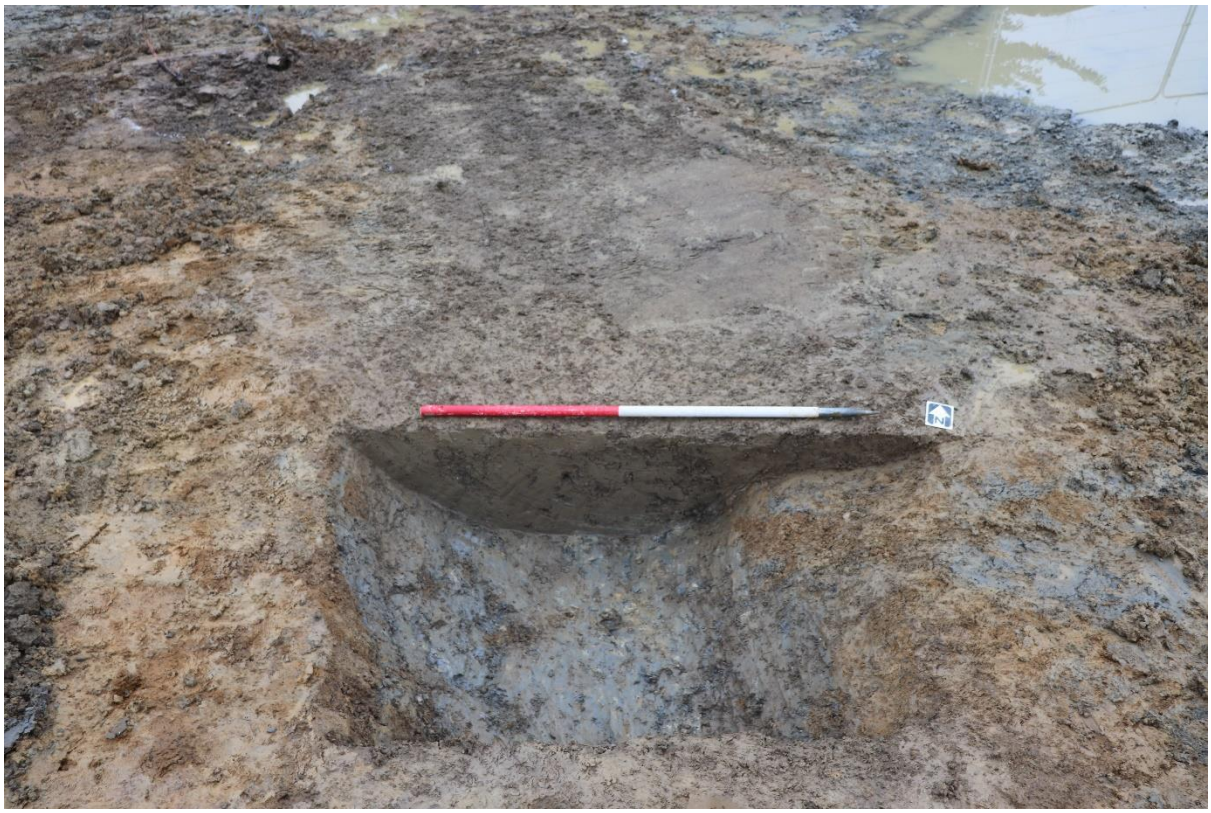


Plate 8: South facing section within early Roman ditch 4161. Pottery sherds from an upright tankard were recovered from this slot and provide a date range of between 1st to mid-2nd century AD. 1m scale.

Plate 9: East facing section of probable field boundary ditch 4111 (CG30) which may form a small paddock or enclosure with ditches 4161/CG28. 0.50m scale.

Plate 10: North-east facing section of probable cremation pit CG17. Radiocarbon dating of the calcined bone provided a calibrated date of between 50-180 cal AD. 0.50m scale.

Plate 11: The heavily truncated and poorly preserved remains of crouched inhumation burial CG16. Though undated, the burial is thought to be early Roman in date based on an association with the nearby cremation pit CG17 and animal burial CG13. 0.50m scale.

Plate 12: Crouched inhumation CG16 was heavily truncated by Roman ditches CG11 (left) and CG23 (right). Ditch recut CG24 is also visible (top right). 0.50m and 1m scales.

Plate 13: The calf burial (CG13) was located approximately 3m south of the crouched inhumation (CG16) and pottery evidence indicates it dates from the early Roman period. View east, 0.50m scale.

Plate 14: East facing section of mid to late Roman boundary ditch CG23. 1m scales.

Plate 15: South-east facing sections of mid to late Roman boundary ditches CG23 and CG25. 1m scales.

Plate 16: East facing section of mid to late Roman boundary ditches CG23 (right), CG24 (middle) and probable posthole 4253/CG26 (left). 1m scale.

Plate 17: Grave CG154 containing the poorly preserved remains of a juvenile inhumation burial. The remnants of the skull can be seen at the southern end of the grave. 1m scale.

Plate 18: Looking west across the remnants of grave CG14 and the juvenile inhumation. The grave was located next to the boundary ditch CG23 and is likely of Roman date. 1m scale.

Plate 19: A sub-rectangular cut next to burial CG14 may represent another grave, though no skeletal remains were present. View south, 1m scale.

Plate 20: Excavating the large post-medieval orchard boundary ditch CG33 in the north of Parcel F.

Plate 21: West facing section of large post-medieval boundary ditch CG33. 1m scales.

Plate 22: Excavation took place under challenging onsite conditions.

Plate 23: General shot of Parcel E Trench 29. View north-east, 1m scales.

Plate 24: General shot of Parcel E Trench 30, which contained a probable Roman gully. View south, 1m scales.

Appendix 1: Summary of project archive (P5611)

TYPE	DETAILS*
Artefacts and Environmental	Animal bones, Ceramics, Environmental, Human bones, Metal, Wood, Worked stone/lithics
Paper	Context sheet, Diary (Field progress form), Drawing, Plan, Report, Section
Digital	Database, GIS, Images raster/digital photography, Spreadsheets, Survey, Text

**OASIS terminology*

The project archive is currently held at the offices of Worcestershire Archaeology. Subject to the agreement of the landowner it is anticipated that it will be deposited at the Museum of Gloucester.

Appendix 2: Radiocarbon dating report (Beta Analytica)

Beta Analytic
TESTING LABORATORY

Beta Analytic Inc
4985 SW 74 Court
Miami, Florida 33155
Tel: 305-667-5167
Fax: 305-663-0964
info@betalabservices.com

ISO/IEC 17025:2005-Accredited Testing Laboratory

July 08, 2020

Ms. Elizabeth Pearson
Worcestershire Archaeology
The Hive, Sawmill Walk, The Butts
Worcester, WRI 3PD
United Kingdom

RE: Radiocarbon Dating Results

Dear Ms. Pearson,

Enclosed are the radiocarbon dating results for two samples recently sent to us. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable. The Conventional Radiocarbon Ages have all been corrected for total fractionation effects and where applicable, calibration was performed using 2013 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a cvs spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

Reported results are accredited to ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 standards and all chemistry was performed here in our laboratory and counted in our own accelerators here. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 program participated in the analyses.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result. The reported d13C values were measured separately in an IRMS (isotope ratio mass spectrometer). They are NOT the AMS d13C which would include fractionation effects from natural, chemistry and AMS induced sources.

When interpreting the results, please consider any communications you may have had with us regarding the samples.

Our invoice will be emailed separately. Please forward it to the appropriate officer or send a credit card authorization. Thank you. As always, if you have any questions or would like to discuss the results, don't hesitate to contact us.

Sincerely,

Ronald E. Hatfield President

Beta Analytic Inc
4985 SW 74 Court
Miami, Florida 33155
Tel: 305-667-5167
Fax: 305-663-0964
info@betalabservices.com

ISO/IEC 17025:2005-Accredited Testing Laboratory

REPORT OF RADIOCARBON DATING ANALYSES

Elizabeth Pearson

Worcestershire Archaeology

Report Date: July 08, 2020

Material Received: June 19, 2020

Laboratory Number	Sample Code Number	Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) & Stable Isotopes Calendar Calibrated Results: 95.4 % Probability High Probability Density Range Method (HPD)	
Beta - 561330	**P5611/4214/16**	**1900 +/- 30 BP**	IRMS δ13C: -22.9 o/oo IRMS δ18O: -18.0 o/oo
(88.4%)	**50 - 180 cal AD**	**(1900 - 1770 cal BP)**	
(5.1%)	**186 - 214 cal AD**	**(1764 - 1736 cal BP)**	
(1.9%)	**28 - 39 cal AD**	**(1922 - 1911 cal BP)**	

Submitter Material: Bone (Cremated)
Pretreatment: (cremated bone carbonate) bone carbonate extraction (acid wash prior to acidification)
Analyzed Material: Cremated bone carbonate
Analysis Service: AMS-Standard delivery
Percent Modern Carbon: 78.94 +/- 0.29 pMC
Fraction Modern Carbon: 0.7894 +/- 0.0029
D14C: -210.64 +/- 2.95 o/oo
Δ14C: -217.29 +/- 2.95 o/oo (1950:2020)
Measured Radiocarbon Age: (without d13C correction): 1870 +/- 30 BP
Calibration: BetaCal3.21: HPD method: INTCAL13

Results are ISO/IEC-17025:2005 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and 4 Thermo IRMSs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5568 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP), "present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (oxalic acid). Quoted errors are 1 sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. d13C values are on the material itself (not the AMS d13C). d13C and d15N values are relative to VPDB-1. References for calendar calibrations are cited at the bottom of calibration graph pages.

Beta Analytic Inc
4985 SW 74 Court
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Fax: 305-663-0964
info@betalabservices.com

ISO/IEC 17025:2005-Accredited Testing Laboratory

REPORT OF RADIOCARBON DATING ANALYSES

Elizabeth Pearson — Report Date: July 08, 2020

Worcestershire Archaeology — Material Received: June 19, 2020

Laboratory Number	Sample Code Number	Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) & Stable Isotopes Calendar Calibrated Results: 95.4 % Probability High Probability Density Range Method (HPD)	
Beta - 561332	**P5611/4065/10**	**2080 +/- 30 BP**	IRMS δ13C: -26.8 o/oo
(94.5%)	**190 - 38 cal BC**	**(2139 - 1987 cal BP)**	
(0.9%)	**9 - 3 cal BC**	**(1958 - 1952 cal BP)**	

Submitter Material: Woody Material
Pretreatment: (wood) acid/alkali/acid
Analyzed Material: Wood
Analysis Service: AMS-Standard delivery
Percent Modern Carbon: 77.19 +/- 0.29 pMC
Fraction Modern Carbon: 0.7719 +/- 0.0029
D14C: -228.13 +/- 2.88 o/oo
Δ14C: -234.63 +/- 2.88 o/oo (1950:2020)
Measured Radiocarbon Age: (without d13C correction): 2110 +/- 30 BP
Calibration: BetaCal3.21: HPD method: INTCAL13

Results are ISO/IEC-17025:2005 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and 4 Thermo IRMSs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5568 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP), "present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (oxalic acid). Quoted errors are 1 sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. d13C values are on the material itself (not the AMS d13C). d13C and d15N values are relative to VPDB-1. References for calendar calibrations are cited at the bottom of calibration graph pages.

Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method (HPD): INTCAL13)

(Variables: d13C = -22.9 o/oo)

Laboratory number **Beta-561330**

Conventional radiocarbon age **1900 ± 30 BP**

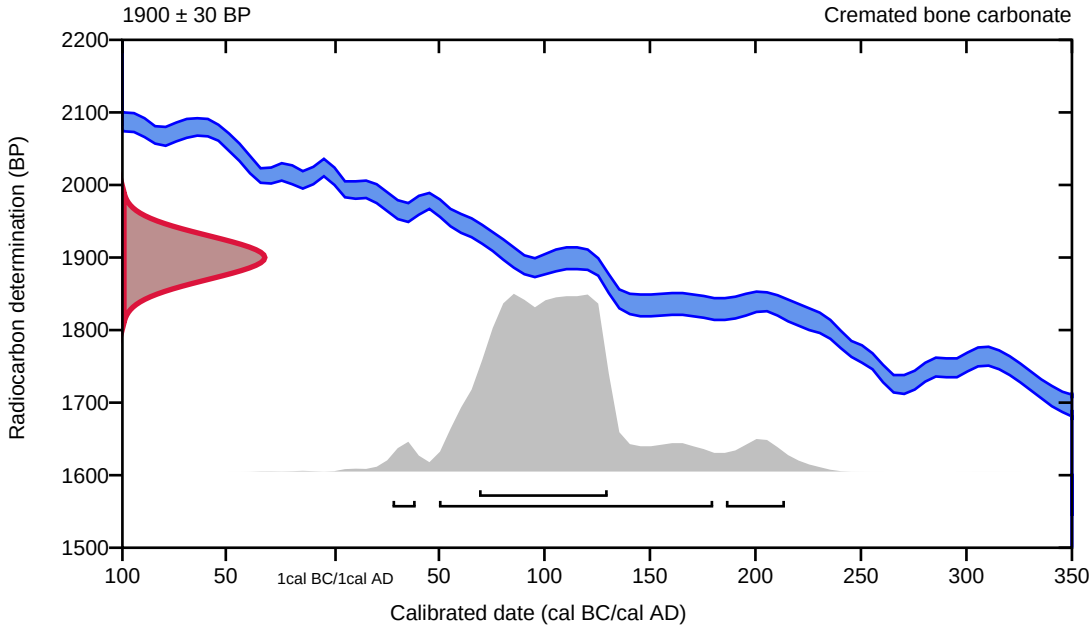
95.4% probability

(88.4%)	50 - 180 cal AD	(1900 - 1770 cal BP)
(5.1%)	186 - 214 cal AD	(1764 - 1736 cal BP)
(1.9%)	28 - 39 cal AD	(1922 - 1911 cal BP)

68.2% probability

(68.2%)	69 - 130 cal AD	(1881 - 1820 cal BP)

P5611/4214/16



Database used

INTCAL13

References

References to Probability Method

Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. Radiocarbon, 51(1), 337-360.

References to Database INTCAL13

Reimer, et.al., 2013, Radiocarbon55(4).

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Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method (HPD): INTCAL13)

(Variables: d13C = -26.8 o/oo)

Laboratory number **Beta-561332**

Conventional radiocarbon age **2080 ± 30 BP**

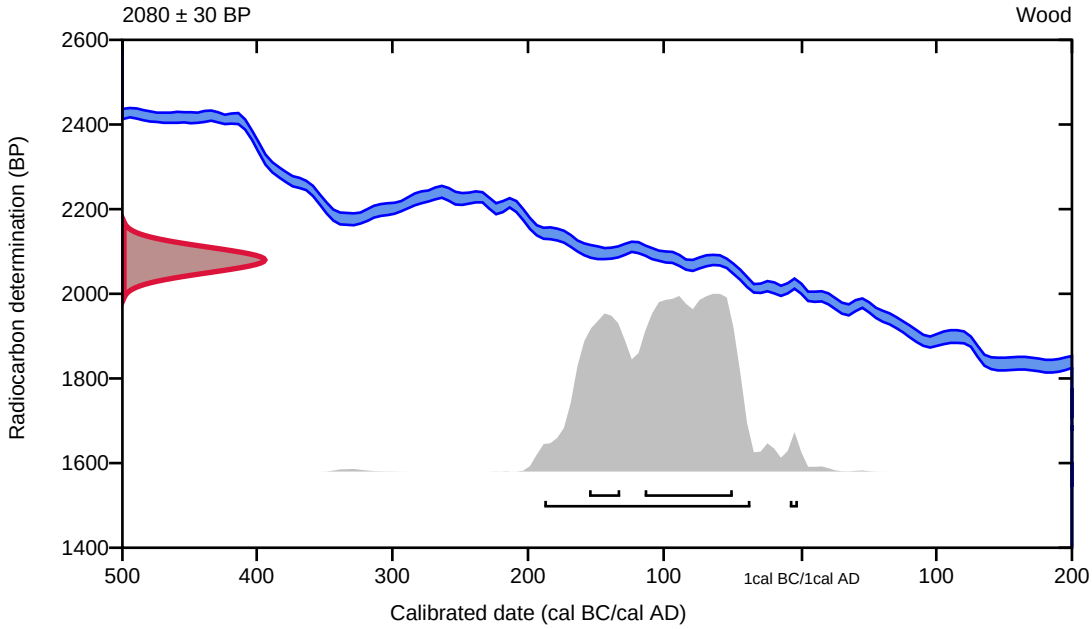
95.4% probability

(94.5%)	190 - 38 cal BC	(2139 - 1987 cal BP)
(0.9%)	9 - 3 cal BC	(1958 - 1952 cal BP)

68.2% probability

(52%)	116 - 51 cal BC	(2065 - 2000 cal BP)
(16.2%)	157 - 134 cal BC	(2106 - 2083 cal BP)

P5611/4065/10



Database used

INTCAL13

References

References to Probability Method

Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. Radiocarbon, 51(1), 337-360.

References to Database INTCAL13

Reimer, et.al., 2013, Radiocarbon55(4).

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ISO/IEC 17025:2005-Accredited Testing Laboratory

Quality Assurance Report

This report provides the results of reference materials used to validate radiocarbon analyses prior to reporting. Known-value reference materials were analyzed quasi-simultaneously with the unknowns. Results are reported as expected values vs measured values. Reported values are calculated relative to NIST SRM-4990B and corrected for isotopic fractionation. Results are reported using the direct analytical measure percent modern carbon (pMC) with one relative standard deviation. Agreement between expected and measured values is taken as being within 2 sigma agreement (error x 2) to account for total laboratory error.

Report Date: July 08, 2020
Submitter: Ms. Elizabeth Pearson

QA MEASUREMENTS

Reference 1	
Expected Value:	129.41 +/- 0.06 pMC
Measured Value:	129.43 +/- 0.37 pMC
Agreement:	Accepted
Reference 2	
Expected Value:	0.45 +/- 0.04 pMC
Measured Value:	0.45 +/- 0.03 pMC
Agreement:	Accepted
Reference 3	
Expected Value:	96.69 +/- 0.50 pMC
Measured Value:	96.65 +/- 0.29 pMC
Agreement:	Accepted

COMMENT: All measurements passed acceptance tests.

Validation: Digital signature on file

Date: July 08, 2020