A14 CAMBRIDGE TO HUNTINGDON IMPROVEMENT SCHEME, CAMBRIDGESHIRE

ARCHAEOLOGICAL INVESTIGATIONS

Volume 3.5: Plant and Insect Remains Assessment

SUBCONTRACT ORDER 3310100/1028/001

commissioned by A14 Integrated Delivery Team (IDT)
on behalf of Highways England

June 2019

MOLA HEADLAND INFRASTRUCTURE
MOLA HEADLAND ARCHAEOLOGY
with
COPA PCA PRE-CONSTRUCT ARCHAEOLOGY

highways england

REGISTERED ORGANISATION CIfA

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This report adheres to the quality standard of ISO 9001:2015

PROJECT INFO:

NGR **TL 1973 3272 to TL 4091 6169**

Parish **Alconbury, Brampton, Offord Cluny and Offord Darcy, Godmanchester, Hemingford Abbots, Hemingford Grey, Fenstanton, Conington, Boxworth, Longstanton, Oakington and Westwick, Girton**

Local Authority **Cambridgeshire County Council**

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Archive Repository **Cambridgeshire Archaeology Archive (Cambridgeshire County Council)**

Approved by **Alex Smith** and **David Bowsher**

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Volume 3.5: Plant and Insect Remains Assessment

MOLA Headland Infrastructure | Version 3 | 12/06/2019

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PLANT REMAINS

Angela Walker, Lara Carretero, Laura Bailey, Rachel Fosberry and Kath Hunter

Over 9,000 samples were taken for the retrieval of environmental material from across the A14 road scheme (Table 3.5.1). These come from a large variety of features and from contexts with a range of dates, though with Iron Age and Roman features being most common. At this assessment stage there are still considerable numbers of samples from undated contexts.

3.5.1. Total number of samples assessed by period and TEA (Targeted Excavation Area).

TEA	Neolithic	Bronze Age	Iron Age	Roman	Saxon	Medieval	Post-medieval	Undated	Total
2-4	13		6	26	4		6	15	70
5		6	76	83				80	245
7		6	406	258	366	201	21	778	2036
8/9								1	1
10		5	438	170	80		7	240	940
10B East			30	14				14	58
11				171	50			39	260
12	58	13	23	60	163		2	467	786
13		19	66					31	116
14			68	141	2	1		33	245
15	2		14	32	2		1	31	82
16	4	136	28	49	16			45	278
19				2				15	17
20			108	498			2	287	895
21			50					12	62
26			7	6				25	38
27	2	13	26	28	1	2		24	96
28		113	98	345			4	364	924
29		1	124					36	161
31			53	4				37	94
32/33	22	67	105	136	321	2	1	411	1065
34			2					2	4
37/38			158	146				259	563
41		1	64	6				29	100
46			8	27				5	40
Total	101	380	1958	2202	1005	206	44	3280	9176

The TEA assessment reports for the plant remains have been produced by the following specialists: Angela Walker, Lara Carretero, Laura Bailey, Rachel Fosberry and Kath Hunter. Anne Davis, John Giorgi,

Catherine Longford and Kate Roberts also undertook assessment recording work. Insect remains assessment was undertaken by Enid Allison.

METHODOLOGY

Bulk samples were subjected to flotation and wet sieving in a Siraf-style flotation machine. The floating debris (the flot) was collected in a 250 µm sieve and, once dry, scanned using a binocular microscope. Any material remaining in the flotation tank (retent) was wet-sieved through a 1mm mesh and air-dried. A 250ml sub-sample of sediment was extracted from waterlogged samples and was manually processed following the procedures of Kenward *et al* (1980). The resulting washovers were recorded wet. All samples were scanned using a stereomicroscope at magnifications of x10 and up to x100. Identifications, where provided, were confirmed using modern reference material and seed atlases including Cappers et al (2006) and Zohary et al (2012) nomenclature for wild taxa follows Stace (2010).

Assessment data was recorded in the MHI integrated database (Oracle). Scales of abundance; occasional (0-25), moderate (26-100), abundant (>100); and diversity scores of; little (<5), moderate (6-15), and abundant (>15) was applied to each category type: cereal (CHD/WLG Grain), chaff (CHD/WLG Chaff), weeds (CHD/WLG Seeds), cultivated/use plants (CHD/WLG misc.), nutshell (CHD/WLG nutshell), rhizome/tuber (CHD/WLG), charcoal (CHD Wood), uncharred wood (WLG), moss (WLG), bark (WLG), stems (WLG), roots (WLG) and leaf (WLG).

Recording included basic cereal categories (barley, bread wheat, spelt, emmer, rye, oat etc.). Weed identification was provided for weed rich assemblages with abundance scores of moderate and abundant; for smaller weed assemblages, ie those with an 'occasional' abundance score, basic ecology types were noted (arable, wetland, ruderal etc.). Nomenclature for weeds (wild taxa) follows Stace (2010). For charcoal, the maximum dimension measurement was taken and the distinction made between oak and non-oak species on fragments >2mm (where possible). The presence and quantity of roundwood was also recorded. The presence of additional environmental evidence types such as insects, molluscs and animal remains were also recorded and their abundance noted.

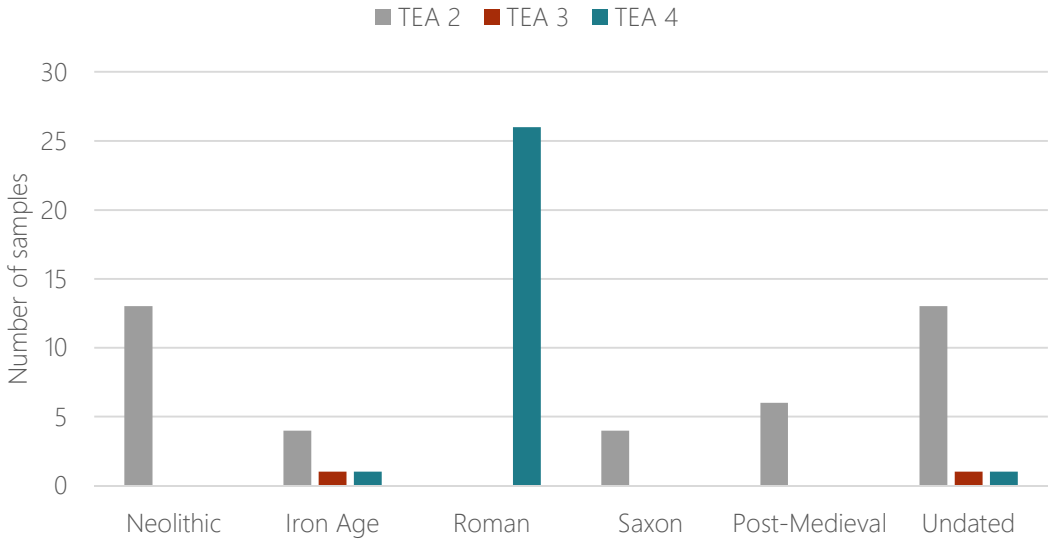
Samples for analysis were selected due to their abundant concentration of well-preserved plant remains and/or their belonging to a context of high significance, as defined within the stratigraphic assessment report. Samples containing unusual species and food remains were also included as well as material with secure radiocarbon dating potential.

QUANTIFICATION, SUMMARY AND SIGNIFICANCE OF RESULTS BY TEA

TEA 2-4

A total of 70 bulk sediment samples were taken from across TEA 2-4 (TEA 2:40; TEA 3:2; TEA 4:28). The samples ranged in size from 10 to 80 litres and were collected from a variety of features including pits, ditches and postholes dating from the Neolithic (TEA 2), Iron Age (TEAs 3 and 4), Roman (TEA 4), Saxon (TEA 2), medieval (TEAs 2, 3 and 4) and post-medieval (TEAs 2 and 3) periods (Figure 3.5.1).

A further seven samples were taken from the areas of TEA 2-4 during the evaluation phase, two from areas trenched by COPA (Clarke et al 2016, Plot 1) and five from areas trenched by Mola Headland Infrastructure (MHI 2016, S1-005).

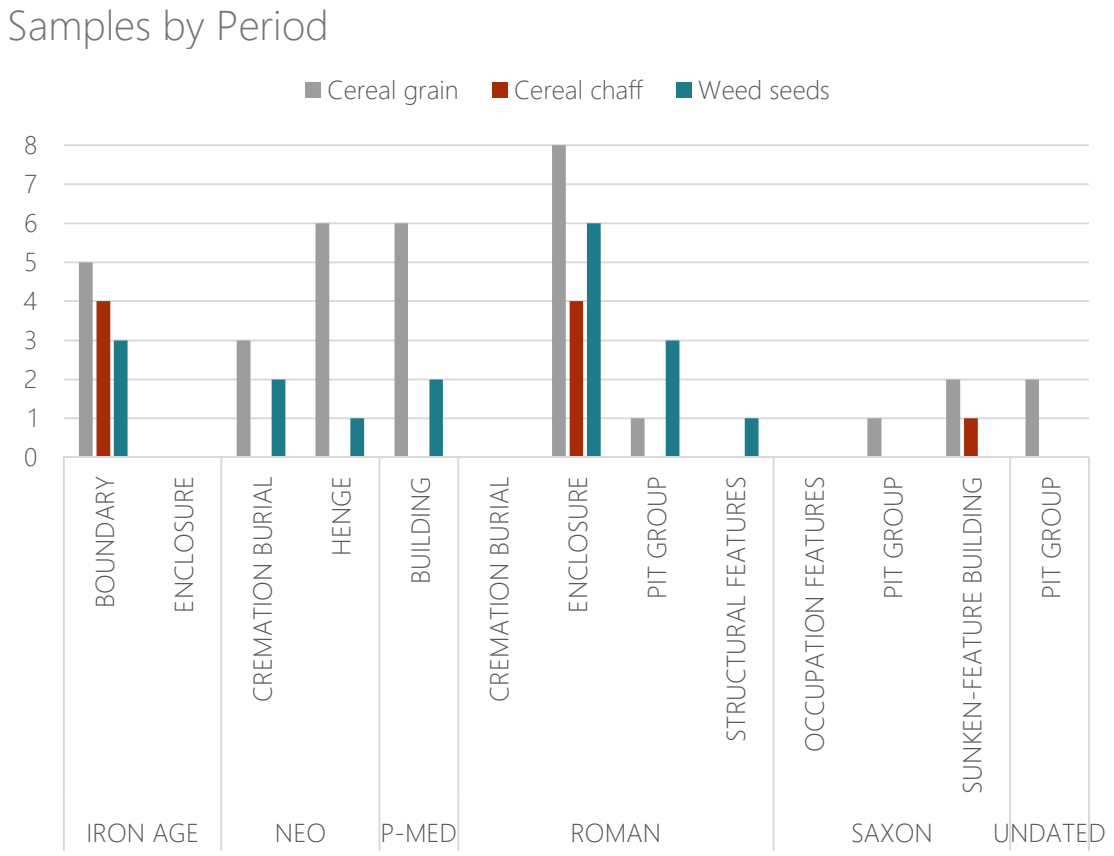


3.5.1. Number of samples per period by TEA

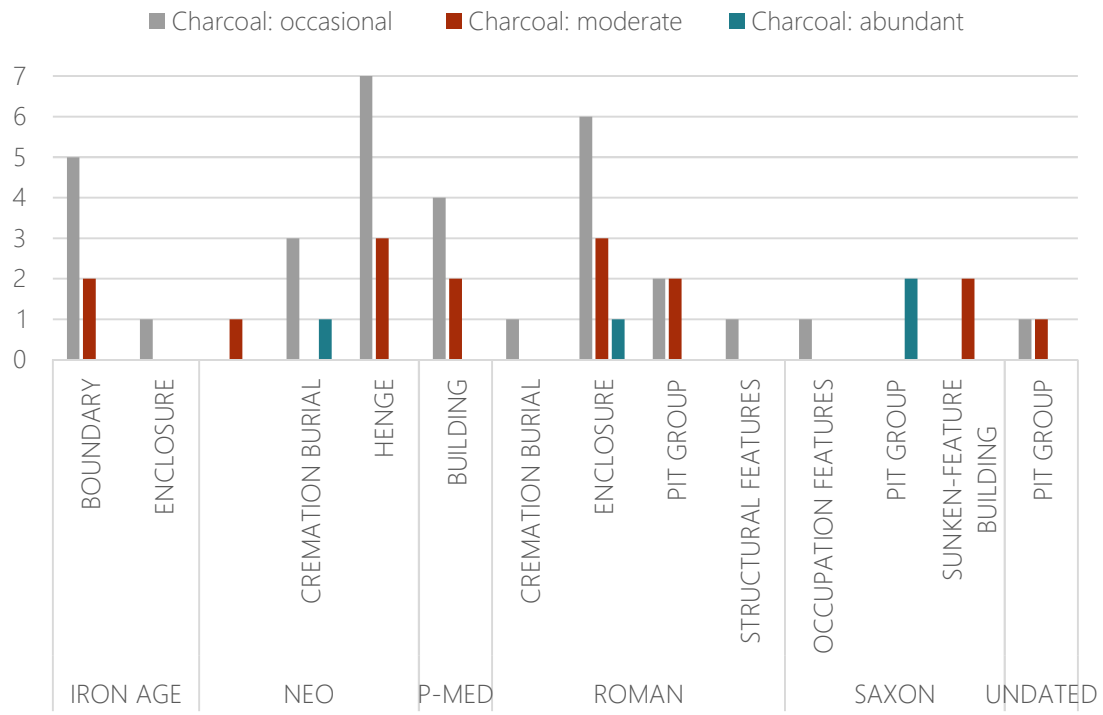
The charred plant remains exhibited mixed levels of preservation ranging from good to very poor. The majority of the cereal grains showed signs of abrasion which prevented identification to species level. Table 3.5.2 presents the occurrence of constituent types in samples per period. There were no waterlogged or mineralised remains from samples in TEA 2-4.

3.5.2. The occurrence of constituent types in samples per period

Period/constituent	Cereal grain	Cereal chaff	Weed seeds	Nutshell	Charcoal	Misc
Neolithic	9	-	3	3	14	-
Iron Age	4	4	3	-	7	1
Roman	9	4	10	2	13	2
Saxon	2	1	-	-	4	-
Post-medieval	6	-	2	-	6	-
Undated	12	-	4	3	19	-



3.5.2. Occurrence of cereal grain/cereal chaff/weeds per period/feature type



3.5.3. Charcoal abundance per period/feature type

Neolithic and Bronze Age

Samples from Henge 2.1 contained moderate charcoal and occasional grains of hulled barley (*Hordeum vulgare*) and glume wheats, as well as wild grasses and hazelnut shells. The charred plant assemblage from the cremation burials was predominantly charcoal with occasional indeterminate cereal grains and weed seeds, including wild grasses. A radiocarbon date was obtained from a glume wheat indeterminate grain from deposit (020063), Pit [020065], which truncated the fills of the northern terminal of the eastern entrance of the henge, returning a Bronze Age date of 1901-1695 cal BC (95.4% probability; SUERC 75283).

Iron Age

Iron Age features sampled included a posthole [30023] from Enclosure 3.1 and various ditch sections from Ditches 4.1, 4.5 and 4.6. Abundant cereal remains were recovered from [40299] from Ditch 4.5 and [40329] and [40416] from Ditch 4.6. Cereals present included spelt wheat (*Triticum spelta*), barley (*Hordeum* sp.) oat (*Avena* sp.), free-threshing wheat and cereal indeterminate. A glume wheat glume base and occasional culm nodes were recovered from [40399] from Ditch 4.1. Occasional to moderate charcoal was recovered from all sampled Iron Age features.

Roman

Charred plant remains were recovered from Roman features across TEA 4 and included cereal remains, arable weed seeds and charcoal. Cereal grains were abundant in [40007], Pit group 4.1; [40040] Enclosure 4.1; [40079] Enclosure 4.2; and [40314] Enclosure 4.3. Species present included spelt wheat (*Triticum spelta*), emmer wheat (*Triticum dicoccum*), hulled barley (*Hordeum vulgare*), free-threshing wheat and oats (*Avena* sp.). Glume wheat cereal chaff and weed seeds were abundant in [40172]: Enclosure 4.3. One of the samples <2802> from the MHI evaluation (S1-TT-005) from a Roman ditch contained abundant cereal remains, including grains of hulled barley, free-threshing wheat and glume wheat indeterminate, along with glume bases, grasses, wild radish and peas/vetches.

Saxon

Two of the pits [020113] and [020076] from Pit Group 2.1 southeast of Sunken Featured Building (SFB) 2.1 contained abundant charcoal. These pits were interpreted as fire pits associated with the building. SFB 2.1 deposits (020144) and (20150) of [020147] contained grains of hulled barley and cereal indeterminate, a basal rachis internode and charcoal. Charcoal from the fire pits (Pit Group 2.1) and the deposits from SFB 2.1 could potentially provide information on wood species utilised as fuel for domestic fires as well as providing information pertaining to the nature of the local environment.

Post-Medieval

Postholes from Building 2.1 produced an assemblage of moderate charcoal with occasional cereal grains and arable weed seeds. Cereal crops present included hulled barley, oats and free-threshing bread/club wheat. Spelt wheat was also present in rare numbers and is likely to be an intrusive component.

Undated

A range of undated features including seven pits, three postholes and two ditch/gully cuts were sampled across TEA 2-4. Occasional hulled barley (*Hordeum vulgare*) and cereal indeterminate grains were recovered from features from both TEA 2 and TEA 4. Hazelnut shell fragments were recovered from three pits from TEA 2; pits [20119], [20122] and [20045]. Occasional to moderate wood charcoal was recovered from all undated sampled features.

Summary and potential of the assemblage

The overall charred cereal grain assemblage from TEA 2-4 was predominantly hulled barley and indeterminate cereal. Assemblages from the Neolithic features suggests the use of hazelnut in combination with the barley, which is later replaced by the addition of glumes wheats such as spelt in the Roman period. The presence of spelt wheat alongside hulled barley in contexts dating to the Roman period supports established evidence that arable farming in rural Roman Britain was based on the cultivation of these two crops (Van der Veen 2016).

The archaeobotanical assemblages assessed from TEA 2-4 have yielded plant remains which would allow the investigation into ritual practices, agricultural practices, food processing and cooking as well as consumption and socio-economic organisation. They have local significance in relation to the understanding of the area and its use, and the diet of its inhabitants, during the periods represented.

Further botanical analysis will provide evidence on these aspects and on the nature of the natural environment.

Recommendations

The table below summarises the samples selected from TEA 2 and 4 for further analysis due to their abundant concentration of well-preserved plant remains and/or their belonging to a particular context of high significance (eg ditches of henge monument). Full details of these samples can be found in the project's digital records.

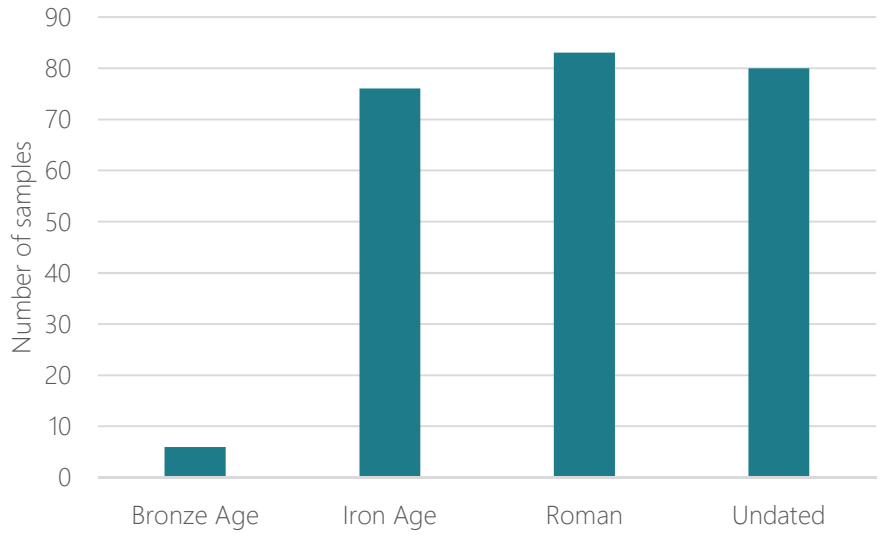
3.5.3. Summary of samples from TEA 2-4 selected for analysis

Site code	Period	Feature	No. samples
A14-2	NEOLITHIC	HENGE	5
A14-2	NEOLITHIC	CREMATION BURIAL	5
A14-4	IRON AGE	BOUNDARY	1
A14-4	ROMAN	PIT GROUP	1
A14-4	ROMAN	ENCLOSURE	2
S1-TT-005	ROMAN	DITCH	1
A14-2	SAXON	PIT GROUP	1
A14-2	SAXON	SUNKEN-FEATURE BUILDING	2
Total number of samples suggested for analysis			18

TEA 5

A total of 245 bulk sediment samples taken from various features in TEA 5 were processed. The samples ranged in volume from 0.25 to 40 litres. They were collected from a variety of features associated with settlement during the Iron Age and Roman periods. Features included boundary ditches, waterholes, storage pits, roundhouses and enclosures. Remains of a crouched burial of probable Bronze Age date and inhumation burials dating to the Roman period were also excavated. A substantial deposit of 'dark earth' covering an area of 0.2 hectares represents the last recorded activity on TEA 5. The deposit was extensively sampled and both bulk environmental samples and monoliths were assessed.

The site was evaluated by Mola Headland Infrastructure (MHI 2016, S1-006). Twenty samples taken during the evaluation phase were processed. The majority of samples were from the fills of ditches and pits. Cereal grain was recovered from fourteen samples. Cereal included spelt (*Triticum spelta*), hulled barley (*Hordeum vulgare*) and indeterminate glume wheat. Weed seeds included sedges (*Carex* sp.), elder (*Sambucus nigra*), plantains (*Plantago* sp.), grasses (*Poaceae* sp.) and seeds of the knotweed family (*Polygonum* sp.). Occasional chaff fragments, peas (*Pisum* sp.) and a possible lentil were also present.



3.5.4. Number of samples per period

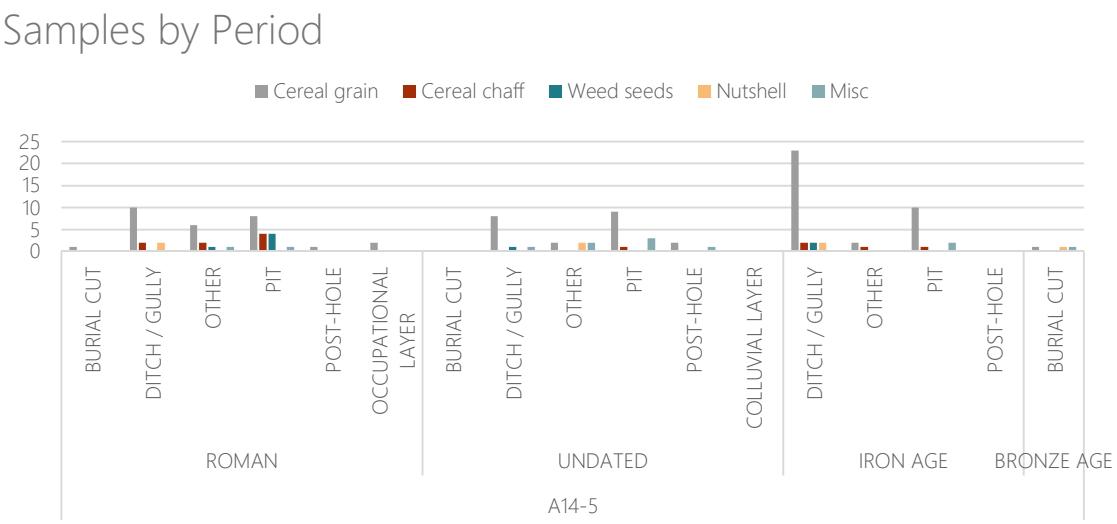
The charred plant remains exhibited mixed levels of preservation ranging from good to very poor. Many of the cereal grains showed signs of abrasion which prevented identification to species level.

Seventeen samples contained plant material preserved by waterlogging - two were from Iron Age Enclosure 5.8, three were from Enclosure 5.9. four were from deposits (51158, 51159, 51160, 53893) in ungrouped Roman pits, and eight were from undated and ungrouped features.

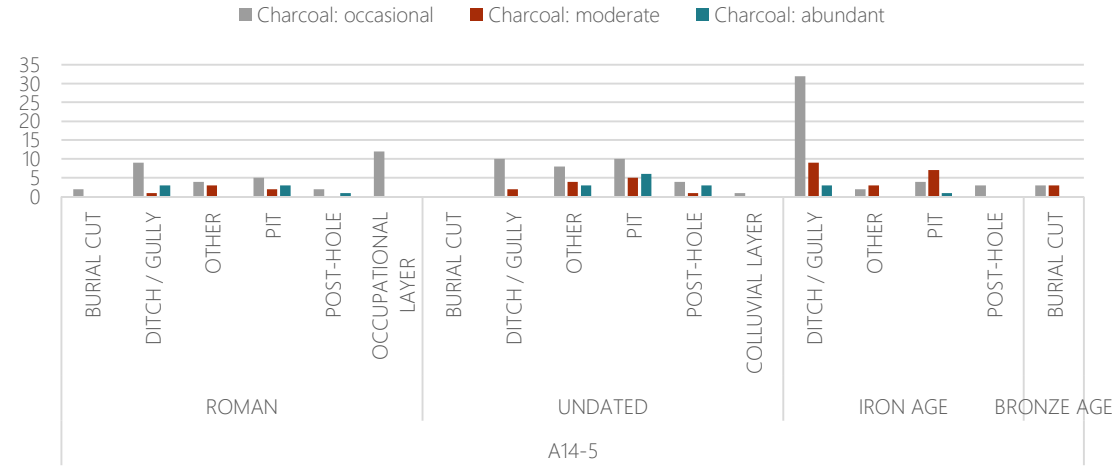
Table 3.5.4 presents the occurrence of constituent types in samples per period.

3.5.4. The occurrence of constituent types in samples per period

Period/Constituent	Cereal grain	Cereal chaff	Weed seeds	Nutshell	Charcoal	CHD misc
Bronze Age	1	0	1	1	6	1
Iron Age	35	4	21	2	64	2
Roman	28	8	26	2	47	2
Undated	21	1	16	2	57	7



3.5.5. Occurrence of charred cereal grain/cereal chaff/weeds/nutshell/misc per period/feature type



3.5.6. Charcoal abundance per period/feature type

Bronze Age

Six samples from the fill (51019) of a crouched burial [51017] were processed. The samples contained occasional hazel nutshell (*Corylus avellana*) fragments, small to medium sized charcoal fragments, and occasional indeterminate cereal grains. Amorphous charred material was recovered, as were abundant roots and insects.

Iron Age

The Iron Age activity has been divided up into three stratigraphic sub-periods. Sub-period 1 comprised two boundary ditches (Boundary Ditch 5.1 and 5.2). Sub-period 2 consists of a series of four enclosures (Enclosures 5.8 to 5.11), eight roundhouses (Roundhouses 5.1 to 5.8), post-built structures (Structures 5.1 and 5.2), and associated domestic features including pits (Pit Groups 5.1 to 5.3 and 5.7) and waterholes (Waterholes 5.1 to 5.3). Sub-period 3 comprised a network of ditches forming plots (Field System 5.2) and an unurned cremation burial of possible late Iron Age date [50236].

IRON AGE: SUB-PERIOD 1

Thirteen samples taken from the fill of Boundary Ditch 5.1. were processed. Six of the samples contained charred plant remains. Most of the samples contained occasional oak and non-oak charcoal fragments. Occasional barley grains, emmer wheat (*Triticum dicoccum*), bread/ club wheat (*Triticum aestivum*), oats (*Avena* sp.) and poorly preserved indeterminate cereals were also identified. Cereal grain was most abundant in deposit (51732). Weed seeds were generally rare with occasional grass seeds recovered from a few samples. However, a moderate amount of seeds including large and small grass seeds, peas, docks (*Rumex* sp.) and fathen (*Chenopodium* sp.) were present in deposit (51732). No samples from Boundary Ditch 2 were processed.

IRON AGE: SUB-PERIOD 2

Twenty-nine samples from Iron Age Enclosures 5.8 to 5.12 were processed. No samples from Enclosure 5.13 were processed.

Three samples taken from Enclosure 5.8 were assessed. One was from the fill (51834) of pit [51835] and the others were from the fills (51966) and (51911) of ditch/gully [51999] and [51868] respectively. Most of the material in the pit was preserved by waterlogging. The seeds recovered represent a variety of environments including grassland (great plantain (*Plantago major*) and large grass seeds), disturbed ground (chickweed (*Stellaria media*), nettle (*Urtica dioica*), thistle (*Sonchus* sp., thistle type (*Circium/carduus*) and henbane (*Hyoscyamus niger*)). Damp or aquatic environments were also represented by the recovery of water-pepper (*Polygonum hydropiper*) and crowfoot (*Ranunculus* subg. *Batrachium)* seeds. Roundwood twigs (up to 70mm), stems, wood and bark fragments were also recovered. Many of the wood and charcoal fragments were impregnated with iron salts. It is likely that the mineral concretion was caused by fluctuating water levels. A similar plant assemblage was present in the fill (51966) of ditch [51999] where nettles, fathen, henbane, great plantain, thistle type, knotweeds and seeds of the carrot (*Apiaeceae* sp.) and daisy (*Asteraceae* sp.) families were recovered. All were preserved by waterlogging. Large roundwood fragments (30mm), bark and wood were also recovered. Some of the roundwood fragments displayed potential cutmarks. A less diverse assemblage was present

in the fill (51911) of ditch [51868] where a small number of fathen, docks and knotweed seeds were present. A heavily abraded oat, an indeterminate cereal grain, and a glume wheat base were also recovered.

Sixteen samples from deposits in Enclosure 5.9 were processed. Fourteen of the samples contained charred plant remains. The samples contained small to medium non-oak charcoal fragments, many with orange mineral concretions. A small number of heavily abraded cereals including hulled barley and indeterminate glume wheats were also recovered. Two spelt wheat glume bases were present in deposit (52211). A variety of weed seeds including henbane, stinking camomile (*Anthemis cotula*) (a common weed of arable land), common hemp nettle (*Galeopsis tetrahit*) and chickweed were observed in deposit (52232). Nettles, crowfoot, docks, nightshades (*Solanum* sp.), seeds of the carrot family, raspberry (*Rubus idaeus*) and thistle were recovered from the ditches. A single sloe fruit stone (*Prunus spinosa*) was present in deposit (51736).

Six samples from Enclosure 5.10 were assessed. Five of the samples contained charred plant remains. The samples contained small to medium charcoal fragments. Occasional hulled barley and emmer wheat grains were recorded in deposit (51609). Weed seeds were very similar to those identified in Enclosures 5.8 and 5.9 and included docks, cleavers, knotweeds and small grass seeds. Some sedges were also identified.

Two samples from pits associated with Enclosure 5.11 were processed. They contained occasional to abundant oak and non-oak charcoal fragments and a single cereal grain. Charcoal was particularly abundant in the fill (50642) of pit [50645].

Two samples from ditch/gully in Enclosure 5.12 were assessed. Deposit (50254) contained abundant small charcoal fragments. A moderate amount of cereal grain including emmer wheat, bread wheat, barley and indeterminate cereal grains were recovered together with a variety of weed seeds. Weed seeds included henbane, docks, brome grass (*Bromus* sp) and elements of plants typically found in wet environments including sedges and blinks (*Montia fontana*). Interestingly, spelt wheat glume bases and spikelet forks were recovered from this deposit. This will require further investigation during analysis.

The presence of roundhouses within the enclosures was marked by the remains of drip gullies. Twenty-three samples from Roundhouses 5.4 to 5.8 were processed. No samples taken from Roundhouses 5.1 to 5.3 were processed.

Ten samples from Roundhouse 5.4 were processed. Most of the samples contained occasional to moderate charcoal fragments. Charcoal was abundant in deposits (51645) and (51712) and many large (up to 40mm) unabraded oak and non-oak charcoal fragments were present. It is possible that the charcoal may be remnants of structural remains from the roundhouse and analysis could provide information on the species used for structural purposes. The charred plant assemblage was very similar to that recovered from Boundary Ditch 5.1 and the enclosure ditches. Seeds of fat hen, henbane, grasses, knotweed and legumes (*Fabaceae* sp.) were identified in deposit (51644). Cereals were generally poorly preserved but hulled barley, emmer and oat were identified. It is possible that the oat may have been a contaminant of the barley crop.

The three samples from Roundhouse 5.5 contained only small charcoal fragments.

Six samples from Roundhouse 5.6 were assessed. The deposits contained occasional heavily abraded, vesicular, hulled barley (51470) and indeterminate glume wheats (51343). A small fragment of hazel nutshell was also present in deposit (51470).

One sample taken from deposit (50320) in Roundhouse 5.7 was processed. It contained poorly preserved, indeterminate cereal grains and occasional charcoal fragments.

Four samples from Roundhouse 5.8 were assessed. Occasional hulled barley, bread wheat and occasional emmer wheat were identified in deposit (52067). Weed seeds including brome grass, knotweeds and peas/vetches were also present in this deposit. It is likely the weeds were contaminants of the cereal crop.

The plant remains from six pits dating to the Iron Age (sub-period 2) were assessed. Three of the samples were from pit [51882]. They contained wheat, barley and occasional spelt wheat, a sloe stone and comparatively large charcoal fragments (up to 15mm). Pit [52002] contained common hemp nettle, peas, legumes, brome grass, small and large grass seeds and large charcoal fragments. A moderate number of hulled barley and emmer wheat grains were also identified. Similarly, pit [53526] contained legumes, docks, an elderberry and large charcoal fragments. Pit [58219] contained a moderate amount of charcoal, (up to 13mm), occasional wheat grains, hawthorn (*Crataegus monogyna*) and grass seeds.

IRON AGE: SUB-PERIOD 3

Only one sample was processed from Field System 5.2. The sample was from the fill (50150) of pit [50152]. It contained a moderate amount of charcoal. A deposit from unurned cremation burial [50236] of possible late Iron Age date was also processed. It contained occasional small charcoal fragments.

Roman

The Roman period on TEA 5 has been divided up into four stratigraphic sub-periods. Sub-period 1 is represented by Ditches 5.1-5.5 and two enclosures (Enclosures 5.14 and 5.15). Sub-period 2 relates to the re-modelling of TEA 5, and comprises Enclosure 5.16, Waterholes 5.10 to 5.12 and Inhumation burials 5.2 to 5.4. Sub-period 3 comprises Enclosure 5.17, Waterhole 5.13 and a post-built structure (Structure 5.2). An extensive layer of 'dark earth' (Layer 5.1) forms sub-period 4 and represents a land-use change and the last evidence of activity on site.

ROMAN: SUB-PERIOD 1

Samples from the following ditches/gullies were assigned to the Roman period but have yet to be grouped; [50299], [50338], [50471], [50548], [51218], [52751], [52865] and [52900]. Cereal grain was present in small quantities in deposits (50337), (50472), (50473), (50549), (51219), (52753) and (52866). Spelt, barley, occasional bread wheat, emmer and oats were identified. Occasional hazel nutshell fragments were present in deposit (52866). Weed seeds were comparatively rare. A variety of weed seeds including knotgrass, peas, legumes, henbane and small grass seeds were present in deposit (51219). Only occasional charcoal fragments up to 15mm were recovered.

ROMAN: SUB-PERIOD 2

Four samples from Waterhole 5.12 were processed. Well preserved cereal grain was abundant in deposits (50543) and (50540). Spelt was the most commonly encountered grain. Barley, free-threshing wheat and oats were also recovered. Occasional emmer spikelet forks, glume bases and coleoptile (a sheath protecting a young shoot tip in a grass or cereal) were present in deposit (50547). Weed seeds included stinking chamomile, docks, peas, oraches (*Atriplex* sp.), large grass seeds and brome grass. Indeterminate pulse fragments were also present in deposit (50540). Analysis of the material from the waterholes will provide valuable information on site economy and the local environment.

Samples from two ([53949] and [53963]) of the four inhumation burials were processed (Inhumation burials 5.3 and 5.4). The fill (53950) of burial [53949] contained only modern roots. Deposit (53962) contained occasional small charcoal fragments, wheat and heavily abraded indeterminate cereal. The presence of amphibian bones in deposit (53962) attest to the fluctuating water levels in the area.

ROMAN: SUB-PERIOD 3

Four samples taken from deposits in Enclosure 5.17 were assessed. The samples contained indeterminate wheat grains. A garden pea (*Pisum sativum*), legume, possible corncockle (*Agrostema githago*), docks and sedges were recovered from deposit (53184). Large (15mm) roundwood ring porous charcoal fragments were abundant in deposit (53185). It is likely that the corncockle was opportunistically growing alongside the cereal crops. Corncockle became a common arable weed in the Roman period (Stace 1997) after being introduced to southern England in the later first millennium BC. As the seeds are of a similar size to cereal grains they are difficult to separate by sieving and they tend to make it through the various crop-processing stages up until the hand-cleaning of cereal grains. As corncockle is poisonous and said to affect deleteriously the physical properties of wheat flour (Clapham et al 1962), it had to be removed, by hand, from the sieves. Its presence in the sample together with cereal grains suggest that sieving and removal of contaminants had not yet taken place.

ROMAN: SUB-PERIOD 4

Fourteen samples were taken from the 'dark earth' deposit. Only occasional fragmented charcoal, charred seeds and indeterminate cereal grains were recovered. Therefore, there is little information about the character of the deposit from the environmental samples. However, six kubiena samples of the 'dark earth' were taken for morphological analysis and it is likely that full analysis of the thin sections and soil chemistry analysis will provide more information on the nature of the deposit.

UNGROUPED ROMAN PITS

Samples from seven ungrouped pits [50565], [51161], [51186], [52539], [52698], [52966], [53890] dating to the Roman period were assessed. Deposits (51158) and (51159), from the fill of pit [51161], contained seeds, wood and stem fragments preserved by waterlogging. Identified seeds included elder, crowfoot, raspberry, nettle, chickweed, thistle, docks, henbane and brambles. Possible legumes were identified in the fills (52540) and (52697) of pits [52539] and [52698] respectively. Cereal grains were abundant in deposits (50562) and (53893) from the fills of pits [50565] and [53890]. Cereal included spelt, occasional hulled barley, emmer and oats. Some of the grains in deposit (53893) were germinated. Deposit (52697)

was the result of *in situ* burning and contained moderate charcoal fragments. Hulled barley, wheat and oats were also identified in deposit (52697) together with corncockle, grass seeds and legumes.

UNDATED FEATURES

A range of undated features including twenty-five pits, thirteen ditches/gullies, eight postholes, one colluvial deposit and thirteen features categorised as 'other' were recorded on TEA 5. Most of the undated ditches contained occasional spelt and barley grains. A diverse plant assemblage containing a variety of species commonly found in grassland including ribwort plantain, yellow rattle (*Rhinanthus* c.f. *minor*) and stinking chamomile were present in deposit (53665). Abundant plant remains preserved by waterlogging were present in deposit (52297). Seeds present included thistle, chickweed, fathen, docks, knotweed, nettle and buttercup. One sample from colluvial deposit (51207) was assessed. The deposit contained occasional charcoal fragments and charred seeds including docks, legumes, brambles and knotweed. It is likely that the charred material washed into deposit and therefore provides no further information on the character of the deposit.

Summary and potential of the assemblage

The overall charred plant assemblage consisted of cereal remains, charcoal and occasional weed seeds relating to the Iron Age and Roman settlements. The Iron Age features contained hulled barley and occasional bread wheat. Interestingly, there was very little chaff. It was only recovered in small amounts from four deposits from Iron Age sub-period 2 (Enclosures 5.12, 5.8 and 5.9) suggesting that the cereals may have been processed elsewhere. The lack of weed seeds in the cereal assemblage suggests that the cereal was from a largely clean crop possibly burnt during food preparation or whilst in storage. Overall, there was a limited variety in the weed species present in TEA 5. The plant macrofossil assemblage comprised grassland species such as ribwort plantain, brome grass, small and large grass seeds, plants indicative of disturbed ground and scrubby species. The presence of grassland species accords with data retrieved from the pollen samples from a palaeochannel in TEA 5 (Taylor and Spur this vol.). The pollen sample was dominated by chicory type (*Cichorium intybus*-type), seeds and grass. Other identified pollen included Scots pine (*Pinus sylvestris*), meadow buttercup (*Ranunculus acris*), chenopodiaceae, ribwort plantain (*Plantago lanceolata*), goldenrod type (Solidago vigaurea-type) and Pteropsida (monolete) indet, suggesting that the area was open grassland. Occasional wetland taxa such as sedges, elder, crowfoot and water blinks were also identified. Many of the charcoal fragments, particularly in the Iron Age deposits, were impregnated with an orange mineral concretion and many features contained seeds preserved by waterlogging, suggesting that the deposits were subjected to varying water levels. The increased wetness of the site is also evidenced archaeologically by a change in the focus of activity during the Roman period and the abandonment of areas which were intensively settled during the Iron Age. Occasional hazel nutshell fragments, brambles and sloe stones were present in small amounts in the Iron Age samples suggesting that wild foodstuffs were also gathered.

Although only a small number of the assessed samples relate to occupation during the Roman period there was a marked change in the cereal grain assemblage. Cereal grain was particularly abundant in the fill of Waterhole 5.12. Spelt was present together with hulled barley and occasional emmer, bread wheat and oats. Indeterminate pulses were also identified. Like the cereal assemblage from the Iron Age

period, weed seeds and chaff were comparatively rare. However, a few large 'grain mimic' seeds from weeds of arable ground (such a corncockle and stinking chamomile) were present. Due to the poisonous glycosides in corncockle it was important that it was removed, by hand, prior to milling. Therefore, it is possible that the grain derived from the final stages of crop processing (hand cleaning prior to milling the grain) and was probably incidentally burnt during food preparation or whilst in storage.

Analysis of the environmental material from TEA5 will provide information about the agricultural economy and practices and how it changed over time. Agriculture was the mainstay of nearby Roman Godmanchester (*Durgovigutum*), situated c.6km to the southeast. Therefore, analysis of the cereal remains from the Roman period will provide more information on the economy of its rural hinterland (Allen et al 2017). Charcoal analysis of some of the wood fragments from Roundhouse 5.4 will provide information on wood types used for structural purposes. Analysis of deposits from the Roman waterhole will provide valuable information on the local environment as well as site economy.

Recommendations

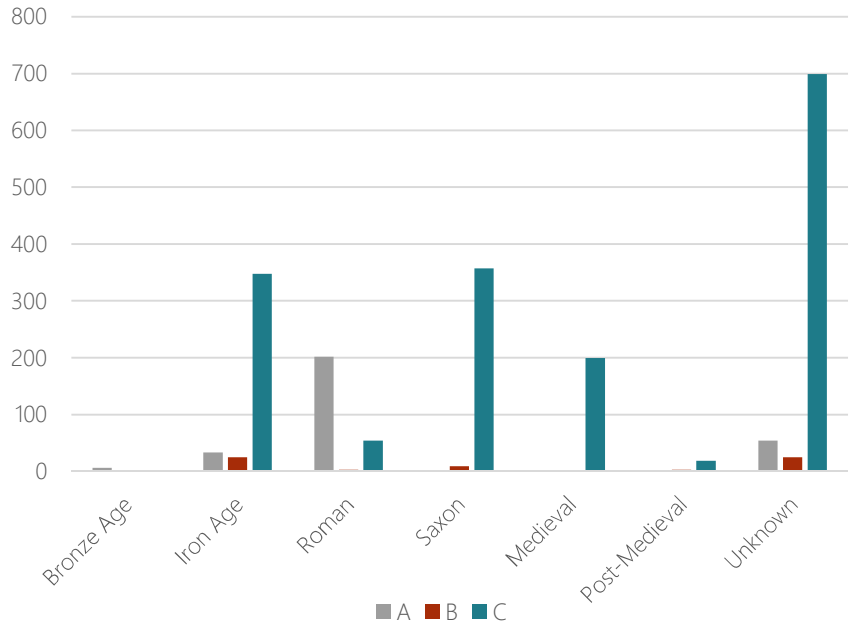
The table below summarises the samples selected from TEA 5 for further analysis due to their abundant concentration of well-preserved plant remains. Many are from deposits in enclosures, roundhouses and waterholes. Full details of these samples can be found in the project's digital records.

3.5.5. Summary of samples from TEA 5 selected for analysis (*if dated)

Site code	Period	Feature	No. samples
A14-5	IA	Enclosure 5.9	3
A14-5	IA	Enclosure 5.8	2
A14-5	IA	Roundhouse 5.4	1
A14-5	IA	Enclosure 5.12	1
A14-5	Roman	Enclosure 5.17	1
A14-5	Roman	Waterhole 5.12	4
A14-5	Roman	Ungrouped	3
A14-5	Roman	Other	3
A14-5	Undated*	Posthole	1
A14-5	Undated*	Pit	2
A14-5	Undated*	Ditch/gully	2
Total number of samples suggested for analysis			23

TEA 7

A high number of environmental samples were collected during the excavations of TEA 7. Due to the size and nature of its archaeological features, TEA 7 is divided in three different sub-areas (A, B and C) which present different and varied archaeobotanical assemblages. In total, 2036 soil samples, ranging from 0.25 to 200 litres in volume, were taken from a variety of archaeological contexts including ditches, pits, burials, occupation layers, postholes and kilns among others, dating back to the Iron Age, Roman, Saxon, medieval and post-medieval periods.



3.5.7. Number of samples per period and sub-area of TEA 7

During the botanical assessment, the TEA 7 samples yielded a remarkably high concentration of archaeobotanical remains on average, with levels of preservation ranging from good to very good. The flots and heavy residues, in general, contained moderate to high charred plant remains in addition to a small number of waterlogged contexts which have yielded occasional waterlogged plant remains.

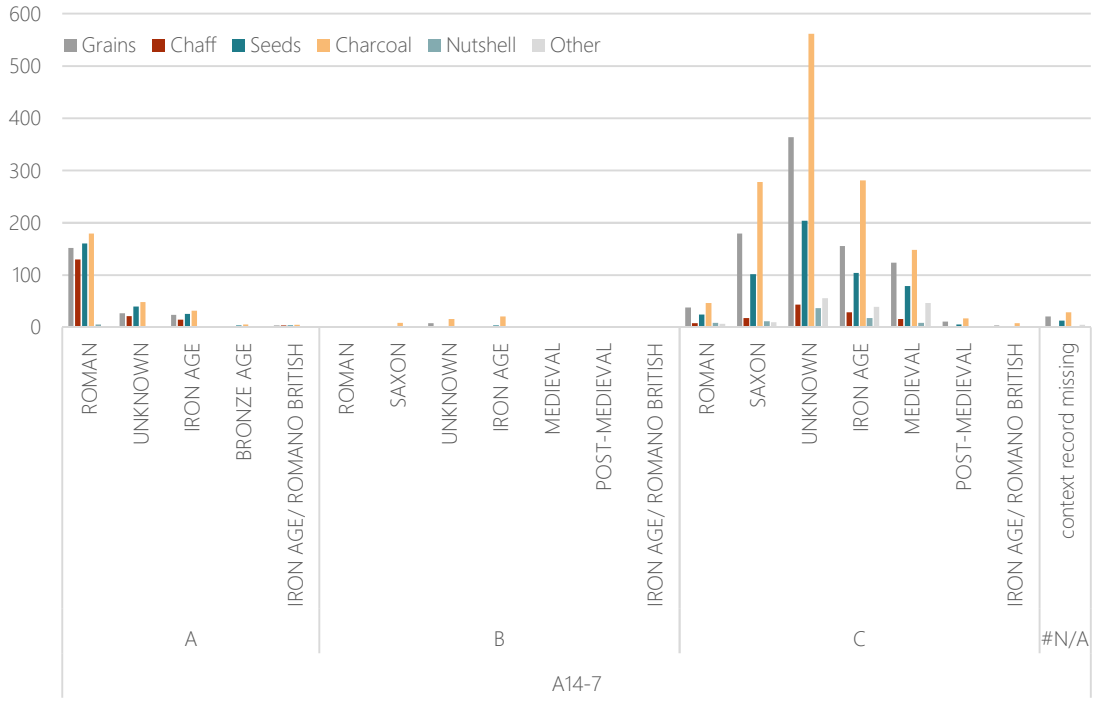
Flots and residues from TEA 7 have yielded an abundant concentration of charcoal and waterlogged wood with fragments up to 50mm in size. In addition, the samples produced a high concentration of cereal remains, such as grains and chaff, and a wide range of seeds from wild plants, roots and tubers. The samples from TEA 7 have been seen to contain the highest concentration of botanical remains among the assessed TEAs in addition to presenting the best preservation, allowing botanical identification to species in most of the cases.

In general, there is a very high presence of cereal crops in the samples from TEA 7, from the prehistoric to medieval periods, showing crop choice patterns through time. The assessed samples from TEA 7 are

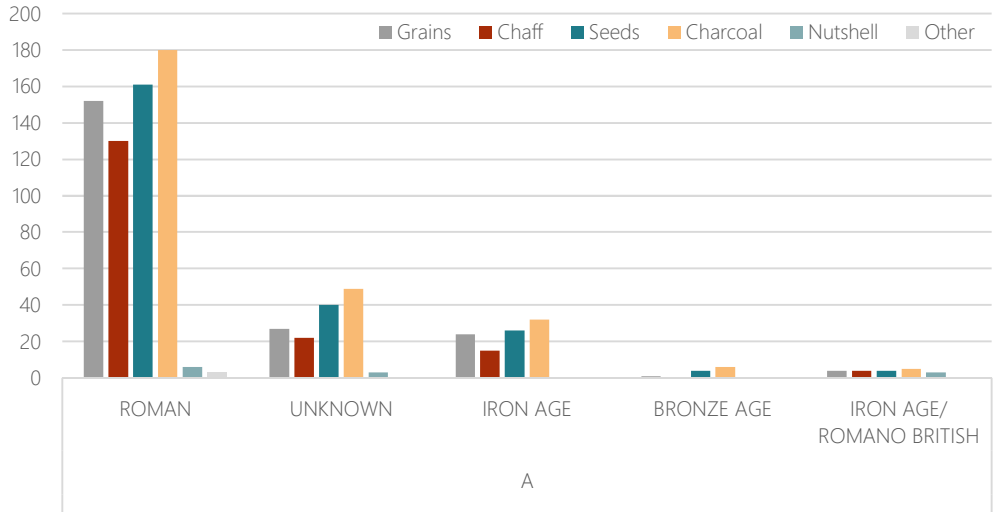
of importance as they have yielded abundant remains of the six main cereal crops cultivated in Britain: barley (*Hordeum vulgare*), emmer (*Triticum diccocum*), spelt wheat (*Triticum spelta*), free-threshing wheat (*Triticum eastivum/durum*), oats (*Avena sativa*) and rye (*Secale cereale*).

3.5.6. The occurrence of constituent types in samples per period

Period/constituent	Cereal Grain	Cereal chaff	Weed seeds	Charcoal	Nutshell	Misc
BRONZE AGE	1	0	4	6	0	0
IRON AGE	183	45	134	334	18	41
ROMAN	191	138	186	230	15	10
SAXON	183	18	103	287	12	12
MEDIEVAL	126	16	81	150	9	48
POST-MEDIEVAL	13	0	6	20	1	1
UNKNOWN	399	66	246	627	41	57



3.5.8. Summary of constituents from TEA 7 by sub-area and period.



3.5.9. Summary of constituents from TEA 7A by period

Samples by Sub-area and Period

TEA 7A

TEA 7A was located to the south of TEA 7C and to the north of TEA 10. This section of TEA 7 has yielded archaeological remains from the middle Bronze Age to the Roman period, in addition to a number of contexts whose phase is currently unknown. From this part of TEA 7, over 100 samples have produced abundant remains of charred plants, in particular remains of charcoal, cereals (grains and chaff) and arable weed seeds.

BRONZE AGE

Environmental samples were collected from a ditch in a field system and a single crouched burial with a preliminary date of middle Bronze Age. The assessed botanical samples from these features have yielded occasional remains of charcoal, cereals such as oats (*Avena sativa*) and wild grasses, in particular arable weeds (Poaceae types).

IRON AGE

A total of 33 soil samples were taken from Iron Age contexts from TEA 7A. These were mainly collected from ditches and pits defining a series of enclosures to the east, northwest and south of the site. Almost half of the Iron Age environmental samples contained abundant archaeobotanical remains, including cereal grains and chaff and wild plant seeds. In general, the archaeobotanical assemblage from the Iron Age features from TEA 7A has yielded abundant grains (+50 per flot) from spelt wheat (*Triticum spelta*), hulled barley (*Hordeum vulgare*) and oats (*Avena sativa*). In addition, moderate to abundant remains of cereal chaff were noticed in the Iron Age samples, including spelt wheat glume bases and spikelet forks, barley rachises and stem and culm fragments. In relation to the wild plant seeds, arable grasses (Poaceae) and other arable weeds (*Galium* sp., *Vicia* sp. and *Lathyrus* sp. among others) were the most

abundant followed by a moderate concentration of wetland plant seeds such as docks (*Rumex* sp.) or sedges (*Carex* sp.).

ROMAN

Extensive Roman remains were recorded across the excavation area of TEA 7A, apparently bounded by a large ditched rectangular enclosure. The ditches were initially assumed to belong to a large defensive placement, maybe to an early Roman military encampment, though this remains quite uncertain. A total of 202 environmental samples were collected from a variety of Roman contexts and have yielded moderate to abundant botanical remains.

In general, Roman features from TEA 7A have produced abundant cereal grains (+100 per flot), mainly from spelt wheat, hulled barley and oats, in addition to occasional remains of possible free-threshing wheat (cf. *Triticum aestivum*). Moreover, abundant remains of cereal chaff were noticed in the Roman samples, including spelt wheat glume bases and spikelet forks, barley rachises and stem and culm fragments. In relation to the wild plant seeds, as seen for the Iron Age contexts, multiple arable grasses (Poaceae) have been identified in the Roman samples in combination with other arable weeds (*Galium* sp., *Vicia* sp. and *Lathyrus* sp. among others) and wetland plant seeds such as docks (*Rumex* sp.) or common buttercup (*Ranunculus* sp.).

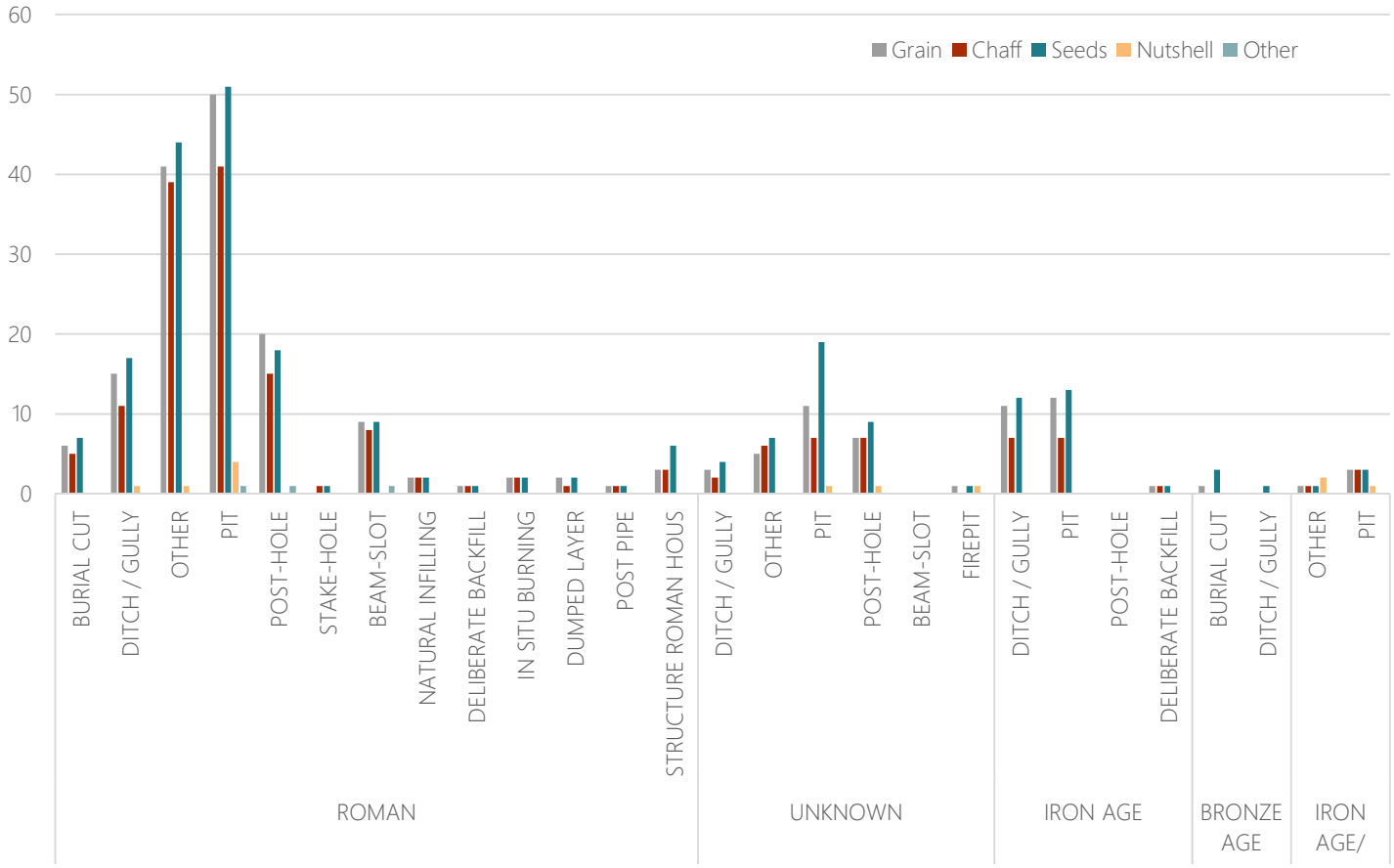
Of especial interest are the abundant botanical remains recovered from two series of 10 pottery kilns located in the southern and northern parts of the site. The archaeobotanical assemblage from these contexts is comprised of abundant remains of cereal grains, mainly spelt wheat and barley. Particularly relevant is the high presence of glumes, sprouted grains and detached kernel embryos which suggest they comprise waste from the dehusking of malted spikelets and from the drying or 'roasting' of malted cereals as part of a possible brewing process. For hulled wheat and barley, the dehusking process to release the grain from the spikelet frequently damages the embryo and for this reason steeping and germination must be conducted within the spikelet (Fryer 2004; Stevens 2013, 33). Further evidence comes from the archaeological record, as the kilns were associated with Ditch 7A.6, Building 7A.1, and Waterhole 7A.2 (a series of very large intercutting pits which appears to have been an important source of water). Similar archaeobotanical remains and combination of structures and features were recovered as part of a Roman malting house from the sites of Weedon Hill in Aylesbury (Wakeham and Bradley 2013) and Beck Row in Suffolk (Bales 2004) adding evidence to this theory. Further analysis is needed in order to determine the nature of this botanical assemblage.

In the same area, samples taken from the associated Pit Groups 7A.1 and 7A.2 and Ditch 7A.6 have yielded similar archaeobotanical assemblages to those seen from the Kilns suggesting the accumulation of waste from malting and brewing activities.

UNDATED CONTEXTS

A total of 54 samples were assessed from currently undated contexts from TEA 7A, having yielded occasional to moderate concentration of archaeobotanical remains. Only 14 of the 54 samples contained abundant remains of plants, most of them from postholes and pit deposits. These assemblages include

a high concentration of remains of charred cereals (grains and chaff) from spelt wheat, hulled barley and oats in addition to abundant arable weed seeds.

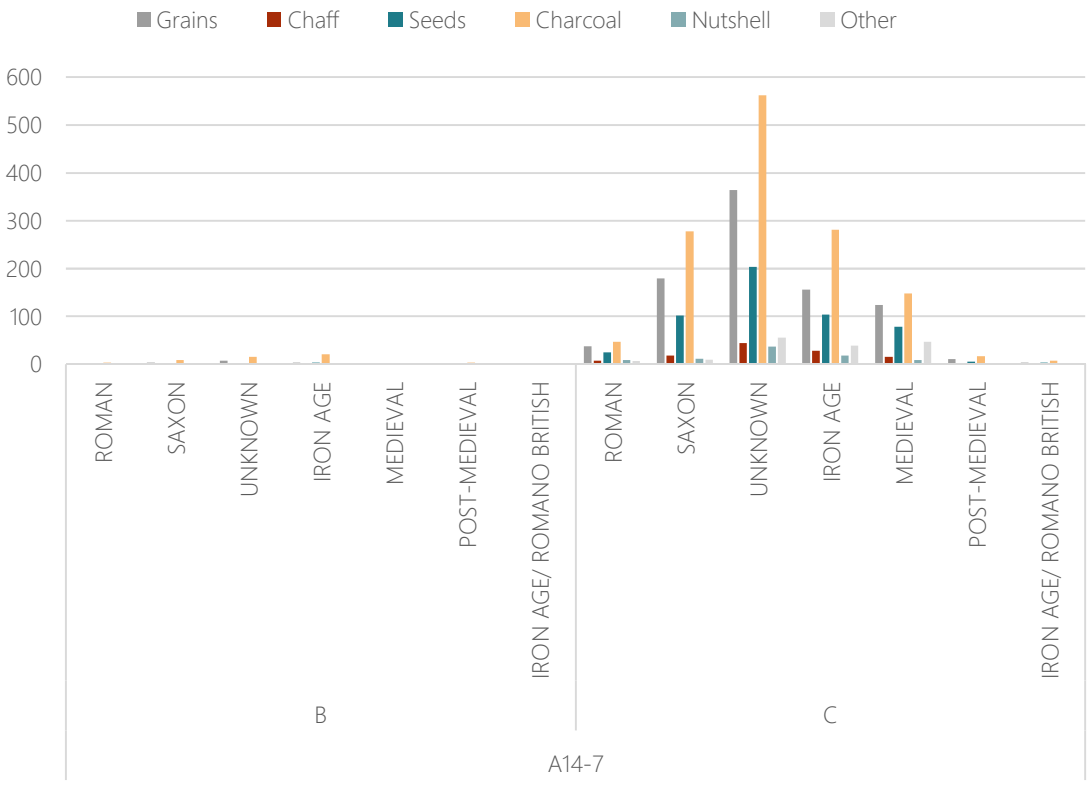


3.5.10. Summary of constituents from TEA 7B + C by period and feature.

TEA 7B+C

TEA 7C comprised the larger area to the west of the oil pipeline and TEA 7B was situated on the smaller area to the east of the pipeline.

This part of TEA 7 yielded abundant archaeological remains from the Iron Age to the post-medieval period, in addition to a number of contexts whose phase is currently unknown. A total of 1755 environmental samples were collected from TEA 7B+7C and have provided us with abundant remains of plants such as cereals, wild seeds and amorphous remains of cereal products such as bread, porridges and beer residues.



3.5.11. Summary of constituents from TEA 7B+7C by period.

IRON AGE

The main focus of late Iron Age activity was in TEA 7C East, where there were a series of sub-circular enclosures respecting the palaeochannels. Further late Iron Age activity outside this area comprised scattered houses and cremation burials to the east, and field systems and three possible structures to the west. A total of 373 samples were collected from Iron Age deposits from TEA 7B+7C. The majority of these were taken from archaeological contexts from TEA 7C with only 25 samples coming from TEA 7B.

The Iron Age archaeobotanical assemblages from TEA 7B represent dispersed Iron Age activity to the east of the main Iron Age enclosures. Roundhouses 7B.1 and 7B.2 yielded a very low concentration of plant remains, with only occasional charcoal fragments, a few indeterminate cereal grains and a couple of other legume seeds (*Lathyrus/Vicia* sp.) identified. In addition, the three cremation burials (Cremation 7B.1, 7B.2 and 7B.3) also produced a very low amount of botanical remains. These are mainly occasional to moderate oak and non-oak charcoal fragments, up to 15mm in size. Iron Age pits and ditches in TEA 7B also yielded a low concentration of archaeobotanical materials. Occasional remains of charcoal were seen from all the assessed samples, and pit 7B.1 [710819] also produced occasional free-threshing wheat chaff.

The Iron Age archaeobotanical assemblages from TEA 7C have, however, produced a higher concentration of plant remains, especially samples from pits and ditches. In general, the archaeobotanical assemblage from the Iron Age ditches from TEA 7C yielded abundant grains (+50 per flot) from free-threshing wheat (*Triticum aestivum/durum*), hulled barley (*Hordeum vulgare*) and oats, in addition to occasional remains of spelt wheat (*Triticum spelta*). Occasional remains of cereal chaff were also noticed in the Iron Age samples, in particular spelt wheat glume bases and spikelet forks. In relation to the wild plant seeds, arable grasses (Poaceae) and other arable weeds (*Galium* sp., *Vicia* sp. and *Lathyrus* sp. and small seed legumes such as *Medicago* sp. to mention some examples) were the most abundant followed by a moderate concentration of wetland plant seeds such as docks (*Rumex* sp.) or sedges (*Carex* sp.). In addition, pits and ditches have yielded a moderate amount of charred remains of cereal products, such as bread or porridge, providing information about culinary traditions very early on. Further analysis of these remains will provide insights into Iron Age recipes.

A large number of environmental samples were collected from a number of enclosures from the main Iron Age occupation area (Enclosures 7C.51, 7C.52, 7C.53, 7C.54, 7C.55, 7C.56, 7C.57, 7C.58, 7C.60, 7C.61, 7C.62 and 7C.64). These, however, have produced a very low concentration of plant remains, which included occasional cereal grains from wheat, barley and oats in addition to glume wheat chaff and arable weeds and wetland plants seeds. In addition, 8 samples from these enclosures [730909], [730929], [731050], [731126], [731133], [731547], [732157] and [733139] were seen to contain amorphous charred remains of cereal products, such as bread-like or porridge-like products.

ROMAN

Roman activity from TEA 7C represents activity on the periphery of the main Roman settlement in TEA 7A. Although no Roman features were identified in the stratigraphic assessment, Roman pottery was collected from features across the site and so it is likely that some of the undated features are infact Roman in date.

A total of 54 environmental samples were collected from contexts associated with dated Roman material and these have yielded low to moderate concentration of plant remains. A total of 16 samples, mostly from pits and ditches, were seen to contain abundant remains of plants, such as cereals, pulses and arable grasses. The assemblages from these samples include abundant cereal grains from free-threshing wheat (*Triticum aestivum/durum*), hulled barley (*Hordeum vulgare*) and oats (*Avena sativa*) in particular and large pulses such as vetch (*Vicia* sp.) and grass pea (Lathyrus sp.). In addition, occasional remains of free-threshing wheat chaff (rachises) have also been noticed in 8 of the Roman pit samples.

Particularly interesting is the presence of a high concentration of rye (*Secale cereal*) grains in three samples from Roman pit deposits [765719] and [762970]. These samples have been seen to contain between 50 and 100 grains of free-threshing wheat, barley, oats and rye in combination with arable weed seeds such as grasses (*Bromus* sp.). In addition, some specimens of broad bean have also been found in these samples (*Vicia faba*) and fragments of hazelnut shell (*Corylus avellana*).

SAXON

A Saxon settlement was identified in TEA 7. This comprised at least 38 post-built buildings, 6 sunken-featured buildings, and 19 pits/wells and preliminary dating suggests that the settlement was occupied in the early – middle Saxon period.

A total of 357 environmental samples were collected from the Saxon deposits from TEA 7C and have provided important information about agricultural practices and plant uses at the time of occupation. In particular, 50 samples have produced a high amount of archaeobotanical remains, with abundant concentrations of free-threshing wheat, barley, oats and rye in addition to grass and wetland plant seeds. The known decrease in the use of glume wheats and the increase in the use of free-threshing wheat, oats and the later introduction of rye during the Saxon period are attested in the TEA 7C archaeobotanical assemblage, as only occasional remains of glume wheats, such as spelt wheat, were noticed among the assessed samples.

Similarly, only 18 samples have yielded remains of cereal chaff. The majority of this comes from outdoor deposits, such as pits and ditches and includes glume bases from glume wheat species, in addition to occasional barley, rye and free-threshing wheat rachises. The low presence of chaff from Saxon deposits is interesting due to the high concentration of plant remains found in these deposits. A possible interpretation would be that the removal of chaff from free-threshing cereals, rye and oats was carried out nearby, in the fields and/or in barns, and only semi-clean grain was brought into the houses. In contrast, the dehusking of glume wheats such as spelt wheat needs contact with fire and would have been carried out as part of the daily activities and most likely inside the houses (Boardman & Jones 1990; McKerracher 2014; 2018; Stevens 2015). In this sense, while in the Iron Age and Roman periods it is common to find a high concentration of charred chaff from indoor deposits due to the use of glume wheat species over free-threshing ones, during the Saxon period we see a decrease in the presence of chaff and weed seeds in the archaeobotanical assemblages.

During excavation, more than 3000 postholes belonging to 38 buildings were unearthed. These contained soil deposits which have yielded a very high concentration of charcoal up to 30mm in size, cereal grains and other plant seeds. In particular, building 7C.3 shows abundant grains of free-threshing wheat, hulled barley and oats with occasional finds of rye in addition to bread-like and porridge-like remains. This building has also yielded two examples of cereal chaff coming from building deposits from TEA 7C, consisting of one free-threshing wheat rachis and one rye rachis. The rest of the seeds found in these deposits were derived from arable weeds and wetland plants such as sedges (*Carex* sp.) and docks (*Rumex* sp.).

Ditches and pits have also yielded a moderate to abundant concentration of plant remains, especially remains of charcoal and cereals as seen for the building deposits. Although a higher concentration of chaff would be expected from outdoor deposits, this is not the case for the Saxon occupation of TEA 7C, adding evidence to the theory of crop-processing activities being carried out nearby in the fields or in barns. In contrast, Saxon pits have produced remains of cereal products, like bread-like and porridge-like products.

MEDIEVAL

The remains of part of the deserted medieval village of Houghton were uncovered in TEA 7C covering an area of approximately 2.5ha. A total of 199 environmental samples were collected from this area, which produced a high concentration of plant remains, especially charcoal. From the 199 samples, 46 have yielded abundant remains of cereals, seeds and chaff in addition to a large quantity of charcoal fragments.

The earliest medieval occupation of TEA 7 is represented by a Trackway 7C.1 which is thought to precede the construction of the Houghton village. Only one sample was collected from a ditch next to the trackway [730318] and has provided very occasional remains of charcoal, barley and oat grains and pulses (*Vicia/Lathyrus* sp.). Trackway 7C.2, however, was in use during the main Saxon occupation phase with the village organised around it. Again, only one sample was collected from a ditch [730046] and has provided moderate amounts of free-threshing wheat grains, barley grains, oat grains and occasional flax seeds. In addition, five main plot boundaries were identified on the northern/western side of the trackway 7C.2 which have produced occasional remains of plants, in particular charcoal fragments, free-threshing wheat and barley grains. The richest archaeobotanical assemblage, with moderate concentrations of charred cereal grains and charcoal, comes from ditch [70496] from boundary 7C.25.

Remains of 12 buildings were excavated to the north and west of the Trackway 7C.2. Although the function of these buildings is currently unknown, some of them seem to have served some type of industrial purpose. Others, due to the recovery of domestic pottery from them, seem to have been houses. A total of 98 samples were collected from deposits inside these buildings, especially from postholes. These have yielded occasional to moderate amounts of archaeobotanical remains, in particular grains from free-threshing wheat, hulled barley and oats. As seen for the Saxon buildings, not much chaff was seen in the assessed samples, with only four of them from Building 7C.39 and 7C.2 containing free-threshing wheat, barley and oat rachises. In contrast, building deposits have yielded a higher concentration of wild seeds than the Saxon buildings; having a moderate presence of arable weeds such as grasses (Poaceae) and small legumes (*Medicago* sp., *Trifolium* sp.) in addition to wetland plant seeds such as docks and sedges. Particularly interesting is the relatively high presence of flax seeds (*Linum usitatissimum*) in ditches and postholes from structural feature 7C.10. This building was categorised during excavation as a "large barn" however the absence of chaff excludes the possibility of this building being used for crop-processing activities. Further analysis of the environmental assemblages will help to shed light on the role of this structure.

In addition to the buildings, 23 groups of pits and wells were identified within the area of the medieval village. These were located to either side of Trackway 7C.2 and were seen, during excavation, to have had a variety of different functions. These deposits have produced the highest concentration of plant remains, especially Pit group 7C.35. This group is thought to have an industrial function however the high presence of charcoal, remains of cereal products (bread, porridge, etc) and cereal grains and chaff suggests the use of these as refuse pits or perhaps as 'corn dryers' or ovens. Pit group 7C.41, 7C.42 and 7C.43 have also produced an abundant concentration of charcoal, cereal grains, remains of bread-like

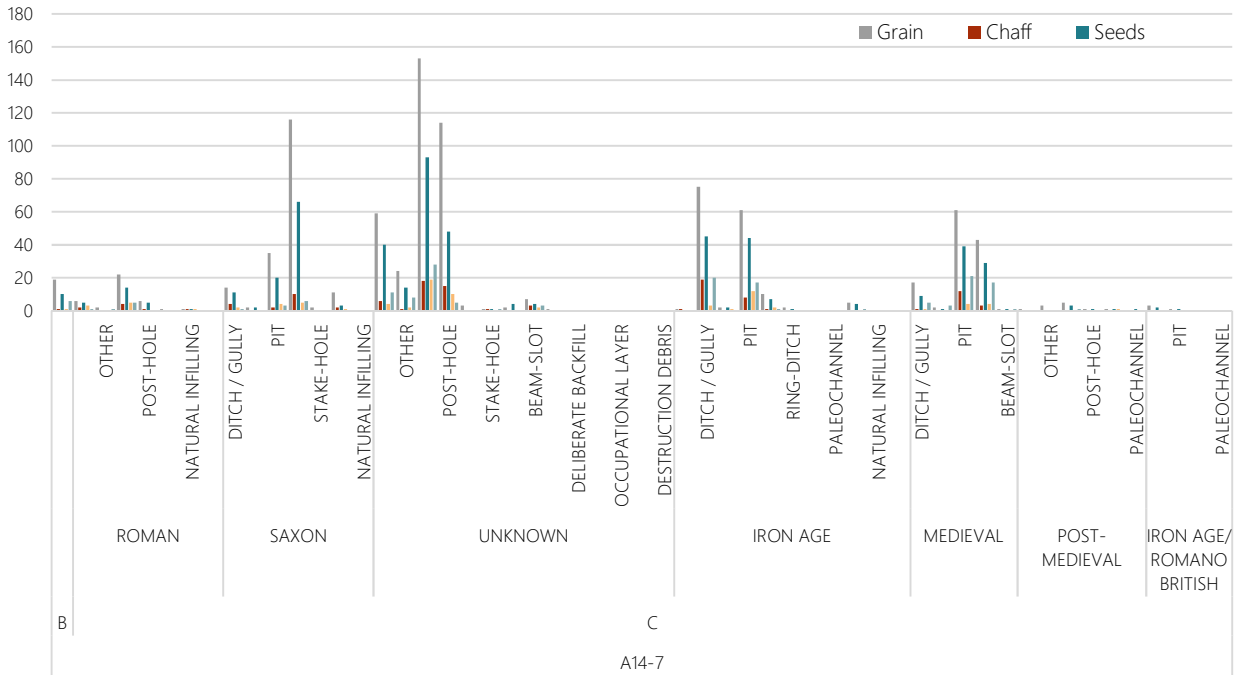
materials and chaff, consistent with the hypothesis of these being refuse pits, perhaps from crop-processing and cooking activities.

POST-MEDIEVAL

Evidence for post-medieval and modern activity was identified across the site, mainly agricultural activity and two 19th century brick kilns. A total of 19 environmental samples were collected from these contexts and have produced a small concentration of plant remains. In particular, the assessed samples contained free-threshing wheat and hulled barley grains, in addition to pulses and fruit stones from blackthorn (*Prunus spinosa*).

UNDATED CONTEXTS

A total of 699 samples were collected from currently undated contexts and have provided a high concentration of plant remains. From these 121 contained abundant remains of cereals (grains and chaff) in addition to arable weed seeds and wetland plant seeds. Among these, the main cereal crops are free-threshing wheat, hulled barley, oats and rye, similarly to archaeobotanical assemblages from the Saxon period onwards. In general, a small amount of cereal chaff has been seen in the assessed samples from undated contexts from TEA 7C+B, having identified occasional remains in 46 samples. This was comprised, mainly, of free-threshing wheat rachises and occasional barley rachises. Future analysis of the archaeobotanical assemblages in correlation with stratigraphic information will provide information about these currently undated contexts.



3.5.12. Summary of constituents from TEA 7B+C by period and feature.

Summary and potential of the assemblage

The botanical assemblage from TEA 7 has yielded remains of the six cereal crops cultivated in Britain from the prehistoric period onwards, in addition to a wide variety of wild plant seeds such as arable weeds and wetland plants which will help the identification of the environment at the time of occupation. The in-depth analysis of these assemblages would allow the investigation into agricultural practices, daily activities such as crop-processing and food preparation, as well as socio-economic organisation.

The charred plant assemblages from TEA 7 are of high significance in relation to the understanding of the area and its use, and the diet of its inhabitants, during the periods represented. Further botanical analysis will provide evidence on these aspects and on the nature of the natural environment.

Recommendations

The table below contains the samples selected from TEA 7 for further analysis due to their abundant concentration of well-preserved plant remains or specific research questions. Full details of these samples can be found in the project's digital records. Analysis of samples from currently undated context is reliant upon them being dated at the analysis stage.

3.5.7. Samples selected for analysis from TEA 7A

Site code	Period	Feature	No. samples
A14-7A	IRON AGE	DITCH/GULLY	3
A14-7A	IRON AGE	PIT	3
A14-7A	ROMAN	PIT	20
A14-7A	ROMAN	DITCH/GULLY	1
A14-7A	ROMAN	BEAM-SLOT	7
A14-7A	ROMAN	BURIAL CUT	4
A14-7A	ROMAN	IN SITU BURNING	3
A14-7A	ROMAN	POSTHOLE	8
A14-7A	ROMAN	OTHER (KILN)	42
A14-7A	ROMAN	STRUCTURE	2
A14-7A	ROMAN	OTHER	1
A14-7A	UNKNOWN	PIT	2
Total number of samples suggested for analysis			96

3.5.8. Samples selected for analysis from TEA 7B+C

Site code	Period	Feature	No. samples
A14-7C	IRON AGE	DITCH/GULLY	9
A14-7C	IRON AGE	PIT	16
A14-7C	IRON AGE	RING-DITCH	2
A14-7C	ROMAN	PIT	6
A14-7C	ROMAN	DITCH/GULLY	2
A14-7C	ROMAN	POSTHOLE	1
A14-7C	SAXON	BEAM-SLOT	1
A14-7C	SAXON	CONSTRUCTION CUT	1
A14-7C	SAXON	DITCH/GULLY	10
A14-7C	SAXON	PIT	10
A14-7C	SAXON	POSTHOLE	30
A14-7C	SAXON	STAKE-HOLE	1
A14-7C	SAXON	OTHER	1
A14-7C	MEDIEVAL	BEAM-SLOT	1
A14-7C	MEDIEVAL	PIT	36
A14-7C	MEDIEVAL	DITCH/GULLY	2
A14-7C	MEDIEVAL	POSTHOLE	10
A14-7C	UNKNOWN	BEAM-SLOT	1
A14-7C	UNKNOWN	POSTHOLE	5
A14-7C	UNKNOWN	PIT	25
A14-7C	UNKNOWN	DITCH/GULLY	3
Total number of samples suggested for analysis			173

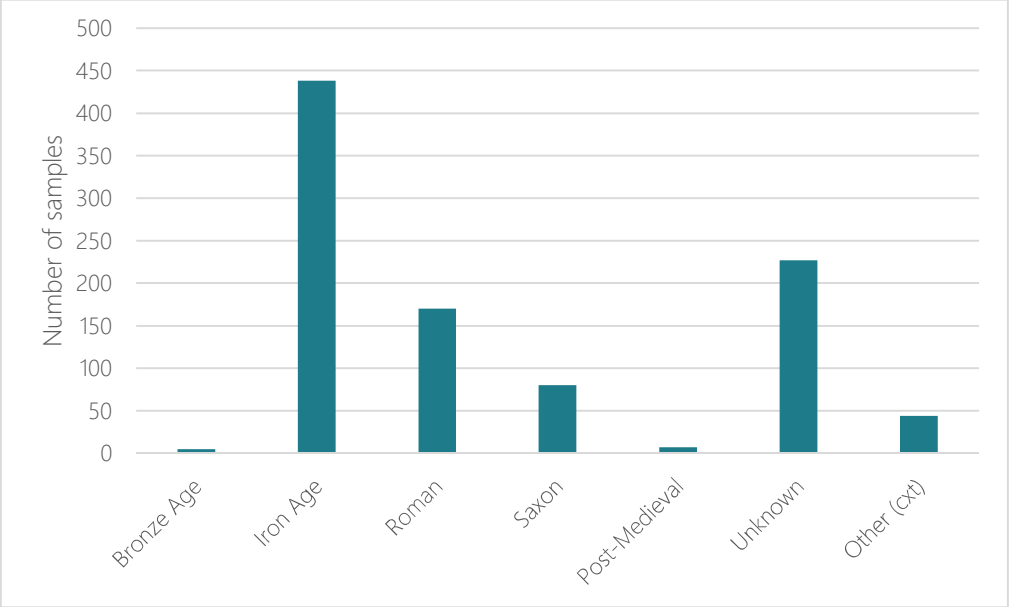
TEA 8/9

A single 10l bulk sediment sample was taken from deposit (90019) from undated cremation burial [90011] on TEA 9. The sample contained occasional charcoal fragments. No further work recommended.

TEA 10

A total of 971 bulk sediment samples were taken from across TEA 10. The samples ranged in size from 1 to 40 litres and were collected from a variety of features including pits, ditches, postholes and burials ranging in date from the Bronze Age to post-medieval periods.

Previous trial trenching work was carried out by CAU (Pattern et al 2010) in the south-east corner of TEA10, by Wessex Archaeology (WA2014) in the eastern part of TEA 10, and by MHI (MHI 2016) in the northern area of TEA10. Features sampled during work carried out by Wessex Archaeology (land parcels 1136 and 1137) derived from a Romano-British kiln and produced an assemblage of hulled barley (*Hordeum vulgare*), spelt wheat (*Triticum spelta*) and oats (*Avena* sp.) as well as cereal chaff (glume bases and spikelet forks) with pulses such as broad bean (*Vicia faba*) and garden pea (*Pisum sativum*) and a diverse assemblage of arable weeds. The plant assemblage generated from the six samples taken during work carried out by CAU comprised spelt wheat and lentil (*Lens culinaris*) from an Iron Age pit/gully, charcoal from a Roman cobbled feature, and indeterminate wheat, spelt wheat glume bases and a grass seed (Poaceae) from a Saxon grubenhaus. Features sampled during the trenching work carried out by MHI included ditches, a well and two cremation burials dating from the Romano-British period. The plant assemblage included spelt wheat, hulled barley, cereal chaff (glume bases), pulses and arable weeds. A single grape seed was also recovered from 1st-century sub-circular enclosure ditch [10109].



3.5.13. Number of samples per period

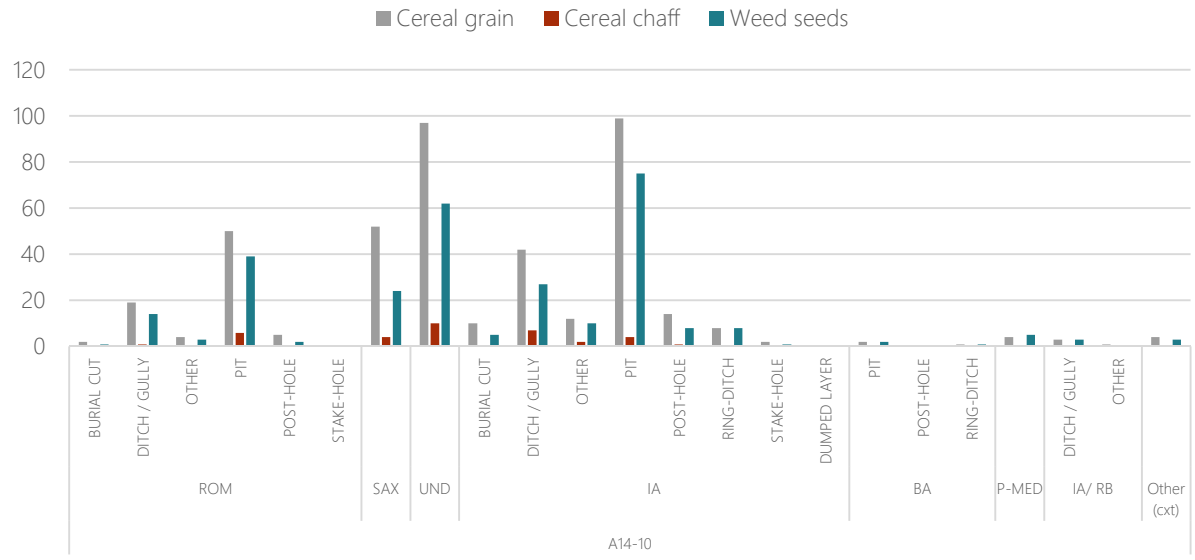
The charred plant remains exhibited mixed levels of preservation ranging from excellent to very poor. The better-preserved botanical material should allow full species identification to be carried out in the analysis phase. Table 3.5.9 presents the occurrence of constituent types in samples per period.

3.5.9. The occurrence of constituent types in samples per period

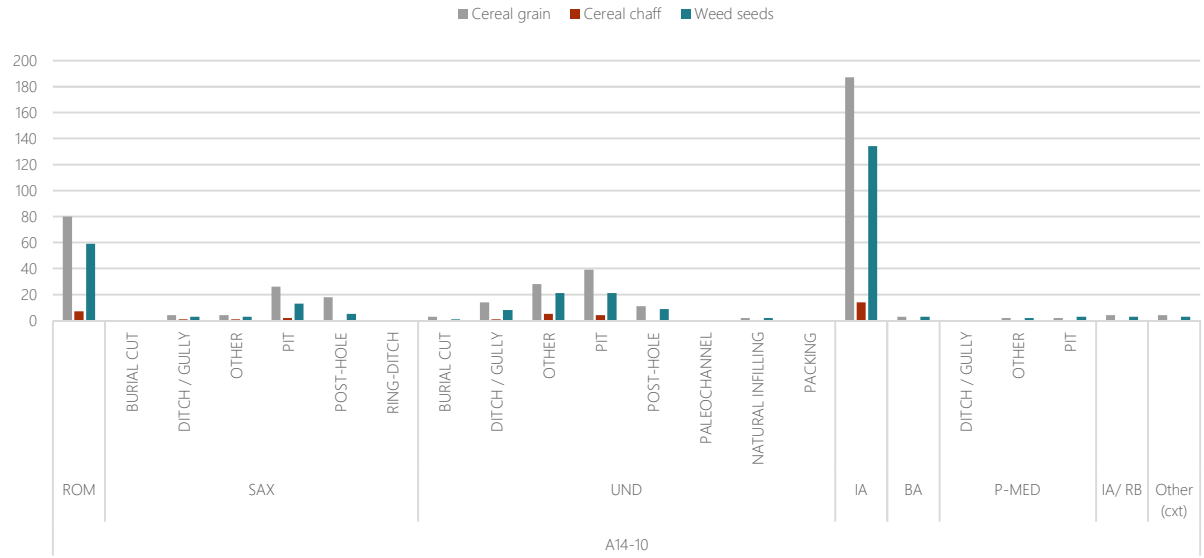
Period/Constituent	Cereal grain	Cereal chaff	Weed seeds	Nutshell	Charcoal	Misc
Bronze Age	3	-	3	-	5	-
Iron Age	187	14	134	13	409	38
Iron Age/Romano British	4	-	3	-	4	2
Roman	80	7	59	6	158	21
Saxon	52	4	24	5	77	8
Post-medieval	4	-	5	1	7	1
Undated	97	10	62	9	200	15
Other (cxt missing)	4	-	3	-	9	1

The topography and fluctuating water table on TEA 10 enabled the preservation of botanical remains by waterlogging. This resulted in traditionally non-waterlogged samples producing waterlogged flots. Where this occurred the flots were kept wet and a note was made of the potential loss of material due to the processing method used ie that for a dry sample. The preservation of the material varies as does the botanical constituents represented, but this is not unexpected given the unusual nature of the samples and the method by which some were processed.

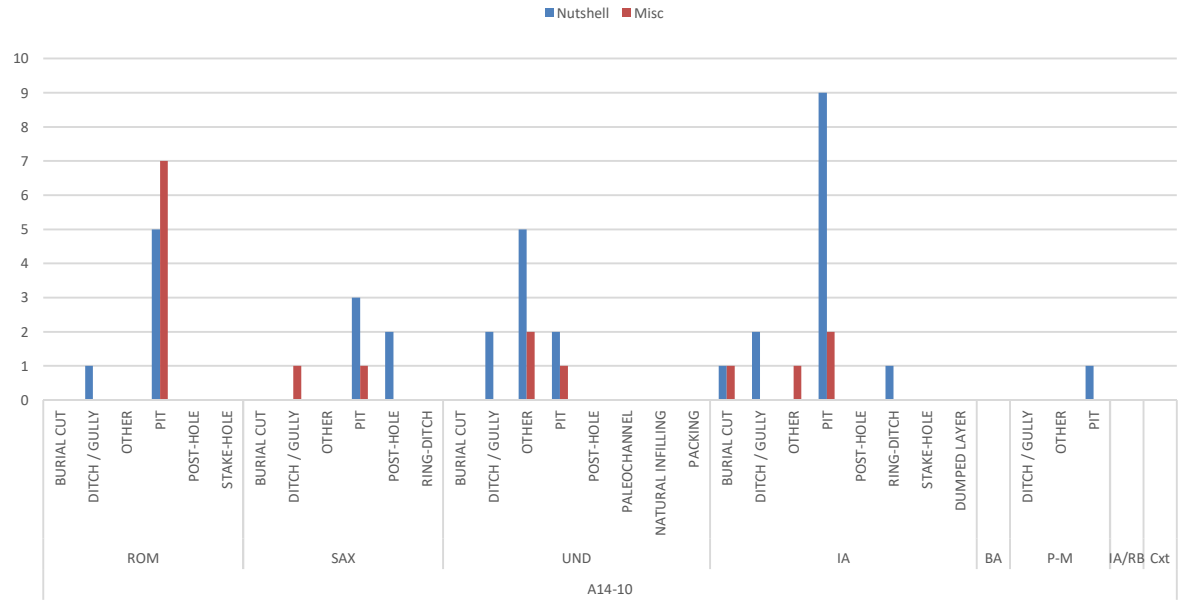
Samples by Period



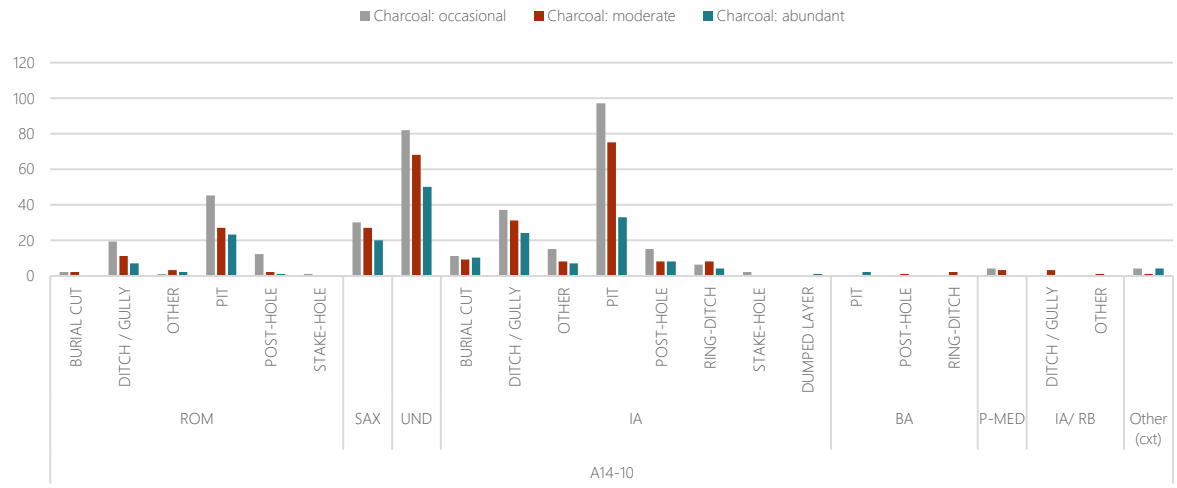
3.5.14. Occurrence of cereal grain/cereal chaff/weeds per period/feature type with feature categories displayed for the Bronze Age, Iron Age, Iron Age/Romano British and Roman periods



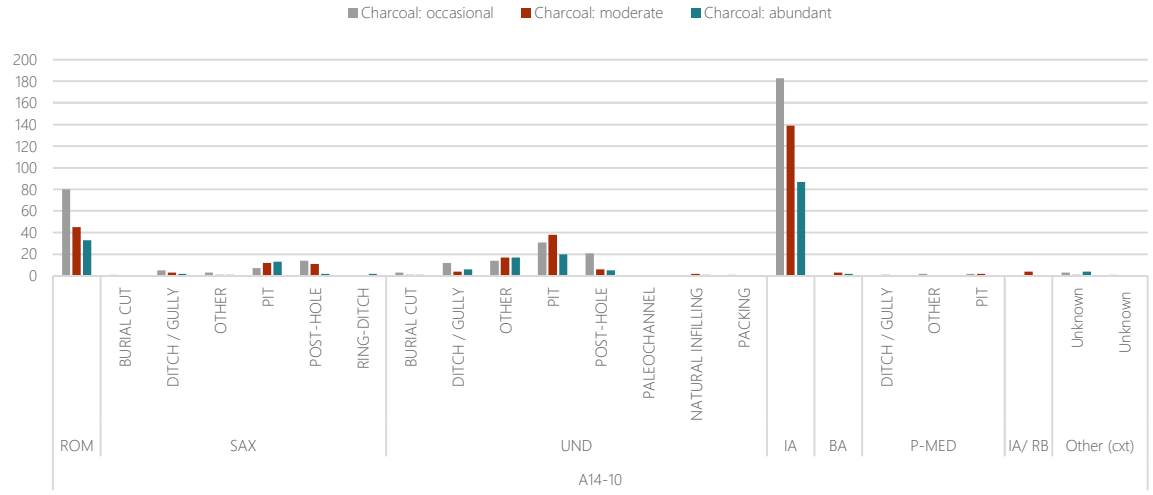
3.5.15. Occurrence of cereal grain/cereal chaff/weeds per period/feature type with feature categories displayed for the Saxon and post-medieval periods as well as Undated features and features with missing context information



3.5.16. Occurrence of nutshell and charred miscellaneous per period/feature type



3.5.17. Charcoal abundance per period/feature type with feature categories displayed for the Bronze Age, Iron Age, Iron Age/Roman and Roman periods



3.5.18. Charcoal abundance with feature categories displayed for the Saxon and post-medieval periods as well as Undated features and features with missing context information

Bronze Age

Occasional to moderate charcoal was recovered from ditches [601014] and [601608] of ring ditch barrow 10.1 and posthole [102585] of cremation 10.1 and was abundant in contexts (103364) and (103365) from pit [103363] and cremation burial 10.1. Pit [103363] and ring-ditch [601014] also contained occasional cereal grains including barley (Hordeum sp.), wheat (Triticum sp.) and cereal indeterminate.

Germinated spelt was recorded in ring-ditch [601608], and context (103364) from cremation pit [103363] contained potential rye (*Secale cereale)*, both of which were species that were not in regular cultivation until the Roman and Saxon periods respectively. The presence of these species in Bronze Age contexts is likely due to taphonomic processes such as bioturbation, movement resulting from a fluctuating water table, and/or continued occupation at the site.

Multiple contexts from several burial cuts associated with cremation burials 10.2 and 10.3 were sampled, all of which contained charcoal. Abundant charcoal was present in contexts from each cremation burial; (100273), (100274), (100275) (burial cut [100276]), context (100236) (cut [1002380]) and (100130) (cut [100131]) from cremation burial 10.2 and contexts (100133) and (100134) (cut [100136]), (100140) (cut [100142]) and (100179) (cut [100180]) from cremation burial 10.3. Other plant remains recovered from the cremation burials included occasional barley and cereal indeterminate grains, small grass seeds and indeterminate fruit stones.

BRONZE AGE: PIT GROUPS

19 pit groups were assigned to the early Bronze Age. Whilst these pits have been dated to the Bronze Age in the stratigraphic assessment report, phasing data from the Oracle database lists some of the pit groups as Iron Age while others remain undated. For the purpose of this report the pits have been included in the section relating to the Bronze Age in order to conform with groups outlined in the stratigraphic assessment report.

The pits from pit groups 10.1-9 contained occasional to moderate charcoal, which was abundant in pits [102791], [103484] and [102819] from pit group 10.1, [102216] from group 10.4, and [103486] from pit group 10.8. Occasional to moderate cereals were recovered from pit groups 10.1, 10.3, 10.5, 10.6, 10.7 and 10.8. Species present included hulled barley, emmer wheat, spelt wheat, bread wheat and cereal indeterminate. This spectrum of cereals is a typical Romano-British assemblage rather than Bronze Age. Weed seeds present included crop weeds as well as legumes such as pea (*Pisum* sp.).

The four pits sampled from pit group 10.12 contained occasional charcoal and cereals including barley, wheat and oats. Pit [105997] also contained a large legume fragment of broad bean/garden pea (*Vicia faba/Pisum sativum*).

Three pits from group 10.14 and one from group 10.15 produced occasional to moderate charcoal and was abundant in pits [101792] and [106936] from group 10.14. Pit [106836] also contained occasional cereal indeterminate grains and an indeterminate legume fragment. Charcoal was abundant in Pit [101579] from group 10.17, but only moderate pit [101606].

Middle Iron Age

MIDDLE IRON AGE: NORTHERN ENCLOSURE 10.1

Features sampled from Enclosure 10.1 included ditch/gullies, pits, and a feature categorised as 'other'. Charcoal was present in all features and was abundant in ditch/gully [107779] and [603043] as well as pit [603101]. Cereals including glume wheat, possible bread wheat (cf. *Triticum aestivum*) and cereal

indeterminate were present in abundance in pit [603226] and in much smaller number in ditch/gully [603043].

MIDDLE IRON AGE: SOUTHERN ENCLOSURE 10.2

Features associated with Enclosure 10.2 included pits, ditch/gullies, a posthole and a feature categorised as 'other'. Pits [107568] and [107729] and ditch/gully [107687] and [107706] comprised multiple contexts from which samples were taken and so produced larger overall botanical assemblages. Charcoal was present in all sampled features and was abundant in ditch/gullies [106851], [106910], [107458], [107552], [107687] and [107706]. Occasional cereal grains were recovered from a small number of pits and ditch/gully sections. Species present included hulled barley (*Hordeum vulgare*), bread wheat, oats (Avena sp.), glume wheat and cereal indeterminate. Glume wheat chaff (glume base) was recorded in ditch gully [107469]. Other charred plant remains included damson/sloe (*Prunus* sp.), drupe and stone fragments, hawthorn (*Crataegus monogyna*) and possible alder buckthorn (cf. *Frangula Alnus*) from ditch/gully [107552], and knotgrass (*Polygonum aviculare*), sedges (*Carex* sp.) and seeds from the cabbage family (Brassicaceae), legumes (2mm) and tree leaf buds from pit [107729]. Ditch/gully [107635] from enclosure 10.2 contained an assemblage of moderate charcoal and cereals including barley, emmer wheat, spelt wheat and bread wheat as well as pulses and grass seeds.

Middle Iron Age: Sub-Circular and Sub-Square Enclosures (Enclosures 10.4, 10.5 and 10.6)

Features sampled from enclosures 10.4, 10.5 and 10.6 included postholes, pits, ditch/gullies, a stake-hole and several features categorised as other. Charcoal was present across all feature types and was abundant in ditch/gullies [107685] from Enclosure 10.4, [107899] and [603003] from Enclosure 10.5, and [107826] from Enclosure 10.6. Occasional to moderate cereals including hulled barley, glume wheat, oats, possible spelt wheat (cf. *Triticum spelta*) and cereal indeterminate were found in a range of feature types from all three enclosures. Cereal chaff was predominantly glume bases and was recovered from posthole [107078], pit [107110] and 'other' feature [107527] from enclosure 10.5; and ditch/gully [107685] from enclosure 10.4. Other plant remains recorded included arable weeds as well as damson/sloe drupe and stone fragments. Charred bread-like food remains were present in ditch/gully [107608] from enclosure 10.4.

MIDDLE IRON AGE: SQUARE ENCLOSURES (ENCLOSURES 10.3 AND 10.8)

Occasional to moderate charcoal was present across a range of features from both enclosures including the ditch/gullies from enclosure 10.8 and pits and postholes of enclosure 10.3. Charcoal was abundant in ditch/gully [107442] and [107444] from enclosure 10.8 and postholes [107976] and [107981] from enclosure 10.3. Occasional cereals including hulled barley, possible spelt and emmer wheat (*Triticum dicoccum*), oats and cereal indeterminate were recovered from features across both enclosures. Weed seeds present included arable weeds as well as legumes (2mm).

MIDDLE IRON AGE: FIELD BOUNDARIES AND DROVEWAY (TRACKWAY 10.1, BOUNDARY 10.1, KILN 10.2)

Two contexts from ditch/gully [106841] from Trackway 10.1 were sampled. Context (106997) yielded abundant charcoal whereas context (106480) contained only occasional fragments. Kiln 10.2 contained abundant charcoal including roundwood.

MIDDLE IRON AGE: PASTURE, DROVEWAY, AND 'QUESTION MARK' ENCLOSURE (TRACKWAY 10.2, ENCLOSURE 10.7)

Ditch/gully contexts sampled from Trackway 10.2 contained occasional to moderate charcoal and was abundant in ditch/gully [106776]. Cereal present included hulled barley, glume wheat and cereal indeterminate. A small number of glume wheat glume bases (chaff) were recovered from ditch/gullies [106776] and [106901]. Occasional weed seeds were also present in ditch/gully [106776] including scentless mayweed (*Tripleurospermum indorum*), grasses and seeds from the daisy family (Asteraceae).

MIDDLE IRON AGE: RADIATING STRIP FIELDS (FIELD SYSTEM 10.1-10.5, ENCLOSURE 10.9)

Ditch/gully [603249] from field-system 10.3 contained moderate charcoal and cereals including barley and indeterminate wheat. Material present in ditch/gullies [104776] and [104788] from enclosure 10.9 included occasional charcoal and indeterminate cereal grains.

MIDDLE IRON AGE: 'LADDER' DITCHES (DITCHES 10.3 AND 10.4)

The three sampled ditch/gully sections from 'ladder' Ditch 10.3; [104611], [104629] and [104657] contained occasional to moderate charcoal.

MIDDLE IRON AGE: ROUNDHOUSES (ENCLOSURE 10.10 AND 10.11, DITCHES 10.7 AND 10.8)

Features sampled from enclosure 10.10 produced occasional charcoal, while pit [108315] contained abundant charcoal. An individual glume wheat grain was recovered from ring-ditch [108260]. The two contexts sampled from ring-ditch [604375] from ditch 10.7 contained occasional to moderate charcoal.

Late Iron Age

LATE IRON AGE: DITCHES, ENCLOSURES AND DISCRETE FEATURES (ENCLOSURES 10.12-10.14, FIELD SYSTEM 10.6, DITCHES 10.9-10.11 AND 10.18, PIT GROUP 10.22, STRUCTURAL FEATURES 10.1)

Ditch/gully contexts sampled from enclosure 10.14 contained varying quantities of charcoal, which was abundant in ditch/gully [604019], and occasional cereal grains of hulled barley and indeterminate cereal from ditch/gullies [104990] and [64019]. The charred plant assemblage from ditch 10.18 comprised charcoal, which was abundant in ring-ditches [104850] and [104963], occasional cereals including spelt wheat and occasional arable weeds. Context (104960) from ring-ditch [104963] contained abundant charcoal; during the stratigraphic assessment this context was assigned a Saxon date. Pit [604421] from pit group 10.22 contained abundant charcoal and occasional glume wheat grains. Ditch/gully [604395] from ditch 10.9 comprised abundant charcoal of a size insufficient for analysis and occasional weed seeds. During the stratigraphic assessment phase ditch/gully [604395] was assigned a Roman date.

LATE IRON AGE: DISCRETE FEATURES (OCCUPATION FEATURES 10.3)

Sampled features from occupation features 10.3 included pits and ditch/gullies. The botanical assemblage comprised charcoal, which was abundant in in pit [104487], and occasional crop weeds

LATE IRON AGE: DISCRETE FEATURES (INHUMATIONS 10.2 AND 10.3, PIT GROUPS 10.23-10.29, STRUCTURAL FEATURES 10.2-10.4, OCCUPATION FEATURES 10.4-10.6)

Sampled contexts from Pit Groups 10.23, 10.26, 10.27 and 10.29 contained varying quantities of charcoal, and was abundant in posthole [104746] and pit [104882] from Pit Group 10.26, pit [603457] from Pit Group 10.27, and pit [107390] from Pit Group 10.29. Cereals present included hulled barley and spelt wheat. Abundant charred grain was recovered from pit [107390] from Pit Group 10.29, including germinated spelt grains. Pit [104882] also contained cereal chaff comprising spikelet forks and glume bases of spelt wheat. Arable weeds were recovered from several pits spanning the pit groups. In addition to charred plant remains, pit [603457] from Pit Group 10.27 and pit [107390] from Pit Group 10.29 also produced botanical remains that had been preserved by waterlogging. The waterlogged assemblage from pit [107390] comprised stem and root fragments with an abundance of henbane (*Hycosyamus niger*) seeds as well as smaller numbers of common nettle (*Uritca dioica*), sedges, blackberry (*Rubus fruticosus*) and indeterminate tree buds whereas the assemblage from pit [603447] contained abundant wood fragments and seeds of celery-leaved buttercup (*Ranunculus sceleratus)*, common chickweed (*Stellaria media*), buttercups and knotgrasses.

Postholes [104935] and [604016] from Structural Features 10.3 contained abundant charcoal and occasional weed seeds. Pits from Occupation Features 10.4 yielded occasional charcoal and grains of hulled barley and glume wheat. Posthole [107569] contained abundant charcoal. Pit [603679] waterlogged plant remains. The assemblage included indeterminate leaf and moss fragments as well as seeds of common nettle, elder (*Sambucus nigra*) and knotgrasses (*Polygonum* sp.). Occasional waterlogged oak (*Quercus* sp.) fragments were also recorded.

LATE IRON AGE: MIGRATING DROVEWAY DITCHES AND DISCRETE FEATURES (TRACKWAY 10.3, OCCUPATION FEATURES 10.7-10.8, STRUCTURAL FEATURES 10.5, PIT GROUP 10.32, DITCH 10.12-10.13)

Pit [103013] and ditch/gully [600615] from Trackway 10.3 contained abundant charcoal. The charcoal was not suitable for analysis due to its size (<1mm). Ditch/gully [601297] from occupation features 10.8 contained moderate charcoal and occasional indeterminate wheat grains. Assemblages from the postholes from structural features 10.5 was predominantly occasional charcoal and indeterminate cereal grains. Posthole [600480] produced botanical remains preserved by waterlogging. This included stems, roots and moss fragments with occasional seeds from the pea (Fabaceae) and abundant waterlogged twig fragments. Pits from pit groups 10.30-32 contained charcoal and was abundant in pits [600593] from pit group 10.30, [600323] from pit group 10.31 and [601087] from pit group 10.32], of these only the charcoal from pit [600323] was suitable for analysis. A single wheat grain was present in pit [600443] from pit group 10.32. Sampled features from ditch group 10.13 contained occasional charcoal only.

LATE IRON AGE: DITCHES IN 10B NORTH

Ditch/gully [600385] from ditch 10.14 contained a mixture of charred and waterlogged remains. Charred plant remains comprised occasional charcoal while the waterlogged remains included roots and stem fragments with abundant seeds including sedges (*Carex* sp.), rushes (*Juncus* sp.), buttercups (*Ranunculus* sp.), blackberry and seeds of the carrot family (Apiaceae). Occasional charcoal was present in ditch

[106865] from Ditch 10.16. Ditch/gully [602051] from Ditch 10.17 also contained plant remains preserved by waterlogging. In addition to root and stem material the waterlogged plant assemblage also included moss, bark fragments, indeterminate rhizomes as well as aquatic taxa; pondweeds (*Potamogeton* sp.) and horned pondweed (*Zannichellia paulstris*). Ditch/gully [103003] comprised an assemblage of moderate charcoal and occasional weed seeds. During initial stratigraphic assessment this ditch/gully section has been assigned a Roman date.

Sampled ditch/gully sections from Boundary 10.2 produced an assemblage of occasional to moderate charcoal with occasional seeds of the sedge family (Cyperaceae). Ditch/gully sections [600836] and [601726] contained seeds preserved by waterlogging. Taxa present were predominantly those that favour wetland and aquatic habitats.

The botanical assemblage from pit group 10.34 comprised both charred and waterlogged plant remains. Charred plant remains included occasional to moderate charcoal. Cereals including spelt, hulled barley and glume wheat were present in several pits and were abundant in pits [601118] and [601536]. Pit [601118] also contained an abundance of spelt chaff (glume bases) as well as moderate numbers of pulses and crop weeds. Pits [602327] and [602251] also had plant remains preserved by waterlogging. This included roots, stem and wood fragments as well as wetland and arable weeds.

LATE IRON AGE: DEAD ZONE (ENCLOSURE 10.15, INHUMATIONS 10.4)

Features sampled from Enclosure 10.15 included pits, postholes, ditch/gully sections and features categorised as 'other'. Charcoal was present in varying quantities across all feature types and was abundant in ditch/gully [106797], posthole [107308], pit [107308] and 'other' feature [106548]. Occasional cereal including barley, glume wheat and cereal indeterminate were also present in several features as well as weeds from a range of habitat types. Glume wheat chaff was recorded in pit [107308].

The botanical content in samples extracted from Inhumation Burial 10.4, comprised moderate charcoal and occasional cereals including hulled barley, indeterminate wheat and cereal indeterminate. Occasional weed seeds were also recorded.

LATE IRON AGE: LIVING ZONE (STRUCTURAL FEATURES 10.7-10.9)

The features that characterised Structural Feature 10.7 and 10.9 were pits, postholes, ditch/gullies as well as features categorised as 'other'. The overall charred plant assemblage derived from these features comprised occasional to moderate charcoal, with an abundance in pit [603645] from Structural Features 10.7, as well as occasional spelt wheat, emmer wheat, hulled barley and oats with occasional arable weed from both structural feature groups.

LATE IRON AGE: SPINE DITCH (DITCHES 10.19-10.21 AND 10.36, PIT GROUP 10.36, STRUCTURAL FEATURES 10.10)

Ditch/gully [601166] from Ditch 10.21 contained abundant cereal grain with occasional charcoal. Cereals present included barley, spelt wheat and free threshing wheat. Ditch/gully [103718] from Ditch 10.19 produced occasional charcoal. Pits from Pit Group 10.36 produced both charred and waterlogged plant remains. Occasional to moderate charcoal was recovered from five pits and waterlogged remains from pits [102359] and [104110]. The waterlogged plant assemblage was predominantly stem and root

fragments with wood fragments and seeds that favour a wetland or aquatic ecology. Pit [102253] from Pit Group 10.36 produced an assemblage of moderate charcoal and occasional barley grain.

Ring/ditch sections [103483], [103572], [103871], [103966] and [104015] characterised Structural Features 10.10. The charred plant assemblage from the ditch sections included varying quantities of charcoal, which included an abundant quantity in ring-ditch [103483]. Cereals present were barley, emmer wheat, spelt wheat, bread wheat and oats. A small number of arable weeds were also present.

LATE IRON AGE: M-SHAPED ENCLOSURE (ENCLOSURE 10.17, PIT GROUP 10.38)

Pit [102132] from pit group 10.38 yielded abundant numbers of barley, oats and charcoal as well as occasional pulses. Pit [103120] contained occasional charcoal.

LATE IRON AGE: D-SHAPED ENCLOSURE (ENCLOSURE 10.16, PIT GROUP 10.27, OCCUPATION FEATURES 10.9-10.10, DITCHES 10.22-10.23)

Ditch gully [104040] from Enclosure 10.16 contained moderate charcoal and occasional grains of hulled barley, spelt wheat, oats and emmer wheat. The samples also contained occasional arable weed seeds. Botanical material from the two pits [601330] and [601351] included occasional to moderate charcoal, occasional oat grains and weed seeds. Pit [601330] also contained charred bread-like food fragments. Features that characterised Occupation Features 10.9 and 10.10 included ditch/gullies, postholes and pits. The overall plant assemblage from the two occupation feature groups comprised occasional cereals including barley, emmer wheat and oats with arable weed seeds and occasional to moderate charcoal. Pit [601829] from Occupation Features 10.9 and posthole [601839] from Occupation Features 10.10 contained abundant charcoal

LATE IRON AGE: PIT COMPLEX (PIT GROUPS 10.39-10.40)

Pit groups 10.39 and 10.40 produced an overall charred botanical assemblage that comprised occasional cereals that included emmer wheat, barley and bread wheat with occasional agricultural weed seeds and occasional to moderate charcoal. Abundant charcoal was recovered from pit [101271] from pit group 10.39 and pit [108413] from pit group 10.40.

LATE IRON AGE: INDUSTRIAL FEATURES (KILNS 10.1-10.3, PIT GROUP 10.41)

Charcoal was the dominant component of the charred plant assemblage from Kilns 10.1 and 10.2. The kilns also contained moderate quantities of cereals including emmer wheat, barley, glume wheat and cereal indeterminate. The assemblage also included occasional grasses and pulses. 'Other' feature [107665] from Kiln 10.1 also contained glume wheat chaff (glume bases). Pit [105226] from Pit Group 10.41 contained occasional cereal indeterminate grains and abundant charcoal including roundwood fragments.

LATE IRON AGE: FUNERARY AREA (DITCHES 10.24-10.25, PIT GROUP 10.42-10.43)

Sampled ditch/gully sections from Ditch 10.24 produced an assemblage of moderate charcoal and occasional cereals and weed seeds. Cereal recorded included barley, glume wheat and cereal indeterminate. Pit [105579] from Pit Group 10.43 contained occasional charcoal, cereal indeterminate grain and arable weeds. A charred bread-like food was also recovered. Pit [603933] from Pit Group 10.42 contained charcoal only.

LATE IRON AGE: LINEAR FEATURES (DITCHES 10.26-10.28 AND 10.30-10.33, ENCLOSURE 10.18)

The sampled ditch/gully sections from Ditches 10.27, 10.30 and 10.31 produced an overall plant assemblage of moderate charcoal, hulled barley, oats and glume wheat.

LATE IRON AGE: SOUTHERN BOUNDARY DITCHES (PIT GROUPS 10.44-10.45)

'Other' feature [105411] from Pit Group 10.45 contained abundant charcoal with occasional indeterminate cereal grain, whereas pit [105028] had occasional charcoal.

LATE IRON AGE: DISCRETE FEATURES (PIT GROUPS 10.46-10.50, OCCUPATION FEATURES 10.11-10.12)

The charred plant assemblage from the seven pits in Pit Groups 10.46-50 was predominantly charcoal, which was abundant in pits [106039] and [106064]. Three pits: [105504], [106959] and [106064] plus 'other' feature [105801] produced occasional hulled barley, indeterminate wheat and cereal indeterminate grains. 'Other' feature [105801] also contained broad bean and other legume fragments. Pits in Occupation Features 10.11-12 produced an assemblage of charcoal, which was abundant in pits [105961] and [106074]. The pits from these groups also contained indeterminate cereal grains, large legume fragments and arable weed seeds.

LATE IRON AGE: DISCRETE FEATURES (STRUCTURAL FEATURES 10.12 AND 10.14, PIT GROUPS 10.51-10.53, OCCUPATION FEATURES 10.13)

Pit [106207] from Pit Group 10.52 contained an abundance of charcoal and possible flax (cf *Linum* sp.) seeds. Other material present included occasional barley, oats and possible rye (cf *Secale cereale*) grains and agricultural weeds.

LATE IRON AGE: PIT GROUP 10.35

Pits from Pit Group 10.35 produced a charcoal dominant assemblage, though the quantities of charcoal present were occasional to moderate. Five contexts sampled from pit [106982] produced an assemblage of moderate charcoal including roundwood of a size suitable for analysis and occasional wheat indeterminate grains. Weeds present included cleavers (*Galium aparine*), docks (*Rumex* sp.) and grasses. Also recovered were rhizome/tuber fragments, false oat grass (*Arrhenetherum elatius*) culm node and sloe fruit stones.

LATE IRON AGE: UNPHASED/UNGROUPED

'Other' feature 107517] contained abundant charcoal and moderate cereal including barley, glume wheat and oats. Posthole [600078] produced occasional charcoal and cereal grain.

IRON AGE/ROMANO-BRITISH

A small number of sampled features from Occupation Features 10.3, Enclosure 10.15 and Kiln 10.1 have been assigned to the Iron Age/ Romano British period. This date category is not included in the stratigraphic report text but is one assigned in the oracle database. This phase has been included in the environmental results text to conform to the periods represented in the charts and data tables included in this report.

Ditch/gully [104530] from Occupation Features 10.3 contained occasional charcoal, indeterminate cereal grains and an indeterminate legume. The ditch also contained charred bread-like food fragments. The two samples from context (106732) from ditch/gully [106734] from enclosure 10.15 produced an assemblage of moderate charcoal with occasional hulled barley and cereal indeterminate grains, legumes and occasional wetland and arable weeds.

Roman

ROMAN: RECTANGULAR ENCLOSURES (ENCLOSURES 10.19-10.20, PIT GROUP 10.64, STRUCTURAL FEATURES 10.15)

The charred plant assemblage from ditch/gully sections from enclosures 10.19 and 10.20 included charcoal which was abundant in ditch/gullies [105617] and [105729] from enclosure 10.20, as well as occasional cereal indeterminate grains and grass seeds. The plant remains from pit [105092] from Pit Group 10.64 comprised abundant charcoal and occasional barley and indeterminate wheat grains. Charred bread-like food fragments were also recorded. Sampled features from Structural Features 10.15 included pits, postholes and a stake-hole. The overall charred plant assemblage from these features comprised occasional to moderate charcoal with occasional barley and cereal indeterminate grains.

ROMAN: ENCLOSURE SUBDIVISION DITCHES (DITCHES 10.39, 10.40, 10.46)

Ditch/gully [102873] from ditch 10.46 produced a small assemblage of charcoal, hulled barley and glume wheat grains with garden pea and arable weeds. Ditch/gully [103857] from ditch 10.40 contained occasional charcoal only.

ROMAN: DISCRETE FEATURES (PIT GROUPS 10.54, 10.66-10.67, 10.69-10.71)

Features sampled from Pit Groups 10.54, 10.66-7, 10.69, 10.70, 10.71 included postholes as well as pits. The overall assemblage from features within these groups included charcoal which was abundant in pits [101663] and [100953] from pit group 10.54, pit [100213] from pit group 10.66, pits [100158], [100314], [100433] and posthole [100312] from pit group 10.67, 'other' feature [101953] from pit group 10.70 and pit [102490] from pit group 10.71. Cereals including barley, emmer wheat, glume wheat, bread wheat and oats were present across the pit groups. A small assemblage of arable weeds and pulses was also recorded. Flax (*Linum usitatissimum*) seeds were present in pit [100433] from pit group 10.67.

ROMAN: MODIFIED SOUTH-EASTERN ENCLOSURE (ENCLOSURE 10.23)

The ditch/gully sections sampled from enclosure 10.23 produced a botanical assemblage composed of charcoal, which was abundant in ditch/gully [601347], as well as moderate cereals including barley and glume wheat and occasional arable weeds.

ROMAN: INTERNAL FEATURES IN ENCLOSURE 10.23 (BOUNDARY 10.6, ENCLOSURE 10.24, DITCHES 10.50-10.53, ENCLOSURE 10.26)

Ditch/gully sections from Boundary 10.6 contained moderate charcoal and occasional barley grains while ditch/gully sections from Enclosure 10.24 contained charcoal, which was abundant in ditch/gully [104401], as well as occasional hulled barley, emmer wheat and oats and occasional weed seeds. The overall plant assemblage from Ditches 10.51, 10.52 and 10.52 included charcoal, which was abundant in ditch/gullies [103466] and [103506] from ditch 10.51, and varying numbers of cereals including an

abundance in 'other' feature [101105] in ditch 10.53. Cereal present included hulled barley, emmer wheat, spelt wheat, bread wheat and oats. Also present across the ditches were occasional arable weeds and garden pea. Ditch/gullies [103466], [103504] and [10306] also produced a diverse range of waterlogged weed seeds from several ecology types.

ROMAN: FEATURES TO THE EAST OF ENCLOSURE 10.23 (DITCHES 10.41-10.44, FIELD SYSTEM 10.9-10.11)

The ditch/gully sections sampled from Ditch 10.42 produced an assemblage of moderate charcoal and occasional cereal indeterminate grains. Ditch/gully [103592] from Field System 10.11 contained indeterminate cereal grain and ditch/gully [103072] from Field System 10.10 produced charcoal flecks.

ROMAN: PITS (PIT GROUP 10.56-10.63, OCCUPATION FEATURES 10.17)

The overall charred plant assemblage from Pit Groups 10.56-10.63 comprised charcoal which was abundant in pits [103028] from pit group 10.59, pit [102803] from pit group 10.60, pit [102103] from pit group 10.62 and pit [101975] from pit group 10.63; and cereals which were abundant in pit [101975]. Cereal present in the overall assemblage included hulled barley, spelt wheat, oats, glume wheat and cereal indeterminate. Occasional weeds seeds and rhizome/tuber fragments were also recorded.

Several pits also produced waterlogged plant remains these were; pit [104323] from pit group 10.56, pits [103728] and [104399] from pit group 10.57, pit [108307] from pit group 10.59 and pit [102803] from pi group 10.60. The general waterlogged assemblage comprised root, stem and moss fragments with wetland, aquatic and arable weeds present. Pit [103728] contained multiple contexts which were sampled. The assemblage from this pit contained moderate amounts of flax seeds, capsule fragments and potential stem fragments which suggests potential flax processing taking place at the site. Posthole [104019] from Occupation Features 10.17 produced occasional charcoal.

ROMAN: DISCRETE FEATURES (OCCUPATION FEATURES 10.18–10.24)

Features sampled from Occupation Features 10.18-10.24 included pits, postholes, ditch/gully sections and a feature categorised as 'other'. The charred plant assemblage from these feature groups included charcoal which was abundant in 'other' feature [106071] from Occupation Features 10.21 and pit [603957] from Occupation Features 10.24. Cereals including hulled barley and glume wheat were present across several pits/ postholes from Occupation Feature groups 10.19, 10.20, 10.21, 10.23 and 10.24 as well as arable weeds. Charred bread-like food fragments with grain inclusion were recovered from pit [105736] from Occupation Features 10.19 and pit [105462] from Occupation Features 10.21.

ROMAN: LARGE PITS (PIT GROUP 10.65 AND 10.68)

Sampled pits from Pit Groups 10.65 and 10.68 produced an assemblage of abundant charcoal in pit [100221] from pit group 10.68 and pit [604582] from pit group 10.65. This pit also contained an abundant and diverse weed seed assemblage, as well as moderate cereals including hulled barley, glume wheat and bread wheat.

ROMAN: ENCLOSURE 10.27

Ditch/gully [104560] from enclosure 10.27 contained moderate charcoal.

ROMAN: DISCRETE FEATURES (PIT GROUP 10.73, OCCUPATION FEATURES 10.26-10.27)

Pit [604300] from Occupation Features 10.26 contained abundant charcoal and moderate cereals including barley and spelt wheat as well as occasional weed seeds. Pit [603304] contained abundant charcoal flecks.

ROMAN: INHUMATION BURIALS (INHUMATION BURIALS 10.5-10.7)

The charred plant assemblage from Inhumation Burial 10.6 comprised moderate charcoal and occasional spelt wheat. Charred bread-like food remains were also recovered. Inhumation Burial 10.7 did not contain any charred plant remains.

ROMAN: POTTERY KILNS (PIT GROUPS 10.74-10.76, KILNS 10.4-10.7)

Pit [604333] from Kiln 10.5 contained an abundance of charred bread-like food remains as well as abundant cereals including barley and spelt wheat (some of which was germinated) and emmer wheat grains and glume wheat chaff. Pulses and arable weeds including large grasses (>2mm) were also recorded. Charcoal was common in the features associated with the other kilns (10.4, 10.6-7) and was abundant in pit [104924] from Kiln 10.4. The assemblage from Kiln 10.4 also contained cereals including hulled barley, spelt wheat, emmer wheat, bread wheat and oats plus glume wheat chaff (glume bases and spikelet forks) as well as pulses and arable weeds. Species present were of a similar range to those in Kiln 10.5 though slightly fewer in number. Charred amorphous fragments were also present. Kilns 10.6 and 10.7 contained small (< 5mm) occasional to moderate charcoal and occasional cereal grains and appear to be in stark contrast to the botanical remains recovered from Kilns 10.4 and 10.5.

Multiple contexts were sampled from pit [104970] from Pit Group 10.74. The assemblage produced abundant charcoal, occasional indeterminate wheat grains and weed seeds including docks and cleavers. Pit [604055] from pit group 10.75 produced moderate charcoal only.

Pit [104635] from pit group 10.76 produced charred and waterlogged plant remains. The waterlogged assemblage comprised abundant stem and root material with occasional waterlogged wood fragments. An abundance of weed seeds were also present and represented taxa from several ecological groups including aquatic, wetland and arable weeds. The charred component comprised occasional charcoal flecks.

ROMAN: PIT GROUP 10.55

Pit [103277] produced an assemblage of both waterlogged and charred plant remains. The waterlogged remains included abundant wood fragments, most likely a larger piece that has fragmented, as well as a moderate number of blackberry seeds. The charred component comprised charcoal and hazel (Corylus avellana) nutshell fragments Pits [103243] and [103968] contained moderate charcoal and occasional arable weeds.

ROMAN: OCCUPATION FEATURES 10.14-10.16

Features sampled from occupation feature groups 10.14, 10.15 and 10.16 were pits and postholes. The overall charred plant assemblage from these features comprised charcoal which was abundant in pit [101787] from Occupation Features 10.14. Cereals present included barley, bread wheat and cereal

indeterminate. Abundant barley grain was present in posthole [101628] from Occupation Features 10.14. Charred bread-like food fragments were recovered from Pit [101161] from Occupation Features 10.15

ROMAN: ENCLOSURE 10.22

Ditch/gully [100380] from enclosure 10.22 produced a small assemblage of charcoal and cereals including hulled barley, bread wheat and spelt wheat.

ROMAN: UNGROUPED FEATURES

Ditch/gully [104527] produced a charred plant assemblage that included moderate numbers of charcoal, grains of hulled barley, indeterminate wheat and oats with broad bean, legumes and a sloe fruit stone.

Saxon

SAXON: SUNKEN-FEATURED BUILDINGS (SFB 10.1-10.5)

Five SFBs were uncovered at TEA 10, two were in area 10A and three in area 10B. Features sampled from the SFBs included pits, postholes, ditch/gully sections and a feature categorised as 'other'. The overall plant assemblage from the two SFBs (SFBs 10.1-2) in 10A comprised moderate charcoal with occasional hulled barley, legumes and weed seeds. Posthole [106186] from SFB 10.2 also contained a charred bread-like food fragment. Features from the three SFBs (10.3-5) in 10B revealed an assemblage of charcoal, which was abundant in ditch/gully [100239] of SFB 10.3, occasional cereals including hulled barley, emmer wheat and bread wheat, weeds seeds and fragments of hazel nut shell.

SAXON: POSTHOLE STRUCTURES (STRUCTURAL FEATURES 10.16-10.21)

Features sampled as part of Structural Features 10.16-21 included pits as well as postholes. The overall charred plant assemblage comprised charcoal which was abundant in postholes [100719] and [100876] from Structural Feature 10.17, pit [101906] from Structural Features 10.16 and pit [603875] from Structural Features 10.21. Cereals present included hulled barley, spelt wheat, emmer wheat, bread wheat and oats. Moderate numbers of cereal grains were recovered from pit [101936] from Structural Features 10.16 and posthole [603815] and pit [603875] from Structural Features 10.21. The assemblage also included occasional arable weeds.

SAXON: LARGE PITS (PIT GROUPS 10.78-10.81)

Pits from pit groups 10.78, 10.79 and 10.81 generated a charred plant assemblage comprising charcoal which was abundant in pits [107187] in pit group 10.78, [101326] from pit group 10.79 and pits [101978] and [101947] from pit group 10.81. Cereals present included hulled barley, bread wheat and cereal indeterminate. The plant assemblage also included arable weeds, hazel nutshell fragments and indeterminate tubers. Pits [101978] and [101944] from pitgroup 10.81 also contained waterlogged plant remains including root and stem fragments, diverse weed seeds from a range of ecological types and wood fragments in pit [101978].

SAXON: DOUBLE-DOG BURIAL (PIT GROUPS 10.82 AND 10.84)

Pit [101109] from pit group 10.82 contained moderate charcoal and occasional barley grains. Pits [100956] and [100960] from piy group 10.84 contained abundant charcoal and occasional grains of barley, wheat indeterminate, bread wheat and oats.

SAXON: BOUNDARY 10.7

The botanical assemblage from ditch/gully [600652] comprised moderate charcoal and uncharred (waterlogged) seeds of rushes.

SAXON: UNGROUPED FEATURES

Ungrouped features dated to the Saxon period included pits, ditch/gully sections, a burial and three features categorised as other. The charred plant assemblage recovered from the sampled ditch/gully sections comprised charcoal, which was abundant in ditch/gully [604498], as well as occasional cereals including wheat indeterminate, oats and cereal indeterminate grains and cereal wheat/rye rachis (chaff). Ditch/gully [604498] also contained charred bread-like food fragments. Pits [102337] and [107075] produced abundant charcoal and abundant cereals including hulled barley, glume wheat, rye and bread wheat. Glume wheat chaff (glume bases) were also present in pit [107075]. The overall assemblage from the pits also contained arable weeds. Posthole [105991] contained an assemblage of moderate charcoal and occasional cereal indeterminate grains as well as amorphous charred fragments. The assemblage from the three features categorised as 'other' included charcoal, which was abundant in feature [102188], occasional grains of hulled barley and wheat, glume wheat chaff (glume base) and occasional weed seeds. Burial [604181] contained occasional charcoal. Pit [100350] from pit group 10.67 contained abundant charcoal with occasional barley grains. This pit group was not referred to in the stratigraphic assessment report but was included in the groups in the oracle database.

Post-Medieval

Features sampled from the post-medieval period included ditches, pits and features categorised as 'other'. Ditch/gully [600419] from Boundary 10.16 contained moderate charcoal. Pits from Pit Groups 10.33, 10.34 and 10.59 produced an overall charred plant assemblage of occasional charcoal and indeterminate wheat grains. 'Other' feature [101105] from Ditch 10.53 contained abundant cereals including hulled barley, spelt wheat, rye, bread wheat and emmer wheat. The assemblage also contained occasional weed seeds and charcoal. Ungrouped feature pit [603791] contained moderate charcoal, occasional grains of spelt wheat, emmer wheat and bread wheat, arable weeds, hazel nutshell fragments and a sloe fruit stone.

Undated Features

A total of 227 undated features were also excavated and sampled, these included pits, postholes, burials, ditch/gully sections and features categorised as 'other'. Burial [108301] produced moderate charcoal, occasional hulled barley and spelt wheat grains and weed seeds while [604554] contained occasional charcoal only. The sampled ditch/gully sections produced an overall charred plant assemblage that comprised charcoal which was abundant in ditch/gully sections [100222], [103360], [106365], 107168], 107937] and [107817], moderate cereals including barley, spelt wheat, oats and wheat indeterminate and weed seeds. Natural infilling features [105566] and [107145] produced moderate to abundant charcoal and occasional barley and wheat indeterminate grains. Packing feature [103649] produced occasional charcoal.

A total of 39 features categorised as 'other' were sampled. The overall charred plant assemblage produced charcoal which was abundant in 16 of the features, cereals including hulled barley, spelt wheat, bread wheat, rye and oats which were abundant in four of the features. Cereal chaff including glume bases and indeterminate rachis was recovered from five of the 'other' features. Weed seeds present derived from a range of ecological groups, also present were pulses, elder seeds, sloe fruitstones and hazel nutshell fragments. Charred bread-like food fragments were recovered from features [106757] and [601966]. Eight of these features also produced waterlogged plant assemblages comprising leaf, stem and root fragments with rich weed seed assemblages worth investigating at the analysis stage.

The overall botanical assemblage from the 51 undated pits sampled included charcoal, which was abundant in 14 pits, cereals including hulled barley, spelt wheat, emmer wheat, bread wheat and oats. Cereal chaff was present in 5 pits and included an assemblage suitable for analysis in pit [103032]. A diverse weed seed assemblage of predominantly arable weeds also featured species from a range of ecological types. Other charred plant remains present included hazel nutshell fragments and flax seeds which were both present in pit [603791] and a mineralised grape seed (*Vitis* sp) from pit [104552]. Waterlogged worked wood was recovered from pit [103738].

Twenty-seven postholes were also sampled, the overall charred plant assemblage from these features comprised charcoal which was abundant in five postholes, occasional to moderate grains of emmer wheat, spelt wheat, hulled barley and oats. The assemblage also included arable weed seeds and pea as well as fig (*ficus* sp.) seeds recovered from posthole [603205].

Missing Context Information

There were also nine samples that derived from features for which no context information was present in the oracle database. Until full context and phasing information is produced there is little value in describing the nature of the botanical assemblage.

Summary and potential of the assemblage

The botanical assemblage comprised a range of cereals including hulled barley and spelt wheat which were the dominant cereal types, as well as emmer wheat, bread wheat, rye and oats and cereal chaff (predominantly glume wheat chaff). The crop spectra present in features from the various periods represented across TEA10 conform to known typologies from other sites in Cambridgeshire, aside from the cereal assemblage from the Bronze Age, which resembled that of a typical Roman assemblage - this may be attributed to taphonomic processes and the continued occupation at the site causing the movement of material and contamination of earlier features. Cereal remains were generally present in occasional to moderate quantities, though abundant assemblages were recovered from four Iron Age features, three Roman features, one post-medieval and two undated features. The number of cereal grains recovered was greater than the numbers of cereal chaff elements present; while it is tempting to suggest that this may be due to crops arriving at the site in a cleaned state it is more likely that the lack of cereal chaff recovered is due to differential preservation and the disposal methods of crop processing waste products ie as fuel.

Waterlogged flax seeds and capsule fragments from Iron Age pit [106207] may offer the opportunity to investigate potential flax processing at the site. In addition to providing information on the diversity of plants consumed at the site, recovered pluses such as broad bean and pea may provide information regarding the intensification of horticulture. The wild plant assemblage (charred and waterlogged) recovered at TEA 10 derived from a range of ecological types and included aquatic, wetland, ruderal and arable weeds and offers potential to understand the nature and development of the local environment.

Charred bread-like food remains were recovered from a range of feature types from the Iron Age, Roman and Saxon periods, with the majority from the Roman features including an abundance of the material in pit [604333] from Kiln 10.5. Detailed investigation into the morphological characteristics of this material through scientific and experimental means could enable the distinction to be made between the material that represents bread, porridge and brewing. Comparison of the food-like material recovered from TEA 10 with similar material recovered from other sites on the A14 road scheme would not only add further depth to the individual site narratives but also to the scheme wide and possibly regional chronological narratives. As a potential additional output from the project this material, if successfully identified, could also be utilised as reference source by other archaeobotanists and scholars who have recovered similar material on their sites.

Charcoal was present in most samples and was in abundance in all periods represented and across a range of feature types including Bronze Age cremation burials, Iron Age enclosures, structural features, occupation features, pit groups and burials, Roman occupation features, kilns, pit groups, enclosures and burials, Saxon SFBs, structural features and pit groups, and a post-medieval ditch. The charcoal assemblage offers the potential to investigate wood selection pertaining to construction and fuel, if there are distinctions made in the species used for domestic, industrial (kilns) and funeral fires. The charcoal assemblage also offers information on the nature of the local environment and available resources.

The archaeobotanical assemblages assessed from TEA 10 have yielded plant remains which would allow investigation into agricultural practices and food consumption at the time of occupation. They have local significance in relation to the understanding of the area and its use, and the diet of its inhabitants, during the periods represented. Further botanical analysis on both the charred and waterlogged plant remains will provide evidence on these aspects while the waterlogged assemblages would allow detailed understanding on the nature of the natural environment.

Recommendations

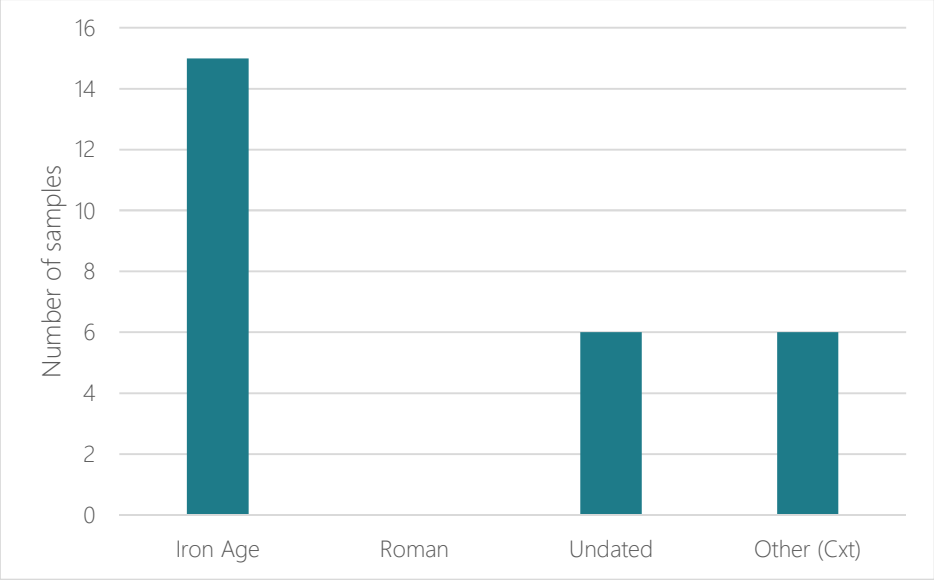
The table below summarises the samples selected from TEA 10 for further analysis due to their abundant concentration of well-preserved plant remains and/or their belonging to a context of high significance (eg wells, kilns, burials, structural features, houses and pits see methodology above). Full details of these samples can be found in the project's digital records. Analysis of the sample from a currently undated context is reliant upon it being dated at the analysis stage.

3.5.10. Summary of samples from TEA 10 selected for analysis

Site code	Period	Feature type	No. samples
A14-10	Bronze Age	pit	1
A14-10	Iron Age	burial cut	2
A14-10	Iron Age	ditch/gully	1
A14-10	Iron Age	'other'	2
A14-10	Iron Age	pit	12
A14-10	Iron Age	Posthole	1
A14-10	Iron Age	ring-ditch	1
A14-10	Roman	burial cut	1
A14-10	Roman	pit	13
A14-10	Roman	posthole	1
A14-10	Saxon	ditch/gully	1
A14-10	Saxon	pit	3
A14-10	Post-medieval	'other'	1
A14-10	Undated	ditch/gully	1
A14-10	Undated	'other'	3
A14-10	Undated	pit	3
A14-10	Undated	posthole	1
Total number of samples suggested for analysis			48

TEA 10B EAST

A total of 27 bulk sediment samples were taken from across TEA10B East. The samples ranged in size from 10 to 20 litres and were collected from a variety of features including postholes, pits and ring-ditches dating from the Iron Age. No previous trenching works were carried out at the site.



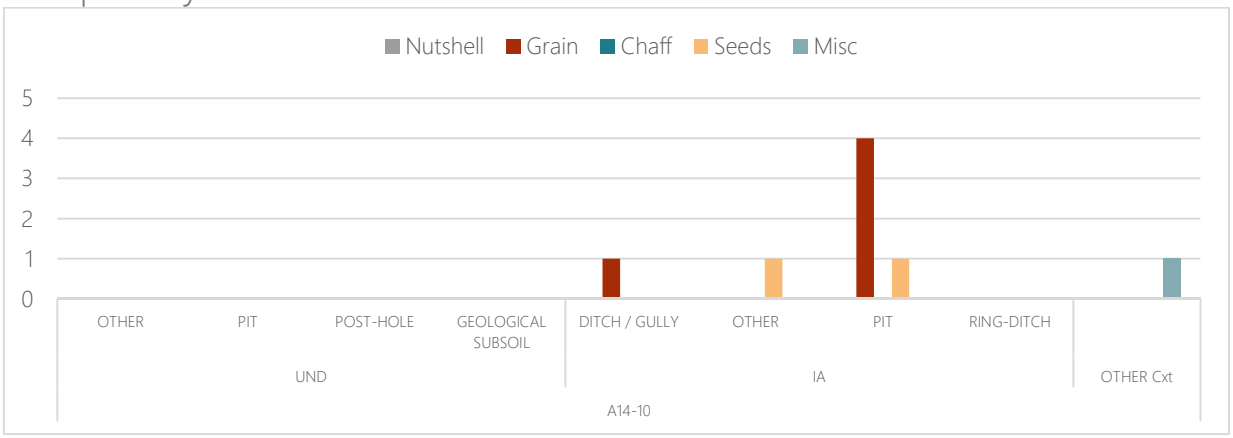
3.5.19. Number of samples per period

The charred plant remains exhibited mixed levels of preservation ranging from moderate to very poor. The majority of the cereal grains showed signs of abrasion which prevented identification to species level. Table 3.5.11 presents the occurrence of constituent types in samples per period.

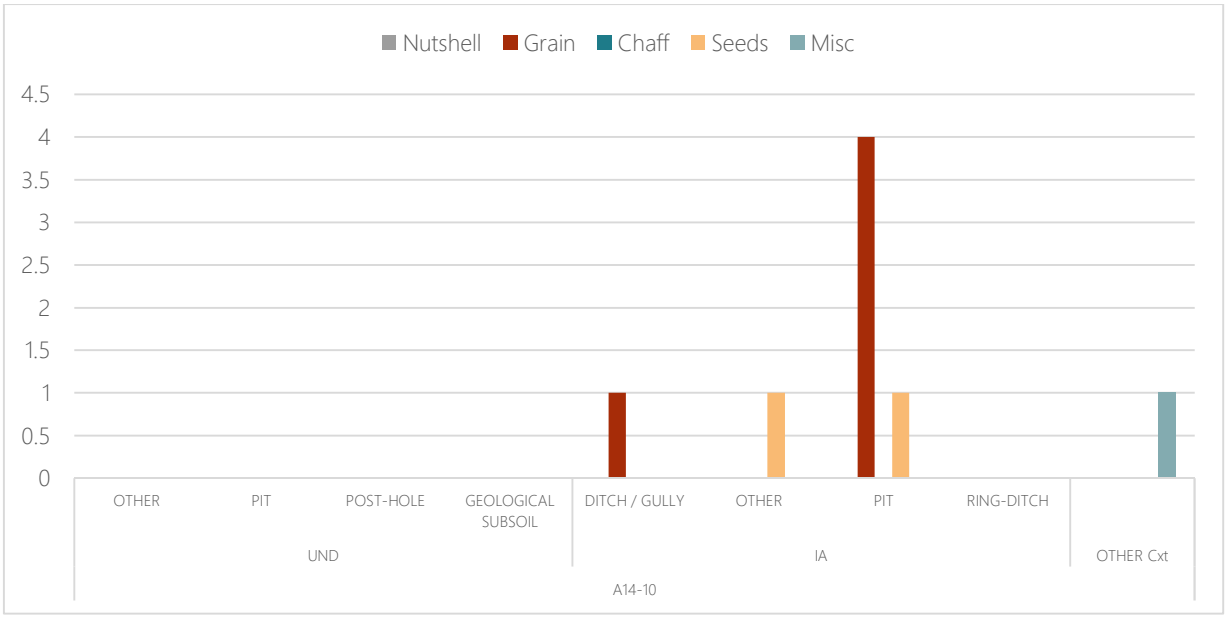
3.5.11. The occurrence of constituent types in samples per period

Period/Constituent	Cereal grain	Weed seeds	Nutshell	Charcoal	Misc
Iron Age	5	1	1	14	-
Undated/other	-	1	-	11	-

Three features contained well preserved waterlogged plant assemblages comprising stem, root and leaf fragments with weed seeds and wood fragments.



3.5.20. Occurrence of charred cereal grain/cereal chaff/weeds/nutshell/misc per period/feature type



3.5.21. Charcoal abundance per period/feature type

Iron Age

A range of Iron Age features were sampled including pits, postholes, waterholes-wells, and ditches. Several pits from Pit Groups 10B.1, 10B.3 and 10B.20 produced an assemblage of charcoal, which was abundant in pits [109069] and [109064] from Pit Group 10B.1, and occasional barley/wheat (Hordeum/Triticum) grains in pit [109235] from Pit Group 10B.3.

Abundant charcoal was present in ring-ditch [109041] from Roundhouse 10B.3 while posthole [104935] from Structural Features 10B.3 contained occasional charcoal, wheat indeterminate grains and

indeterminate nutshell fragments. Occasional charcoal was also recovered from 'other' feature [109446] from Road/Trackway 10B.2.

Sampled ditch/gully sections [109288] from Enclosure 10B.1 contained occasional charcoal. Occasional cereals including oats and cereal indeterminate grains were also present in ditch/gully [109288].

The five waterholes-wells contained a combination of charred and waterlogged plant remains. Pit [109310] (waterhole-well 10B.1) contained moderate charcoal and cereals including wheat indeterminate and cereal indeterminate grains and occasional weed seeds while pit [109518] (well 10B.5) had moderate charcoal and occasional cereal indeterminate grains and pit [109258] from well 10B.4 contained occasional charcoal only. 'Other' feature [109433] from well 10B.3 comprised charred and waterlogged plant remains including abundant charcoal and occasional stems, roots, seeds and waterlogged wood fragments and pit [109410] (waterhole-well 10B.2) produced abundant waterlogged wood.

Undated Features

A range of undated features including two pits, three features categorised as 'other', a posthole and a geological subsoil were also recorded on TEA 10B East. Charcoal was present in all features apart from the geological subsoil and was abundant in posthole [109026] and pit [109082].

The sample from [109031] geological subsoil contained material that had been preserved by waterlogging. The plant assemblage comprised an abundance of root, stem and bark fragments with occasional nettle seeds and wood fragments that may have been part of a larger fragment that had broken and degraded.

Missing Context Information

There were also six samples that derived from features for which no context information was present in the oracle database. Until full context and phasing information is produced there is little value in describing the nature of the botanical assemblage.

Summary and potential of the assemblage

The overall botanical assemblage comprised spelt wheat, barley, indeterminate wheat and possible rye. The cereal remains were generally present in occasional quantities, with only a single abundant assemblage, from an undated categorised as 'other'.

Charcoal was present in most samples and was in abundance in Iron Age features including pits from Pit Group 10B.1, a ring-ditch section from Roundhouse 10B.3 and Waterhole-Wells 10B.2 and 10B.3. Waterlogged plant remains recovered from across the site were predominantly stem, root and leaf fragments with weed seeds and wood.

The archaeobotanical assemblages assessed from TEA 10B East have yielded plant remains which would allow limited investigation into agricultural practices and food consumption. They have local significance in relation to the understanding of the area and its use, and the diet of its inhabitants, during the periods represented. Further botanical analysis on both the charred and waterlogged plant remains will provide

evidence on these aspects while the waterlogged assemblages would allow detailed understanding on the nature of the natural environment.

Recommendations

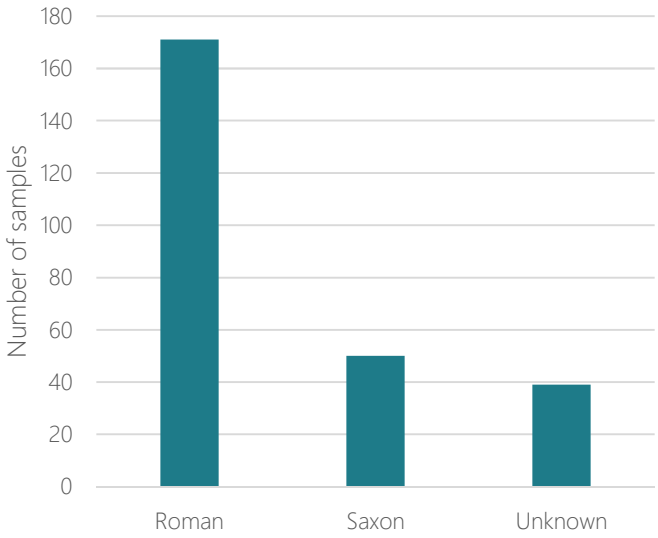
The table below summarises the samples selected from TEA 10B East for further analysis due to their abundant concentration of well-preserved plant remains and/or their belonging to a particular context of high significance (eg wells, houses). Full details of these samples can be found in the project's digital records. Analysis of the samples from a currently undated contexts is reliant upon it being dated at the analysis stage and the contexts with missing data will also need to be ascertained.

3.5.12. Summary of samples from TEA 10B East selected for analysis

Site code	Period	Feature	No. samples
A14-10B	Iron Age	pit	1
A14-10B	Iron Age	Ring-ditch	1
A14-10B	Undated	Posthole	1
A14-10B	Undated	'other'	1
Total number of samples suggested for analysis			4

TEA 11

A total of 260 bulk sediment samples were collected from TEA 11. The samples ranged in size from 10 to 100 litres in volume and were collected from a variety of archaeological features including burials, pits, gullies, ditches, postholes and kilns, mainly dated to the Roman period but also including features relating to the Saxon settlement.



3.5.22. Number of samples per period in TEA 11

The 260 environmental samples from TEA 11 produced small to medium dry flots and residues which contained charred plant remains. During the botanical assessment, the samples yielded a low to medium number of archaeobotanical remains on average, with ranging levels of preservation from good to poor. The flots and residues in general contained occasional to moderate charred plant remains with the exception of a small number of samples which produced abundant botanical remains.

Flots and residues from TEA 11 have yielded an abundant concentration of charred wood remains (charcoal) in addition to a moderate concentration of cereal remains, such as grains and chaff, and a wide range of seeds from wild plants. Virtually all samples contained oak and non-oak charcoal fragments up to 20mm.

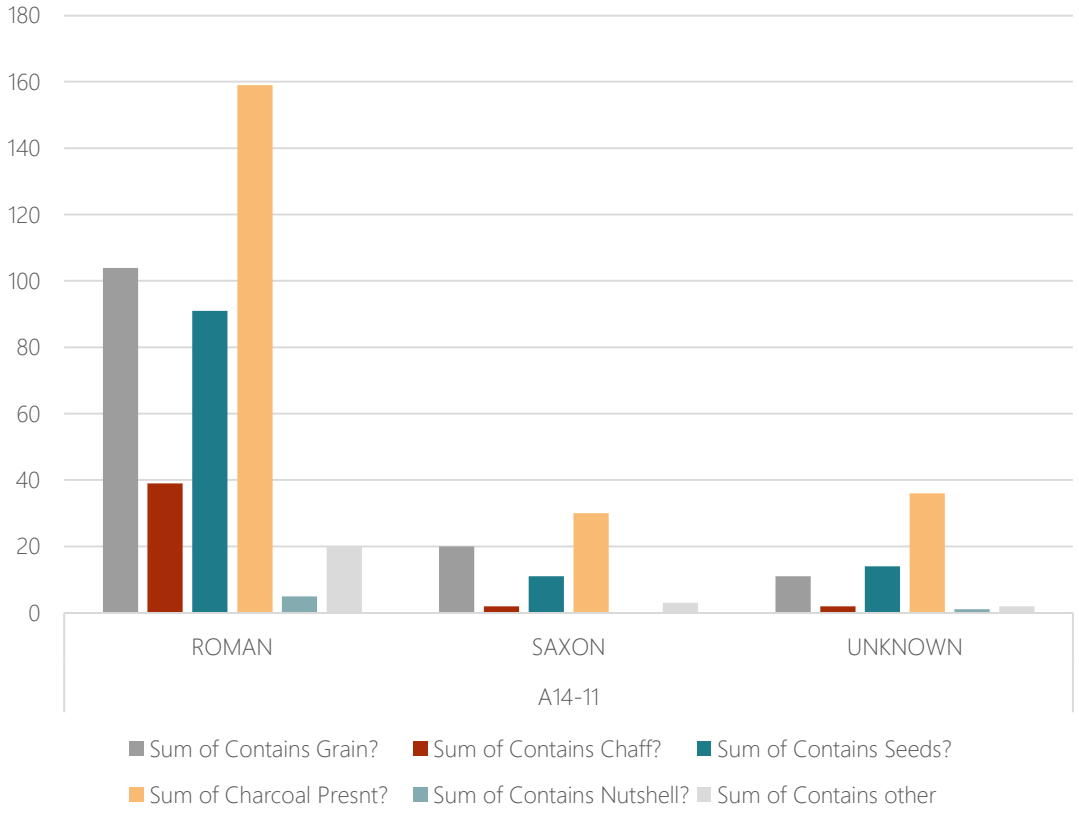
A total of 22 samples from TEA 11 contained moderate to abundant concentrations of cereal remains. These included cereal grains mainly from barley (*Hordeum vulgare*), glume wheat species such as spelt wheat (*Triticum spelta*), and occasional remains of oats (*Avena sativa*). In general, TEA 11 has yielded a higher concentration of chaff than average with remains of cereal chaff being noticed in 31 samples, with a particular high concentration of glume wheat chaff (glume bases) mainly derived from spelt wheat and occasional barley chaff (rachises). No chaff from oats was identified from the assessed samples despite the presence of oat grains.

TEA 11 has produced a higher amount of weed seeds than most of the other A14 sites. In particular arable grasses (*Poaceae*) and wetland plants such as sedges (*Carex* sp.) and docks (*Rumex* sp.) have been recovered in moderate amounts from 32 samples, and some of them contain a particularly high concentration.

In addition, a total of six samples yielded occasional quantities of amorphous charred remains of cereal foods, such as bread, porridges and most likely beer. Further analysis would be needed to determine the nature of these remains and their composition.

Samples by Period

Just over half of the assessed samples from TEA 11 represent a variety of archaeological contexts from the Roman period. In addition, a total of 118 samples come from archaeological contexts with no assigned period at the moment. Both archaeobotanical assemblages are dominated by crop taxa and arable and wetlands seeds.



3.5.23. Summary of constituents from TEA 11 by period.

Roman

All sampled Roman contexts from TEA 11 yielded archaeobotanical remains including cereals (grains and chaff), arable and wetlands seeds and abundant charcoal. A high number of samples yielded moderate and abundant cereal remains which include a great number of hulled barley grains, spelt wheat grains and glume bases and oat grains, in addition to some scattered remains of free-threshing wheat grains.

Pits yielded the highest concentrations of botanical remains from TEA 11. This concentration is particularly high from sample <11068> from a pit deposit [110155] which included abundant and well preserved grains from barley, spelt wheat, oats and possibly rye (cf. *Secale cereale*); in addition to abundant spelt glume bases and arable weed seeds such as brome grasses (*Bromus* sp.) and vetch (*Vicia* spp.). Moreover, occasional remains of other pulses, such as pea (*Pisum sativum*), were noticed, although it is not clear if this might have been an intrusive weed among the cereal crop fields or a crop itself. The presence of remains of chaff and weed seeds, in combination with cereal grains, suggest that these assemblages are derived from crop-processing activities.

Abundant remains of barley, spelt wheat and free-threshing wheat grains have also been recovered from sample <11063> from a 'ring-ditch' context [110104]. Further analysis and dating is needed in order to confirm the presence of free-threshing wheat in Roman contexts as, per the current archaeobotanical evidence, free-threshing wheat was not an established crop until the Anglo-Saxon period in Britain, although there are a number of local sites with higher proportions of this crop (Lodwick 2017, 27).

Roman kilns/furnaces yielded a low to moderate amount of plant remains. These included cereal grains mainly from hulled barley (*Hordeum vulgare*) and spelt wheat (*Triticum spelta*) and occasional remains of oats (*Avena sativa*). A number of samples also yielded a moderate amount of chaff, mainly in the form of glume bases from glume wheats such as spelt wheat; this has especially been noticed from sample <11195> from a group of kilns [111273].

Saxon

50 samples from the Saxon period have been assessed for archaeobotanical materials. The Saxon contexts yielded a low to medium concentration of plant remains, with a total of 20 samples which contain cereal grains, 11 which contain other seeds such as wild grasses, and only 2 samples which contain cereal chaff. The cereal remains identified from the Saxon contexts include hulled barley (*Hordeum vulgare*) and indeterminate glume wheat grains, in addition to occasional remains of chaff, mainly wheat glume bases. Arable weeds and pulses such as vetch (*Vicia* sp.), grass pea (*Lathyrus* sp.) and faba bean (*Vicia faba*) have also been identified among the assemblage.

Pits and construction cuts are the contexts with the highest concentration of plant remains, probably derived from accumulation of refuse materials from daily activities involving crops such as dehusking or pounding. Samples <11002> and <11003> from a pit [110012] produced the highest concentration of botanical remains, mainly hulled barley (*Hordeum vulgare*) and glume wheat grains, in addition to wild arable grasses (*Poaceae*), pulses such as vetch (*Vicia* sp.) and charred food remains (bread-like products).

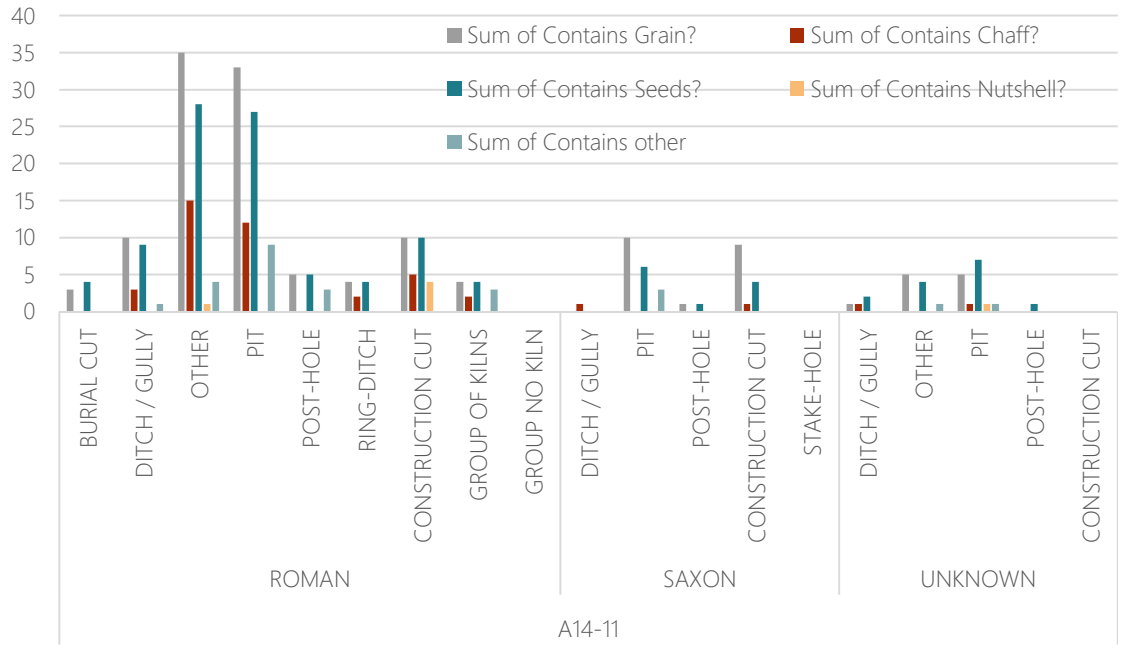
Undated

39 samples from TEA 11 were collected from currently unphased contexts. These have yielded abundant remains of charcoal in addition to medium-low concentration of cereal remains (grains and chaff) and other seeds. During archaeobotanical assessment, these were seen to contain cereal grains, particularly from hulled barley and spelt wheat with occasional free-threshing wheat grains. In addition, a wide range of wild plant seeds, including arable grasses (*Poaceae*) and wetland plants such as docks (*Rumex* sp.) have been noticed in more than half of the samples, and in some occasions a wide variety of species has been identified. Further analysis to determine the wild taxa present in the samples in correlation with chronological periods is recommended.

Pits yielded the highest concentration of plant remains, especially sample <11039> from a pit [110081] which contained moderate amount of barley and glume wheat grains.

Summary and potential of the assemblage

The overall botanical assemblage from TEA 11 has predominantly yielded remains of barley and spelt wheat (grains and chaff) with occasional remains of oats, rye and free-threshing wheat. In addition, seeds from wild plant species, such as arable weeds and wetlands plants, were very ubiquitous. The presence of arable weeds and chaff in combination with cereal grains indicates that these assemblages most likely derived from crop-processing activities (eg threshing, dehusking) (Stevens 2015). Moreover, the recovery of high amounts of hulled barley and spelt wheat from the Roman contexts supports the already established evidence that Roman Britain agricultural system was focused on these two species as the main cereal crops (Van der Veen 2016).



3.5.24. Samples with abundant plant remains from TEA 11 by period and feature.

The archaeobotanical assemblage assessed from TEA 11 yielded plant remains which would allow the investigation into agricultural practices, food processing and cooking as well as consumption and socio-economic organisation.

The charred plant assemblages from TEA 11 have local significance in relation to the understanding of the area and its use, and the diet of its inhabitants, during the periods represented. Further botanical analysis will provide evidence on these aspects and on the nature of the natural environment.

Recommendations

The table below contains the samples selected from TEA 11 for further analysis due to their abundant concentration of well-preserved plant remains or specific research questions. In addition, a number of samples derived from specific archaeological features such as kilns have been selected to explore the possible uses of these installations in relation to plant use.

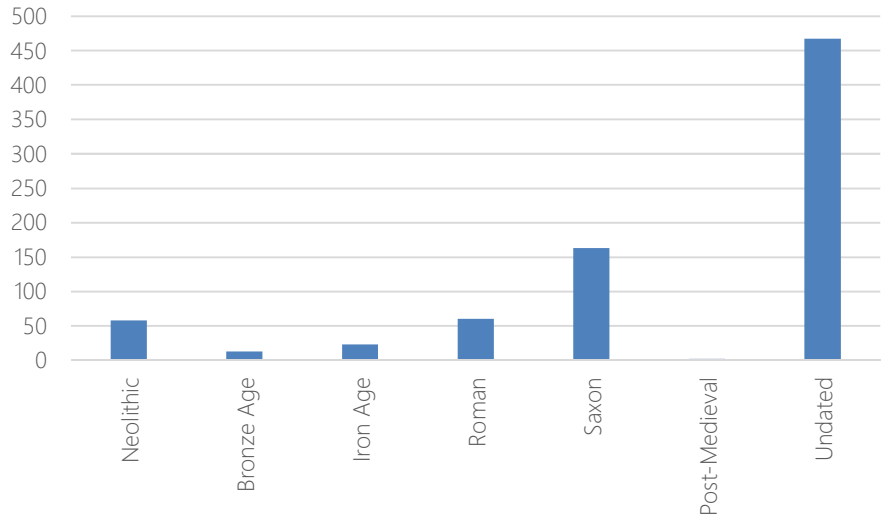
3.5.13. Summary of samples from TEA 11 selected for analysis

Site code	Period	Feature	No. samples
A14-11	ROMAN	CONSTRUCTION CUT (KILNS)	2
A14-11	ROMAN	DITCH/GULLY	3
A14-11	ROMAN	OTHER (KILNS)	5
A14-11	ROMAN	OTHER	1
A14-11	ROMAN	**PIT (KILNS)**	**2**
A14-11	ROMAN	RING DITCH	2
A14-11	ROMAN	PIT	2
A14-11	SAXON	PIT	**2**
A14-11	SAXON	CONSTRUCTION CUT	3
A14-11	UNKNOWN	PIT	2
Total number of samples suggested for analysis			24

TEA 12

786 bulk sediment samples were taken from across TEA 12. The samples ranged in size from 1 to 50 litres and were collected from a variety of features including postholes, pits and ditches dating from the Neolithic to post-medieval periods.

Previous trial trenching work was carried out by CAU (Pattern et al 2010) and Wessex Archaeology (WA 2014) (land parcel 1132). The plant assemblage generated from the six samples taken during work carried out by CAU comprised spelt wheat and lentil (*Lens culinaris*) from an Iron Age pit/gully, charcoal from a Roman cobbled feature, and wheat indeterminate, spelt wheat glume bases and a grass seed (Poaceae) from a Saxon sunken-featured building. No environmental samples were assessed by Wessex Archaeology from land parcel 1132.



3.5.25. Number of samples per period

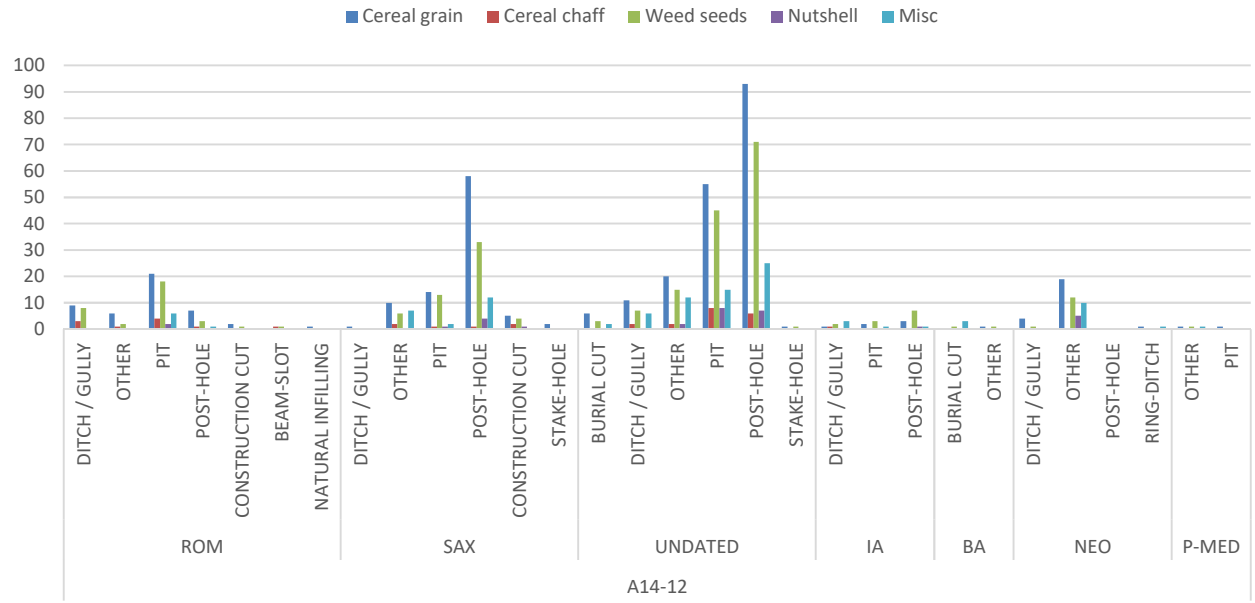
Charred Plant Remains

The charred plant remains exhibited mixed levels of preservation ranging from good to very poor. The majority of the cereal grains showed signs of abrasion which prevented identification to species level. Table 3.5.14 presents the occurrence of constituent types in samples per period.

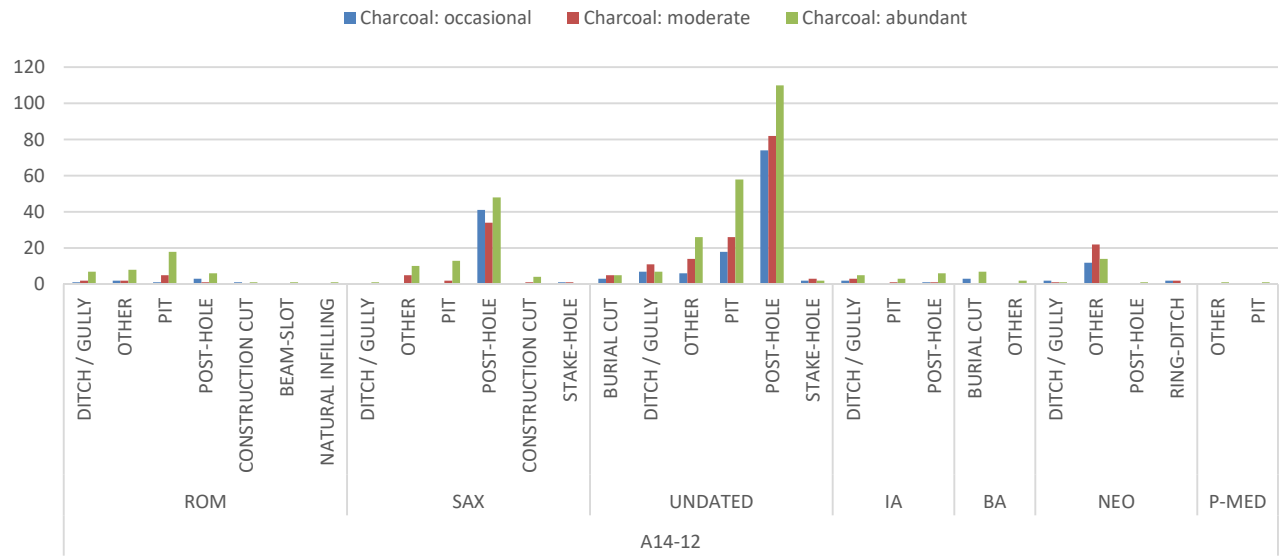
3.5.14. The occurrence of constituent types in samples per period

Period/Constituent	Cereal grain	Cereal chaff	Weed seeds	Nutshell	Charcoal	Misc
Neolithic	24	-	13	5	57	11
Bronze Age	1	-	2	-	12	3
Iron Age	6	1	12	1	22	5
Roman	46	10	33	2	60	7
Saxon	90	6	56	6	161	21
Post-medieval	2	-	1	-	2	1
Undated	186	18	142	17	459	60

Samples by Period



3.5.26. Occurrence of charred cereal grain/cereal chaff/weeds/nutshell/misc per period/feature type



3.5.27. Charcoal abundance per period/feature type

Neolithic

Features sampled from the Neolithic included ditch sections from Ditch 12.1 (the ring-ditch), a posthole and 18 features categorised as 'other'. The charred plant assemblage was predominantly charcoal, which was abundant in 11 features. The charcoal was highly fragmented and none of the assemblages produced charcoal of a size suitable for analysis. Cereals present were few in number and included hulled barley (*Hordeum vulgare*), emmer wheat (*Triticum dicoccum*), bread wheat (*Triticum aestivum*), oats (*Avena* sp.), spelt wheat (*Triticum spelta*), indeterminate glume wheat and cereal indeterminate. Weed seeds were also present in low numbers and were mostly arable weeds.

The charred plant assemblage from 'other' feature [122146] associated with Ditch 12.1 comprised abundant charcoal with occasional wheat indeterminate (*Triticum* sp.) grains and weed seeds including large grasses.

Bronze Age

Sampled contexts from the cremation burials in Cremation Cemetery 12.1 contained abundant charcoal, some of which was of a size sufficient for analysis (eg burial [121831]). Cereals present included hulled barley, spelt wheat and emmer/spelt wheat (*Triticum dicoccum/spelta*) grains. Weed seeds were mostly of the pea family (Fabaceae) with some bedstraws (*Galium* sp.). There was also occasional false oat-grass (*Arrhenatherum elatius*) tubers in burial [121641] and [121636].

Iron Age

Features dating to the Iron Age included 4 postholes, 2 pits and 2 ditch/gully sections. The charred plant assemblage comprised charcoal which was abundant in 11 features but was only of a size sufficient for analysis in ditch/gully [122002] from Enclosure 12.1 and ditch/gully [121122] from Enclosure 12.3.

Occasional grains of hulled barley were recorded in posthole [122705] from Building 12.7 and cereal indeterminate grains in posthole [122497]. Weed seeds were present in occasional numbers in a number of features and were predominantly arable weeds.

Roman

Sampled contexts from Waterholes 12.11 [121690] and 12.5 [121475] contained abundant charcoal. Cereal present in the waterholes included moderate numbers of grains of hulled barley, bread wheat and rye (*Secale cereal*). Weed seeds present were predominantly arable weeds. The waterholes did not produce waterlogged plant remains. Postholes from Buildings 12.3 and 12.9 contained charcoal, which was abundant and (in posthole [121184]) of a size suitable for analysis. There was also occasional spelt wheat and cereal indeterminate grains.

Ungrouped sampled features included pits, postholes, ditch/gully sections, a construction-cut and features categorised as 'other'. The overall plant assemblage from these features comprised charcoal, which was abundant in 6 pits, 4 postholes, 3 'other' features, 5 ditch/gully sections, a beam slot, a construction cut and a natural infilling deposit, and occasional cereals including grains of hulled barley, spelt wheat, emmer wheat, bread wheat and oats as well as occasional cereal chaff including glume wheat glume bases and indeterminate culm nodes. Weed seeds (predominantly arable weeds) were also recovered and were abundant in a pit [126058] and ditch/gully [126110]. Occasional hazel (*Corylus avellana*) nutshell fragments were also present.

Three of the sampled contexts that were assigned a Roman date (based on finds) were interpreted as belonging to Sunken-Featured Buildings 12.1, 12.5 and 12.9. It is likely that these features are Saxon in date and that residual Roman material is present in the excavated features, which has led to them being ascribed a Roman date.

Saxon

A total of ten sunken-featured buildings were present on TEA 12; of these six samples were assessed (SFBs 12.1, 12.2, 12.5, 12.6, 12.7, 12.9). Sampled features included pits, postholes, construction-cuts and features categorised as 'other'. The overall charred plant assemblage from the sampled SFBs comprised abundant charcoal and occasional to moderate cereals including hulled barley, spelt wheat, bread wheat, rye and oats. Glume wheat chaff comprising glume bases and spikelet forks was also present. Weed seeds recovered were predominantly arable weeds. Occasional hazel (*Corylus avellana*) nutshell fragments were also recorded.

Pits and 'other' features from Waterholes 12.5, 12.8 and 2.11 produced an assemblage of charcoal which was abundant in three of the features and cereals which were abundant in two. Cereal present included hulled barley, bread wheat, rye, spelt wheat and oats. Weed seeds present were predominantly arable weeds with wetland taxa. None of the waterhole-wells produced waterlogged material.

Samples from pits and postholes from Buildings 12.1-12.4, 12.6, 12.7, 12.9 contained abundant charcoal, occasional grains of spelt wheat, hulled barley, rye, bread wheat and oats. Other plant remains recovered included arable weeds, pea and hazel nutshell fragments.

Features sampled from structural features groups 12.1, 12.7 and 12.8 included postholes and pits (likely Saxon in date). The overall plant assemblage included charcoal, which was abundant in 6 postholes and 2 pits from 12.7, and single postholes from 12.1 and 12.8 as well as occasional grains of hulled barley, oats, bread wheat and arable weeds.

Ungrouped features included pits, ditch/gully sections, a construction cut and features categorised as 'other'. The overall plant assemblage comprised charcoal which was abundant in 3 pits, a construction-cut, a ditch/gully section and a single 'other' feature; occasional to moderate cereals including bread wheat, hulled barley, emmer wheat and oats. Glume wheat chaff (glume bases) were recovered from the construction-cut. Other plant remains present included arable weeds, hazel nutshell fragments and pea (*Pisum* sp.).

Post-Medieval

The charred plant assemblage from 'other' feature [121500] comprised abundant charcoal and abundant cereals including bread wheat, rye and hulled barley. Other plant remains present included occasional pulses, culm nodes and arable weeds. Pit [122544] contained abundant charcoal of a size insufficient for analysis and occasional cereal indeterminate grains.

Undated Features

A large proportion of the features excavated at TEA 12 remain undated. In the Oracle database these undated features fall into two categories: those that have been assigned to feature groups (and are therefore more likely to easily assigned to a period) and those that have no date or feature group assigned. For the purpose of assessment the botanical assemblages from undated features were categorised and assessed using these basic categories.

Undated but assigned to feature groups

Ditch/gully sections from Boundaries 12.1, 12.2, 12.3, 12.5 and 12.6 contained charcoal which was abundant in Boundary 12.6 and occasional cereals including spelt wheat and cereal indeterminate grains.

Pits from Pit Group 12.1 contained charcoal which was abundant in one of the two sampled pits, and occasional grains of barley and bread wheat with grass seeds.

Undated and ungrouped features

There were 467 undated and ungrouped features from TEA 12, these were predominantly postholes but also included ditch/gully sections, stake-holes, pits and features categorised as 'other'.

The botanical assemblage from the postholes comprised charcoal, which was abundant in 97 postholes; cereals which were abundant in 3 postholes; and weed seeds, which were abundant in 1 posthole. Cereals present included hulled barley, rye, bread wheat, spelt wheat and glume wheat indeterminate grains. Cereal chaff included indeterminate glume wheat spikelet base fragments and indeterminate culm nodes. Also present were weed seeds, which were predominantly arable weeds, pea, hazel nutshell fragments, sloe (*Prunus spinosa*) fruitstones, false oat-grass tubers, Indeterminate tubers and undifferentiated tree buds.

The sampled ditch/gully cuts generated a botanical assemblage comprising charcoal, which was abundant in 6 ditch/gully sections; occasional cereals including hulled barley, spelt wheat, bread wheat, rye, glume wheat indeterminate grains as well as occasional to moderate arable weeds.

Stake-holes and 'other' features produced an overall charred plant assemblage that included charcoal which was abundant in 20 'other' features and 2 stake-holes; cereals, which were abundant in 1 of the features categorised as 'other'. Cereals recovered included hulled barley, spelt wheat, emmer wheat, rye, bread wheat and oats, cereal chaff present included indeterminate rachis internodes. Other plant remains present ranged from arable weed seeds, peas, pulses, false oat grass tubers, indeterminate tubers, sloe friutstones, blackberries (*Rubus fruticosus*) and undifferentiated leaf buds.

The charred plant assemblage from the sampled pits comprised charcoal, which was abundant in 44 pits; cereals, which were abundant in 1 pit; and nutshell, which was abundant in 1 pit. Cereals present included hulled barley, spelt wheat, emmer wheat, bread wheat, rye and oats. Cereal chaff present included oat florets, rye rachis fragments and glume wheat glume bases. A diverse range of arable weed and local environmental indicators were also recorded.

Summary and potential of the assemblage

The botanical assemblage comprised a range of cereals including hulled barley and spelt wheat, which were the dominant cereal types, as well as emmer wheat, bread wheat, oats and rye. Cereal chaff was predominantly glume wheat glume bases with occasional indeterminate culm nodes and undifferentiated rachis internodes. The cereal remains were present in a range of quantities with abundances in a range of feature types across several periods. Charcoal was present in most samples and was in abundance in variety of Neolithic, Bronze Age, Iron Age, Roman, Saxon and post-medieval contexts and feature groups. Weed seeds were predominantly agricultural weeds but also contained species that would aid in the characterisation of the local landscape. The presence of arable weeds, cereal chaff and grains indicated that the assemblages most likely derived from crop-processing activities. Other plant remains recovered such as hazel nutshell, sloe and blackberries may indicate the utilisation of local resources as a dietary supplement.

It is recommended that undated features with abundant and/or informative assemblages are included for analysis. Material from these assemblages could also be used in the radiocarbon dating programme.

The archaeobotanical assemblages assessed from TEA 12 have yielded plant remains which would allow investigation into ritual practices (charcoal from burials), agricultural practices and food consumption at the time of occupation. They have local significance in relation to the understanding of the area and its use, and the diet of its inhabitants, during the periods represented. Further botanical analysis will provide evidence on these aspects and on the nature of the natural environment.

Recommendations

The table below summarises the samples selected from TEA 12 for further analysis due to their abundant concentration of well-preserved plant remains and/or their belonging to a particular context of high significance (eg burials, wells, houses, enclosure groups). Full details of these samples can be found in

the project's digital records. Analysis of the sample from a currently undated context is reliant upon it being dated at the analysis stage.

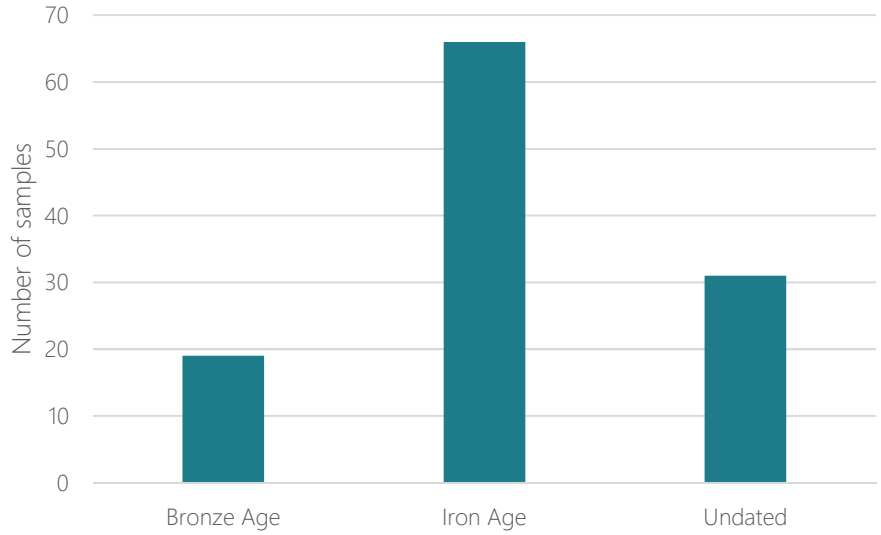
3.5.15. Summary of samples from TEA 12 selected for analysis

Site code	Period	Feature	No. samples
A14-12	Neolithic	Ring-ditch	2
A14-12	Bronze Age	Burial	3
A14-12	Roman	Pits	2
A14-12	Roman	Posthole	2
A14-12	Saxon	Waterhole-Well	2
A14-12	Saxon	Pits	1
A14-12	Saxon	Posthole	6
A14-12	Saxon	Other	2
A14-12	Post-medieval	Other	2
A14-12	Undated	Burial	1
A14-12	Undated	Pit	2
A14-12	Undated	Posthole	5
Total number of samples suggested for analysis			30

TEA 13

A total of 116 bulk sediment samples were taken from TEA13. The samples ranged in size from 3 to 40 litres and were collected from a variety of features including postholes, pits and ditches dating from the late Bronze Age/early Iron Age (recorded as Bronze Age in graphs below) and Iron Age.

A further two samples were taken from the area of TEA 13 during the evaluation phase by Mola Headland Infrastructure (MHI 2016; S2-006).

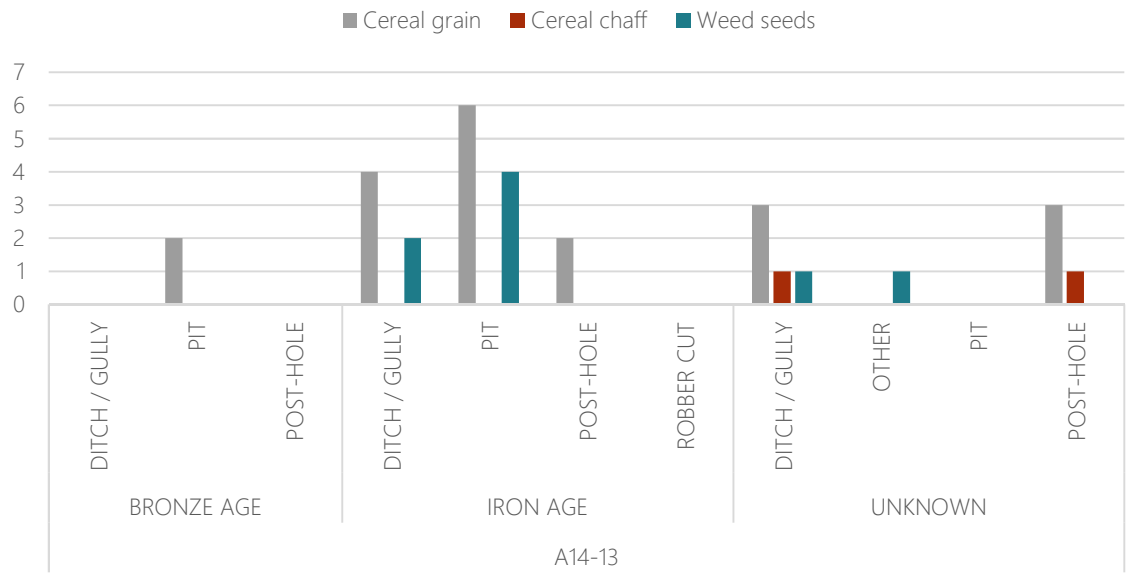


3.5.28. Number of samples per period

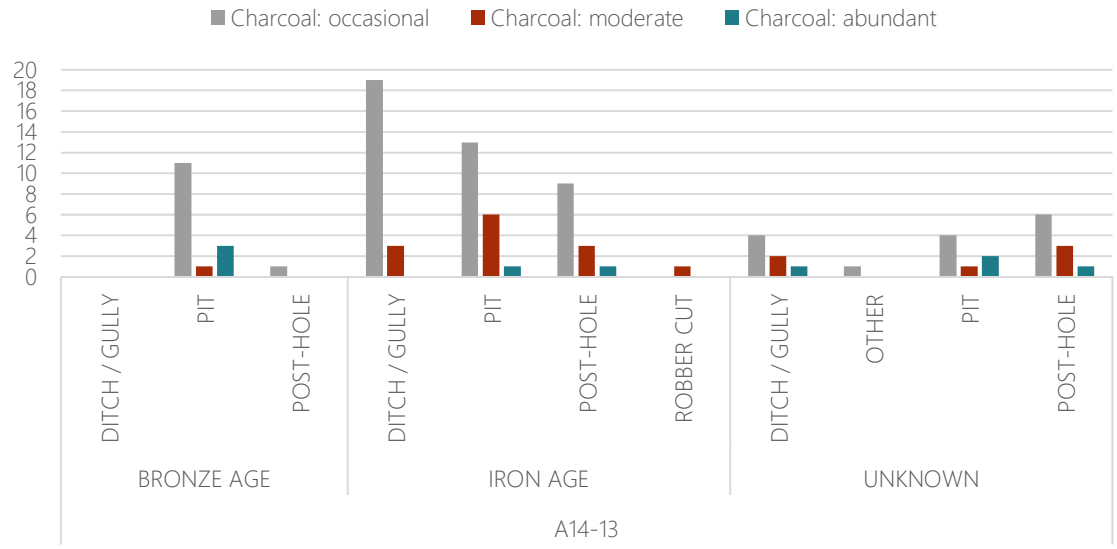
The charred plant remains exhibited mixed levels of preservation ranging from good to very poor. The majority of the cereal grains showed signs of abrasion which prevented identification to species level. Table 3.5.16 presents the occurrence of constituent types in samples per period.

3.5.16. The occurrence of constituent types in samples per period

Period/constituent	Cereal Grain	Cereal chaff	Weed seeds	Charcoal	Misc
Bronze Age/Iron Age	2	-	-	19	1
Iron Age	12	-	6	66	9
Undated	6	2	2	31	-



3.5.29. Occurrence of cereal grain/cereal chaff/weeds per period/feature type



3.5.30. Charcoal abundance per period/feature type

Bronze Age/Iron Age

Charcoal was present in 17 of the pits sampled from prehistoric pit alignment 13.1, and was abundant in two pits, [132559] and [132572]. Occasional cereal remains, including grains of barley (*Hordeum* sp.),

free-threshing wheat (*Triticum* sp.) and cereal indeterminate, were recovered from three of the pits, [132264], [132345] and [132393].

Iron Age

Fourteen of the 16 Iron Age pits sampled contained charcoal and this was particularly abundant in pit [132328]. Cereal remains, including grains of barley (*Hordeum* sp.), wheat (*Triticum* sp.) and cereal indeterminate were also recovered from a range of features. Abundant assemblages of cereals were recovered from pit [132328], which also contained peas/vetches (*Lathyrus* sp./*Vicia* sp.) and indeterminate pulse fragments. Peas/vetches and pulse fragments were also recovered from pit [132314] in low quantities. Occasional to moderate charcoal was present in sampled contexts from middle Iron Age Enclosure 13.1, late Iron Age Enclosures 13.2 and 13.5, and late Iron Age/early Roman Enclosure 13.3. No cereal remains were recovered from these samples.

The assemblages from postholes and ditches associated with Roundhouse 13.2, 'work area' 13.5 and four-post structure 13.6 were predominantly occasional charcoal with occasional indeterminate cereal grains present in ditch [132159] from 'work area' 13.5 and postholes [130036] and [130009] from four-post structure 13.6. Sampled deposits from Roundhouses 13.1, 13.2 and 13.3 contained occasional charcoal. Occasional indeterminate cereal grains were recovered from ditches [132135], [132415] and [132467] from Roundhouse 13.1. Deposit (132155) from pit [132156] contained abundant charcoal.

Two samples taken during the evaluation phase from a late Iron age pit/ posthole (17505) and an Iron Age/Roman quarry pit (13521) contained occasional and abundant charcoal.

Undated Features

A range of undated features including; 12 ditch/gully cuts, 10 pits, 12 postholes, 2 robber cuts and one feature categorised as 'other' were also recorded on TEA 13. Charcoal was present in all features and was abundant in ditch/gully [132319], posthole [130095] and pit [130025]. Cereal remains were few and occurred in features such as pits, postholes and ditches. Species present included barley and spelt wheat (*Triticum spelta)* as well as indeterminate cereal. Other charred plant remans present were pea (*Pisum* sp.) and pea/vetches (*Lathyrus* sp./*Vicia* sp.).

Summary and potential of the assemblage

The botanical assemblage comprised barley and spelt wheat, with the inclusion of occasional pulses. The cereal remains were generally present in occasional to moderate quantities, with only a single abundant assemblage, from an Iron Age pit. Weed seeds present, though few, were predominantly agricultural weeds. Charcoal was present in most samples, including many of the pits from the late Bronze Age/early Iron Age pit alignment, though only three of these had charcoal in abundance.

The archaeobotanical assemblages assessed from TEA 13 have yielded plant remains which would allow limited investigation into ritual practices (charcoal from the pit alignment), agricultural practices and food consumption at the time of occupation. They have local significance in relation to the understanding of the area and its use, and the diet of its inhabitants, during the periods represented.

Further botanical analysis will provide evidence on these aspects and on the nature of the natural environment.

Recommendations

The table below summarises the samples selected from TEA 13 for further analysis due to their abundant concentration of well-preserved plant remains and/or their belonging to a particular context of high significance (eg pits of pit alignment). Full details of these samples can be found in the project's digital records. Analysis of samples from currently undated context is reliant upon it being dated at the analysis stage.

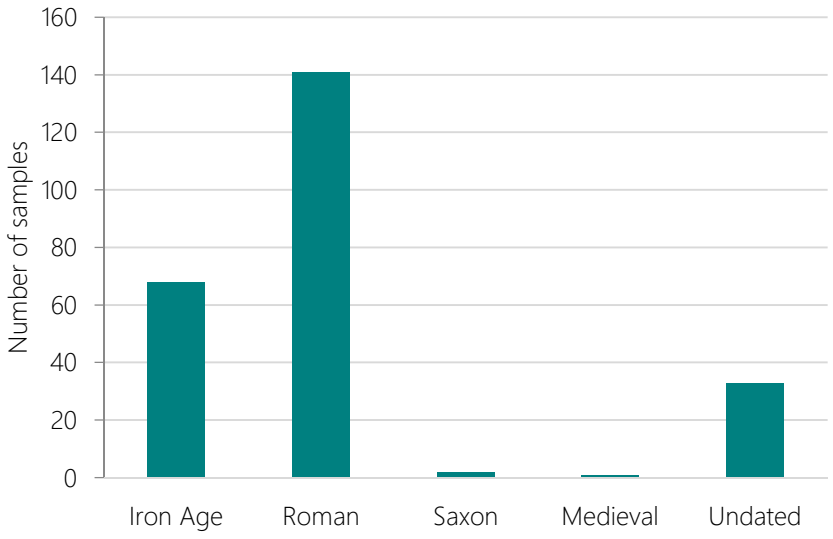
3.5.17. Summary of samples from TEA 13 selected for analysis

Site code	Period	Feature	No. samples
A14-13	BA/IA	PIT ALIGNMENT	1
A14-13	IRON AGE	POSTHOLE	1
A14-13	IRON AGE	BURIAL CUT	1
A14-13	IRON AGE	PIT	2
A14-13	UNDATED	POSTHOLE	1
Total number of samples suggested for analysis			6

TEA 14

A total of 245 bulk sediment samples were taken from various features in TEA 14. The samples ranged in volume from 5 to 40 litres. They were collected from a variety of features including pits, postholes, ditches, waterholes, kilns and funerary features dating from the Iron Age to the medieval period.

During the evaluation stage the site was trenched by Cambridge Archaeological Unit (Patten et al 2016, Plot 28), Wessex Archaeology (Wessex Archaeology 2014; land parcel 1131), COPA (Clarke et al 2016; Plot 28) and Mola-Headland Infrastructure (MHI 2016; 20-008). Eight environmental samples from the evaluation works were processed, four from areas trenched by COPA, one from areas trenched by CAU and three from areas trenched by Mola-Headland Infrastructure. No samples from Wessex Archaeology were processed. The majority of samples contained only small amounts of charcoal. Cereal grains were recovered from two samples; five indeterminate grains were present in a currently undated ditch (Clarke et al 2016; 139). They were particularly abundant in a sample recovered from the fill (18108) of ditch [18109] (MHI 2016; 20-008, 94). Cereal included barley (*Hordeum* sp.), spelt (*Triticum spelta*) and indeterminate wheat (*Triticum* sp.). Chaff, including spikelet forks and glume wheat bases, were also present, suggesting that cereals may have been stored in their ears (MHI 2016; 20-008, 94). Weed seeds, including wild radish (*Raphanus raphanistrum*), pea/vetches (*Lathyrus/vicia*), docks (*Rumex* sp.) and seeds of the knotweed family (*Polygonum* sp.), were also common in the feature. One sample from a probable Iron Age pit contained a hazelnut shell fragment (Clarke et al 2016; 60).



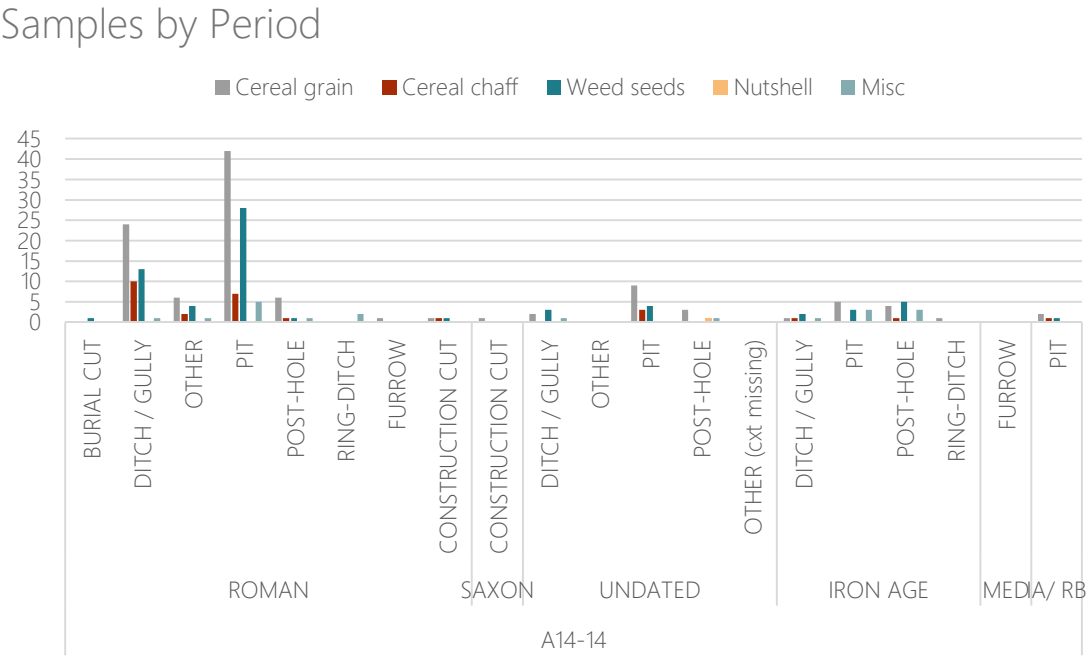
3.5.31. Number of samples per period

The charred plant remains exhibited mixed levels of preservation ranging from good to very poor. Many of the cereal grains showed signs of abrasion which prevented identification to species level. Plant remains probably preserved by waterlogging were present in the Roman waterholes. Several uncharred

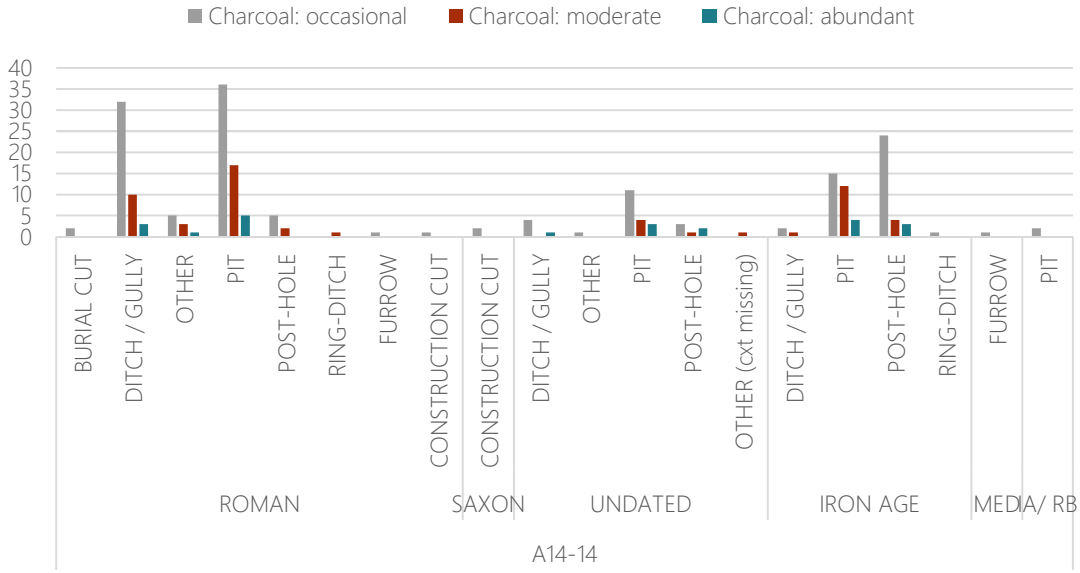
seeds, likely modern, were recovered from various features and will not be considered further. Table 3.5.18 presents the occurrence of constituent types in samples per period.

3.5.18. The occurrence of constituent types in samples per period

Period/Constituent	Cereal grain	Cereal chaff	Weed seeds	Nutshell	Charcoal	CHD misc
Iron Age	11	2	10	-	66	7
Iron Age/Romano British	2	1	1	-	2	-
Roman	80	21	48	-	124	10
Saxon	1	-	-	-	2	-
Medieval	-	-	-	-	1	-
Undated	14	3	7	1	31	2



3.5.32. Occurrence of cereal grain/cereal chaff/weeds/nutshell/misc. per period/feature type



3.5.33. Charcoal abundance per period/feature type

Iron Age

Two areas of Iron Age activity were identified, one in the southwestern part of site and the other in the northeastern area.

IRON AGE: SOUTH-WESTERN AREA

Archaeological remains in the southwestern area comprised a roundhouse (Roundhouse 14.1), four clusters of pits (Pit Groups 14.1-14.4), a cremation burial, and a extensive boundary ditch (Ditch 14.1). One sample from Boundary Ditch 14.1 was processed. It contained small charcoal fragments (<5mm).

Samples from nine pits and postholes associated with Roundhouse 14.1 were processed. The majority of sampled features [140590], [140564], [140597], [140592], [140597] contained small (<2mm) indeterminate charcoal fragments. Cereal grain was recovered in varying quantities from three of the postholes, [140597], [140533] and [140531]. Cereal was particularly abundant (>200 grains) in the fill (140595) of posthole [140597]. Wheat (*Triticum* sp.), barley (*Hordeum* sp.), oats (*Avena* sp.) and possible rye (*Secale cereale*) grains were recovered, some showed signs of germination. Glume bases and occasional spikelet forks were also recovered together with arable weeds and a possible broken cucumber type (*Cucumis* sp.) seed. This identification will need to be investigated further during the analysis stage. A moderate amount of cereal was recovered from posthole [140533] together with parenchyma (food, fruit) fragments. Pit/Posthole [140533], located at the entrance to the roundhouse, also contained poorly preserved indeterminate cereal grains and occasional parenchyma (food, fruit) fragments. Two samples were taken from the roundhouse drip gully [140502] and [140505]. Both deposits contained occasional charcoal fragments. A small number of seeds from the pink family

(Caryophyllaceae sp.), speedwells (Veronica sp.) and sedge nutlets (Cyperaceae sp.) were also present in context [140502].

All seven of the pits in Pit Group 14.1 contained charcoal in varying quantities. Oak (*Quercus* sp.) charcoal was particularly abundant in the fill (142548) of pit [142549]. Occasional poorly preserved indeterminate cereal grains were present in deposit (142550).

Three pits [142488], [142508] and [142521] from Pit Group 14.2 were sampled. They contained occasional to moderate charcoal fragments measuring up to 13mm.

Five samples from the three pits and the posthole [142661] forming Pit Group 14.3 were assessed. The features contained evidence for *in situ* burning and were interpreted as cooking pits. All pits contained occasional to moderate charcoal fragments. Large (17mm), unabraded charcoal fragments were abundant in the fill (142694) of pit [142692]. Analysis of the charcoal from this deposit may provide information on the species used for fuel wood.

Samples from eight deposits (142643), (142645), (142647), (142645), (142662), (142664), (142666), (142672) from features in Pit Group 14.4 were assessed. All samples contained occasional charcoal fragments ranging in size from 6 to 14mm. Occasional poorly preserved indeterminate cereal grains were present in the fill (142643) of pit [142644].

The three deposits (142300), (142302) and (142305) from Cremation Burial 14.1 contained moderate to abundant charcoal. The seeds of many grassland species were present in deposit (142302), suggesting that grassland plants were also used for fuel or tinder. Analysis of the charcoal and charred plant remains from this deposit will provide information on the material used for fuel for the cremation.

Four of the eight postholes forming a possible outbuilding associated with the roundhouse (Structural Features 14.1) were sampled. Posthole [142307] contained occasional barley grains and indeterminate cereal grains alongside a culm node and tuber fragments. Occasional speedwells (*Veronica hederifolia*) were also present. All postholes contained heavily fragmented charcoal in varying quantities.

Pits [140606] and [142532] contained occasional charcoal fragments.

IRON AGE: NORTH-EASTERN AREA

A second area of late Iron Age settlement comprising four buildings (Roundhouse 14.2 and Buildings 14.1, 14.2, 14.3), a boundary (Ditch 14.2) and two waterholes (Waterholes 14.1 and 14.2) was identified in the northeastern part of site.

The fill (141266) of one of the postholes forming Boundary 14.2 was processed. It contained occasional small (<1mm) charcoal fragments.

Environmental material from the fills (141910) and (141911) of posthole [141912] from Roundhouse 14.2 was assessed. The posthole contained occasional barley grains, indeterminate fruit fragments and occasional oak and non-oak charcoal measuring up to 11mm.

Samples from twelve of the thirteen postholes in Building 14.1 were assessed. The postholes contained occasional to moderate small charcoal fragments, occasional charred rhizomes and a small amount of amorphous vesicular material. Fragments of hulled barley (*Hordeum vulgare*) were present in posthole [141873] and a single indeterminate cereal grain was recovered from posthole [141900]. The small amount of cereal present suggests that it was incidentally incorporated into the postholes and does not relate to the function of the building.

One sample from posthole [141823] in Building 14.2 was processed. It contained occasional small (<7mm) charcoal fragments and occasional barley grains.

Samples from the fills (141069) and (141075) of pit [141068] and posthole [141075] respectively were assessed. The posthole (141076) contained abundant cereals including wheat, possible spelt (*Triticum spelta*), free threshing wheat (possibly bread wheat), barley and glume wheats. Four possible spelt glume bases were also recovered. Occasional weed seeds including brome grass (*Bromus* sp.), sedges (*Carex* sp.), wild barley (*Hordeum spontaneum*) and mayweed (*Tripleurospermum* sp.) were also observed. The presence of medium height taxa (mayweed) and high growing taxa (Brome grass) suggests that harvesting took place relatively high on the cereal stalk, with some straw retained. Analysis of this deposit would provide information on crop processing practices.

Two features interpreted as waterholes (Waterhole 14.1 and 14.2) were located in the area of Iron Age activity. No samples were processed from Waterhole 14.1. Two of the pits [143160] and [143097] that cut into the upper fills of Waterhole 14.2 were assessed. The features were tentatively assigned to the Iron Age period based on their form, though could well be Roman in date. The plant assemblage from the fill (140395) of pit [143160] was particularly rich. Cereal grains, chaff and weed seeds were abundant. Cereal grains included emmer wheat and spelt. Occasional sprouted grains were also noted. Chaff included glume wheat bases and spikelet forks. Seeds included pea/vetch, sedges, (Lolium sp.), brome grass, wild carrot (*Daucus carota*), docks and scentless mayweed (*Tripleurospermum inodorum*). The presence of sprouted grains is interesting. Sprouted (spelt) grain is a common occurrence at Roman sites in the region and is sometimes associated with corndriers and malting. However, it is possible that germination may have been incidental if the grain was harvested when damp or became damp during storage; analysis of the plant material may provide more information on the function of this feature. Radiocarbon dating of the cereal grains will also provide a firm date for this feature.

A series of features including small gullies, pits and postholes, many of which were overlain by the later Roman trackway, were assigned to the Iron Age period. Gully [143094] contained abundant large (up to 40mm) charcoal fragments. A series of small ditches lay to the south of these. Ditch [141915] contained occasional charcoal fragments and a charred grass seed.

Iron Age/Romano-British

Pits [140586] and [143035] were spot-dated to the Iron Age/ Romano-British period. However, it is likely that Pit [140586] is Roman due to the presence of fig (*Ficus* sp.) seeds and germinated wheat (likely to be spelt, given the presence of over twenty spelt wheat glume bases). Pit [143035] contained a small amount of charcoal and barley grains.

Roman

ROMAN PHASE 1

Three phases of Roman activity were identified. The first phase (early Roman) comprised a trackway (14.1), burial, settlement enclosures and five waterholes.

Environmental material was recovered from nine deposits associated with the trackway (some of these may relate to the feature in Roman Phase 2). Occasional small charcoal fragments were present in the majority of deposits. Indeterminate cereal grains and parenchyma fragments were observed in deposit (142155). Plant material, possibly preserved by waterlogging, was abundant in deposit (140991). Heather (*Calluna vulgaris*) stems and the seeds of elder, thistle (*Cirsium* sp.), cinquefoils (*Potentilla* sp.), buttercup (*Ranunculus* sp.), bramble (*Rubus* sp.), rush-type (c.f. *Juncus* sp.) and sedge were all identified. The presence of wetland taxa (sedges and rushes) suggests that there may have been standing water in the vicinity. Although heather has been identified at other sites (TEA 29), it is not commonly found in this area. This identification will need to be investigated further during analysis.

The deposits from burial [142287] contained only occasional small charcoal fragments.

Samples from a series of enclosure ditches associated with the early Roman farmstead contained poorly preserved indeterminate cereal grains and mineralised charcoal fragments. Moderate amounts of possible wheat, barley, indeterminate cereal grain and free threshing wheat rachis were recovered from Ditch 14.8 [140683]. Interestingly, occasional fig seeds were also recovered together with cyperaceae nutlets, soapworts (*Saponaria* sp.) and sedge.

Ditch 14.10 [140330] and [140512] contained poorly preserved barley grains, rye, occasional indeterminate cereals and occasional small charcoal fragments. Similarly, Ditch 14.17 [142534] and [140155] contained occasional barley, a glume base and indeterminate cereal grains. Ditch 14.11 [140310] contained only a small amount of charcoal, most of which was mineralised and unsuitable for radiocarbon dating.

Evidence for buildings was present within some of the enclosures (Structural Features 14.2, 14.3, 14.4 and 14.5). Environmental samples from pits and postholes in all but one (14.4) of the Structural Features were assessed. A posthole [140160] and a pit [14075] from Structural Features 14.2 contained occasional small charcoal fragments, oats and indeterminate cereal grains. Pits [140163] and [140274] within Structural Features 14.3 contained occasional glume wheat, indeterminate cereal and occasional charcoal fragments up to 10mm. Pit [143023] in Structural Featured 14.5 contained occasional barley, bread wheat (*Triticum aestivum*) and peas/vetches together with occasional oak charcoal fragments.

Five waterholes (Waterholes 14.3, 14.4, 14.5, 14.6 and 14.7) were located in the area of dense Roman activity. Environmental samples from all five features were assessed. The waterholes contained cereal grains, chaff, charcoal and a variety of taxa (preserved by charring and waterlogging) from different environments.

The fill (141353) of Waterhole 14.3 [141349] contained over fifty spelt wheat glume bases together with a small number of indeterminate wheat and possible barley grains. Occasional docks, sedge and grass

seeds were also present. It is possible that the chaff may have been used as fuel, or accidentally burnt during the parching process.

A large variety of weed seeds, preserved by waterlogging, were present in Waterhole 14.4 [140222]. Identified seeds included eurytopic taxa eg docks, ruderal taxa; soapworts, bindweeds (*Fallopia* sp.), cinquefoils (*Potentilla* sp.) and burdock (*Arctium* sp.). Arable weeds such as stitchwarts (*Stellaria* sp.) were also identified together with scrubby taxa (brambles). Rushes (*Juncus* sp.) were also present. Occasional spelt, barley and oats were identified as well as indeterminate pulse fragments. Analysis of this material would provide information on the local environment.

Waterhole 14.5 (140201) was particularly rich in environmental material indicative of a variety of environments. Plant material was preserved by waterlogging and charring. Occasional charred prunus type (*Prunus* sp.) fruit stones were recovered together with occasional hulled barley (*Hordeum vulgare*), spelt, oat and indeterminate cereal grains. A variety of seeds preserved by waterlogging were observed. These included ruderal taxa; common nettle (*Urtica dioica*), nightshades (*Solanum* sp.), henbane (*Hyoscyamus* sp.), knotweed (*Persicaria* sp.), swine-cresses (*Coronopus* sp.) and goosefoots (*Chenopodium* sp.). Occasional woodland and hedgerow taxa; elder (*Sambucus nigra*) and brambles (*Rubus* sp.) were also noted. Also recorded were docks and stitchwarts. Interestingly, waterlogged heather stem fragments were also identified. Large, non-oak charcoal fragments (up to 50mm) were also present. Analysis of this deposit would provide information on the local and wider environment.

The plant material recovered from Waterhole 14.6 [140141] was very similar in character to that from 14.4 and 14.5. Charred seeds including brome grass, sedges and wild barley. Elder, bramble and nettle seeds, preserved by waterlogging, were also present. Occasional barley grains and poorly preserved indeterminate cereals were also recorded.

Waterhole 14.7 contained small charcoal fragments. No plant remains were recovered.

ROMAN PHASE 2

The second phase of Roman activity comprised the establishment of a series of ditches and enclosures probably for livestock.

A sample from the fill (145188) of a curving ditch/gully [145189] defining Building 14.4 contained a substantial amount of cereal grain (c.60) including wheat and barley. Charcoal was also abundant, though heavily fragmented

The fills (141521), (141547) and (141572) of pits [141524], [141548] and [141576] in Pit Group 14.5 all contained charcoal in varying quantities. A small number of poorly preserved possible wheat, barley and indeterminate cereal grains were present in deposit (141547).

The fill (141177) of Ditch 14.26 [141179] contained only two tiny charcoal fragments. The fills (140805) and (142075) of Ditch 14.28 [140806]/ [142076] contained many lemna (free-floating aquatic plants from the duckweed family) and occasional sedges suggesting that the ditch may have been waterlogged. Approximately ten glume bases and two wheat grains were also present. Two samples from deposit

(140343) filling ditch 14.32 [140344] were assessed. Occasional cereal culm nodes and occasional small charcoal fragments were present.

Three samples from the fill (145085) of Burial 14.2 [145087] were assessed. The samples contained occasional charred seeds and flecks of charcoal.

Two pottery kilns were identified on site (Kilns 14.1 and 14.2). Kiln 14.1 contained approximately 20 poorly preserved wheat and barley grains, glume bases and occasional roundwood charcoal. Grass (*Poa* sp.) seeds, brome grass, peas/vetches and sedges were also present. It is possible that the grasses, chaff and charcoal are the remains of fuel waste. Deposits (141802) and (141854) from ditches [141803] and [141857] associated with Kiln 14.2 contained occasional to moderate, small charcoal fragments. Deposit 141854 also contained a small number of cereal grains including bread wheat (*Triticum aestivum*), glume wheat and barley. Eight rye grains, a single barley grain and occasional wheat grains were present in the fill (145131) of Pit [145157] associated with Kiln 14.2. A small number of Chamomile type (*Anthemis* sp.) seeds and grasses (*Poaceae* sp.) were also observed together with occasional charcoal fragments.

Three waterholes were located within the Phase 2 Roman enclosures. One sample from the fill (145156) of Waterhole 14.9 [145159] was processed. It contained occasional indeterminate cereal grains and charcoal fragments.

ROMAN PHASE 3

The last phase of Roman activity represents abandonment and a complete remodelling of the area, to divide it into fields. One sample taken from the fill (142209) of Ditch 14.39 was assessed. It contained occasional to moderate charcoal fragments and occasional charred tubers.

Saxon

SFB 14.1 was the only Saxon feature identified on site. Only a few small charcoal fragments and barley grains were recovered from the fill (142361) and (142362).

Medieval

Medieval agricultural furrows were identified across the site. A sample taken from furrow [145228] contained occasional charcoal fragments.

Undated features

A range of undated features including 17 pits, five postholes, five ditches/gullies and one feature categorised as 'other' were recorded on TEA 14. The ditches, gullies and postholes mainly contained a small amount of charcoal and occasional barley and glume wheat grains.

The majority of undated pits contained occasional cereal grains and occasional to moderate charcoal fragments. Pit [145389] was of interest as it contained abundant barley, wheat and oats together with stinking chamomile (*Anthemis cotula*), peas/vetch, mayweed and 'grain mimic weeds' such as brome grass and *raphanus*. Similarly, Pit [140526] had a high concentration of cereal grains and arable weed seeds. Cereal included spelt, barley, free-threshing wheat and oats. Many of the barley grains were germinated and some of the spelt was also germinated. A small number of spelt glume bases and barley

rachis were also recovered. Weed seeds included scentless mayweed, small nettle (*Urtica urens*), goosefoots, docks, sedge, pea/vetch, peas and knotweeds.

Summary and potential of the assemblage

The overall charred plant assemblage consisted of charcoal and cereal remains relating to the Iron Age and Roman settlements. The botanical assemblage from features dating to the Iron Age comprised glume wheats, hulled and twisted barley and occasional oats, possibly a contaminant of the barley crop. Cereal was particularly abundant in posthole [140597] in Roundhouse 14.1 and Ditch/Gully [142012]. Analysis of the abundant cereal remains and parenchyma from postholes associated with Roundhouse 14.1 will provide information on agricultural practices and food consumption at the time of occupation.

During the Roman period there was a marked increase in the presence of spelt wheat and weeds associated with arable crops or field margins, such as common chickweed, bindweed, brome grass, wild oat and stinking chamomile. Hulled barley, glume wheats and occasional oats were also identified. Many of the grains were sprouted. The identification of charred fig seeds in Ditch [140683] and Pit [140856] suggests that food was also imported.

Analysis of the environmental material from TEA14 will provide information about the agricultural economy and how it changed over time, and thus provide information for one of Medlycott's key research questions on the nature of agrarian economy (Medlycott 2011, 31). Analysis of the charcoal and plant remains from the cremation would allow limited investigation into ritual practices and fuel woods used for cremation purposes. Palaeoenvironmental evidence from the basal fills of the waterholes will also provide information on the natural local environment.

Recommendations

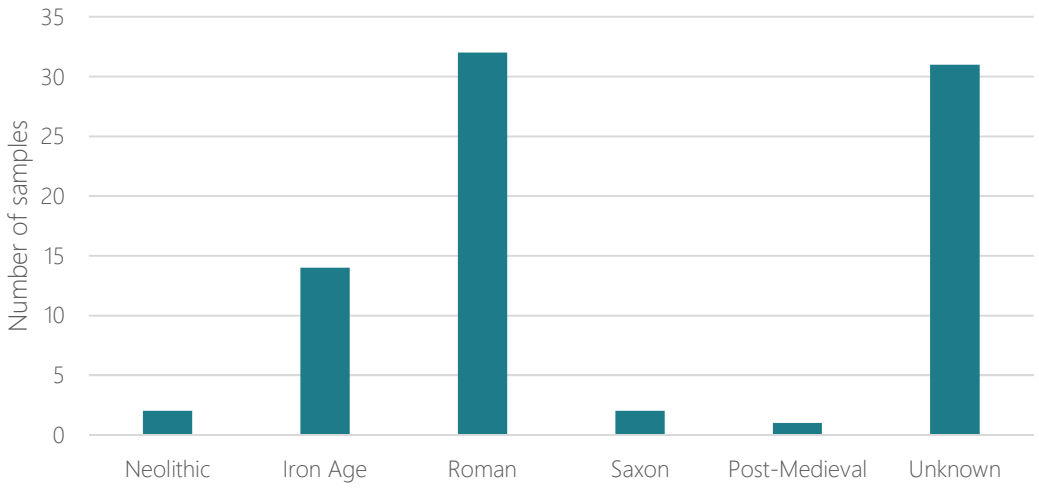
The table below summarises the samples selected from TEA 14 for further analysis due to their abundant concentration of well-preserved plant remains. Many are from primary deposits in houses etc. Full details of these samples can be found in the project's digital records.

3.5.19. Summary of samples from TEA 14 selected for analysis (*if dated)

Site code	Period	Feature	No. samples
A14-14	Iron Age	PIT GROUP	1
A14-14	Iron Age	ROUNDHOUSE	2
A14-14	Iron Age	CREMATION	2
A14-14	Roman	WATERHOLES	3
A14-14	Roman	DITCH/GULLY	1
A14-14	Roman	BUILDING	3
A14-14	Roman	PIT	1
A14-14	undated	Pit [140526] *- Rich cereal and arable assemblage- some germinated barley and spelt	1
Total number of samples suggested for analysis			14

TEA 15

A total of 82 bulk sediment samples were collected from TEA 15. The samples ranged in size from 10 to 100 litres in volume and were collected from a variety of archaeological features including pits, gullies, ditches and postholes dating back to Neolithic, Iron Age, Roman, Saxon and post-medieval periods.



3.5.34. Number of samples per period

The 82 collected environmental samples from TEA 15 produced small to medium dry flots and residues which contained charred plant remains. During the botanical assessment of the samples, a low to medium number of archaeobotanical remains were noticed, with ranging levels of preservation from good to poor. The flots and residues in general contained a medium concentration of charred plant remains, in particular abundant charcoal and cereal grains.

Charred remains

Flots and residues from TEA 15 have yielded a high concentration of charred wood remains (charcoal) in addition to medium concentration of cereal remains, such as grains and chaff, and a small amount of weed seeds. Virtually all samples were seen to contain oak and non-oak charcoal fragments up to 20mm.

A total of 34 samples from TEA 15 contained occasional to abundant concentrations of cereal remains from the Iron Age and Roman periods. These included cereal grains mainly from barley (*Hordeum vulgare*) and Oats (*Avena sativa*) in addition to remains of glume wheat species such as spelt wheat (*Triticum spelta*) and occasional remains of emmer wheat (*Triticum diccocum*). Occasional to moderate quantities of chaff were also noticed in 17 samples from TEA 15, with a particular high concentration of glume wheat chaff (glume bases), most likely to be derived in its majority from spelt wheat and occasional barley chaff (rachises). No chaff from oats was identified from the assessed samples despite the presence of oat grains.

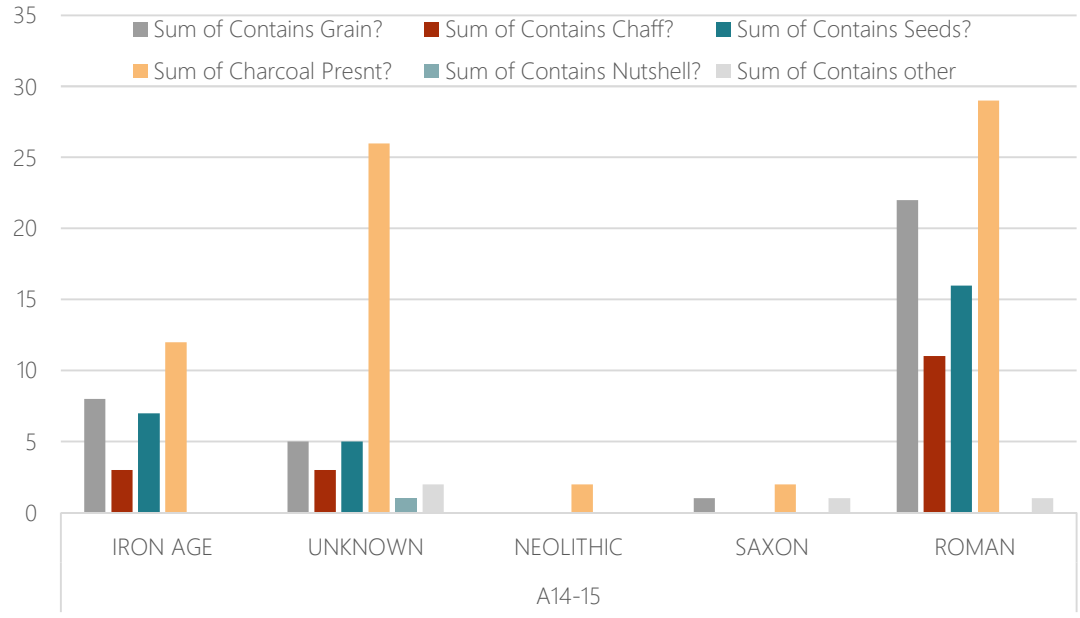
Remains of other plants, in particular arable weeds/grasses have been recovered in occasional and moderate amounts from 25 samples from TEA 15.

Waterlogged remains

Only a very small amount of waterlogged wood was noticed - from a Neolithic pit in sample <15161> from (151687); and from a post-medieval ditch/gully in sample <15001> from (150006).

Samples by Period

The assessed environmental samples from TEA 15 represent a variety of archaeological contexts from Neolithic to post-medieval periods. In general, samples from all periods contained an abundant amount of charcoal. In contrast to later levels, the samples from Neolithic/Bronze Age levels did not yield remains of crops or seeds. A moderate concentration of crops, amongst which cereals constituted the majority of the seed assemblage, was noticed from samples from Iron Age to medieval contexts.



3.5.35. Summary of constituents by TEA and period.

Neolithic/Bronze Age

The Neolithic plant assemblage is constituted by only two samples and has yielded a very low quantity of archaeobotanical remains. The majority of plant materials recovered from Neolithic contexts is fragments of waterlogged and charred wood in addition to modern vegetation and modern seeds.

Iron Age

The 11 samples dated to the Iron Age from TEA 15 contained an abundant concentration of charcoal, a moderate amount of cereal grains, and occasional chaff and weed seeds. Amongst the main cereal taxa

recovered from the Iron Age samples, hulled barley was the most common species, followed by occasional remains of oats. Especially abundant were the remains of barley and oat grains from the samples <15116> and <15117> from a pit [151057]. These same samples also contained a moderate amount of glume wheat chaff and occasional weed seeds which most likely indicates that this deposit represents remains of crop-processing activities.

Roman

Charred plant remains were recovered from all Roman features across TEA 15 including cereal remains, arable weed seeds, and abundant charcoal. A total of 38 samples dating to the Roman period yielded plant remains. The majority of these were remains of cereals including abundant hulled barley and oats, in addition to some scattered remains of wheat which did not allow for species identification.

Ditches/gullies and pits yielded the highest concentrations of botanical remains from TEA 15, and in particular samples <15002> from [150030], <15006> from [150040], <15104> from [151027] and <15123> from [151008]. These remains included barley, spelt wheat and oat grains in addition to spelt and barley chaff and arable weeds which suggest that these archaeobotanical assemblages probably derived from the accumulation of crop-processing activities such as threshing or dehusking.

Saxon

Only two samples came from contexts dating to the Saxon period. Sample <15195> from a pit [152044] contained occasional remains of charcoal, while sample <15200> from a construction cut [152057] yielded occasional remains of cereal grains, charcoal and a possible sedge tuber.

Post-Medieval

Amongst the assessed environmental samples only one pit [150007] provided archaeobotanical remains from a post-medieval context (150006). The concentration of these was very low, having recovered only occasional remains of waterlogged wood.

Undated

A total of 28 samples from TEA 15 were collected from currently unphased contexts. These have yielded abundant remains of charcoal in addition to moderate amounts of cereal remains (grains and chaff) and other seeds. A small proportion of the samples provided abundant remains of barley and oat grains together with occasional unidentified glume wheat grains. Three samples <15102>, <15107> and <15200> from two ditches and a pit [151073], [151085] and [151008] respectively, have yielded abundant remains of glume wheat chaff and weed seeds in combination with cereal grains, most likely representing assemblages derived from crop-processing activities. Especially interesting is the presence of abundant emmer wheat chaff, with whole spikelet forks, from sample <15107> from ditch [151085].

Summary and potential of the assemblage

The botanical assemblage from TEA 15 was predominantly formed by remains of barley and oats. Samples from Iron Age and Roman contexts yielded a medium concentration of cereal remains, in particular barley, spelt wheat and oat grains in addition to glume wheat chaff and arable weeds. The presence of oats in the Iron Age contexts is unusual and further analysis is needed in order to confirm

if these are wild or domesticated types. The presence of oats as weeds in other field crops is attested from the Neolithic in Britain; however the cultivation of oats is thought to be introduced during the Roman occupation (Welch 1995). The presence of arable weeds and moderate chaff in combination with abundant cereal grains in the assessed deposits indicates that these assemblages are most likely derived from crop-processing activities (eg threshing, dehusking) prior to the cleaning, storage and use of these crops for human consumption (Stevens 2015).

The archaeobotanical assemblages assessed from TEA 15 have yielded plant remains which would allow the investigation into agricultural practices and food processing as well as socio-economic organisation at the time of occupation. The charred plant assemblages from TEA 15 have local significance in relation to the understanding of the area and its use, and the diet of its inhabitants, during the periods represented. Further botanical analysis will provide evidence on these aspects and on the nature of the natural environment.

Recommendations

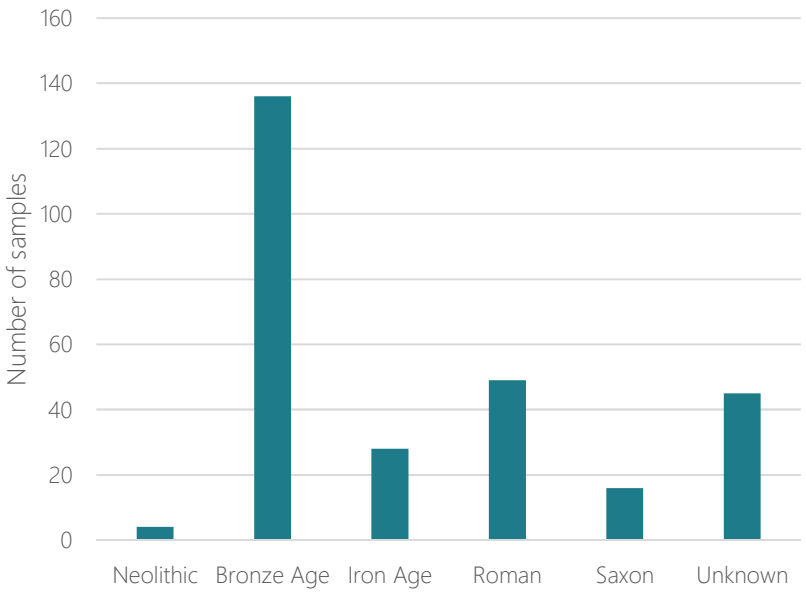
The table below contains the samples selected from TEA 15 for further analysis due to their abundant concentration of well-preserved plant remains. Full details of these samples can be found in the project's digital records. Analysis of samples from currently undated contexts is reliant upon them being dated at the analysis stage.

3.5.20. Summary of samples from TEA 15 selected for analysis

Site code	Period	Feature	No. samples
A14-15	IRON AGE	PIT	1
A14-15	ROMAN	DITCH/GULLY	5
A14-15	ROMAN	PIT	2
A14-15	UNKNOWN	DITCH/GULLY	3
Total number of samples suggested for analysis			11

TEA 16

A total of 278 bulk sediment samples were collected from TEA 16. The samples ranged in size from 10 to 100 litres in volume and were collected from a variety of archaeological features including cremation burials, pits, gullies, ditches, postholes and kilns, and date back to the Neolithic, Bronze Age, Iron Age, Roman and Saxon Periods.



3.5.36. Number of samples per period

The TEA 16 samples yielded a low to medium concentration of archaeobotanical remains on average, with levels of preservation ranging from good to poor. The flots and residues, in general, contained occasional to moderate charred plant remains with the exception of 26 samples which produced abundant botanical remains.

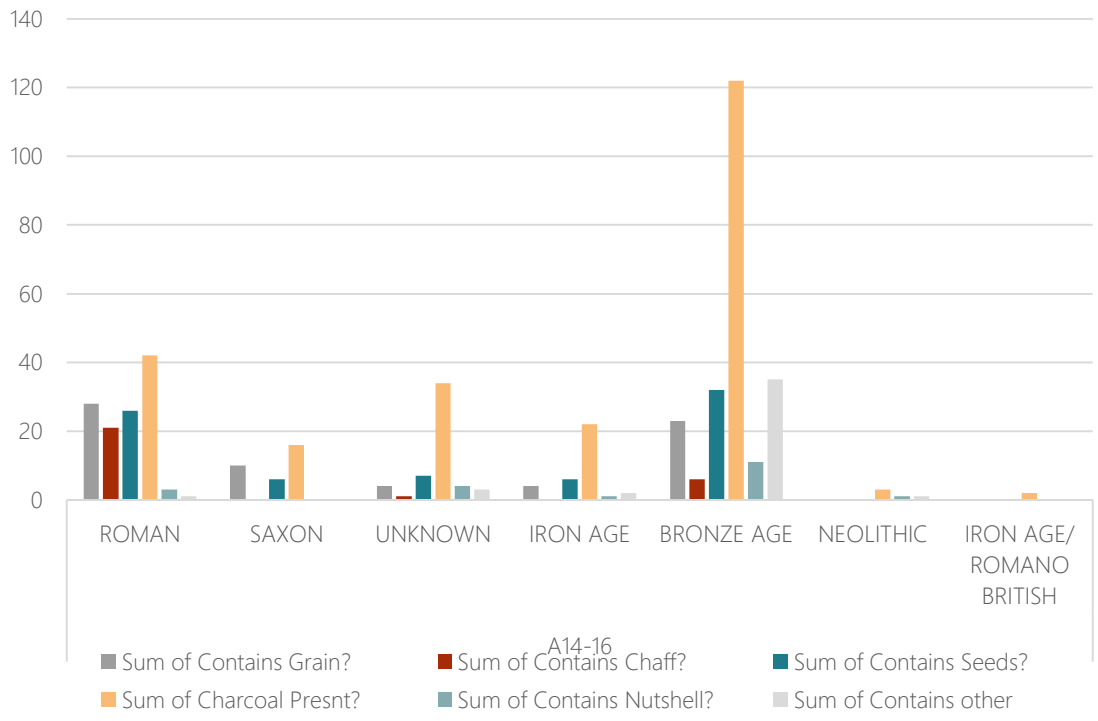
Flots and residues from TEA 16 have yielded an abundant concentration of charcoal with fragments up to 30mm in size. In addition, the samples produced a moderate concentration of cereal remains, such as grains and chaff, and a wide range of seeds from wild plants, roots and tubers.

3.5.21. The occurrence of constituent types in samples per period

Period/constituent	Cereal Grain	Cereal chaff	Weed seeds	Charcoal	Misc
Neolithic	-	-	-	3	2
Bronze Age	23	6	32	122	46
Iron Age	4	-	6	22	3
Roman	28	21	26	42	4
Saxon	10	-	6	22	3
Undated	4	1	7	34	7

Samples by Period

Samples were collected from a variety of features and contexts from different chronological periods. In relation to prehistoric periods, the majority of the samples from TEA16 come from contexts which date back to the Bronze Age, in addition to 4 samples from Neolithic contexts and 28 samples from Iron Age contexts. From later periods, a total of 49 samples were taken from Roman contexts, in addition to 16 samples from Saxon features. All archaeobotanical assemblages have yielded an abundant concentration of charcoal in combination with a low to moderate concentration of cereal remains, legumes, wild plant seeds and other plant remains such as roots and tubers.



3.5.37. Summary of constituents from TEA 16 by period.

Neolithic

The Neolithic plant assemblage from TEA 16 is represented by 4 environmental samples from ditches/gullies which have yielded very low concentrations of plant remains. Three of the four samples contained charcoal fragments, up to 4mm in size.

Sample <16159> from a ditch [161205] (Ditch 16.2), in addition to charcoal, has also yielded remains of nutshell and parenchyma fragments which will need further analysis in order to be fully identified.

Bronze Age

The Bronze Age plant assemblage is represented by 136 samples which have yielded low concentrations of plant remains. A total of 122 samples contained remains of oak and non-oak charcoal up to 10mm in size. Only a portion of the samples from Bronze Age deposits have yielded remains of cereals, with only 23 samples containing occasional cereal grains and 6 samples containing cereal culm remains (straw). In general, the cereal remains in the Bronze Age samples are represented by a majority of barley (*Hordeum vulgare*) grains, and occasional glume wheat grains.

In relation to non-cereal remains, a total of 32 samples contained wild plant seeds, in particular arable grasses (*Poaceae*) and small legumes (*Lathyrus sp* and *Vicia sp.*). Further analysis is needed to fully identify these species.

88 samples were collected from contexts which represent cremation burials. During assessment, these samples yielded a very high concentration of charcoal and false oat-grass roots and tubers (*Arrhenatherum elatius* var. *bulbosum*). These tubers are very commonly recovered from cremation contexts in Northern Europe and Britain. Their recurrence in the archaeological record has been interpreted in a variety of ways including their possible ritual deposition as part of cremation goods or their potential use as fire starters/fuel for the cremations (Roehrs et al 2012). In addition, occasional remains of cereals and other seeds mainly from arable grasses, small legumes, sedges and docks were seen among the samples from burial cuts.

On the contrary, samples from the pit alignment on the western part of the site yielded a very low concentration of plant remains, with only occasional charcoal and sedge seeds (*Carex* sp.) present in the assemblages.

Iron Age

Although a total of 28 samples were collected from Iron Age deposits, only 4 of these yielded remains of cereals and other plant seeds. Charcoal, however, was present in the majority of the samples, in low to moderate concentrations.

Among the cereals recovered from Iron Age deposits, occasional remains of barley and spelt wheat (*Triticum spelta*) are the most commonly seen, in addition to possible remains of oats (cf. *Avena sativa*). In particular, sample <16101> from a posthole deposit [161007] yielded a moderate concentration of barley and spelt wheat in addition to remains of small pulses (*Fabaceae*). Other remains of seeds found

among the samples from Iron Age contexts are arable weeds and other small seed grasses. No remains of chaff have been found in the Iron Age samples.

Roman

From the 49 samples collected from Roman contexts, 39 have yielded low to medium concentration of archaeobotanical remains. The majority of the samples were taken from kilns/furnaces, in addition to a small number of samples from ditches/gullies. Kiln deposits have produced the highest concentration of plant remains, which include an abundant amount of charcoal and a moderate amount of cereal grains and chaff, in combination with abundant presence of wild plant seeds.

A total of 8 samples have yielded abundant remains of plant remains, all of them taken from kiln deposits <16004>, <16007>, <16011>, <16018>, <16320>, <16322>, <16323> and <16329>. Among these, the majority have shown a very high concentration of more than 100 cereal grains and wild plant seeds per sample. In particular, hulled barley and spelt wheat dominate the assemblage, in addition to occasional remains of oats. Cereal chaff has been seen in 6 of these samples, represented mainly by glume bases from glume wheat species, probably in their majority derived from spelt wheat, and occasional hulled barley rachis internodes. In relation to wild seeds, 5 of these kiln samples have produced an abundant concentration of seeds from a wide range of wild plant species. Mainly, these have been seen to be derived from arable weeds such as grasses (such as *Bromus* sp. or *Poa* Sp.) and pulses such as vetch (*Vicia* sp.) and grass pea (*Lathyrus* sp.).

In comparison, pits, ditches and gullies have only produced a low amount of archaeobotanical remains, with occasional charcoal, barley grains and sedge seeds being recovered.

Saxon

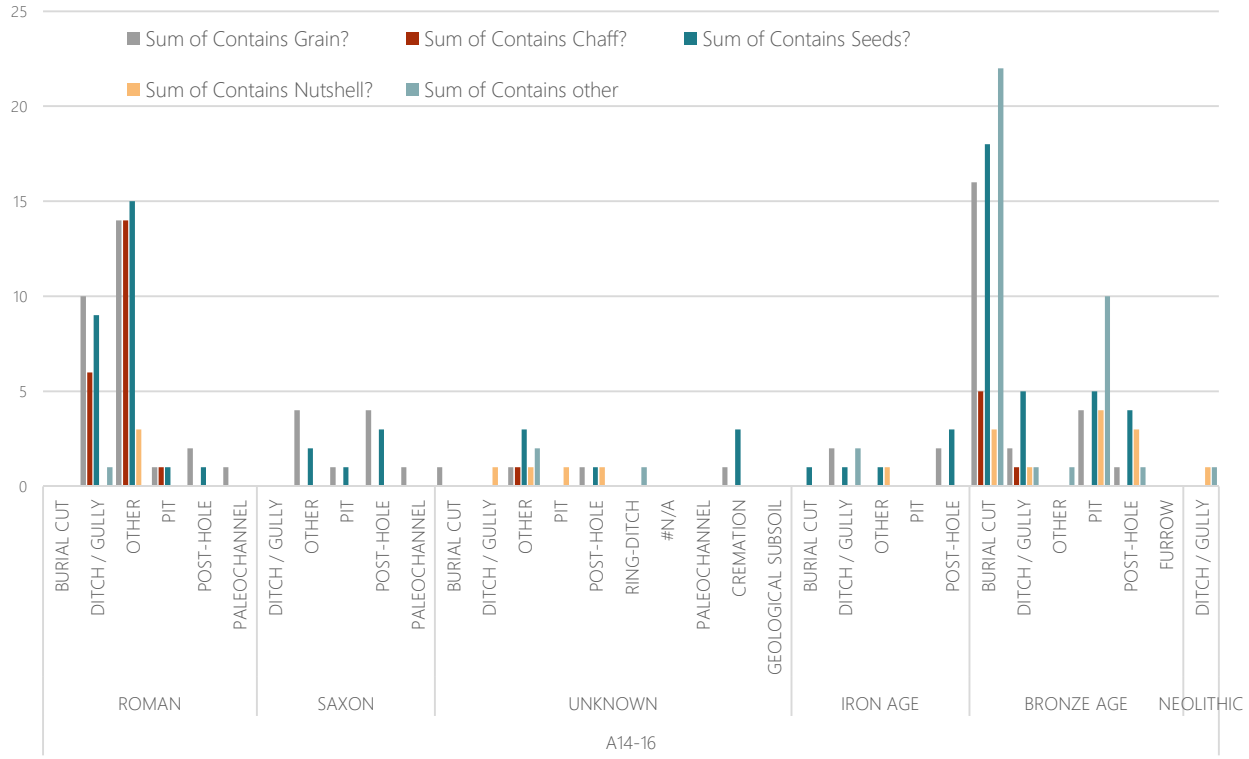
The Saxon archaeobotanical assemblage from TEA16 is formed by a small amount of plant remains. Although the majority of the samples have produced remains of charcoal, cereal grains and other seeds have only been occasionally recovered from 10 samples. Cereal remains include a small number of hulled barley, spelt wheat and oat grains however no chaff remains have been seen among the assessed Saxon samples. 6 of these samples also contained arable weed seeds such as grasses (*Poaceae*) and docks (*Rumex* sp.) and sedges (*Carex* sp.) seeds. The highest concentration of plant remains come from sample <16024> from a posthole deposit [160187], which yielded abundant barley grains, pulses and other weed seeds.

Undated contexts

A total of 45 samples from TEA16 were collected from currently undated contexts. From these, only 9 samples have produced remains of plant materials, generally in low concentrations. Sample <16023> from [16084] has yielded the highest number of archaeobotanical remains, including barley, wheat and oat grains. In addition, this sample contained a moderate amount of wild plants seeds, in particular from arable grasses (*Poaceae*) and sedges (*Cyperaceae*).

Summary and potential of the assemblage

The botanical assemblage from TEA 16 has predominantly yielded remains of barley and spelt wheat (grains and chaff) with occasional remains of oats. In addition, seeds from wild plant species, such as arable weeds and wetlands plants were very ubiquitous.



3.5.38. Samples with abundant plant remains from TEA 16 by period and feature.

The archaeobotanical assemblage assessed from TEA 16 has yielded plant remains which would allow the investigation into agricultural practices, food processing and cooking as well as consumption and socio-economic organisation.

The charred plant assemblages from TEA 16 have local significance in relation to the understanding of the area and its use, and the diet of its inhabitants, during the periods represented. Further botanical analysis will provide evidence on these aspects and on the nature of the natural environment.

Recommendations

The table below contains the samples selected from TEA 16 for further analysis due to their abundant concentration of well-preserved plant remains or specific research questions. In addition, a number of samples derived from specific archaeological features such as kilns have been selected to explore the possible uses of these installations in relation to plant use.

3.5.22. Summary of samples from TEA 16 selected for analysis

Site code	Period	Feature	No. samples
A14-16	NEOLITHIC	DITCH/GULLY (BARROW)	1
A14-16	BRONZE AGE	CREMATION BURIAL	6
A14-16	BRONZE AGE	DITCH/GULLY (BARROW)	2
A14-16	IRON AGE	POSTHOLE	2
A14-16	IRON AGE	DITCH/GULLY	1
A14-16	IRON AGE	CREMATION BURIAL	2
A14-16	ROMAN	KILN	8
A14-16	SAXON	PIT	1
A14-16	SAXON	POSTHOLE	3
A14-16	SAXON	OTHER	2
A14-16	UNKNOWN	OTHER	1
A14-16	UNKNOWN	BURIAL CUT	2
Total number of samples suggested for analysis			31

TEA 19

A total of 17 bulk soil environmental samples were collected from TEA19 and ranged in volume from 20 to 40L. The samples were selected from a variety of archaeological contexts and features such as ditches/gullies, pits, burials and paleochannels.

From the 17 collected environmental samples, 9 have produced small to medium flots. A total of 8 flots are dry flots and contain charred plant remains; the remaining one is a wet flot and contains waterlogged plant remains. The assessed samples have yielded a low number of botanical remains which generally presented a poor state of preservation.

Charred remains

Dry flots have produced charred remains of cereal grains and other seeds, as well as charcoal. A total of 6 samples contained oak and non-oak charcoal fragments up to 30mm. In terms of cereal remains, indeterminate cereal grains whose preservation was too poor to allow identification to species were noticed from samples <19007> from context (190114) and <19017> from (190173). Remains of cereal chaff were not recovered from any of the flots and occasional charred arable weed seeds were noticed in sample <19012> from (190147).

Waterlogged remains

Only a very small quantity of waterlogged remains of plants has been recovered from sample <19018> from context (190178). These are comprised in their majority of small fragments of waterlogged wood. No waterlogged seeds or fruit stones have been recovered from TEA19.

Summary and potential of the assemblage

Due to the low number of botanical remains recovered from the assessed samples from TEA19, the significance of the archaeobotanical data is especially low for this site. Due to the poor preservation, the botanical remains from TEA19, despite showing an occasional use of cereals, have not provided additional information about plant use, diet or economy at that time.

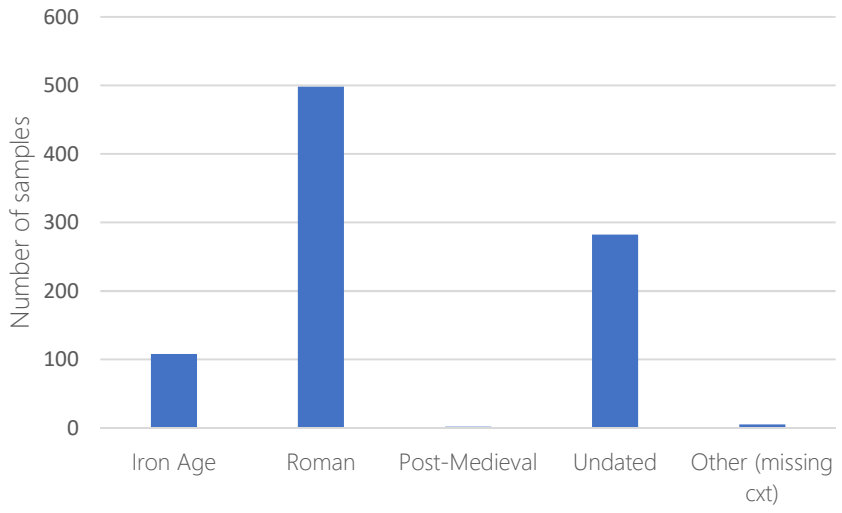
Recommendations

Due to the low concentration of archaeobotanical remains in the environmental samples from TEA 19, there are no recommendations for further analysis of samples at this moment. In the event of C14 dating required from a specific context, samples <19007> from context (190114) and <19017> from (190173) should be prioritized.

TEA 20

A total of 895 samples were taken from across TEA 20. The samples range from 1 to 80 litres in size and were collected from a range of features dating from the Iron Age, Roman and post-medieval periods. This assessment was carried out by the author [Kath Hunter] using the Oracle data provided from the work of six different botanists. In some cases, identification information regarding season chaff has been omitted from the spreadsheet supplied. The majority of plant remains had been preserved by charring cereal grain and chaff, with charcoal being the most frequent. Some waterlogged plant remains were also recorded. The only evidence of mineralisation appears to be the cysts in some samples; there is currently no definitive conclusion about the origin of these items as they are often associated with other mineralised material. There is no evidence recorded of silicified plant remains.

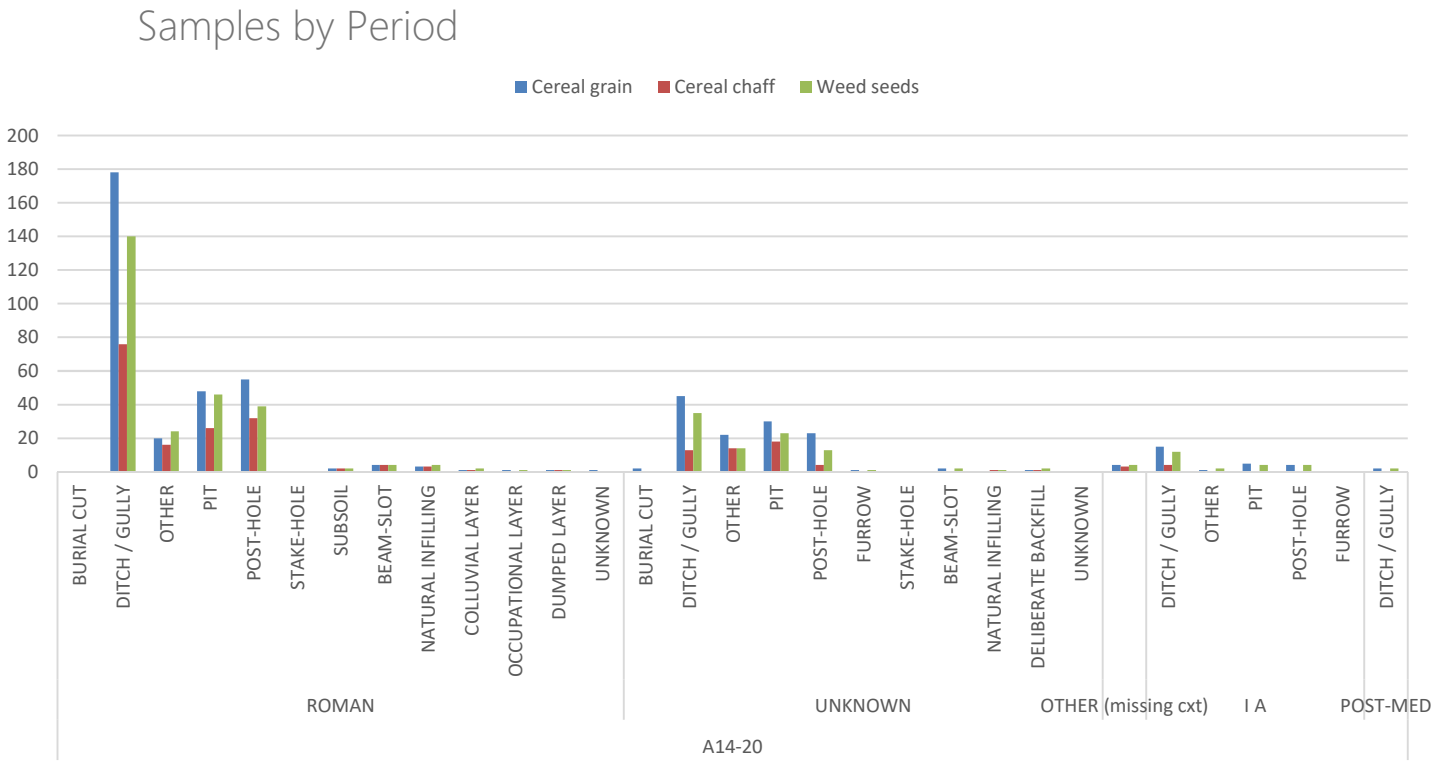
Previous work carried out by CAU Area C2 encountered Neolithic and Bronze Age deposits only (Patten 2010).



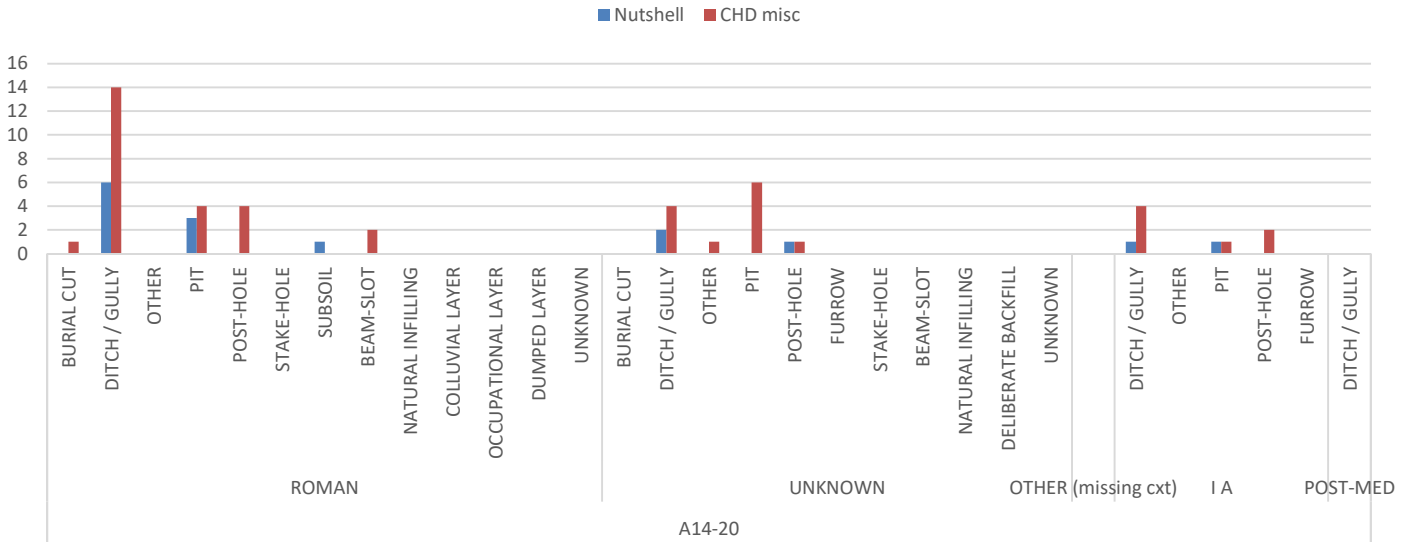
3.5.39. Number of samples per period

3.5.23. The occurrence of constituent types in samples per period

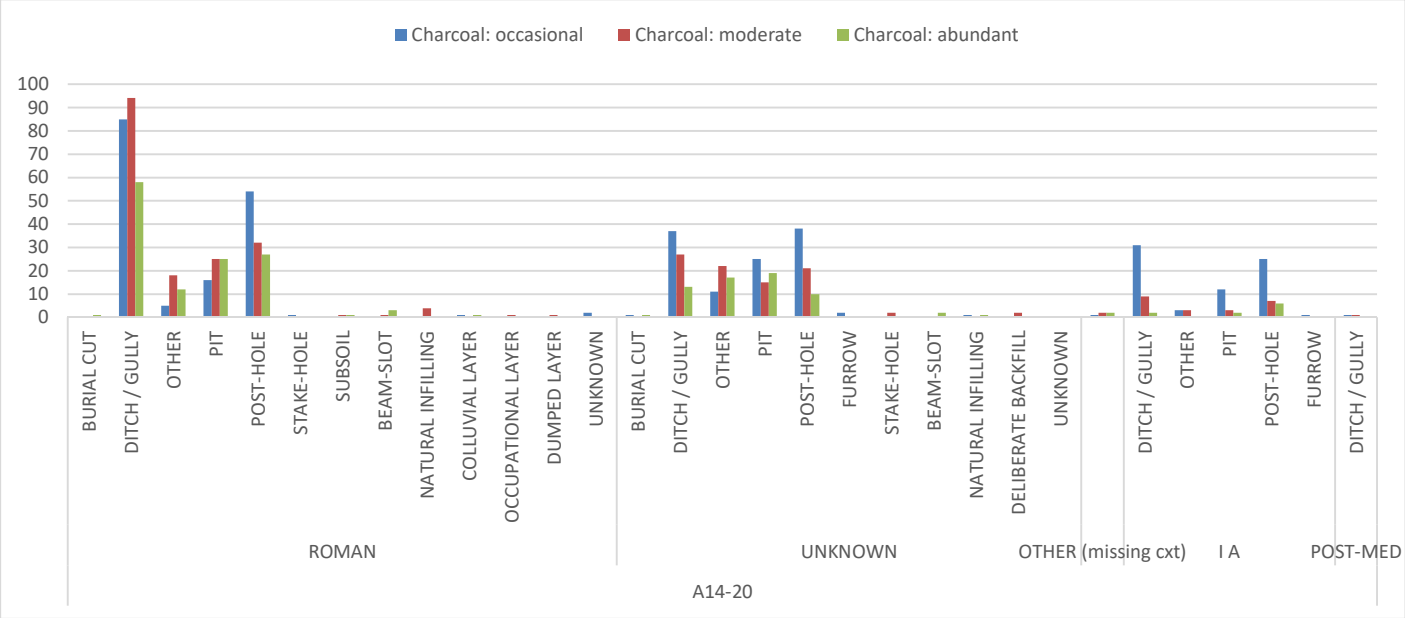
Period/Constituent	Cereal grain	Cereal chaff	Weed seeds	Nutshell	Charcoal	Misc
Iron Age	25	4	22	2	104	7
Roman	314	161	263	10	469	25
Post-medieval	2	-	2	-	2	-
Undated	126	51	91	3	267	12
Other (cxt missing)	4	3	4	-	5	-



3.5.40. Occurrence of cereal grain/cereal chaff/weeds per period/feature type



3.5.41. Occurrence of nutshell/charred misc. per period/feature type



3.5.42. Charcoal abundance per period/feature type

Iron Age

Iron Age activity at TEA 20 was divided into two phases. The first phase comprised a field system and a metalled trackway. The second phase was characterised by a number of enclosures and a series of associated landscape boundaries. A number of different types of features were sampled from across the area including boundary ditches, postholes, pits and features categorised as 'other'. The results of the assessment suggests a general low quantity of charred cereals, seeds, and charcoal across the site. Waterlogged plant remains were noted from a waterhole/well [204168].

IRON AGE 1

Features sampled from Iron Age Phase 1 included postholes from Structural Features 20.1, ditch/gully sections and 'other' features from Boundary 20.1, a pit from Enclosure 20.1, and Well 20.1. Charcoal was present in low numbers in all of the sampled features but was abundant in pit [205606] (Enclosure 20.11) - the charcoal was unsuitable for analysis due to its size (<5mm). Occasional barley (*Hordeum* sp.) grains were recovered from pit [205606] and cereal indeterminate grains from posthole [201192] (Structural Features 20.1). Waterlogged plant remains were recovered from waterhole-well [204168] and comprised stem and wood fragments as well as arable weeds.

IRON AGE 2

The botanical assemblage from the ditch/gully sections from Boundaries 20.2 - 20.5 and 20.7 and Enclosures 20.2-20.5, 20.13 and 20.15 comprised charcoal, which was abundant in ditch/gully [205394] (Boundary 20.7), and cereals that included emmer (*Triticum dicoccum*), spelt (*Triticum spelta*), hulled

barley (*Hordeum vulgare*) and bread wheat (Triticum *aestivum/durum/turgidum)*. Emmer/spelt glume bases and straw culm nodes were the only chaff elements present and were few in number. Weed seeds recorded were predominantly arable weeds. A small assemblage of waterlogged plant remains was recovered from ditch/gully [205016] (Enclosure 20.2).

The remaining sampled features: pits, postholes and features categorised as 'other' yielded occasional to moderate charcoal and occasional arable weeds. Cereal remains included bread wheat from 'other' feature [201440] (Boundary 20.5) and a single hulled barley grain from posthole [204617] (Enclosure 20.3).

IRON AGE UNGROUPED AND UNPHASED

There was a small number of unphased and ungrouped features, dated to the Iron Age based on finds information. This included pits, ditch/gully sections and a post hole. These features produced a botanical assemblage comprising charcoal which was abundant in pit [200009], occasional to moderate cereals and occasional weeds. Cereals present were emmer and barley and the weeds were typical arable weeds. A blackthorn (*Prunus spinosa*) fruitstone was recovered from ditch/gully section [203935] and hazel (*Corylus avellana*) nutshell fragments from pit [200009]. The charcoal from pit [200009] was unsuitable for analysis due to its size (<2mm).

Three samples have been selected for analysis of charred plant remains based on the presence of grain including wheat (*Triticum* sp.) and hulled barley, wheat glume base fragments (T. *spelta/dicoccum*) and weed seeds. Ditch/gully sections [206722] and [205215] and pit [200009] were selected using these criteria. Pit [200009] also contained fragments of hazel nutshell, a potential food resource.

The presence of low-level cereal remains in Iron Age deposits from TEA 20 does not suggest the primary deposition of crop processing waste and/or fuel. Rather, the material suggests secondary or tertiary deposition of the charred remains. So, in spite of this paucity of remains from the Iron Age features, it is recommended that four samples are fully analysed.

Roman

The assessment of the Oracle data for 498 samples dated to the Roman period produced a much wider range of plant remains, from a number of different types of feature. These included postholes, ditches, pits, occupation layers, cremations, and *in situ* burning. In some cases, there was a great abundance of charred cereal remains including grain and chaff. Flax seeds (*Linum usitatissimum*) were also recorded from ditch/gully [200612] from Enclosure 20.13, as well as rich deposits of weed seeds. There is some evidence of potentially imported food represented by waterlogged grape (*Vitis vinifera*) seeds from waterhole/well [204168] and a possible waterlogged olive stone (*Olea europea*) from pit [203164]. Fig (*Ficus carica*) seeds are also identified from an enclosure ditch [200612] (Enclosure 20.13)

ROMAN 1

The most intensive area of activity from this phase centered on a group of three buildings and their associated enclosures. The range of features sampled included boundary ditches, postholes, pits and ditches. Several features produced waterlogged plant remains including the waterhole-well [204168],

which may help to give an indication of changes through time of imported plants and the local vegetation.

Charcoal was present in varying quantities in all features but was abundant in twenty-seven, of these, eight of the assemblages contained charcoal suitable for analysis. These features included ditch/gully sections [203513], [202847] and [202761] and 'other' feature [202520] from Enclosure 20.10, posthole [201053] and pit [202687] from Building 20.2, ditch/gully [202527] from Enclosure 20.9 and posthole [200897] from Building 20.1.

There was a range of charred plant remains preserved. Some of the sampled features produced only a few identifiable items, whilst others contained abundant quantities of what appears to be redeposited charred cereal processing waste. For example, posthole [200879] from Building 20.1 contained a significant amount of charred cereal grains including wheat (*Triticum* sp.), barley and oat (*Avena* sp.), with cereal chaff and a few legume type seeds. Other features with abundant cereal remains included posthole [202185] from Building 20.1 and ditch/gully [202008] from Enclosure 20.1.

Abundant waterlogged plant assemblages were recovered from Waterhole-well 20.1, ditch/gully sections [202621], [202780], [203593] from Enclosure 20.9, ditch/gully [202825] from Enclosure 20.8, and ditch/gully [203002] from Enclosure 20.10.

ROMAN 2

The activity from this phase comprised a formal layout with the addition of a large double ditched enclosure. A range of features were sampled including pits, postholes and ditches. Again, the quantity and type of preservation varied greatly. The assemblage from posthole [208450] (Building 20.5) contained a mixture of cereal grain, chaff and abundant seeds. Ditch/gully [206612] (Enclosure 20.13) also contained cereal processing waste and charred grain along with flax and fig seeds. Flax may have been grown to produce both oil from its seeds and fibres for the production of linen. Figs are most likely to have been imported.

Ten of the sampled features produced abundant charcoal. None of the charcoal assemblages were suitable for analysis. Abundant cereal grains were recovered from pit [209020] (Building 20.4) and cereal chaff from ditch/gully [202009] (Boundary 20.10). Weed seed assemblages were predominately arable weeds and were abundant in posthole [208511] (Building 20.4), posthole [208450] (Building 20.5) and ditch/gully sections [200612] and [208681] (Enclosure 20.13).

Roman kiln [207302] produced a rich assemblage of charcoal along with small quantities of great fen sedge (*Cladium mariscus*) and wheat glume bases. It is documented that cereal chaff has been used as tinder since at least the Roman period in Britain (Hunter 2012; 2015). Great fen sedge is also documented as being used as tinder in Cambridgeshire since at least the 17th century (Rowell 1986) and it is possible that the practice in the area predates this. It is therefor, recommended that the identification of these remains is confirmed through full analysis. Though in abundance, the charcoal fragments measure 4mm which may not be suitable for identification.

ROMAN 3

The activity in this phase saw a remodelling of the features and enclosures of the Roman 2 phase. This included the replacement of buildings, remodelling ditch systems and the addition of a new enclosure. Features sampled included pits, postholes, ditch/gully sections and a colluvial layer. Both charred and waterlogged plant remains were recovered from this sub phase. For example, ditch/gully [202049] (Boundary 20.1) produced abundant waterlogged seeds and some fruit stones. These may help to characterise the local vegetation during this period. Two postholes [207749] (Structural Features 20.2) and [208496] (Building 20.6) produced abundant grain chaff and seeds.

Abundant cereals were also present in colluvial layer [208334] (Occupation features 20.2) and ditch/gully sections [205867] and [205834] (Enclosures 20.17). Abundant cereal chaff was identified in posthole [208855] (Building 20.6) and pit [207651] (Boundary 20.11). Cereals present included hulled barley, emmer, spelt, bread wheat and oats. Chaff recovered included emmer/spelt glume bases, barley rachis, oat awns and straw culm nodes. Weed seeds recovered were predominantly arable weeds and were abundant in postholes [208610], [208623] and [208855] (Building 20.6), colluvial layer [208334] (Occupation Features 20.2), and [207744] (Structural Features 20.2) Twenty-four features produced abundant charcoal assemblages, none of which were suitable for analysis.

ROMAN 4

Evidence for activity from this phase comprised isolated features and a field system (Field System 20.1). Sampled features included ditch/gully sections and beam-slots. Cereals present included spelt, barley and oat. Some of the cereal grains were identified as possible rye (*Secale cereale*). Abundant cereals were present in ditch/gully sections [207561], [207630] and [207447]. Beam slot [207418] (Field System 20.1) contained abundant wheat glume bases with free threshing wheat rachis (*T. aestivum/durum/turgidum*) and barley internodes.

Abundant weed seeds were preserved in the assemblages from beam-slot [207418] and ditch/gully sections [207561], [207630] and [207447]. These included stinking chamomile (*Anthemis cotula*), an arable weed preferring base rich soils, and spike rush (*Eleocharis plaustris*), a plant most commonly found growing in or by ponds and marshes. Charcoal was present across a range of feature types and was abundant in five features, though none of the fragments were suitable for analysis.

The assemblage from gully/ditch [207561] produced abundant grain with wheat, barley and oat, and wheat and barley chaff. Abundant seeds also included stinking chamomile as well as the seed capsules of wild radish (*Raphanus raphanistrum*) that are often retained with cereal grains during processing. The seeds of henbane (*Hyoscyamus niger*) suggest growing conditions high in nitrogen such as a midden.

ROMAN UNGROUPED AND UNPHASED

A total of 173 features remained ungrouped but assigned to the Roman period based on finds information. The range of features included pits, postholes, stake-holes, beam slots, ditch/gully sections, features categorised as 'other' and a colluvial layer.

Charcoal was present in varying quantities across a range of features and was abundant in 52 of the sampled features. Of these, seven produced assemblages suitable for analysis. These were postholes

[200668] and [202728], pits [202064], [202736] and [205088], and ditch/gully sections [203218] and [204924].

Cereal grains were present in 132 features and occurred in abundance in eleven features including pits [203548], [206031], [207011], [207485], [209087] and [208795], other feature [200102], and ditch/gully sections [200123], [200525], [200592] and [207162]. Cereal chaff was present in 70 features and abundant in ten features including pits [260031], [207011], [207485], [209248] and [208795], ditch/gully sections [200528], [207162], [207322], [207340], and 'other' feature [207112]. The cereal assemblages demonstrate distinctive patterns in their composition such as pit [207011] which produced abundant grain and wheat chaff, most of which were wheat glume bases. 'Other' feature [207112] contained abundant wheat glume bases with free threshing wheat and barley rachis, ditch/gully [207162] produced cereal grains including rye, barley and wheat, and ditch/gully [200528] produced over 300 spelt glume bases and germinated wheat grains. An abundance of seeds was also present, though the identity of these has not been recorded on Oracle.

Weed seeds were present in the assemblages from 113 sampled features and were abundant in ten features including pits [20711], [207414], [207485], [209248] and [208795], beam-slot [207451], 'other' feature [207559], and ditch/gully sections [207162], [209056] and [208888]. The weed seed assemblages were dominated by arable species.

Hazel nutshell fragments were recovered from seven features that included pits [205927], [206031] and [209087], ditch/gully sections [209005], [208188] and [208199], and subsoil [207543]. Possible charred food remains were recorded in ditch/gully [207162].

Abundant waterlogged plant remains comprised wood fragments in pit [203164] and ditch/gully [203218] and abundant weeds from ditch/gully [206723]. In addition to these, a further nine features contained waterlogged plant remains, predominately arable weeds with occasional local environment indicator species.

Post-Medieval

The botanical assemblage from ditch/gully [208111] comprised moderate charcoal, with 2 wheat indeterminate grains and arable weeds.

Undated

220 samples recorded on the Oracle spreadsheet, supplied for the assessment stage, are recorded as being undated. These included samples from ditches, cremations, postholes, pits and *in situ* burning.

Charcoal was present in varying quantities across a range of feature types and was abundant in 58 features. Of these, only twelve assemblages contained charcoal suitable for analysis, these were pits [202243], [205523], [205526], [205517] and [205526], 'other' features [202257], [202915], [203108], [202897] and [205545], posthole [202609], and ditch/gully [204030].

Cereals (grains and chaff) were present in 119 features. Cereals present included spelt, emmer, barley, rye, bread wheat and oats. Chaff recovered was predominantly glume wheat glume bases and spikelet

forks with barley rachis, oat awns and undifferentiated straw fragments. Grain rich assemblages were noted in pits [200170], [202243] and [207658], chaff rich assemblages in pits [207722], [207761] and [207734] and assemblages with an abundance of grain and chaff were recovered from pit [209265] and ditch/gully [206879].

Weed seeds, which were predominantly arable weeds, were present in the assemblages of 83 features, with an abundant assemblage in ditch/gully sections [204030], [208375], [208384] and [206879] and pit [207722].

Waterlogged plant remains were recovered from pits [201813], [203837] and [209265]. These may help to characterise the local vegetation.

The samples selected for full analysis have similar assemblages, particularly to those selected for the Roman period. All of them contain charred material which appears to be suitable for radiocarbon dating as well as having rich plant assemblages. If it is possible to ascertain which periods these samples are from, they would provide further information regarding both crops being utilised in the area and changes in the local environment.

Summary and potential of the assemblage

The range of samples selected for full analysis include samples which have very rich charred or waterlogged assemblages, as well as less productive samples which have plant species that may be able to provide more in-depth information about changes in the local economy and environment.

A number of deposits from across the site are very rich in cereal grains and chaff. These may represent the deposition of burnt crop processing waste, which may in turn have been utilised as fuel. This appears to be a common practice in the Roman period with examples identified during excavations on East Kent access road and London Gateway excavations (Hunter 2012; 2015).

The presence of rich deposits excavated from enclosure ditches and other features suggests that this may be the case at TEA 20. Therefore, a range of samples have been selected for full analysis from across the Roman sub periods identified in the Oracle database. It may be possible to identify the likely areas of crop processing and/or other industrial processes using crop processing waste as fuel.

The table below lists the samples recommended for full analysis. The currently undated samples in the list could be analysed if they can be securely dated. Samples from features identified as 'other' in the data base also require further clarification before a decision can be made about their usefulness for the analysis stage.

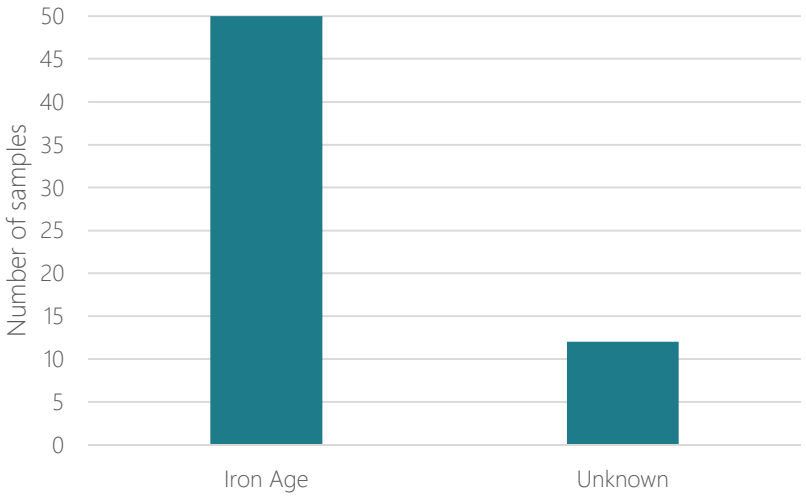
Recommendations

3.5.24. Summary of samples from TEA 20 selected for analysis

Site code	Period	Feature	No. samples
A14-20	Iron Age	Ditch/Gully	2
A14-20	Iron Age	Pit	2
A14-20	Iron Age	Waterhole/well	2
A14-20	Roman	Beam slot	2
A14-20	Roman	Colluvial layer	1
A14-20	Roman	Ditch/gully	52
A14-20	Roman	Other-Kiln	8
A14-20	Roman	Other-Waterhole	3
A14-20	Roman	Other	6
A14-20	Roman	Pit	13
A14-20	Roman	Posthole	23
A14-20	Roman	Blank	1
A14-20	Undated	Ditch/gully	4
A14-20	Undated	Pit	8
A14-20	Undated	Other	12
Total number of samples suggested for analysis			139

TEA 21

A total of 62 bulk sediment samples were taken from across TEA 21. The samples ranged in size from 1 to 90 litres and were collected from a variety of features including pits, postholes, ditches and the gullies of a roundhouse, and from other undated features. A further four samples were taken from the area of TEA 21 during the evaluation phase by Wessex Archaeology (WA 2014).

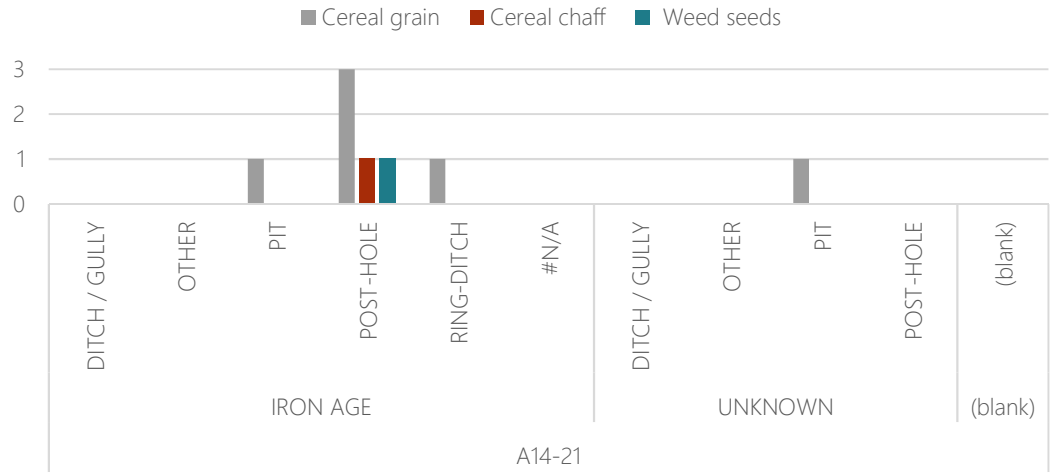


3.5.43. Number of samples per period

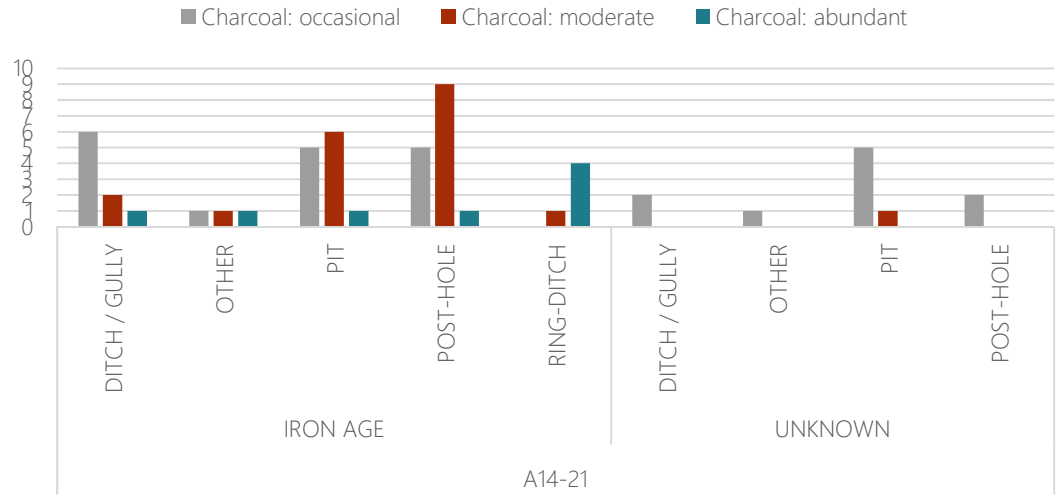
The charred plant remains exhibited mixed levels of preservation ranging from good to very poor. Most of the cereal grains showed signs of abrasion which prevented identification to species level. Table 3.5.25 presents the occurrence of constituent types in samples per period.

3.5.25. The occurrence of constituent types in samples per period

Period/constituent	Cereal grain	Cereal chaff	Weed seeds	Nutshell	Charcoal	Misc
IRON AGE	5	1	1	-	45	5
UNDATED	1	-	-	2	11	-



3.5.44. Occurrence of cereal grain/cereal chaff/weeds per period/feature type



3.5.45. Charcoal abundance per period/feature type

Iron Age

The charred plant assemblages from four-post structure 21.1, roundhouse 21.1 and enclosure 21.1 comprised occasional to moderate charcoal and occasional cereal remains. Charcoal was abundant in seven features associated with roundhouse 21.1 ([210327], [210689], [210742], [210745], [210805], [210707], [211062]).

Cereal remains were recovered from four-post structure 21.1 ([210096] and [210100]) and from Roundhouse 21.1 ([210805]). Species present included spelt wheat, barley and indeterminate cereal. Spelt chaff was present in posthole [210100], hinting at crop-processing in the vicinity.

Undated/Roman

Most of the remaining features yielded occasional to moderate charcoal. Abundant charcoal was recovered from pit [210052].

Occasional indeterminate cereal grains were recovered from posthole [210044] and pits [210027] and [210377]. A trace amount of hazel (*Corylus avellana*) nutshell was recovered from ditch [210068] and pit [210180].

Four samples taken during the Wessex Archaeology evaluation, ostensibly from ditches of Romano-British date (ditches [20831], [20836], [20353] and [20840]), produced hulled wheat and barley grain fragments, glume base and spikelet fork fragments, as well as occasional charcoal.

Summary and potential of the assemblage

The overall charred plant assemblage was predominantly charcoal with occasional to moderate cereal remains, mostly from features associated with the Iron Age settlement. Although barley (*Hordeum* sp.) and spelt wheat (*Triticum spelta*) were present, particularly in relation to Iron Age four-post structure 21.1, most of the grains recovered were poorly preserved and could not be identified to species level.

The archaeobotanical assemblage assessed from TEA 21 has yielded plant remains which would allow the investigation into agricultural practices, food processing and cooking as well as consumption and socio-economic organisation at the Iron Age settlement. In particular, the sample from the four-post structure has the potential to inform on our understanding of the function of these structures, typically thought to have acted as grain stores (Van der Veen and Jones 2006). They have local significance in relation to the understanding of the area and its use, and the diet of its inhabitants, during this period. Further botanical analysis will provide evidence on these aspects and on the nature of the natural environment.

Recommendations

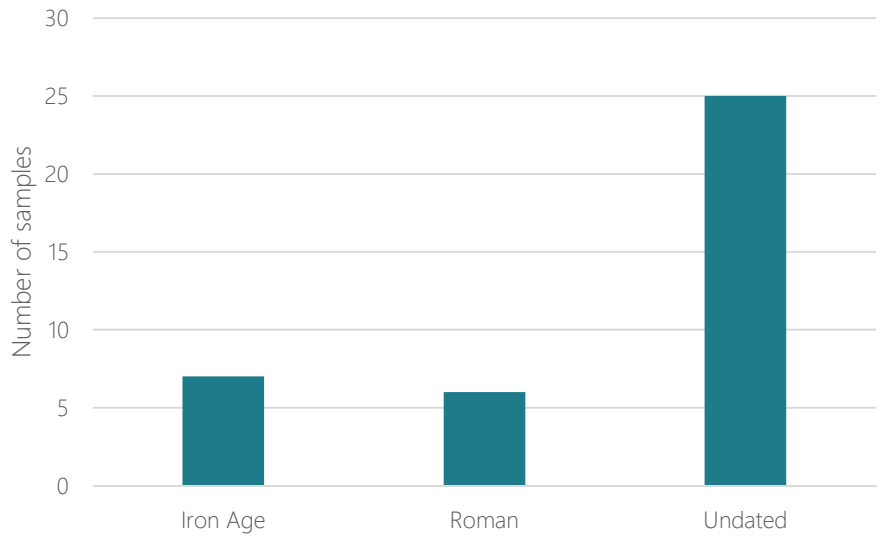
The table below summarises the samples selected from TEA 21 for further analysis due to their abundant concentration of well-preserved plant remains and/or their belonging to a particular context of high significance. Full details of these samples can be found in the project's digital records. Analysis of samples from currently undated contexts is reliant upon them being dated at the analysis stage.

3.5.26. Summary of samples from TEA 21 selected for analysis

Site code	Period	Feature	No. samples
A14-21	IRON AGE	ROUNDHOUSE	2
Total number of samples suggested for analysis			2

TEA 26

38 bulk sediment samples were taken from across TEA 26. The samples ranged in size from 10 to 50 litres and were collected from a variety of features including pits, postholes, ditches/gullies and a paleochannel. No environmental samples were taken from evaluation trenching in this area (MHI 2016; S3B-003).

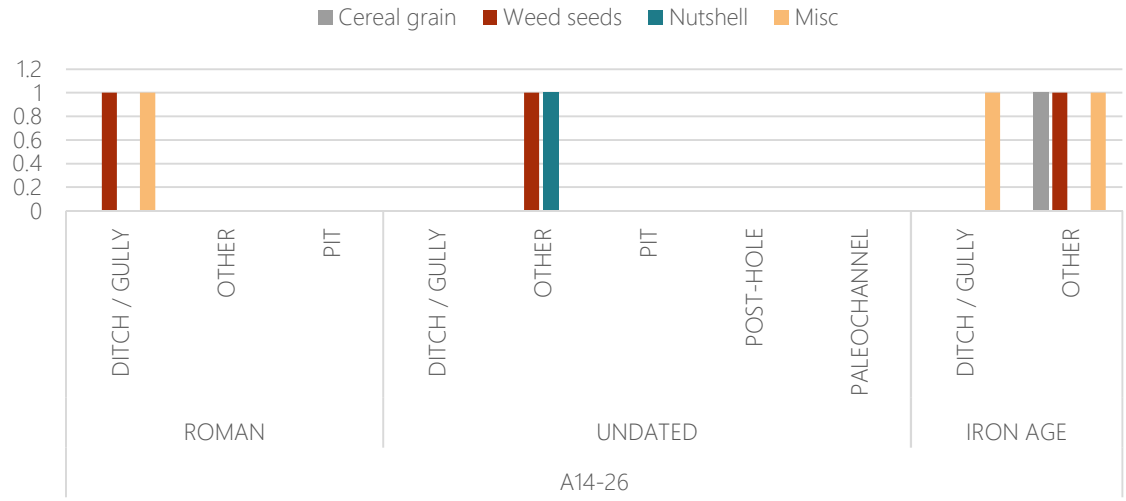


3.5.46. Number of samples per period

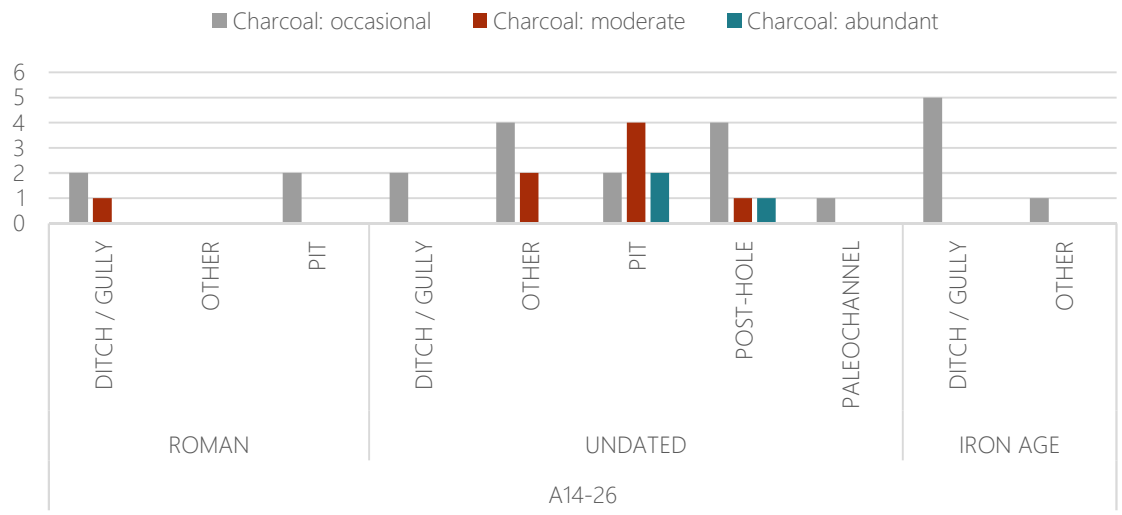
The charred plant remains exhibited mixed levels of preservation ranging from moderate to very poor. Table 3.5.27 presents the occurrence of constituent types in samples per period.

3.5.27. The occurrence of constituent types in samples per period

Period/constituent	Cereal grain	Weed seeds	Nutshell	Charcoal	Misc
Iron Age	2	2	-	7	2
Roman	-	1	-	5	1
Undated	-	1	1	23	-



3.5.47. Occurrence of cereal grain/weeds/nutshell/misc. per period/feature type



3.5.48. Charcoal abundance per period/feature type

Iron Age

Iron Age features sampled included five ditch/gully sections from Enclosure 26.1, two 'other' features associated with field system 26.1, and a single 'other' feature. The charred plant assemblage from these features was predominantly occasional charcoal. Occasional barley (*Hordeum* sp.) grains and pea/vetch

(*Lathyrus* sp./*Vicia* sp.) were recovered from natural feature 'other' [260310], and occasional barley from 'other' feature [260386]. A single charred indeterminate bud was recovered from ditch gully [260297].

Roman

Charcoal was present in 5 of the 6 features sampled. This included ditch/gully sections from Road-Trackways 26.1 and 26.3, Boundary 26.3, and a pit within cultivation trench system 26.3. Ditch/gully [260097] from Boundary 26.4 contained occasional weed seeds. 'Other' feature [260390] from cultivation trench system 26.2 did not contain any charred plant remains.

Undated

A range of undated features, including six postholes, seven pits, ditches/gullies, five features categorised as 'other' and a palaeochannel [260141], contained occasional to moderate charcoal. Abundant charcoal was recovered from pit [260316], pit [260436], and posthole [260318] (from Structural Features 26.13). Occasional nutshell was present in 'other' feature [260053] and occasional seeds in 'other' feature [260365].

Summary and potential of the assemblage

The charred botanical assemblage from TEA 26 was predominantly charcoal. Cereal remains were only recovered from natural feature 'other' [260310] and 'other' feature [260386] and were few (<5). Samples associated with the Roman cultivation trenches demonstrated no potential to address their usage.

The majority of the sampled features from TEA 26 remain undated at this stage, and it is recommended that future work should include AMS radiocarbon dating of selected undated features particularly Structural Features; 26.11, 26.13, 26.17, 26.18, 26.19 and 26.20, in order to determine the date of the structures and the chronological relationship between them.

Recommendations

The table below summarises the samples selected from TEA 26 for further analysis due to their abundant concentration of well-preserved plant remains and/or their belonging to a particular context of high significance. Full details of these samples can be found in the project's digital records. Analysis of samples from currently undated contexts are reliant upon them being dated at the analysis stage.

3.5.28. Summary of samples from TEA 26 selected for analysis

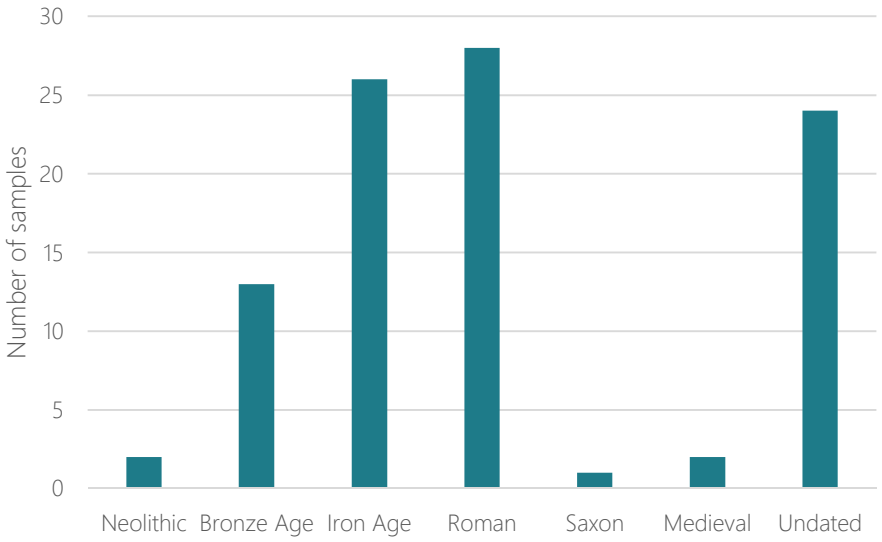
Site code	Period	Feature	No. samples
A14-26	UNDATED	PIT [260436]	1
A14-26	UNDATED	POSTHOLE [260318]	1
Total number of samples suggested for analysis			2

TEA 27

A total of 96 samples were taken from a variety of features that included ditches, pits, postholes, inhumations, and cremation burials. Sample volumes varied from 1 to 68 litres. The features sampled dated from the Neolithic through to the medieval period.

Samples with suspected human skeletal remains were processed in their entirety. Waterlogged samples had a sub-sample assessed and other bulk samples had two buckets processed.

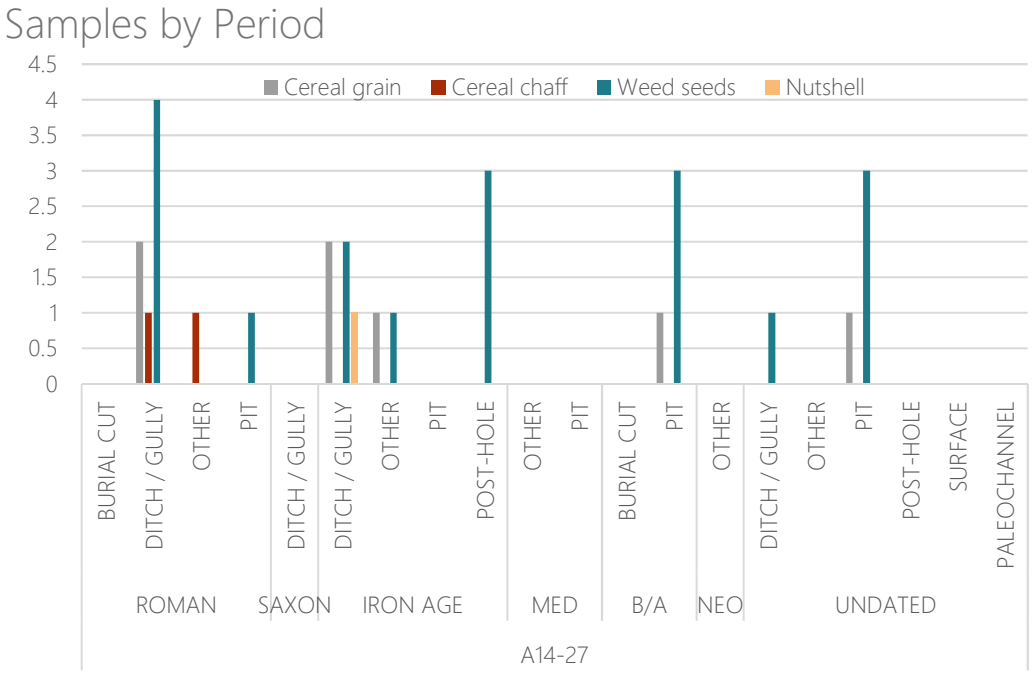
Preservation of plant remains is predominantly by carbonisation although there are occasional samples that contained evidence of waterlogging. The overall density and diversity of preserved plant remains is low and preservation is generally poor.



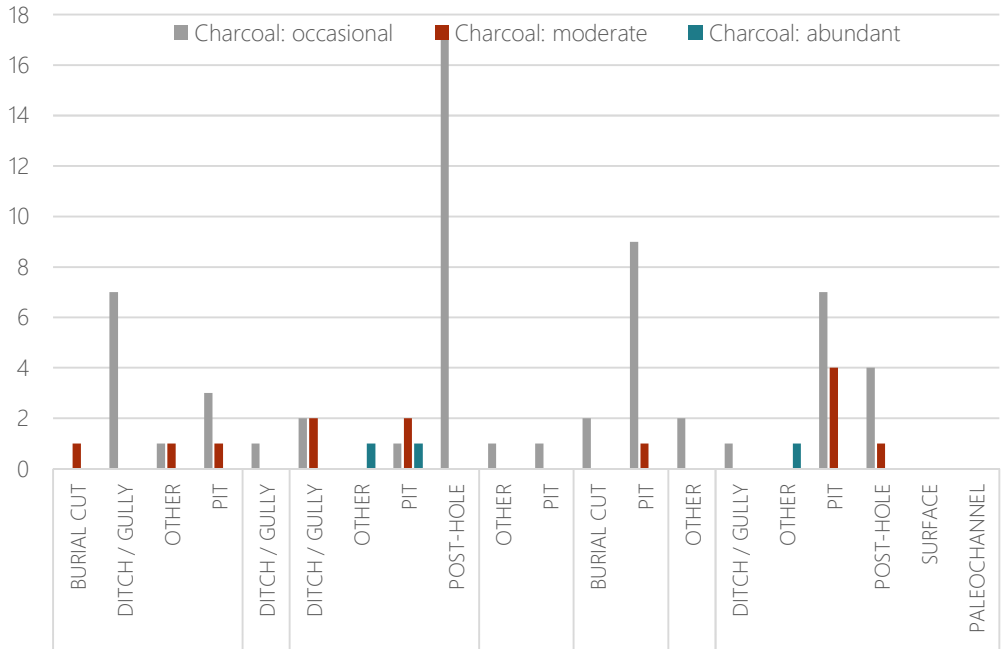
3.5.49. Number of samples per period

3.5.29. The occurrence of constituent types in samples per period

Period/constituent	Cereal grain	Cereal chaff	Weed seeds	Nutshell	Charcoal	Misc
Neolithic	-	-	-	-	2	-
Bronze Age	1	-	3	-	12	1
Iron Age	3	-	6	1	26	3
Roman	2	2	5	-	15	-
Medieval	-	-	-	-	2	1
Undated	1	-	4	-	18	-



3.5.50. Occurrence of cereal grain/cereal chaff/weeds/nutshell per period/feature type



3.5.51. Charcoal abundance per period/feature type

Neolithic

Neolithic tree throw [270722] contained occasional charcoal only.

Bronze Age

Samples were taken from a single inhumation and five cremation burials (from Cremation Group 27.1). Inhumation [270731] did not contain preserved plant remains but ostracods (small bivalve crustaceans) were noted in the flot. Of the five cremations, [270847] and [270849] both contained single charred tubers of onion couch grass (*Arrhenatherum elatius* subspecies *bulbosus*), a grassland species that produces underground 'tubers' (swollen basal internodes) that are often found charred in archaeobotanical assemblages. The burnt tubers are commonly found in cremation deposits and are thought to represent de-turfing around the pyre-site to create a fire break (Stevens 1998, 78) or may simply have become carbonised due to proximity to the pyre.

Cremation [270849] also contained a single barley (*Hordeum vulgare*) grain and a seed that has been tentatively identified as rose (*Rosa* sp.). Cremation [270871] also contained a single charred barley grain. Cremations [270868] and [270873] contained sparse charcoal only. None of the samples contained more than a few specks of charcoal suggesting that either calcined bone had been carefully picked out of the pyre or that any accompanying charcoal did not survive. Cremation [270847] also contained untransformed seeds of duckweed (*Lemna* sp.) and water-crowfoot (*Ranunculus* subgenus *Batrachium*) suggesting that the area of the cremations (cremation group 27.1) as well as the inhumation to the south, was in an area in which the water-table was once high, leading to preservation by waterlogging.

Iron Age

Twenty-six samples were taken from Iron Age deposits. Of these, 17 samples were taken from postholes of four-post structures (Buildings 27.1 – 27.4). Charred plant remains are present in only two of the postholes; a single cereal grain in [270641] (Building 27.2) and a sloe (*Prunus spinosa*) in [270963] (Building 24.4). Waterlogged plant remains were recovered from two postholes, [270510, 270965] and include seeds of water-crowfoot and duckweed.

Preserved plant remains in Iron Age pits and ditches are generally limited to occasional cereal grains, a single fragment of charred hazelnut (*Corylus avellana*) shell and charcoal quantities varying from low to moderate/abundant. The most productive feature is ditch [270347] which produced a charred assemblage of mixed cereal grains in which oats (*Avena* sp.) predominate with lesser quantities of barley and wheat (*Triticum* sp.). Preservation of the grains is very poor, and the level of abrasion precludes accurate identification to species. Weed seeds include single specimens of stinking mayweed (*Tripleurospermum inodorum*), sedge (*Carex* sp.) and rush (*Juncus* sp.), tentatively suggesting that the cereals may have been growing in damp ground.

Roman

Twenty-eight samples were taken from pits, postholes, ditches and three inhumation burials. Charred plant remains are infrequent occurring as occasional grains and weed seeds in ditch fills, with a significant assemblage recovered from ditch [270476], comprised of a moderate amount of grain and weed seeds.

Chaff was mostly absent but some of the wheat grain present had the morphology of spelt (*Triticum spelta*) and a single spikelet of spelt was present in which the grain had germinated. The preservation of most of the wheat grains was too poor to observe any further evidence of germination. Oat grains were frequent, but these may represent the wild rather than the cultivated form. Other taxa represented by charred seeds include thistles (*Carduus/Cirsium* sp.), scentless mayweed, docks (*Rumex* sp.), clover/medick (*Trifolium/Medicago* sp.), agrimony (*Agrimonia eupatoria*), grasses (Poaceae), vetch/tares and cornsalad (*Valerianella dentata*). These species have broad habitats but are likely to have been crop weeds. The scarcity of chaff is interesting as this suggests the cereals may have been fully processed.

Ditch [270374] (Enclosure 27.4) produced an assemblage of waterlogged seeds with a diverse range of taxa that includes, docks, henbane, knotgrass, dead-nettles (*Lamium* sp.), goosefoots, campions (*Silene* sp.), stinging nettle (*Urtica dioica*), common nettle (*U. urens*) and thistles, which are all common species that grow in disturbed soils. Other species represented are corncockle (*Agrostemma githago*) and corn gromwell (*Lithospermum arvense*) which are more commonly associated with cultivated fields. Pondweed and water-crowfoot were also present and indicate that the ditch contained water. Arthropod fragments are frequent.

Waterlogged plant remains were present in four features; pits [270352, 270496 and 270747] and waterhole [271049] include water-crowfoot, duckweed and ostracods, cladoceran ephippia and arthropod remains. The most abundant assemblage was from pit [270352] which also contained orache (*Atriplex* sp.), thistles, goosefoots (*Chenopodium* sp.), henbane (*Hyoscyamus niger*), knotgrass (*Polygonum aviculare*), chickweed (*Stellaria media*), docks, sedges and pondweed (*Potamogeton* sp.). Fragments of wood were also noted within this feature

The three inhumation burials (burial group 27.1) did not contain preserved remains other than human skeletal remains.

Medieval

Two samples from medieval features did not produced significant preserved plant remains.

Undated

Twenty-four samples were taken from 22 features that did not contain dating evidence. Features included pits, postholes, ditches, a paleochannel and a grave. Charred plant remains are scarce but moderate charcoal was retrieved from pits [270601 and 270776] and a charred tuber of onion couch grass from pit [271054]. These items may be suitable for radiocarbon dating if required.

Waterlogged plant remains were recorded from ditches [271284, 271337, 271360 and 271373] and from posthole [271056]. The ditch samples were particularly productive containing seeds of orache, thistles, hemlock (*Conium maculatum*), goosefoots, pale persicaria (*Persicaria lapathifolia*), henbane, sainfoin (*Onobrychis viciifolia*), knotgrasses, docks, buttercups (*Ranunculus acris/repens/bulbosus*), field penny cress (*Thlaspi arvense*), chickweed, common nettle, pondweed, duckweed and water-crowfoot in addition to ostracods, cladoceran ephippia and arthropod remains.

Summary and potential of the assemblage

The plant remains recovered from the excavated features on this site were preserved by charring and waterlogging. The charred assemblages were comprised of cereal grains and weed seeds with only occasional legumes and virtually no chaff. The cereal grains are poorly preserved and have limited potential for further study. Sample <27008>, fill (270478) of Roman ditch [270476] may be considered for additional processing and further study as the only sample to have produced a quantifiable assemblage from this site. Charcoal quantities were also low to moderate, rarely exceeding 10ml. The presence of waterlogged plant remains suggests that this area had a relatively high water-table which may have affected the preservation of charred remains. Plant remains preserved by waterlogging are reasonably well-preserved and Sample <27076>, fill (270354) of Roman pit [270352] (Enclosure 28.4) and Sample <27009>, fill (270531) of Roman ditch [270374] (Enclosure 27.4) are recommended for further study based on their diversity and density of taxa, to provide an insight into the local flora and the potential change as the site became unoccupied at the end of the Roman period. Insect and pollen analysis could also be considered for these samples. The currently undated ditches [271284 and 271337] produced the most diverse waterlogged assemblages which would be suitable for further study if dating could be secured. Sainfoin has been recovered from a Roman well at Love's Farm, St Neots and has also been noted from Iron Age deposits (Fryer 2018, 274).

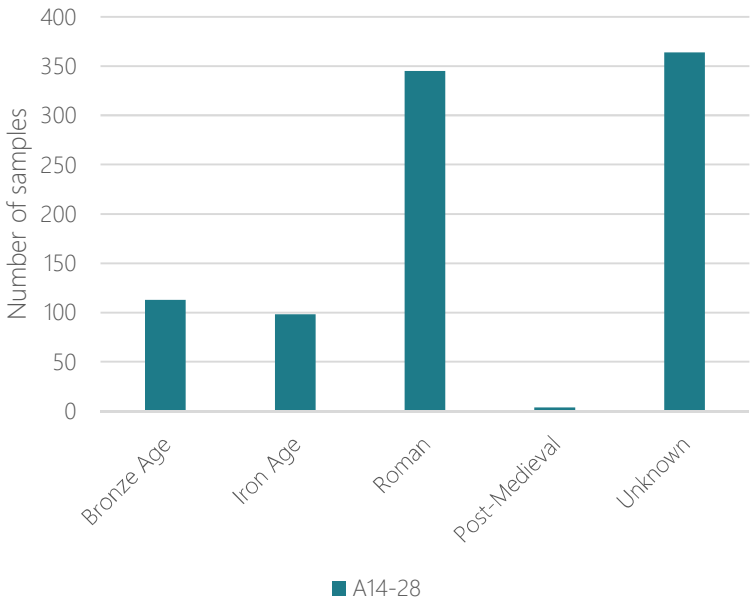
Recommendations

3.5.30. Summary of samples from TEA 27 selected for analysis

Site code	Period	Feature	No. samples
A14-27	Roman	Pit (270352)	1
A14-27	Roman	Ditch (270476)	1
A14-27	Roman	Ditch (270374)	1
A14-27	Undated*	Ditch (271284)	1
A14-27	Undated*	Ditch (271337)	1
Total number of samples suggested for analysis (*if dated)			5

TEA 28

A total of 924 bulk sediment samples were collected during excavation of TEA 28. The soil samples ranged in size between 0.25 and 40 litres in volume and were collected from a variety of archaeological features including cremation burials, pits, gullies, ditches and postholes. The environmental samples have provided information about the plant remains which were available to the communities during the Bronze Age, Iron Age and Roman periods, in addition to a few samples from the post-medieval period.



3.5.52. Number of samples per period

During the botanical assessment, the TEA 28 samples yielded a low to medium concentration of archaeobotanical remains on average, with levels of preservation ranging from good to poor. The flots and residues, in general, contained occasional to moderate charred plant remains with only c.16% of the assessed samples (151) producing abundant botanical remains.

Flots and residues from TEA 28 contained abundant oak and non-oak charcoal with fragments up to 30mm in size. In addition, the samples produced a low to medium concentration of cereal remains, such as grains and chaff, and other seeds, in particular arable weed seeds. A small number of samples have also produced remains of rhizomes and tubers, especially those coming from burial contexts. Moreover, a number of samples also contained charred food remains such as bread-like and porridge-like residues which will shed light on cooking practices and consumption of plant-based foods at the time of occupation.

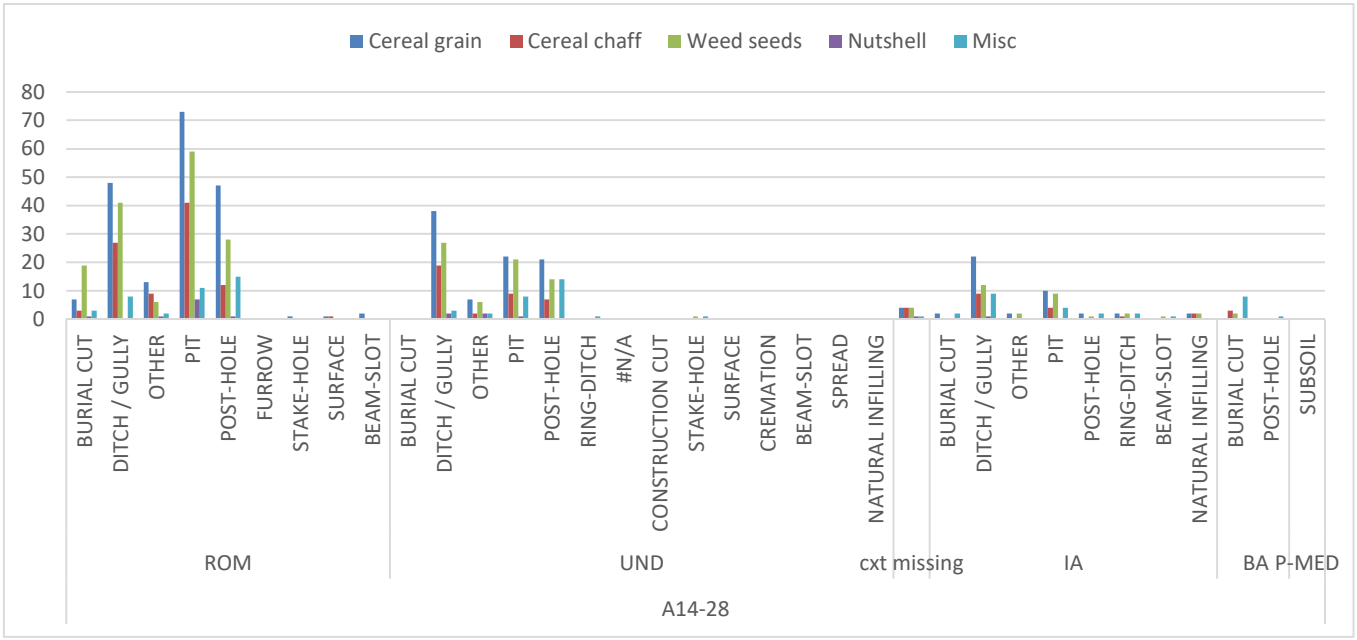
3.5.31. The occurrence of constituent types in samples per period

Period/constituent	Cereal Grain	Cereal chaff	Weed seeds	Charcoal	Nutshell	Misc
BRONZE AGE	0	3	2	26	0	9
IRON AGE	42	16	29	83	1	20
ROMAN	192	93	153	289	10	39
POST-MEDIEVAL	0	0	0	0	0	0
UNKNOWN	88	37	69	233	5	29

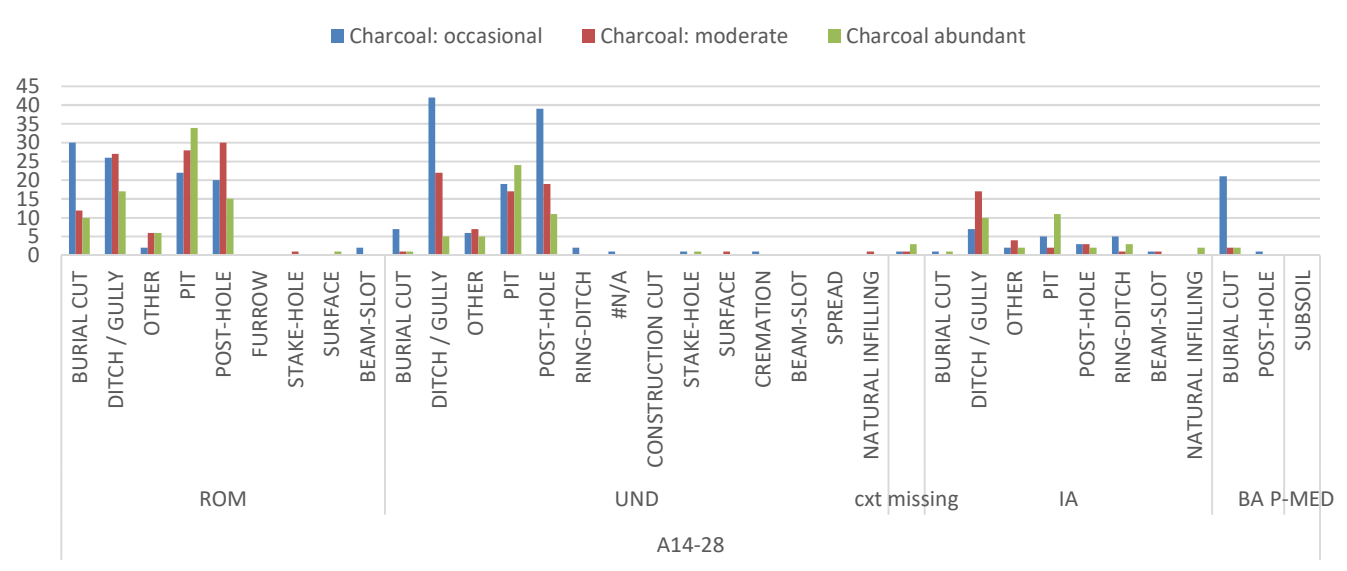
Samples by Period

Samples were collected from a variety of features and contexts from different periods. In particular, samples for botanical assessment were collected from Bronze Age, Iron Age and Roman contexts. Although these samples have produced a very high concentration of charcoal fragments, they showed a low to medium concentration of cereal remains and other plant seeds.

Although the Bronze assemblage is smaller than those from the later periods, it is extremely important as it has provided information about the use of plants during prehistoric occupation in the area. Iron Age and Roman assemblages contain a moderate amount of plant remains which have shed light in the economy and plant use at the time.



3.5.53. Occurrence of cereal grain/cereal chaff/weeds/nutshell/ misc per period/feature type



3.5.54. Charcoal abundance per period/feature type

Bronze Age

The environmental samples collected from Bronze Age deposits come from a Bronze Age cemetery located in the southwest corner of the site. Besides four inhumation burials, the majority of the burials are cremations (a total of 55). The assessed samples all contained abundant charcoal remains. However, of the 113 samples collected from the Bronze Age burials, only 5 of them contained remains of seeds and other plant materials. These were found in very low quantities and included cereal chaff, most likely from glume wheats and indeterminate seeds.

In addition, three prehistoric pits [79105], [790126] and [790139] have yielded a high concentration of charcoal and occasional modern seeds from saltbushes (*Atriplex* sp.) and corn-cockle (*Agrostemma* sp.).

Iron Age

A total of 98 samples were collected from Iron Age contexts, although only half of them (47) contained remains of cereals and other seeds. The archaeological deposits which contained the highest concentration of plant remains are those coming from ditches/gullies and pits. Most of the assessed samples contained abundant oak and non-oak charcoal and occasional to moderate cereal grains, chaff and wild seeds.

Amongst the cereal crops identified in the Iron Age archaeobotanical assemblage, the majority of the samples contained glume wheat species, in particular possible emmer (*Triticum diccocum*) and spelt wheat (*Triticum spelta*) in addition to hulled barley (*Hordeum vulgare*). Chaff is less abundant, being only present in 15 of the assessed samples; this is mainly comprised of glume wheat glume bases, particularly derived from the dehusking and threshing of spelt wheat. The Iron Age assemblage also yielded a

medium concentration of wild seeds from arable weeds such as legumes (*Medicago* sp., *Trifolium* sp., *Vicia* sp.) and grasses (*Bromus* sp.).

In addition, three samples have produced occasional remains of cereal-based foods similar to porridge-like and beer brewing residues. Further analysis will provide more information about the nature of these remains and their preparation.

Roman

The Roman occupation of the site is spread over 5ha, comprising networks of enclosures and trackways along with c 15 buildings and a substantial pond feature. It was provisionally interpreted on site as an agricultural distribution centre.

A total of 345 samples were collected from Roman contexts and during assessment have produced a medium to high concentration of archaeobotanical remains, particularly cereal remains. The highest concentration of plant remains come from pits and ditches/gullies which have yielded abundant cereal remains, in particular hulled barley and spelt wheat grains in addition to large amounts of glume wheat chaff, which in some cases contained +200 glume bases. Occasional remains of oats (*Avena sativa*) and possible free-threshing wheat (cf. *Triticum aeastivum/durum*) were also seen in some of the assessed samples, which is typical of the later Roman period when these cereal crops started to gain economic importance. Other plant seeds seen in pit and ditches deposits are also related to cereal agriculture as the majority of them are weed seeds, mainly arable grasses (Poaceae) and small legumes.

The Roman structural features and buildings excavated in TEA 28 have also yielded rich botanical assemblages. Posthole and pit deposits from Buildings 28.9 and 28.13 have produced the highest concentration of plant remains, in particular cereal grains and chaff, most likely derived from the accumulation of refuse from crop-processing activities. The assessed samples coming from these deposits contained mainly spelt wheat grains and glume bases in addition to occasional free-threshing wheat grains. Interestingly, the presence of weed seeds in the botanical assemblages from the Roman buildings was very low which suggests the accumulation of refuse from the processing of semi-clean spikelets, once most threshing and pounding had taken place (Stevens 2015). This fits with the idea of using barns or other facilities for the initial stages of crop-processing when most of the waste is created.

In addition to the above mentioned features, a group of 13 burials were also excavated in this area. All of them have yielded botanical assemblages with moderate charcoal remains and occasional charred grains, seeds from arable grasses and *Arrhenatherum* rhizomes/tubers, typically found in cremation deposits around Europe.

Post-Medieval

A group of four samples were collected from post-medieval contexts however they did not produce botanical remains.

Undated

A total of 364 samples from currently undated contexts have been assessed for the identification of botanical remains. These have shown an abundant concentration of charcoal and a low to medium concentration of cereal remains (grains and chaff) in addition to weed seeds and other plant materials. The majority of these remains were consistent with other Iron Age and Roman deposits from TEA 28 as they contained mainly spelt wheat grains and chaff and arable weed seeds.

Summary and potential of the assemblage

The overall botanical assemblage from TEA 28 has predominantly yielded remains of spelt wheat (grains and chaff) with occasional remains of hulled barley, oats, emmer wheat and possible free-threshing wheat. In addition, seeds from wild plant species, such as arable weeds, are very ubiquitous. The low presence of barley in the archaeobotanical record from TEA 28 is surprising as it contrasts with the larger amounts present from other assessed TEAs. This suggests a focus on growing spelt wheat, with emmer as residual crops in spelt wheat fields. This accords well with the known regional shift to extensive cultivation of spelt wheat in the later Roman period (Allen et al 2017, 149).

The archaeobotanical assemblage assessed from TEA 28 has yielded plant remains which would allow the investigation into agricultural practices, food processing as well as socio-economic organisation.

The charred plant assemblages from TEA 28 have local significance in relation to the understanding of the area and its use, and the diet of its inhabitants, during the periods represented. Further botanical analysis will provide evidence on these aspects and on the nature of the natural environment.

Recommendations

The table below contains the samples selected from TEA 28 for further analysis due to their abundant concentration of well-preserved plant remains or specific research questions.

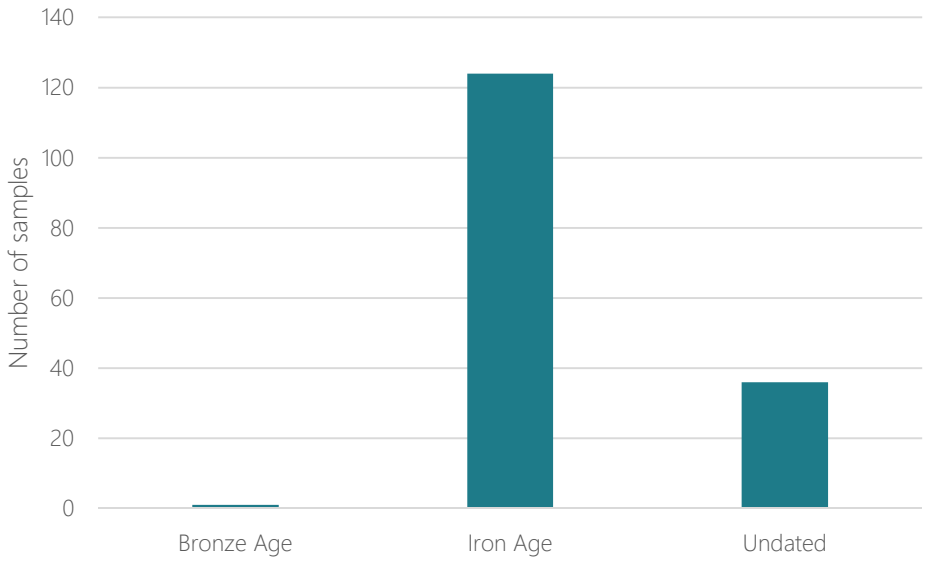
Full details of these samples can be found in the project's digital records. Analysis of samples from currently undated contexts is reliant upon them being dated at the analysis stage.

3.5.32. Summary of samples from TEA 28 selected for analysis

Site code	Period	Feature	No. samples
A14-28	IRON AGE	RING-DITCH	2
A14-28	IRON AGE	DITCH/GULLY	8
A14-28	IRON AGE	PIT	5
A14-28	IRON AGE	OTHER	1
A14-28	IRON AGE	NATURAL INFILLING	1
A14-28	ROMAN	BURIAL	1
A14-28	ROMAN	DITCH/GULLY	27
A14-28	ROMAN	PIT	49
A14-28	ROMAN	POSTHOLE	33
A14-28	ROMAN	STAKE-HOLE	1
A14-28	ROMAN	OTHER	11
A14-28	UNKNOWN	DITCH/GULLY	2
A14-28	UNKNOWN	PIT	5
A14-28	UNKNOWN	POSTHOLE	6
A14-28	UNKNOWN	OTHER	4
Total number of samples suggested for analysis			156

TEA 29

A total of 161 bulk sediment samples were taken from across TEA29. The samples ranged in size from 2 to 50 litres and were collected from a variety of features including postholes, pits, ditches and six wells dating from the early-middle Iron Age. Previous trial trench evaluation work was carried out by Wessex Archaeology (WA 2014) (land parcel 1093) in the area of TEA 29, however no environmental samples were taken during this phase of work.



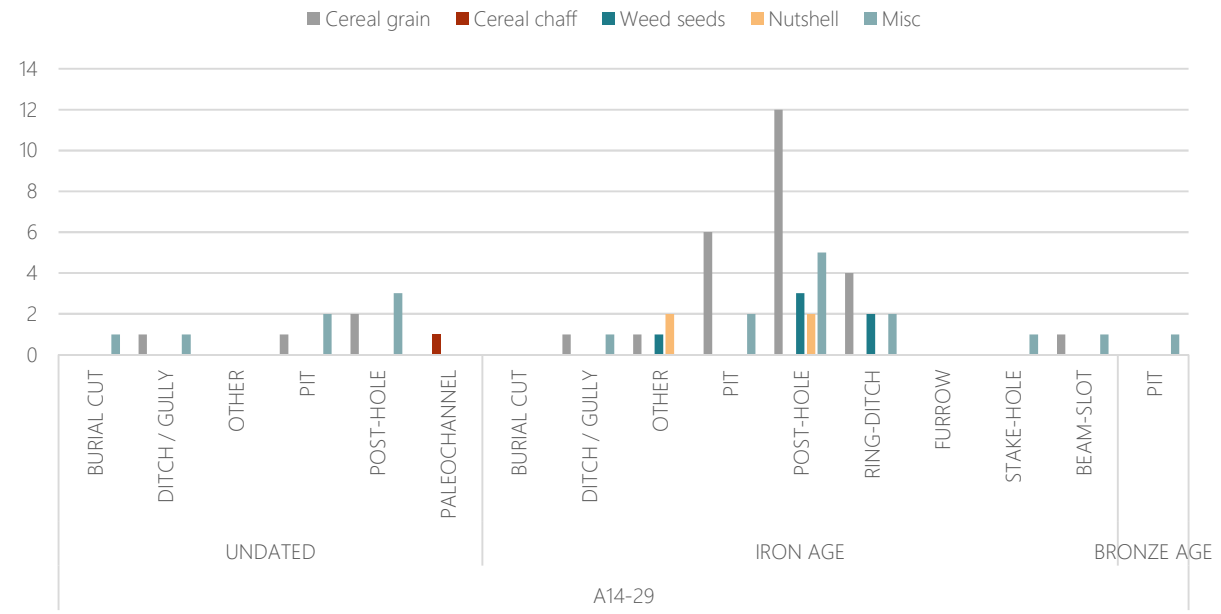
3.5.55. Number of samples per period

The charred plant remains exhibited mixed levels of preservation ranging from good to very poor. The majority of the cereal grains showed signs of abrasion which prevented identification to species level. Table 3.5.33 presents the occurrence of constituent types in samples per period.

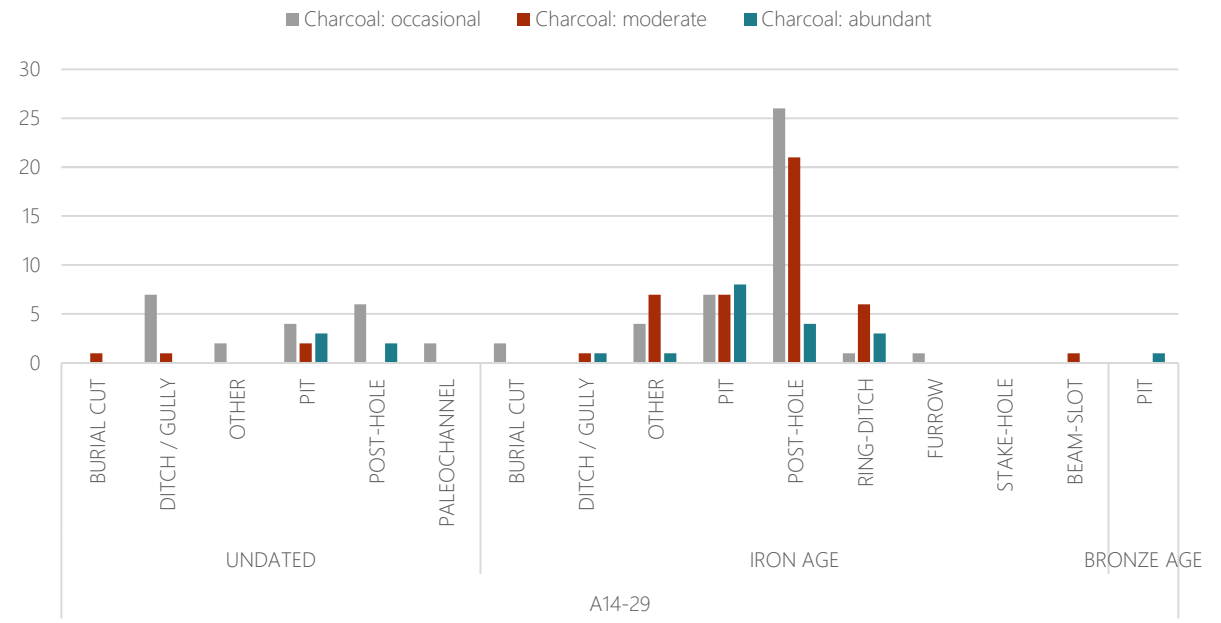
3.5.33. The occurrence of constituent types in samples per period

Period/constituent	Cereal grain	Cereal chaff	Weed seeds	Nutshell	Charcoal	Misc
Iron Age	25	-	6	4	102	13
Undated	4	1	-	-	30	7

Early-middle Iron Age wells 29.1, 29.2, 29.5 and 29.6 and mid-late Iron Age well 29.8 produced rich well-preserved plant assemblages preserved by waterlogging.



3.5.56. Occurrence of charred cereal grain/cereal chaff/weeds/nutshell/misc per period/feature type



3.5.57. Charcoal abundance per period/feature type

Early – middle Iron Age

Six wells dating to the early-middle Iron Age were revealed on site. Four of the wells; 29.1, 29.2, 29.5 and 29.6 were sampled for the recovery of charred and waterlogged plant remains.

The waterlogged plant assemblage from the wells comprised abundant plant epidermis, stem and root fragments and leaf fragments. Weed seeds present included; wetland taxa such as celery-leaved buttercup (*Ranunculus sceleratus*), water-pepper (*polygonum hydropiper)* and sedges (*Carex* sp.), aquatic taxon crowfoot (*Ranunculus* subg. *Batrachium*) and arable weeds; small nettle (*Urtica urens*) and stitchworts (Stellaria sp.). Also recorded were ruderal taxa; common nettle (*Urtica dioica*), poppies (*Papaver* sp.), nightshades (*Solanum* sp.), sowthistles (*Sonchus* sp.), and Eurytopic taxa; clovers (*Trifolium* sp.) docks (*Rumex* sp.) buttercups (*Ranunculus* sp.), thistle (*Carduus* sp./*Cirsium* sp.) and seeds of the carrot family (Apiaceae) and daisy family (Asteraceae).

In addition to the assemblage listed above, Well 29.6 also contained abundant woodland (inc. scrub and hedgerow) taxa including; damson (*Prunus domestica*), elder (*Sambucus nigra*), brambles (*Rubus* sp.) and hawthorns (*Crataegus* sp.). Well 29.6 also contained an abundance of material that has provisionally been identified as heather (*Calluna vulgaris)* leaf and stem fragments. This identification will need to be investigated further during the analysis stage. Well 29.2 also contained waterlogged wood fragments including roundwood. Charcoal was recovered from each well and was abundant in well 29.5. Occasional barley (*Hordeum* sp.) grains were present in Well 29.5 and occasional bread wheat grains (T*riticum aestivum*) from Well 29.2.

Wells 29.1, 29.5 and 29.6, which were the largest of the wells, revealed collapsed wooden linings in their bases composed of woven sticks and axe cut planks (see Goodburn, this vol). Each well also contained an alder (*Alnus* sp.) log ladder. A sample from the ladders in Wells 29.1 and 29.5 were sent for radiocarbon dating and returned dates of 453-385 BC (GU45480) and 525-457 BC (GU45481) respectively. Other wooden artefacts recovered included and oak paddle and fragments of rope.

Middle – late Iron Age

Features dating to the mid-late Iron Age included; 2 wells, 3 roundhouses, 14 structural features (4-post structures), and a cremation burial. Well 29.7 contained occasional charred wood. Well 29.8, which revealed material preserved by waterlogging, comprised an assemblage predominantly of rannoch-rush (*Scheuchzeria paulstris*) rhizomes. Occasional bramble seeds were also recorded.

Roundhouses 29.1 and 29.3 were sampled. Features sampled from Roundhouse 29.1 included 2 pits, a ditch/gully, and the ring-ditch. Plant remains recovered included charcoal, which was abundant in both pits as well as ring ditch [290847]. Occasional cereal indeterminate grains were present in pit [290757] and ring ditch [298847].

Features sampled from Roundhouse 29.3 included 15 postholes, a beam slot, stake-hole and the ring-ditch. The plant assemblage included abundant charcoal and occasional glume wheat (*Triticum* sp.) and cereal indeterminate grains from ring-ditch [290839]. Moderate charcoal and occasional cereal indeterminate grains were recovered from beam slot [290924], and stakehole [290833] contained

indeterminate charred material. Fourteen postholes contained charcoal and this was abundant in postholes [290890] and [290900]. Four postholes contained occasional barley and cereal indeterminate grains. Hawthorn fruitstone fragments were present in posthole [290876].

All of the 4-post structures were sampled. Charcoal was present in all structures but was abundant in Structures 29.2 and 29.3. Cereals including barley, bread wheat and cereal indeterminate were recovered from Structures 29.2, 29.3, 29.6, 29.8 and 29.10. Weed seeds were present in Structures 29.6 and 29.2 and nutshell was recovered from Structures 29.2 and 29.12

Additional mid-late Iron Age features included; cremation burial [290365] (Cremation Burial 29.2), two ditches/gullies, five pits, a posthole and two features categorised as 'other'. The burial, posthole and 'other' feature contained occasional to moderate charcoal. The assemblage from ditch/gully [290834] comprised abundant charcoal and occasional wheat and cereal indeterminate grains. Ditch gully [290412] did not contain any charred plant remains. The pits all contained charcoal and this was abundant in pits [290097] and [290545].

Iron Age

Four features categorised as 'other' were dated to the Iron Age but were not assigned to any sub period. All features contained charcoal and this was abundant in feature [290730]. Abundant hulled barley (*Hordeum vulgare*), cereal indeterminate and occasional nutshell and weed seeds were present in feature [290573].

Undated

Undated features excavated included two palaeochannel sections, a pit, posthole and a ditch/gully. Charcoal was present in the pit and palaeochannel and was abundant in posthole [290930]. A single indeterminate cereal chaff fragment was recovered from palaeochannel [290066]. Ditch/gully [290749] did not contain any charred plant remains.

Summary and potential of the assemblage

The overall botanical assemblage comprised barley with occasional bread wheat. The cereal remains were generally present in occasional quantities, with only a single abundant assemblage, from an Iron Age feature categorised as 'other'. Charcoal was present in most samples and was in abundance in early-middle Iron Age Well 29.5 as well as many of the structural features and roundhouses from the mid-late Iron Age. The waterlogged plant remains recovered from the wells derived from a range of ecological types and included aquatic, wetland, ruderal and arable weeds.

The archaeobotanical assemblages assessed from TEA 29 have yielded plant remains which would allow limited investigation into agricultural practices and food consumption. They have local significance in relation to the understanding of the area and its use, and the diet of its inhabitants, during the periods represented. Further botanical analysis on both the charred and waterlogged plant remains will provide evidence on these aspects while the waterlogged assemblages would allow detailed understanding on the nature of the natural environment.

Recommendations

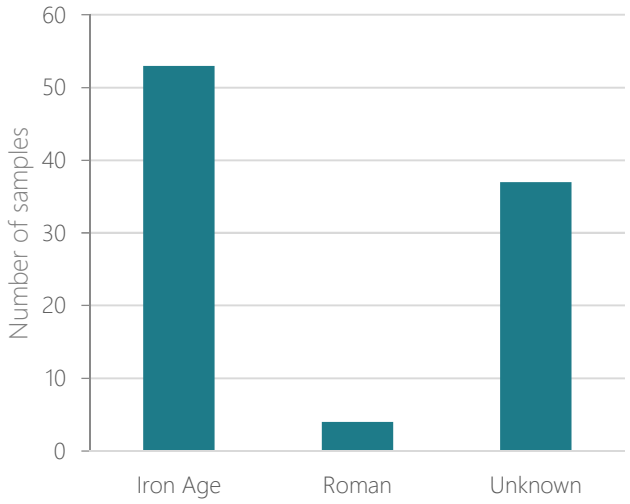
The table below summarises the samples selected from TEA 29 for further analysis due to their abundant concentration of well-preserved plant remains and/or their belonging to a particular context of high significance. Full details of these samples can be found in the project's digital records. Analysis of the samples from currently undated contexts is reliant upon them being dated at the analysis stage.

3.5.34. Summary of samples from TEA 29 selected for analysis

Site code	Period	Feature	No. samples
A14-29	Early-mid Iron Age	Wells	12
A14-29	Mid-late Iron Age	Structural features	2
A14-29	Mid-late Iron Age	Well	1
A14-29	Iron Age	'other' [290573]	1
Total number of samples suggested for analysis			16

TEA 31

A total of 94 bulk sediment samples were collected during excavation of TEA 31. The soil samples ranged in size between 1 and 20 litres in volume and were collected from a variety of archaeological features including pits, gullies, ditches and postholes, dating to the Iron Age and Roman periods.



3.5.58. Number of samples per period

During the botanical assessment, the TEA 31 samples yielded a low to medium concentration of archaeobotanical remains on average, with levels of preservation ranging from good to poor. The flots and residues, in general, contained occasional to moderate charred plant remains. 13 samples produced abundant botanical remains.

Flots and residues from TEA 31 contained abundant charcoal with fragments up to 30mm in size. In addition, the samples produced a low to medium concentration of cereal remains, such as grains and chaff, and other seeds, in particular arable weed seeds.

3.5.35. The occurrence of constituent types in samples per period

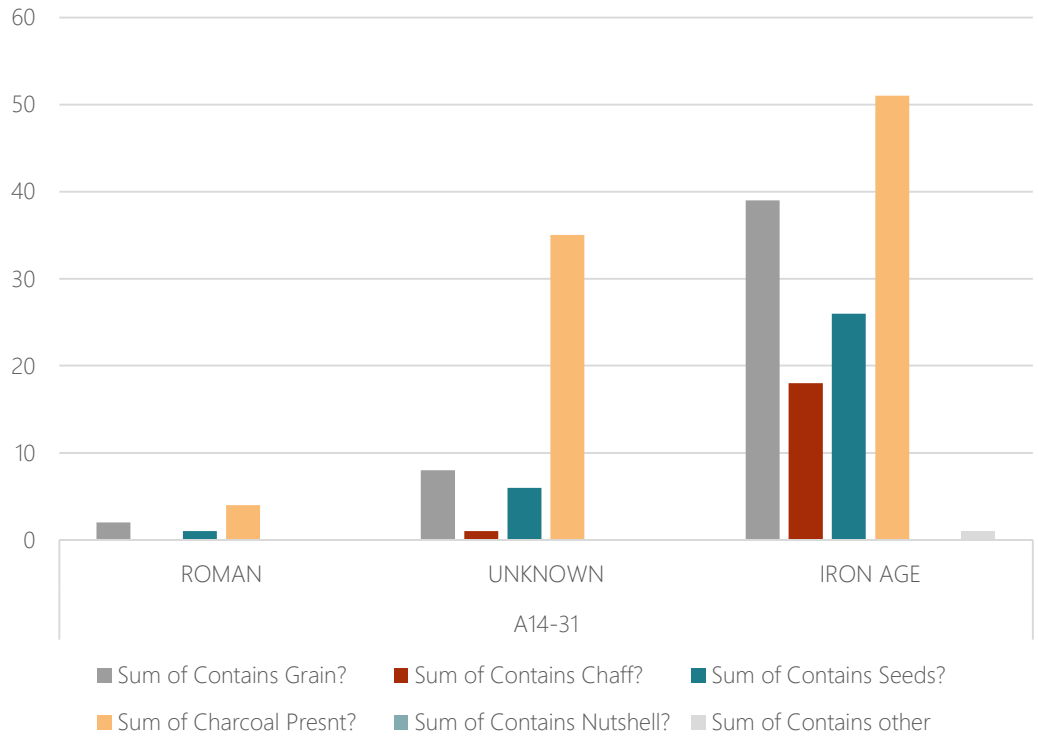
Period/constituent	Cereal Grain	Cereal chaff	Weed seeds	Charcoal	Misc
Iron Age	39	18	26	51	1
Roman	2	0	1	4	0
Undated	8	1	6	35	1

Samples by Period

Samples were collected from a variety of features and contexts from different chronological periods, particularly Iron Age and Roman contexts. Although these samples produced abundant charcoal fragments, they showed a low concentration of cereal remains and other plant seeds, especially for the

Roman period (only 4 samples from Roman features were taken). This reflects the nature of Roman activity, with features comprising a trackway and elements of a field system.

From Iron Age contexts (a small enclosed farmstead), a total of 53 samples have been assessed for archaeobotanical remains providing us with a general picture of the environment and economy at the time of occupation. In addition, 37 more samples from currently undated contexts in TEA 31 have been assessed and included in this report.



3.5.59. Summary of constituents from TEA 31 by period

Iron Age

A total of 53 samples were collected from Iron Age deposits and have provided information about the plant resources used during the time of occupation. Virtually all assessed samples contained abundant charcoal fragments up to a size of 20mm. More than half of the Iron Age samples also contained occasional cereal grains; however the concentration of other plant seeds and chaff is in general low, with only three samples containing cereal chaff.

Among the cereals recovered from the Iron Age deposits, occasional remains of hulled barley (*Hordeum vulgare*) and spelt wheat (*Triticum spelta*) are the most commonly seen, in addition to a low concentration of oat grains (*Avena sativa*). Only two samples, <31010> from a ring-ditch deposit [310289] and <31035> from a gully [310574], produced a higher concentration of cereal grains (+25).

The first one also yielded a moderate concentration of wild seeds, most of them from arable weeds (Poaceae).

Interestingly, a high concentration of chaff was noticed in three samples <31003>, <31020> and <31022> from two pits and a gully associated with Roundhouse 31.2 ([310111], [310380] and [310392]). Chaff was recovered in combination with occasional remains of cereal grains and wild arable weed seeds, which most likely indicates accumulation of waste from crop-processing activities.

Roman

The Roman botanical assemblage is represented by only four samples which were collected from Field Systems 31.5 and 31.6, located either side of the Roman trackway. The assessed samples yielded a very low concentration of botanical remains, with occasional to moderate fragments of charcoal and occasional wheat grains which, due to poor preservation, did not allow for species identification. No other remains of archaeological plant material have been recovered from the Roman contexts.

Undated

A total of 35 samples from TEA31 were collected from currently undated contexts. From these, 14 contained charcoal fragments, generally in low quantities, and only nine samples have produced cereal remains and other seeds. The archaeobotanical assemblage from currently undated contexts from TEA31 is characterised by a low concentration of cereal grains from hulled barley and spelt wheat in addition to some sporadic emmer wheat (*Triticum diccocum*) grains.

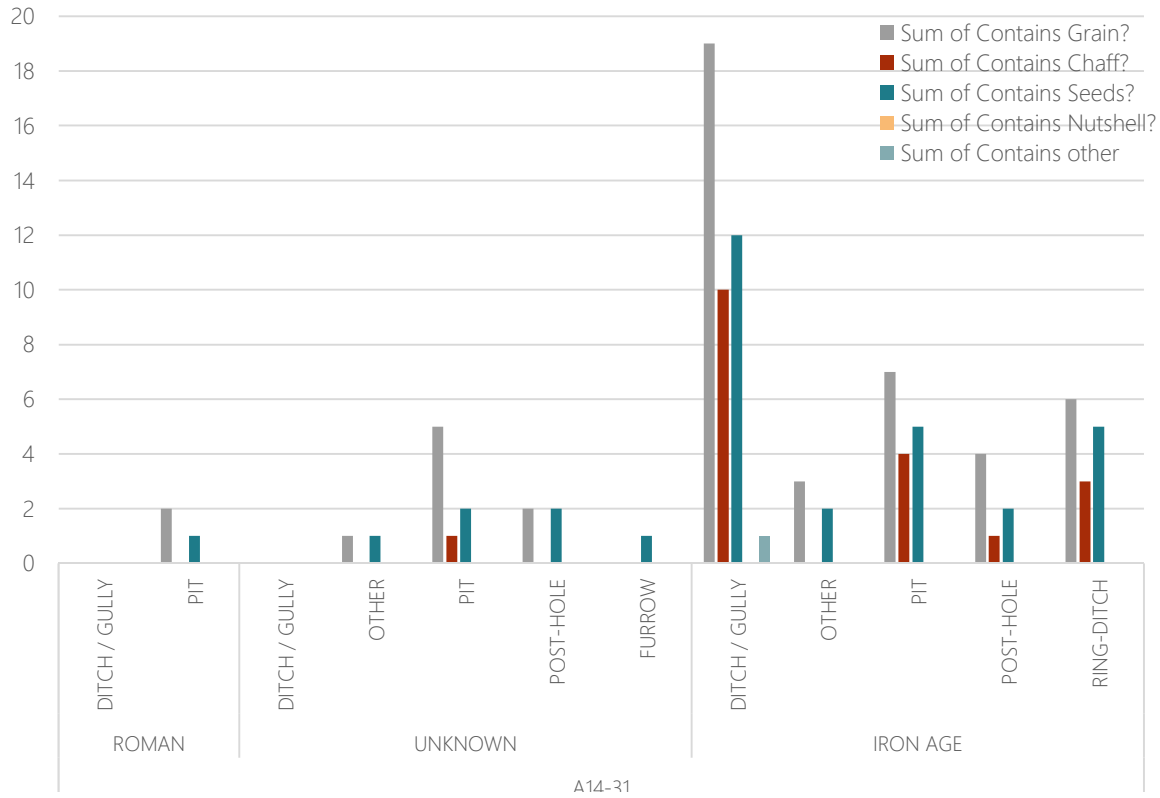
Pit contexts yielded the highest concentration of archaeobotanical remains, in particular from samples <31030> and <31085> from pits [310454] and [311014]. These contexts have produced moderate to abundant amounts of glume wheat (emmer and spelt) and hulled barley grains, in addition to arable weed seeds (general Poaceae; *Stellaria* sp. and *Montia* sp.). Sample <31030> has also produced an abundant concentration of chaff, including both emmer and spelt wheat glume bases.

Summary and potential of the assemblage

The overall botanical assemblage from TEA 31 has predominantly yielded remains of hulled barley and spelt wheat (grains and chaff) with occasional remains of oats and emmer wheat. In addition, seeds from wild plant species, such as arable weeds have been found to be very ubiquitous in the botanical assemblage. Emmer is a pre-Roman crop widely used in Britain, especially during the Iron Age. The scattered presence of emmer wheat among the undated contexts from TEA 31 suggests that these features are likely to be associated with the Iron Age settlement.

The archaeobotanical assemblage assessed from TEA 31 has yielded plant remains which would allow the investigation into agricultural practices, food processing as well as socio-economic organisation.

The charred plant assemblages from TEA 31 have local significance in relation to the understanding of the area and its use, and the diet of its inhabitants, during the periods represented. Further botanical analysis will provide evidence on these aspects and on the nature of the natural environment.



3.5.60. Samples with plant remains from TEA 31 by period and feature

Recommendations

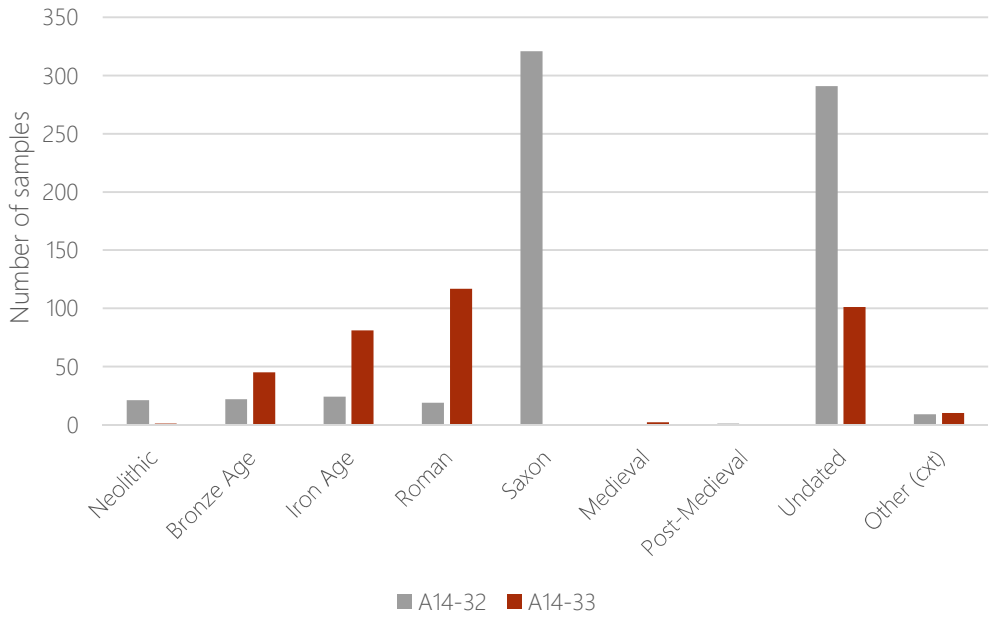
The table below contains the samples selected from TEA 31 for further analysis due to their abundant concentration of well-preserved plant remains. Full details of these samples can be found in the project's digital records. Analysis of samples from currently undated contexts is reliant upon them being dated at the analysis stage.

3.5.36. Summary of samples from TEA 31 selected for analysis

Site code	Period	Feature	No. samples
A14-31	IRON AGE	DITCH/GULLY	7
A14-31	IRON AGE	RING-DITCH	3
A14-31	IRON AGE	PIT	3
A14-31	ROMAN	PIT	2
A14-31	UNKNOWN	PIT	3
Total number of samples suggested for analysis			18

TEA 32/33

A total of 1065 bulk sediment samples were taken from TEA32 (708 samples) and TEA33 (357 samples). The two sites have been considered together, divided into three areas. The samples ranged in size from 4 to 40 litres and were collected from a variety of features dating from the Neolithic through to the post-medieval period. The main periods of activity were Saxon and Roman and features of these dates have been extensively sampled.

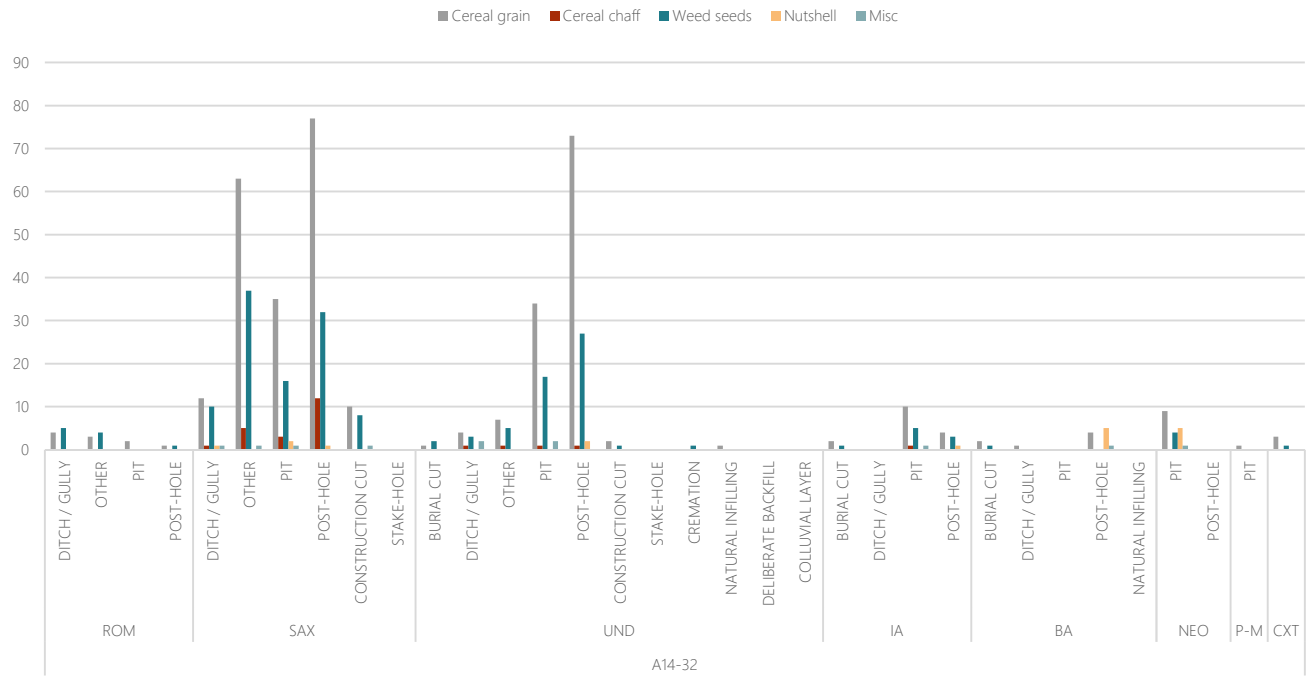


3.5.61. Number of samples per period

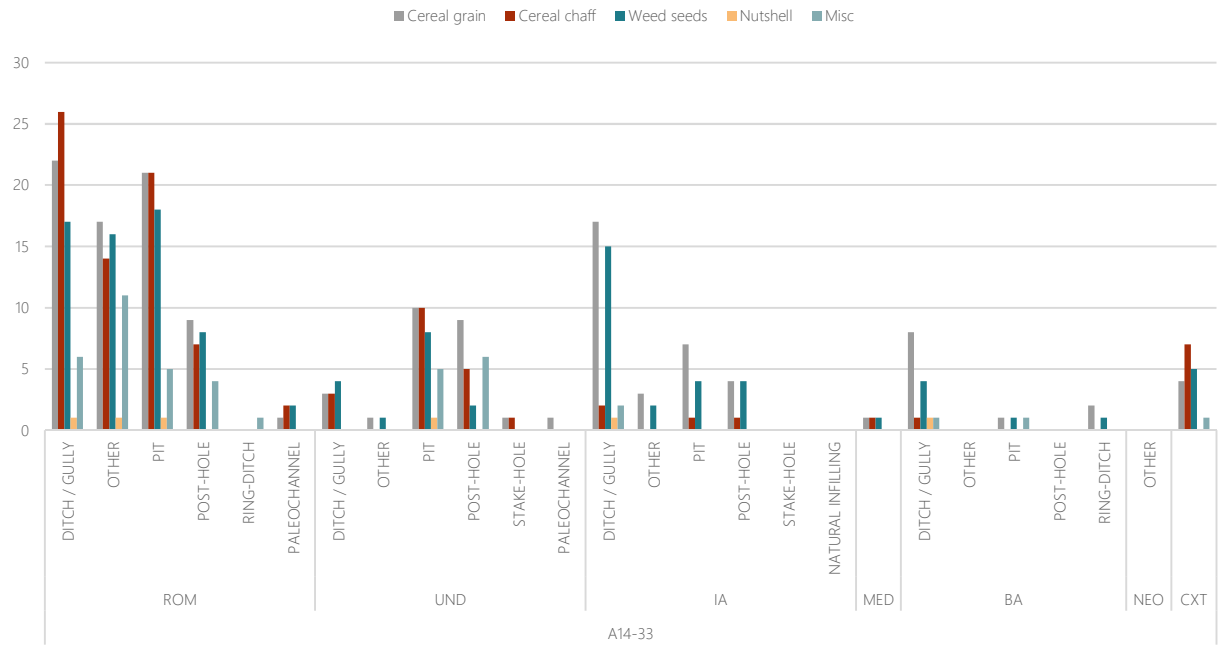
3.5.37. The occurrence of constituent types in samples per period

Period/constituent	Cereal grain	Cereal chaff	Weed seeds	Charcoal	Nutshell	Misc
A14-32						
Neolithic	9	-	4	20	5	1
Bronze Age	7	-	1	21	5	1
Iron Age	16	1	9	23	1	1
Roman	10	-	10	19	-	-
Saxon	197	21	103	293	4	4
Post-medieval	1	-	-	1	-	-
Undated	122	4	56	250	2	4
Other (cxt)	3	-	1	8	-	-
A14-33						
Bronze Age	11	1	6	39	1	2
Iron Age	31	4	25	79	1	2
Roman	70	70	61	110	3	27
Medieval	1	1	1	2	-	-
Undated	25	19	15	87	1	11
Other (cxt)	4	7	5	9	-	1

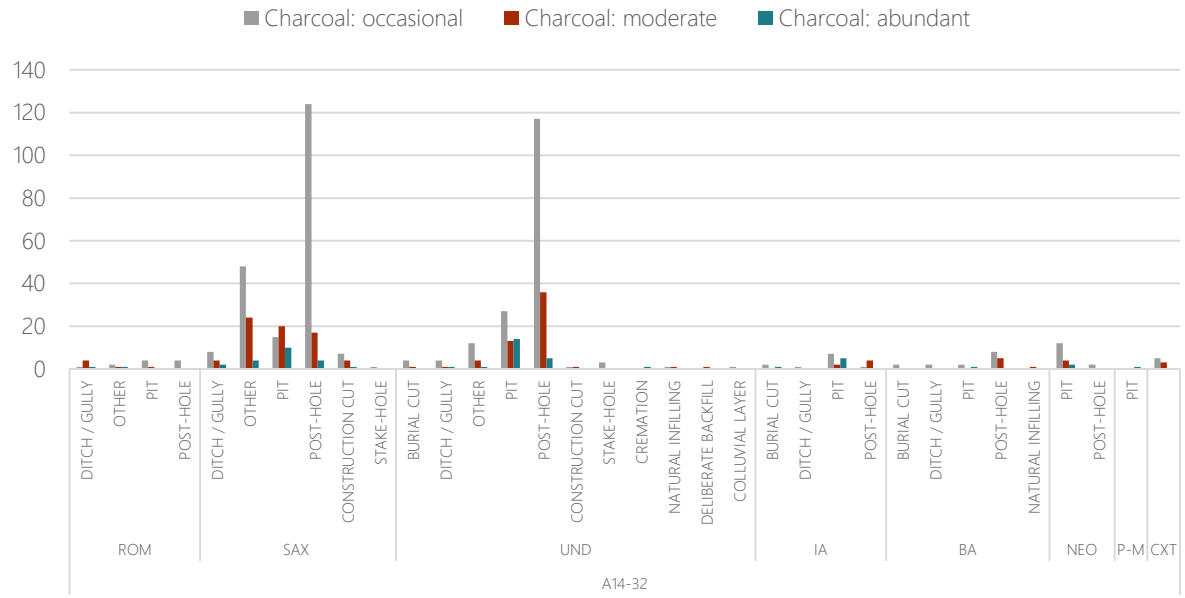
Samples by Period



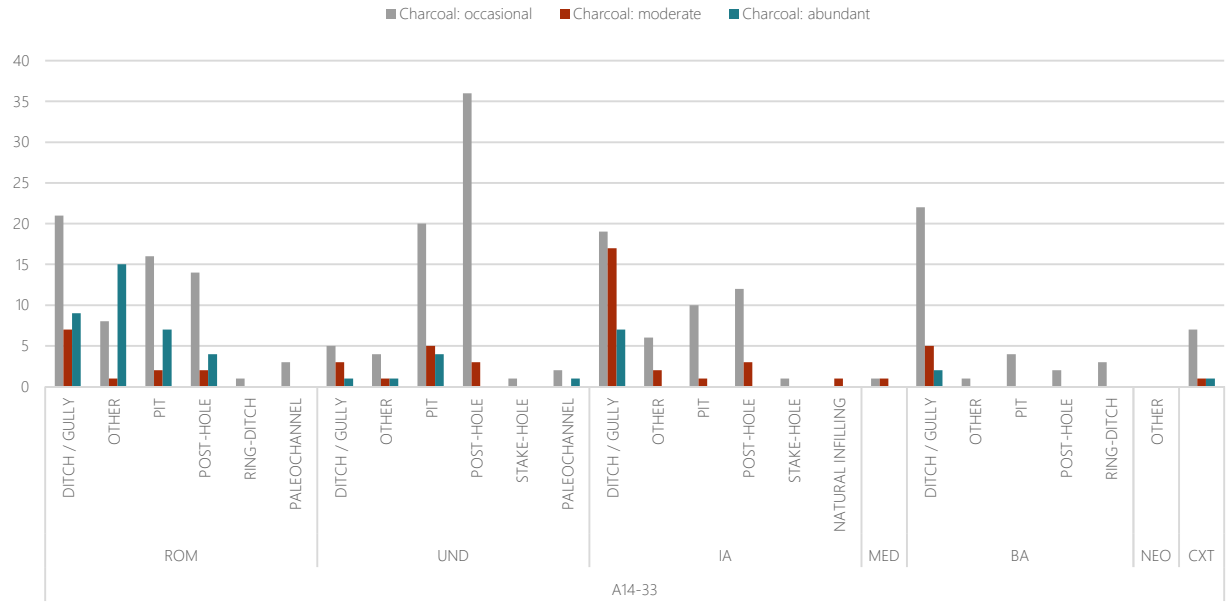
3.5.62. Occurrence of cereal grain/cereal chaff/weeds/nutshell per period/feature type on TEA 32



3.5.63. Occurrence of cereal grain/cereal chaff/weeds/nutshell per period/feature type on TEA 33



3.5.64. Charcoal abundance per period/feature type on TEA 32



3.5.65. Charcoal abundance per period/feature type on TEA 33

Neolithic

Neolithic activity was present in Area 1. Charred plant remains were recovered from many of the sampled pits, mostly as occasional charred barley (*Hordeum vulgare*) or hulled wheat (*Triticum dicoccum/spelta*) grains and fragments of hazelnut (*Corylus avellana*) shells. Noteworthy features include pit [323677] (Pit Group 32.2) which was dated through a Mildenhall pottery assemblage and contained occasional charcoal and a moderate amount of hazelnut shell (estimated 15 nuts). Neolithic pit [323671] contained well-preserved germinated charred barley grains in addition to charred seeds of clover/medick (*Trifolium/Medicago* sp.), oat/brome (*Avena/Bromus* sp.), sedge (*Carex* sp.) and vetch/tare (*Vicia/Lathyrus* sp.). In-situ burning was noted on excavation and a moderate amount of charcoal was recovered. Pits [323677] and [324021] contained abundant charcoal.

Bronze Age

Charred plant remains from Bronze Age features were present in very low quantities and include grains of barley and hulled wheat and seeds of bromes, docks (*Rumex* sp.) and grasses. Waterlogged plant remains were recovered from wells and some are reasonably well-preserved. Hedgerow plants were evident through the presence of hawthorn (*Crataegus monogyna*), sloe (*Prunus spinosa*), bramble (*Rubus* sp.), elder (*Sambucus nigra*) and rose (*Rosa* sp.).

Within Enclosure 32.1 (Area 1), several pits (Pit Group 32.3) and postholes contained assemblages of sparse charred cereal grains and occasional fragments of hazelnuts. Pit [323790] and ditch/gully [334282] contained abundant charcoal. Within Enclosure 32.2 (Area 3) were several ditch samples in which charred plant remains occurred sporadically with low density and diversity and include hazelnut

shell, wheat and barley grains, a hawthorn stone and occasional charcoal fragments. Ditch [334282] was particularly charcoal rich. Lower fills of some of the ditches contained plant remains preserved by waterlogging; ditch [332720] contained seeds of water-crowfoot (*Ranunculus* subgenus *Batrachium*) and rushes (*Juncus* sp.), with a mollusc assemblage that could indicate the area had periodic flooding.

A number of wells associated with Enclosure 32.2 produced reasonably well-preserved seed assemblages; most notable is feature [331028] which contained seeds of plants that would have been growing nearby such as buttercups (*Ranunculus* sp.), docks, knotgrass (*Polygonum aviculare*), vetch/tare, thistles (*Carduus/Cirsium* sp.), nettles (*Urtica* sp.) and fumitory (*Fumaria* sp.), in addition to plants that were more likely to be growing on the edge or within the feature such as sedges, rushes, water-crowfoot and pondweed (*Potamogeton* sp.). This feature was located on the edge of a paleaochannel. Waterlogged pit/well [331133] was located to the north of the enclosure and contained a moderate assemblage of seeds that included goosefoots (*Chenopodium* sp.) thistles, seeds of the carrot family (Apiaceae) and evidence of hedgerow/scrub flora in the form of seeds of brambles, elder and sloe and thorns of rose.

Iron Age

In general, Iron Age deposits produced only small quantities of charred plant remains. It is interesting to note that chaff was extremely scarce indicating that this by-product of hulled wheat processing was not being utilised as kindling/fuel.

Early Iron Age well [331698] in Area 2 contained charred grain fragments and waterlogged seeds of thistles, chickweed, goosefoots, knotgrass, nettles, fumitory, brambles and buttercups and sedges. A lower fill (333196) produced a similar assemblage and contained waterlogged wood and seeds of hemlock (*Conium maculatum*). This feature was surrounded by a group of ten pits (Pit Group 32.4) of which four were sampled and found to contain only occasional charred grains. A further waterlogged feature in Area 2 [331859], provisionally dated as early Iron Age, produced a moderate assemblage of plant remains that included docks, buttercups, goosefoots, sedges, chickweed, hawkweeds (*Hieracium* sp), nettles, rushes and water-crowfoot.

Early Iron Age Pit [324238] in Area 1 was originally thought to be a cremation due to the presence of calcined bone and abundant charcoal. Each of the six deposits sampled contained occasional charred grain, mainly barley with hulled wheat and oats. Charred seeds occurred occasionally and include vetch, goosefoot, black-bindweed (*Fallopia convolvulus*), cleavers (*Galium aparine*), ribwort plantain (*Plantago lanceolata*), flax (*Linum usitatissimum*) and dock.

Two four-post structures in Area 2, provisionally dated as early Iron Age, produced sparse charcoal (Building 32.3) and occasional charred plant remains including spelt grain and chaff and single seeds of vetch/tare, brome/ryegrass (*Lolium* sp) and stinking mayweed (*Anthemis cotula*) (Building 32.4)

Six samples taken from middle Iron Age Ditch 32.4 contain occasional charred cereal grains and weed seeds (oat (*Avena* sp.)/brome, grasses (Poaceae) and stinking mayweed). Samples from Enclosure 32.5 also contained similar assemblages of occasional charred grains and weed seeds and ditch 334312 also

contained abundant waterlogged elderberry seeds. Charcoal was abundant in ditches [334643] and [334770].

Area 2 Ditch [330349] produced a waterlogged assemblage of seeds of goosefoots, henbane, stinging nettles, cinquefoil (*Potentilla* sp.), dead nettle (*Lamium* sp.), water-crowfoot, rushes, brambles, elder in addition to ostracods, insects, cladoceran ephippia and a charred brome and a charred oat. Ditch [333332] produced a small assemblage of charred grain but was rich in charcoal. Ditch [334590] also produced a moderate charred assemblage of charred cereals including hulled wheat, with seeds of vetch/tare and grasses.

Roman

Early Roman activity was in the east of Area 1 and the west of Area 2 and included four enclosures with two large buildings and two areas of bedding trenches. The contents of samples from early Roman enclosure ditches reflect the level of activity in associated features. Enclosure 32.7 ditch [335059] contained abundant charcoal and occasional charred plant remains and Enclosure 32.8 ditch [334696] contained moderate charred grain whereas ditches [333490] and [333929] from Enclosure 32.9, an area of more intense Roman activity, produced moderate amounts of hulled wheat grain, moderate to abundant chaff, and abundant charcoal.

Building 32.5 had substantial postholes, three of which contained abundant charred plant remains; Postholes [334848], [334852] and [334867] all produced abundant grains and chaff of hulled wheat and occasional seeds of wild radish (*Raphanus* sp.), oat/brome, grasses and vetch/tare. Ditch terminus [334970] is associated with Building 32.5 and contained a very similar assemblage. Building 32.6, in comparison, contained only occasional charred plant remains.

Field Systems 32.2 and 32.3 were comprised of early Roman bedding trenches (also called cultivation strips/rows) that extended across Areas 1 and 2 and contained occasional charred cereals, sparse chaff and weeds of brassica, stinking mayweed and grasses. Early Roman Pit [323938] was located close to the bedding trenches and contained abundant charcoal.

Samples from a later Roman enclosure (Enclosure 32.10) were rich in charred plant remains. Several samples were taken from burnt clay deposits in ditch/gully [334334] in the east of Area 1. Charred plant remains were abundant and included hulled wheat grain and chaff, barley grain and weed seeds that include bromes, docks, grasses and brassicas (*Brassica* sp.). It is likely that these samples represent oven demolition deposits.

The focus of Enclosure 32.10 was a late Roman pit [335267] which was initially excavated by test pits [335169] due to the extent of the charcoal-rich spread. This upper spread of material was abundant in hulled wheat chaff with moderate amounts of grain, some of which have evidence of germination weed seeds such as bromes and rye-grass (*Lolium* sp.) and docks. Detached coleoptiles (cereal sprouts/acrospires) were also abundant in context (335166) suggesting the assemblage represents deliberate germination of spelt wheat for brewing. Three lower deposits were subsequently sampled spatially; (335268), (335720) and (3335721) and were varied in content; Sample <33352> (335720)

produced abundant charred chaff and an assemblage of waterlogged material that includes wood, moss and seeds of sedges and buttercups. Most of the other samples from this feature contain only occasional charred plant remains although <33363> (335720) also contained charred and waterlogged plant remains such as waterlogged seeds of sedges, spike rush (*Eleocharis* sp.), moss, buttercups, self-heal (*Prunella vulgaris*), cinquefoils and charred seeds of grasses, bromes and stinking mayweed. This sample is worthy of analysis, particularly as the feature possibly has a drainage function from an associated irrigation system

Undated ditch [335153] is likely to be associated with pit [335267] and produced a similar assemblage to the upper spread of charred material including abundant hulled wheat and chaff with frequent seeds of oat/brome, docks and grasses. Layer (335002) extended over a large area to the west of pit [335267] and also contained hulled wheat grain, chaff and seeds of oat/bromes, grasses and docks, all in abundance. Detached coleoptiles were noted along with occasional seeds of stinking mayweed, black-bindweed and orache (*Atriplex* sp.).

Three late Roman ovens; [335059], [335065] and [335066] (Kilns 32.1) in the north-east of Area 1 each produced large assemblages of charred plant remains with abundant hulled wheat grain, chaff and charcoal. Weed seeds were also present in abundance and include vetch/tare, spike-rush (*Eleocharis* sp.), docks, clover/medick, goosefoots, grasses and wild radish.

Two cremation burials both contained occasional charred plant remains; cremation [323806] contained sparse grains of wheat and barley and also contained small fragments of avian eggshell. Cremation [323907] contained abundant charcoal and a tuber of onion-couch grass (*Arrhenatherum elatius* subspecies *bulbosus*).

A number of productive features that have been broadly dated to the Roman period but stratigraphic context is unclear. Several pits and two ditches in the extreme east of Area 1 produced abundant charred plant remains rich in hulled wheat grain, chaff and charcoal. These include ditches [333135] and pits [334709, 334138, 333929 and 334687]. Undated ditch [335171] <33335> has complex fills with charred assemblages of hulled wheat and chaff that closely resemble Roman material in this area.

Saxon

Early Saxon settlement was found in the west of Area 1. Samples were taken from 22 Sunken feature buildings (SFBs), most of which contained occasional charred cereal grains. Glume bases of hulled wheat were also noted occasionally which may indicate a continuation in the cultivation of spelt/emmer into this period. Generally, the preservation of plant remains in SFB's is poor; none of the SFBs produced assemblages that would indicate the deliberate deposition of hearth waste, but associated pits and ditches were more productive. Free-threshing wheat (*Triticum aestivum* s.l), barley and rye (*Secale cereale*) grains were most frequent in SFB 32.23 with wheat predominant and occasional barley although preservation was poor. SFB 32.10 contained ten charred flax seeds and SFB 32.11 also produced flax seeds along with occasional seeds of sedge and legumes. A single mineralised seed of henbane (*Hyoscyamus niger*) was recovered from SFB 32.21 and a phosphatic nodule from SFB 32.1 but there were no other indicators of cess. All of the SFBs, apart from SFB 32.4 and SFB 32.22, produced charcoal

that may be suitable for species identification and radiocarbon dating (with the aim of sequencing the construction and use of the SFBs). The most abundant charcoal was recovered from SFB 32.5 (approximately 280ml).

A number of pits may have been associated with the SFBs. These include pit [323315] (Pit group 32.10) which lay to the north-west of SFB 32.5 and produced charred flax seeds. Pit [322614] close to SFB 32.2 contained a mineralised dock seed, occasional mineralised insects and occasional charred grain indicating the presence of cess. Pit [322520] close to SFB 32.12 contained abundant charcoal.

Several ditches located close to SFBs produced charred assemblages that may represent hearth waste disposal. Three samples taken from ditches [320146] and [320150] to the east of SFBs 32.10 and 32.11 contain moderate quantities of charred cereals (up to 50 grains) with a mixture of rye, barley, wheat and oats with occasional peas and beans (Fabaceae) and seeds of stinking mayweed, cleavers, docks and bromes. Ditch [320332], close to SFB 32.19, produced 18 grains of rye and wheat. Ditch [321928], also located close to SFB 32.19, contained abundant free-threshing wheat grains with frequent rye grains and occasional chaff and flax seeds. Weeds include stinking mayweed, wild radish, cornflower, knotweed and dock and a sloe/cherry stone. Ditch [322011] (close to SFB 32.17) produced a moderate assemblage of charred cereals, legumes and flax.

Three buildings in Area 1 have been provisionally dated as early Saxon; five of the postholes from Building 32.7 contain occasional glume bases of both spelt and emmer wheat. A germinated spelt grain was noted in posthole [321716] and several of the postholes also contained charcoal. Similarly, postholes from Building 32.8 also contained sparse grain and a few glume bases. Occasional charred weed seeds include henbane, mallow (*Malva* sp.), grasses, knotgrass and seeds of sedges and rushes which may indicate thatching or flooring material. Postholes from Building 32.15 were less productive producing only two charred grains of free-threshing wheat and charcoal was absent.

Five possible buildings in the north of Area 1 have provisionally been dated ad early to middle Saxon; Buildings 32.9, 32.10, 32.11 and 32.13 all produced occasional charred cereals (barley and wheat) and very low volumes of charcoal. Building 32.13 was not sampled.

Of the wells recorded in Area 1, only well [322922] contained waterlogged plant material. Preservation is poor with no survival of seeds. Well [322614] (provisionally dated as middle Saxon) contained charred cereals and legumes as well as a mineralised grain of rye and seeds of ribwort plantain and knotgrass. Mineralised egg cases, maggots and fly puparia are further indicators that this feature had been used for the disposal of cess. Well [322949] contained abundant charred plant remains including wheat, rye, barley and oats, peas, seeds of stinking mayweed, corncockle (*Agrostemma githago*), grasses, brassicas, thistles, fairy flax (*Linum* cf. *catharticum*), ribwort plantain, chickweed (*Stellaria media*), nettles, docks, buttercups and sedges. Nearby ditch [321928] contained free-threshing wheat, barley and rye with occasional rye chaff, occasional flax seeds and weed seeds including stinking mayweed, cornflower, knotgrass, wild radish and vetch/tare.

Three Saxon waterlogged features were located in the western part of Area 1; well [320843], well [320932] and spring, pond or pool [320944] all produced very similar assemblages. Seeds of obligate

aquatics were present in all three features and include water-crowfoot, horned pondweed (*Zanichellia palustris*), rushes, duckweed as well as ostracods and cladoceran ephippia. The assemblage from well [320944] is the most diverse and also contained black nightshade (*Solanum nigrum*), dock, thistles, pondweed, nettles and charophytes. Sainfoin (*Onobrychis vicifolia*) was noted in well [320843].

Situated on the edge of the excavation in the south of Area 1 was a possible middle Saxon gateway. This feature truncated early Saxon ditch/gully [320471] and produced an assemblage of charred grain (predominantly barley but frequent wheat and occasional oats and rye) with frequent legumes and frequent stinking mayweed. The sample volume was only 4L and most likely represent a discrete deposit (described as ash-like deposits within the ditch fill). This sample was taken from an area close to where gateway pit [320644] was cut into the ditch. This pit contained a very similar assemblage of barley and wheat with occasional rye and legumes and stinking mayweed and it is possible that the two contexts were mixed.

Miscellaneous Saxon features that produced noteworthy plant assemblages include pit [322637] (Enclosure 32.13) which contained frequent plant remains in its upper fill consisting of charred wheat, rye and barley with occasional legumes and frequent charcoal. Mineralised seeds include pale persicaria and nettle which together with mineralised fly pupae and egg cases indicates a cess component. The upper two fills (320653 and 320654) of pit [320160] (part of feature group 320655 (possibly a well)) produced an assemblage of abundant cereal grain in which barley and wheat predominate along with lesser quantities of rye. Culm nodes representing cereal straw were frequent and peas and beans were also present. Seeds of stinking mayweed and henbane were abundant along with seeds of medick/clover, grasses, sedges, self-heal, bromes, corncockle, docks, campions, sedges and rushes. Mineralised insects and phosphatic nodules suggest cess inclusion and both samples were rich in charcoal.

Middle Saxon post-pit [322193], one of three post-pits located in the centre of Area 1, contained frequent poorly-preserved charred grains, legumes and weeds of stinking mayweed, wild radish, bromes and grasses.

Medieval

The only medieval deposits that contained preserved plant remains is watering hole [334305], in Area 3, which contained waterlogged bramble and rush seeds.

Post-Medieval

Pit [320004] contained charcoal and sparse grain and pit [322755] produced moderate wheat, barley and oats, sedges and reed and charcoal.

Undated

A number of features are currently undated and have produced assemblages that may be worthy of further study:

AREA 1:

- One of three isolated postholes [321564] contained frequent waterlogged rushes, water-crowfoot and several species of ostracods.
- Isolated pit [321554] in Area 1 (possibly early Iron Age) contained frequent six-row barley grains and seeds of grasses, buttercup, mallows, goosefoots and a fragment of charred dung or bread. with occasional chaff fragments and charred grass stems. Barley grains were submitted for radiocarbon dating. Pit [323845] also contained six-row barley (some of which has germinated), wheat and black-bindweed.
- Isolated fire pit [321808] contained frequent charcoal that may be suitable for species id or dating and pit [324083] produced 1.2L charcoal.
- Pit/ posthole [323193] may have been associated with Saxon Building 32.10. It produced occasional charred grain, mainly barley and wheat. Some of the barley grains are shiny and have shrunken sides indicating they had germinated. Pit [322191] produced approximately 70ml charcoal possibly associated with Saxon Buildings 32.8 and 32.9. Ditch [321461] may be associated with SFB 32.16 due to its close proximity and contained a moderate assemblage of mixed cereals and stinking mayweed. Pit [324257] contained charred wheat, barley and flax and moderate charcoal.

AREA 2

- Undated ditch terminus [334970] was possibly associated with Roman Building 32.5 and contained frequent grain and hulled wheat chaff.

Summary and potential of the assemblage

All of the main phases of activity from the Neolithic to the Saxon period have produced botanical assemblages that have the potential to address the research aims of the project. The assemblages from Neolithic pits were limited but the charred remains of hazelnuts, charcoal and occasional cereal grains provide material suitable for radiocarbon dating, if required. Species identification of charcoal could also be considered.

Middle Bronze Age activity is represented by field systems and enclosures in a low-lying area of the site and the general scarcity of charred plant remains reflect this. Hulled wheat and barley are evident as cultivated cereals. Waterlogged assemblages from wells/watering holes in Area 3 provide information on the local flora with evidence of hedgerow plants which were likely to have been deliberately planted on the banks of the enclosure ditches to form stock barriers (Pryor 2017, 85). Pollen analysis would extend the information of plants and trees in the wider landscape.

Preserved plant remains from Iron Age features follows a similar pattern in which charred plant remains are generally scarce. Hulled wheat and barley represent cultivated cereals and the presence of stinking mayweed indicates cultivation of heavy clay soils and advancement in ploughing technology. Waterlogged preservation of plant remains in wells/watering holes offer the potential for comparison with assemblages from other periods to investigate changes in the environment.

The Roman period sees an intensification in agricultural processing with spelt as the predominant wheat variety and emmer wheat as a minor component. Barley is less frequent, but this may be due to the increased exposure of hulled wheat to fire as it requires heat for processing and wheat chaff was also used as fuel. Hulled wheat assemblages are frequently abundant particularly in oven features and also in the extreme east of Area 1. The charred material is present in several features within this area and provides the potential to investigate the relative proportion of spelt and emmer in the assemblages and the spatial distribution of the cereal processing waste. Hulled wheat is known to be cultivated extensively in this region and a mass-production supply farm was revealed locally at Earith, where spelt wheat appears to have been the major export (Evans et al 2013). The germination of hulled wheat may indicate deliberate malting for brewing beer. There is increasing evidence of spelt malting in this area including very locally at Over (Fosberry 2018, 15-30).

The bedding trenches that extend across Areas 1 and 2 form a large early Roman field system. These features are frequently found on early Roman sites in this region and are usually sterile (Lodwick 2017, 74). The charred plant remains recovered are likely to be intrusive due to the amount of charred processing waste from later Roman features in the area and they are not considered to relate to the crops being grown (either in the trenches or in the soil in between (lazy-beds)). Investigation of related features, particularly the waterlogged deposits, may provide evidence of the use of the bedding trenches, particularly pollen analysis.

The extensive occupation of the site in the early Saxon period offers the potential to investigate continuity from the Roman period, and the botanical assemblages contribute to this. Preserved plant remains in the SFBs are sparse however all of the SFBs, apart from SFB 32.4 and 32.22, produced charcoal that may be suitable for species identification and radiocarbon dating (with the aim of sequencing the construction and use of the SFBs). Features associated with the SFBs offer greater potential as they were used for rubbish disposal and can contribute to food consumption and agricultural techniques.

There is evidence of continued cultivation of hulled wheat into the early Saxon period suggesting continued use of Roman cultivated fields (Murphy 1994, 37). Free-threshing bread wheat and barley predominate, and rye is introduced. Flax was noted in an Iron Age assemblage but becomes more frequent and legumes are also increasingly evident as a cultivated crop. Waterlogged assemblages again offer the potential to track changes in the landscape over time.

The extensive sampling from TEA 32 and TEA 33 have produced archaeobotanical assemblages that have potential to add to the understanding of agriculture, diet and economy of the occupants of the site over a long timescale with local and regional significance. The fortuitous presence of waterlogged assemblages from Bronze Age, Iron Age, Roman and Saxon periods offer a rare opportunity to study changes in the landscape over time.

Recommendations

Samples from TEA 32 and TEA 33 have been selected for further analysis due to their archaeobotanical content, contextual information and provisional phasing. This list is not exclusive, and the further study

of other samples should be considered if phasing is revised or with reference to other specialist reports. Charcoal analysis should be considered from selected features is dating is required or if there is a particular interest in fuel choice.

There is unprocessed soil from several samples. Additional processing has the potential to provide further material for quantification and should be considered for features of interest. The remaining buckets from SFB 32.11 should be processed as this feature was extensively sampled. Similarly SFB 32.21 had numerous small finds and additional processing may yield more.

3.5.38. Summary of samples from TEA 32-33 selected for analysis

Site code	Period	Feature	No. samples
A14-32	NEOLITHIC	PIT	4
A14-32	BRONZE AGE	PIT	1
A14-32	ROMAN	DITCH/GULLY	1
A14-32	ROMAN	OTHER	4
A14-32	ROMAN	POSTHOLE	2
A14-32	SAXON	DITCH/GULLY	3
A14-32	SAXON	OTHER	6
A14-32	SAXON	PIT	8
A14-32	UNDATED	POSTHOLE	1
A14-32	UNDATED	PIT	1
A14-33	BRONZE AGE	OTHER	1
A14-33	BRONZE AGE	PIT	1
A14-33	IRON AGE	WELL	1
A14-33	IRON AGE	OTHER	1
A14-33	IRON AGE	DITCH/GULLY	3
A14-33	ROMAN	DITCH/GULLY	1
A14-33	ROMAN	OTHER	2
A14-33	ROMAN	PIT	4
A14-33	ROMAN	POSTHOLE	3
A14-33	UNDATED	DITCH/GULLY	1
Total number of samples suggested for analysis			49

TEA 34

Four bulk sediment samples, ranging in size from 20 to 40 litres were taken from a paleochannel, Iron Age enclosure 34.1 and Iron Age segmented ditch 34.1.

Samples by Period

Palaeochannel

Deposit (340016) from [340018] and (340056) from [340058] contained occasional charcoal. Occasional cereal remains were also recovered from deposit (340016) from [340018].

Iron Age

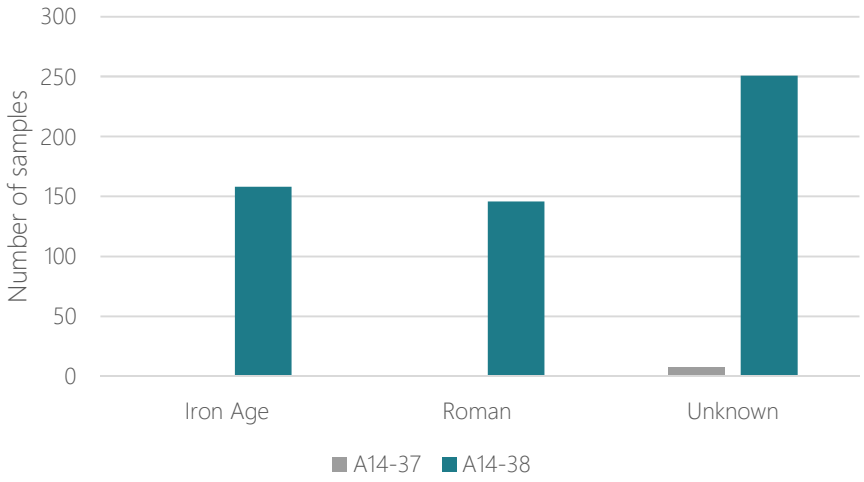
The samples from ditch/gully [340044] from Enclosure 34.1, and ditch/gully [340046] contained occasional charcoal.

Potential and Recommendations

The samples from TEA 34 are considered to have low potential and are not recommended for further analysis.

TEA 37/38

A total of 556 bulk sediment samples were taken from TEA 38 and 8 samples from TEA 37. The samples ranged in size from 10 to 590 litres in volume and were collected from a variety of archaeological features including pits, gullies, ditches, postholes and furnaces/kilns dated to the mid-late Iron Age (TEA 37-38), Roman (TEA 37-38), medieval (TEA 37) and post-medieval periods (TEA 37). Three samples were also taken from the evaluation stage of Northstowe/Longstanton by CAU in the area of the TEA 38 settlement (CAU settlement 12; Evans et al 2005).



3.5.66. Number of samples per period by TEA

The 564 collected environmental samples from TEAs 37-38 produced small to medium wet and dry flots and residues which contained charred and waterlogged plant remains. A low to medium number of archaeobotanical remains were noticed, with ranging levels of preservation from good to very poor. The dry samples in general contained a medium concentration of charred plant remains, in particular cereals grains, which showed signs of abrasion due to pre-deposition charring and post-deposition taphonomical processes.

Dry flots from TEAs 37 and TEA 38 have produced charred remains of cereal grains and other seeds, as well as charcoal. Virtually all samples contained oak and non-oak charcoal fragments up to 35mm. TEA 37 provided a very low amount of cereal remains, with only occasional indeterminate wheat grains observed (*Triticum* sp.) and spelt (*Triticum spelta*) chaff from sample <37103> (371023). In contrast, a total of 75 samples from TEA 38 contained abundant cereal remains which included cereal grains and wheat chaff. The environmental samples from TEA 38 have yielded abundant examples of the commonly grown cereal species during the Iron Age and Roman periods: spelt wheat (*Triticum spelta*), oats (*Avena sativa*) and hulled barley (*Hordeum vulgare*) with the addition of occasional remains of free-threshing/bread wheat (*Triticum aestivum*) and possible emmer wheat (*Triticum diccocum*). Moderate

quantities of chaff were also noticed with a particular high concentration of glume wheat chaff (glume bases), most likely to be derived in its majority from spelt wheat.

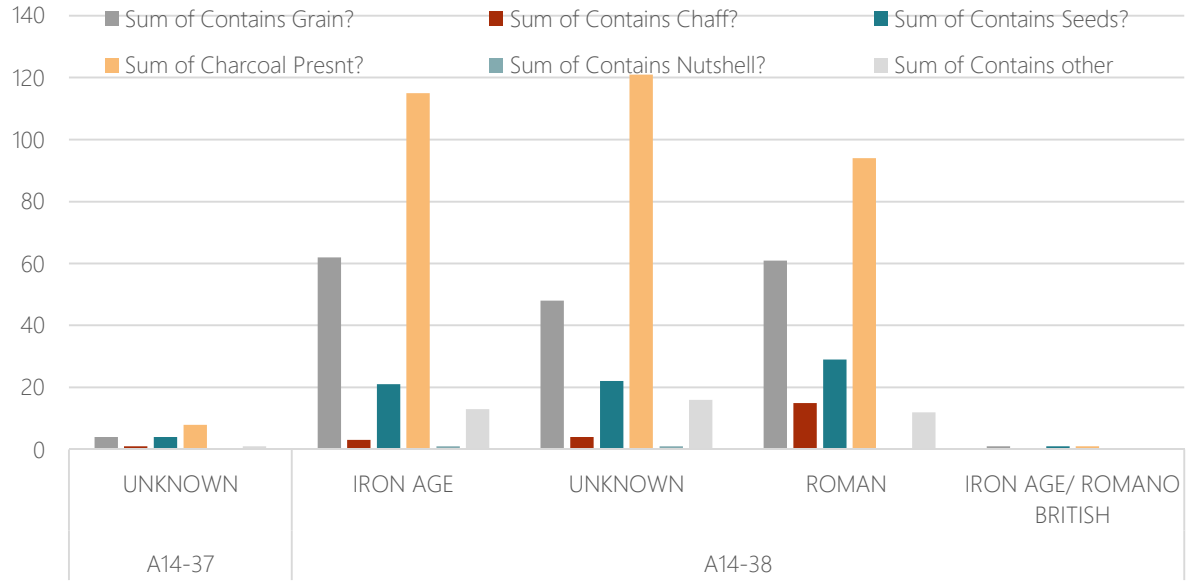
Remains of other plants, such as pulses and wild weeds/grasses, have been recovered in occasional and moderate amounts from samples from TEA 38. In addition, 13 samples have yielded occasional to moderate quantities of amorphous charred remains of cereal foods, such as bread, porridges and most likely beer. Further analysis would be needed to determine the nature of these remains and their composition.

In contrast to TEA 38, which yielded a small number of waterlogged samples, TEA3 7 did not produce waterlogged botanical materials. Samples <38066>, <38452>, <38422>, <38594> produced waterlogged wood up to 20mm fragments and seeds in low to medium quantities. Among the taxa recovered from these samples there was a moderate concentration of seeds of common ruderals such as sedges (*Carex* sp.) and docks (*Rumex* sp.), Buttercup (*Ranunculus* sp.), Nettle (*Urtica* sp.), nightshade (*Solanum* sp.), Henbane (*Hyoscyamus* sp.) and Thistle (*Cirsium/Carduus* sp.). In addition, some seeds from food plants such as Parsnip (*Pastinaca* sp.) and Carrot (*Daucus* sp.) were noticed in low concentrations among the samples.

Environmental samples from TEA 37 and TEA 38 have yielded a small amount of mineralised plant remains. No samples from TEA 37 produced mineralised plant materials and only three samples from TEA 38 contained mineralised wood and straw in addition to indeterminate seeds.

Samples by Period

The assessed environmental samples from TEAs 37-38 represent a variety of archaeological contexts from the mid-late Iron Age (TEAs 37-38) and Roman periods (TEA 37-38). Much of the archaeology on TEA 37 is presently unphased, but is thought to represent medieval and post-medieval activity. In general, all samples through time contain an abundant amount of charcoal and a moderate concentration of crops, amongst which cereals constitute the majority of the seed assemblage.



3.5.67. Summary of constituents by TEA and period

Mid-late Iron Age

Samples dated to the Iron Age from TEA 38 contained an abundant concentration of charcoal and moderate amount of cereal grains. Amongst the main cereal taxa recovered from the Iron Age samples, hulled barley is the most common species, followed by glume wheats such as emmer and spelt wheat. Occasional remains of oats and bread wheat were also identified from some of the assessed samples. In contrast to cereal grains, remains of chaff and weed seeds are very rare in the assemblages from Iron Age contexts. Only 26 samples yielded seeds from arable weeds and only 4 samples contained glume bases from glume wheats (probably spelt wheat) and hulled barley rachises. The high concentration of grains in contrast to very low quantity of chaff and weed seeds suggests that these deposits are representative of activities which involved the use of clean grain which had been previously processed someplace else (Stevens 2015).

Ditches and gullies yielded the highest concentrations of botanical remains, in particular cereal grains, followed by arable weeds. Especially rich and diverse is the assemblage from sample <38279> (381613) (Enclosure 38.11) which has yielded remains of hulled barley, spelt wheat and bread wheat as well as a wide range of weed seeds such as small grasses, sedges and pulses like grass pea (*Lathyrus* sp.) and vetch (*Vicia* sp.). Of particular interest is the assemblage from furnace/kiln [385643], in samples <38582> from (385639) and <38583> from (385641), which have yielded a high number of germinated barley and glume wheat grains in combination to a moderate amount of charred food remains which could be derived from the preparation of foodstuffs such as breads or beers. Further analysis would be needed in order to assess the nature of these assemblages.

Roman

Charred plant remains were recovered from all Roman features across TEA 38 including cereal remains, arable weed seeds and abundant charcoal. The majority of the cereal remains constituted abundant hulled barley and spelt wheat grains in addition to occasional oats and emmer wheat grains. Chaff, although still rare, was present in 14 samples from TEA 38 and it was mainly derived from glume wheat species, such as spelt wheat. The presence of numerous quernstones and millstones on TEA 38 (see Shaffrey this vol.) suggests that milling and grinding cereal grain was a significant part of the Roman settlement's economy. Arable weeds and ruderals were present in 28 Roman contexts from TEA 38, a similar amount to those from Iron Age features.

The fill deposits from burial and construction cuts for kilns yielded the highest concentrations of plant remains from Roman contexts, especially from samples <38008>, <38058>, <38009>, <38072>, <38421> and <38442>, which contained abundant remains of barley and glume wheat grains. These high concentrations suggest accumulation from dense occupation and/or possible use of soils for burials from areas with high concentrations from refuse activities. In addition, sample <38072> from (381751) yielded charred food remains, similar to bread-like and beer-like products, in combination with abundant germinated spelt wheat and barley grains.

The three samples from the CAU evaluation were from Roman ditches, and contained predominantly spelt and barley grains, along with wheat glume bases and some wild plant seeds (large grass seed (Poaceae), goosefoot (*Chenopodium* sp.) and orache (*Atriplex patula/prostrata*)).

Undated

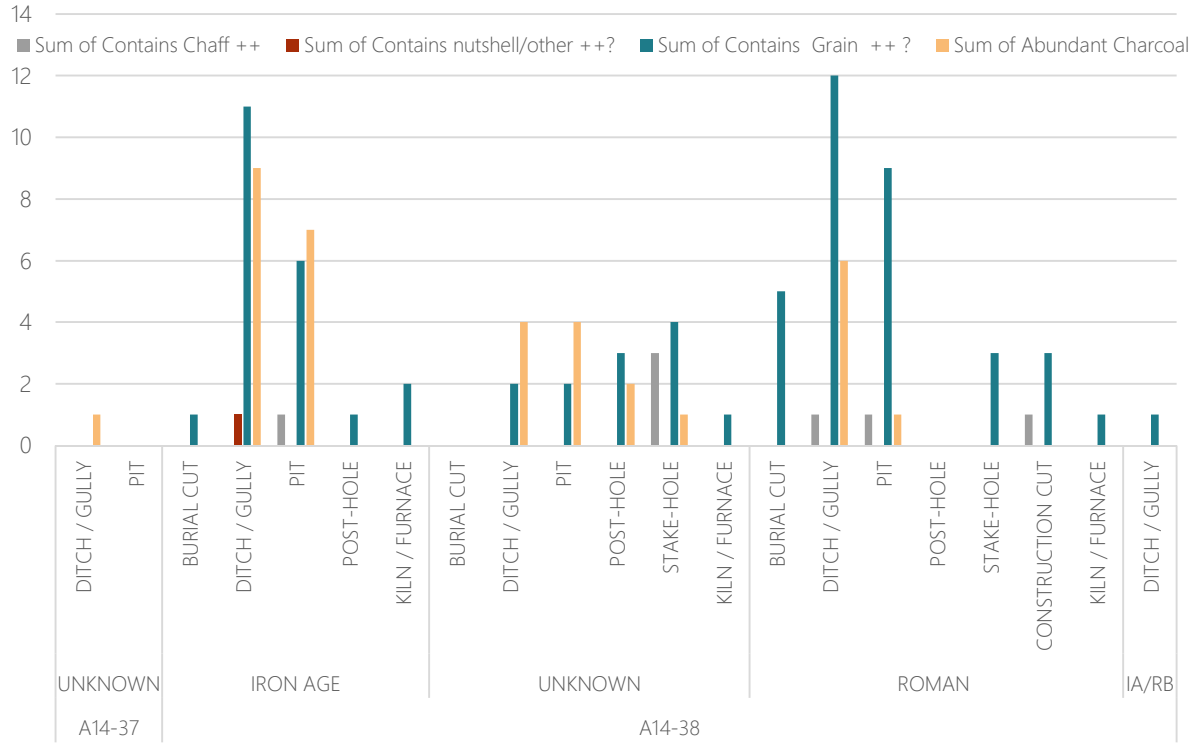
TEA 37 is thought to represent the medieval and post-medieval periods however this site is presently unphased. The botanical assemblage is therefore undated and consists of very occasional cereal grains and moderate charcoal remains. The majority of the cereal remains are wheat, however the poor preservation of the grains did not allow for species identification.

Undated contexts from TEA 38 have provided abundant plant remains, particularly charcoal and cereal grains such as barley and glume wheats. The number of samples containing chaff and weed seeds is low, supporting the evidence for these deposits to be representative of activities which involved the use of clean grain rather than crop-processing activities.

Summary and potential of the assemblage

The overall botanical assemblage from TEAs 37-38 was predominantly hulled barley and spelt wheat. The presence of hulled barley and spelt and emmer wheat in contexts dating to the Iron Age supports established evidence that Iron Age agriculture was based on the combination of barley and glume wheats. The scattered presence of emmer wheat among the Roman samples in comparison with the high concentration of spelt wheat suggests that emmer was a residual crop in the spelt fields rather than a major one (Stevens 2009). The recovery of high amounts of hulled barley and spelt wheat from the Roman contexts supports established evidence that agriculture in rural Roman Britain was based on these two crops (Van der Veen 2016).

The archaeobotanical assemblages assessed from TEAs 37 and 38 have yielded plant remains which would allow the investigation into agricultural practices, food processing and cooking as well as consumption and socio-economic organization. The charred plant assemblages from TEAs 37 and 38 have local significance in relation to the understanding of the area and its use, and the diet of its inhabitants, during the periods represented. Further botanical analysis will provide evidence on these aspects and on the nature of the natural environment.



3.5.68. Samples with abundant plant remains by TEA, period and feature

Recommendations

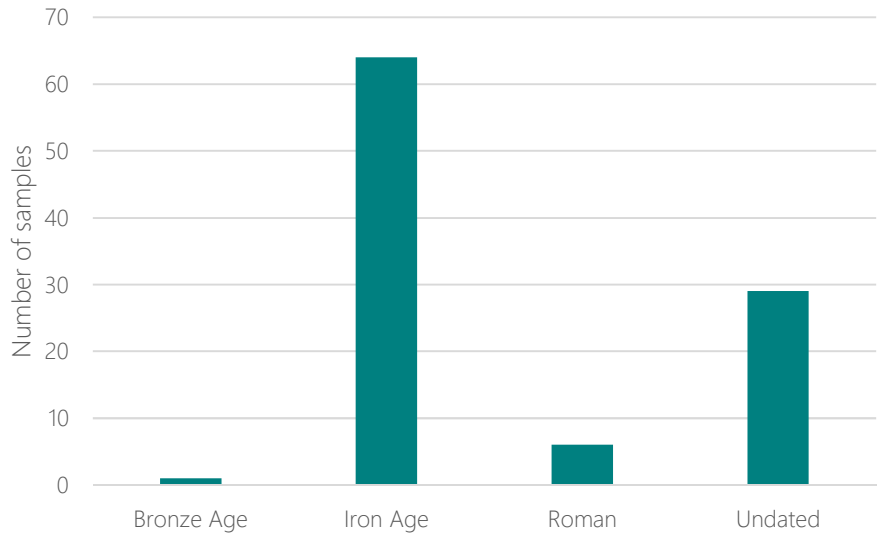
The table below contains the samples selected from TEA 38 for further analysis due to their abundant concentration of well-preserved plant remains. Full details of these samples can be found in the project's digital records. TEA 37 is thought to have features of medieval and post-medieval contexts, but due to the low concentration of the plant remains from TEA 37 and their poor preservation which did not allow for species identification, there is no recommendation for further analysis. Charcoal remains and occasional seeds, however, would provide an adequate amount for C14 dating if required. Analysis of samples from currently undated contexts is reliant upon them being dated at the analysis stage.

3.5.39. Summary of samples from TEA 37-8 selected for analysis

Site code	Period	Feature	No. samples
A14-38	IRON AGE	PIT	3
A14-38	IRON AGE	DITCH/GULLY	6
A14-38	IRON AGE	FILL	1
A14-38	IRON AGE	KILN/FURNACE	1
A14-38	ROMAN	BURIAL	3
A14-38	ROMAN	CONSTRUCTION CUT	2
A14-38	ROMAN	DITCH/GULLY	1
A14-38	ROMAN	PIT	6
A14-38	ROMAN	POSTHOLE	1
A14-38	ROMAN	STAKE-HOLE	1
A14-38	UNDATED	DITCH/GULLY	3
A14-38	UNDATED	KILN/FURNACE	2
A14-38	UNDATED	OTHER/FILL	1
A14-38	UNDATED	STAKE-HOLE	2
Total number of samples suggested for analysis			33

TEA 41

100 bulk sediment samples were taken from across TEA 41. The samples ranged in size from 2 to 20 litres and were collected from a variety of features including pits, postholes, ditches and burials, dating mainly from the middle and late Iron Age and the early Roman periods (Figure 3.5.69). A further six samples were taken from the area of TEA 41 during the evaluation phase by Mola Headland Infrastructure (MHI 2016; S4-012).

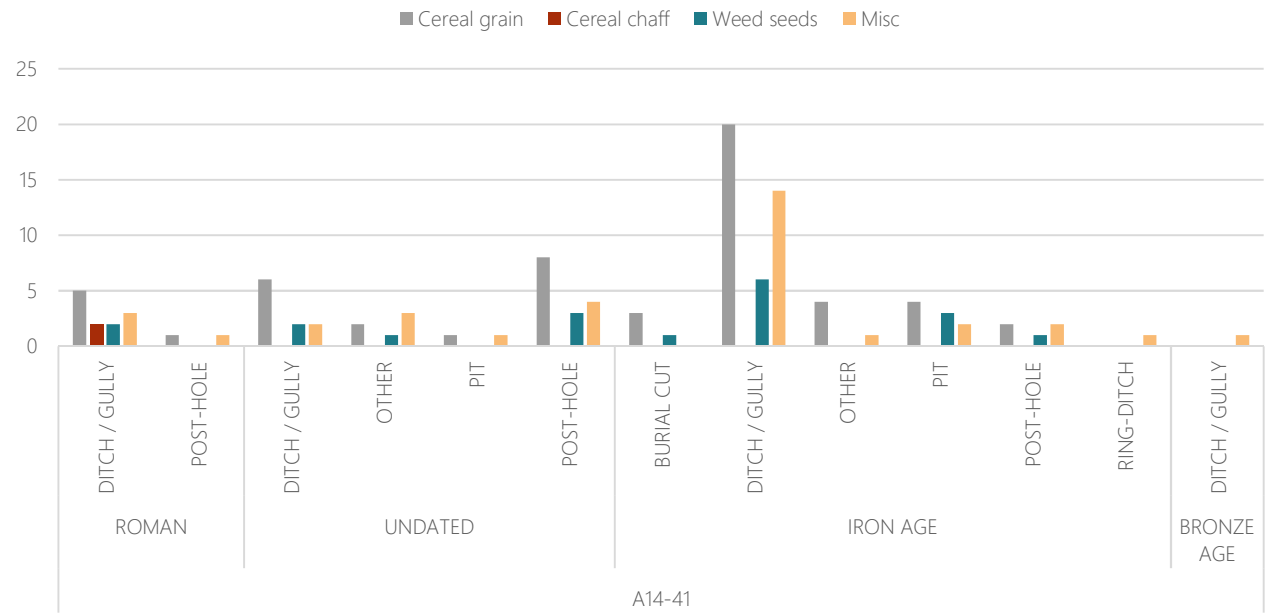


3.5.69. Number of samples per period

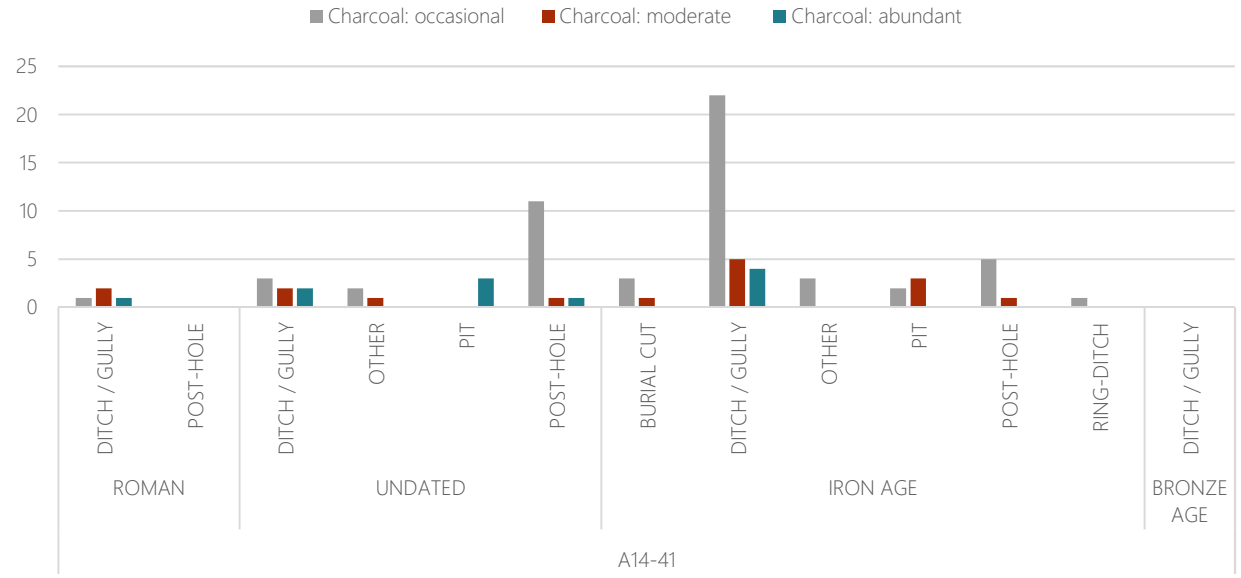
The charred plant remains exhibited mixed levels of preservation ranging from good to very poor. Most of the cereal grains showed signs of abrasion which prevented identification to species level. Table 3.5.40 presents the occurrence of constituent types in samples per period. There were no waterlogged or mineralised remains from samples in TEA 41.

3.5.40. The occurrence of constituent types in samples per period

Period/Constituent	Cereal grain	Cereal chaff	Weed seeds	Charcoal	Misc
Iron Age	33	-	11	50	21
Roman	6	2	2	4	4
Undated	17	-	6	26	10



3.5.70. Occurrence of cereal grain/cereal chaff/weeds/charred misc. per period/feature type



3.5.71. Charcoal abundance per period/feature type

Middle Iron Age

The remains of six middle Iron Age roundhouses were present, three of which were sampled; Roundhouses 41.1, 41.2 and 41.6. The samples from the roundhouses derived primarily from gullies; additional features sampled from roundhouse 41.6 also included pits. The charred plant assemblage comprised occasional to moderate charcoal and was abundant in gully sections [410768] and [410538] of Roundhouse 41.6. Occasional to moderate cereals were recovered from the sampled roundhouses; species present included spelt (*Triticum* spelta), barley (*Hordeum vulgare*) and oats (*Avena* sp.). Most of the cereal grains were poorly preserved with identifications limited to categories such as wheat (*Triticum* sp.), barley/wheat (*Hordeum*/*Triticum*) and cereal indeterminate. A small assemblage of weed seeds recovered included knotweeds (*Fallopia* sp.), docks (*Rumex* sp.), cabbages (*Brassica* sp.) and soapworts (*Saponaria* sp.).

Grape (*Vitis vinifera*) seed was recovered from gully [410922] in Roundhouse 41.1 and charred bread-like food fragments were present in gully [411007] of Roundhouse 41.6 and ditch [410922] of Roundhouse 41.1.

Late Iron Age

Features sampled from the late Iron Age included a bread oven and burial from Enclosure 41.1 and ditch sections from Annex Enclosure 41.2.

Grave [410453], which contained an adult female skeleton, was cut into the southern ditch of Enclosure 41.1. This was radiocarbon dated to 39 cal BC – 76 cal AD (late Iron Age/early Roman) (SUERC-85559, GU50645). The charred plant assemblage comprised occasional charcoal and occasional poorly preserved cereals including wheat and cereal indeterminate. Occasional pulse fragments were also recovered.

Bread oven [411089] was cut into the west part of Enclosure 41.1. Five contexts were sampled and revealed a charred plant assemblage of occasional charcoal and cereals including barley, wheat and cereal indeterminate. The remains of charred bread-like food fragments were recovered from context (411095).

Two contexts (411139) and (411141) sampled from ditch [411142] from Enclosure 41.2 contained occasional to moderate charcoal, while context (411139) also contained abundant wheat grains.

Six samples taken during the evaluation phase derived from a late Iron Age double-ditched circular enclosure. The samples were taken from the inner and outer enclosure ditches as well as from internal division ditches. The charred plant assemblage comprised occasional charcoal, occasional cereals including grains of spelt and indeterminate cereal, glume wheat chaff (glume bases) and weed seeds such as wild grasses (Poaceae) and sedges (*Carex* sp.).

Iron Age (general)

A number of features were dated to the Iron Age, based on finds information, but were not phased as part of the stratigraphic assessment work. This section discusses these.

Sixteen ditch sections were dated generally to the Iron Age; 15 produced charcoal including an abundance of material in ditches [410258] and [410525]. Cereal grain was present in ten ditch sections and was abundant in ditch [410919]. Species present included spelt wheat, glume wheat indeterminate and cereal indeterminate. Pea (*Pisum* sp.) was recorded in ditch [410912] and charred bread-like food fragments in ditches [410237] and [410919].

Pits [410845] and [410994] contained occasional to moderate charcoal and moderate cereal grains of barley and indeterminate cereal.

All of the sampled postholes contained occasional charcoal. Abundant cereal remains were present in posthole [411087]. Species present included emmer wheat (*Triticum dicoccum*), spelt, oats and cereal indeterminate. Abundant charred bread-like food remains were recovered from posthole [410025].

Cremation burial [410330] contained moderate charcoal and poorly preserved occasional cereals.

Two features categorised as 'other' produced an assemblage of occasional charcoal and cereals including barley, glume wheat and cereal indeterminate.

Roman

Samples dating to the early Roman period were taken from ditch sections from Enclosure 41.5, which was remodelled from late Iron Age Enclosure Ditch 41.1. Ditches [410096] and [410402] contained abundant cereals including barley, spelt, oats and indeterminate cereal, while ditch [411123] contained occasional wheat grains. Moderate charcoal was recovered from ditch [410096] and an indeterminate tuber from ditch [410402]; this ditch also contained occasional weed seeds of bromes (*Bromus* sp.) and soapworts.

The charred plant assemblage from ditch [410696], Enclosure 41.10, comprised abundant charcoal with moderate cereals including emmer wheat (*Triticum dicoccum*) and indeterminate cereal, and occasional arable weeds.

Undated

A range of currently undated features, including 6 ditch cuts, 4 pits, 14 postholes and 2 features categorised as 'other', were sampled from across TEA 41. It is likely, given the nature of the archaeology at the site, that these features are all associated with Iron Age and Roman enclosures.

The charred plant assemblage from the ditches comprised charcoal which was present in all six of the ditch cuts and was particularly abundant in ditch [41136]. Cereal remains including spelt wheat, emmer wheat, barley and oats were present in five ditches and were abundant in ditch [41155]. Occasional weed seeds were present in ditch [410540] and occasional pulses in ditch [410668].

Charcoal was present in three of the four sampled pits and was abundant in pits [410227], [411039] and [411119]. Poorly preserved occasional cereals were recovered from pit [410114].

Eleven of the 14 postholes contained charcoal and was abundant in posthole [410779]. Seven postholes contained cereal remains with abundance in posthole [410674]. Cereals present included spelt wheat, emmer wheat, barley and oats as well as poorly preserved grains categorised as cereal indeterminate.

The charred plant assemblage from the features categorised as 'other' comprised occasional to moderate charcoal and cereal remains. Cereals present included barley and wheat indeterminate. Occasional weeds seeds were also recorded.

Summary and potential of the assemblage

The overall charred plant assemblage was predominantly charcoal with cereal remains relating to both the Iron Age and early Roman settlements. The archaeobotanical assemblage assessed from TEA 41 has yielded plant remains which would allow the investigation into agricultural practices, food processing and cooking (bread oven [411089]) as well as consumption and socio-economic organisation at the Iron Age and Roman settlement. They have local significance in relation to the understanding of the area and its use, and the diet of its inhabitants, during these periods. Further botanical analysis will provide evidence on these aspects and on the nature of the natural environment. The plant remains would also allow limited investigation into ritual practices (cremation burials).

The identification of a grape (*Vitis vinifera*) pip from the gully of an Iron Age roundhouse is highly unusual and it is likely to be intrusive; it may have been associated with the Roman period settlement, though archaeobotanical evidence for grape pips in rural Roman Britain is still relatively scarce (Lodwick 2017, 75).

Recommendations

The table below summarises the samples selected from TEA 41 for further analysis due to their abundant concentration of well-preserved plant remains and/or their belonging to a particular context of high significance (eg ditches of roundhouses or enclosures). Full details of these samples can be found in the project's digital records. Analysis of samples from currently undated contexts is reliant upon them being dated at the analysis stage.

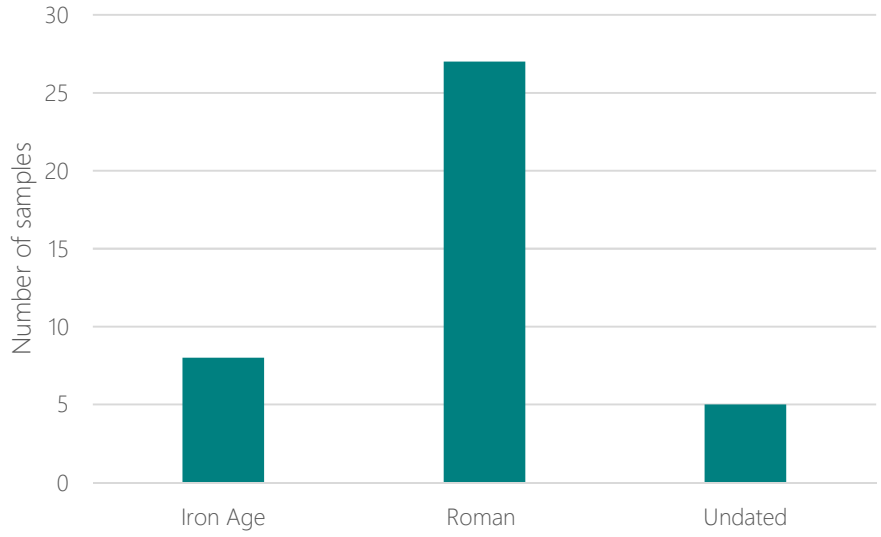
3.5.41. Summary of samples from TEA 41 selected for analysis

Site code	Period	Feature	No. samples
A14-41	IRON AGE	POSTHOLES	2
A14-41	IRON AGE	BREAD OVEN	1
A14-41	IRON AGE	DITCH/GULLY	1
A14-41	IRON AGE	BURIAL	2
A14-41	UNDATED	BREAD OVEN	1
A14-41	UNDATED	POSTHOLE	1
Total number of samples suggested for analysis			8

TEA 46

A total of 40 bulk sediment samples were taken from across TEA 46. The samples ranged in size from 5 to 40 litres and were collected from a variety of features including ditches, pits and postholes dating from the Iron Age and Roman periods.

Trial trench evaluation work undertaken by Cambridge Archaeology Unit (CAU) identified features associated with a Roman settlement and isolated drip gully. Ten bulk sediment samples were taken during the CAU investigations (Patten et al 2009). Evaluation work was also undertaken in the area of TEA 46 by Mola Headland Infrastructure (MHI 2016; S4-019) however no bulk sediment samples were taken.

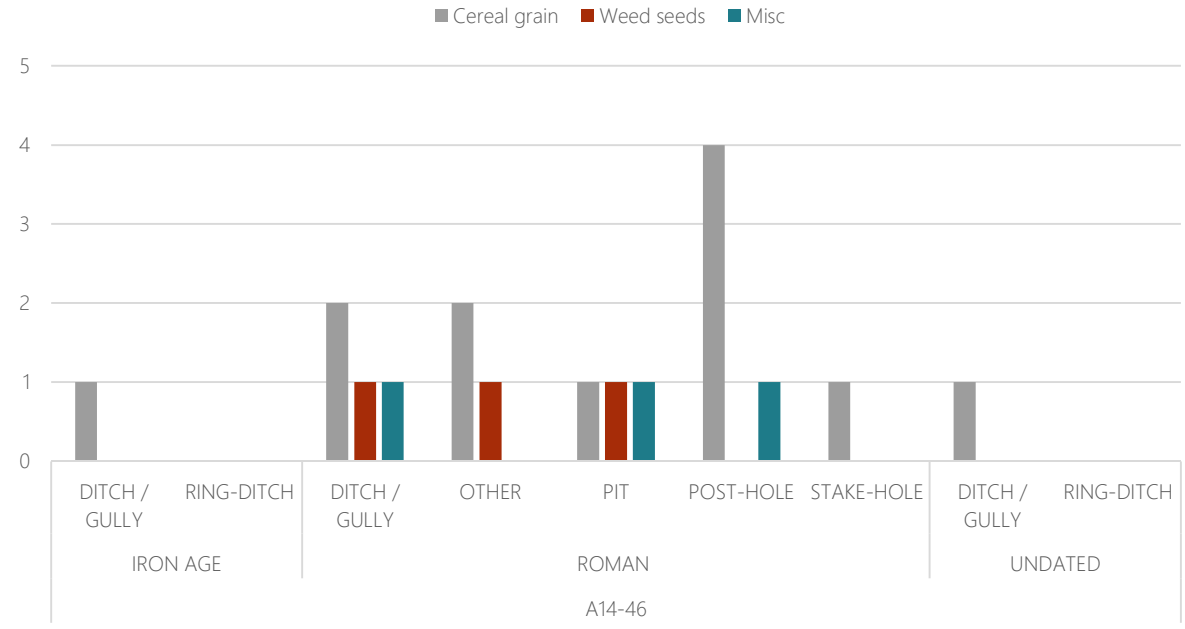


3.5.72. Number of samples per period

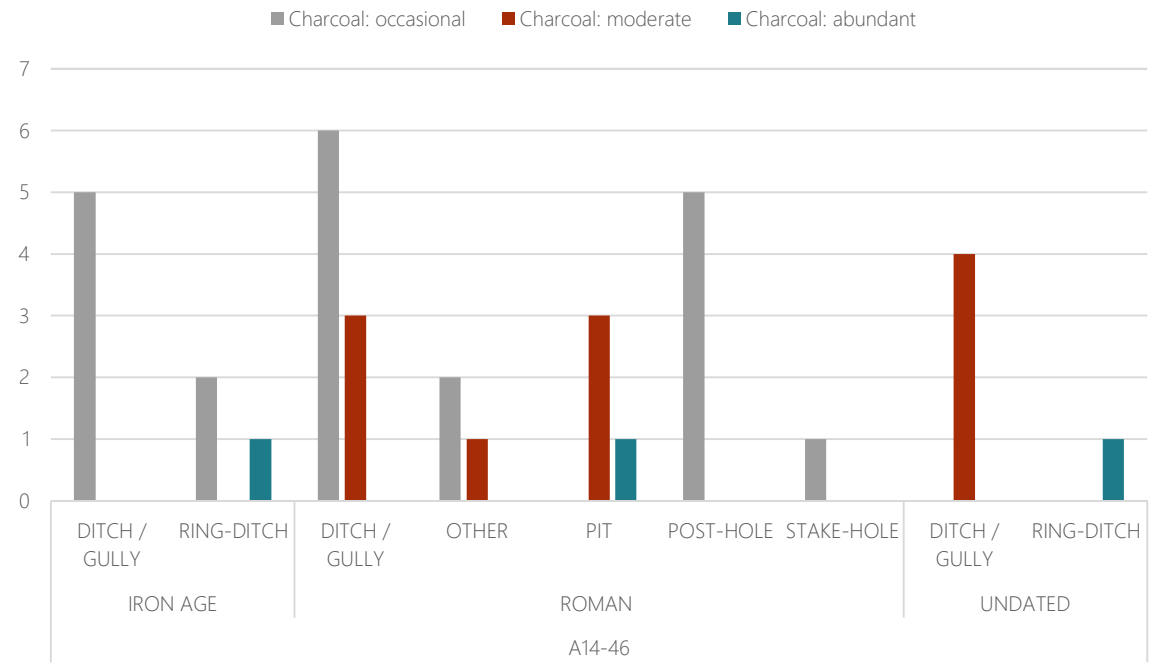
The charred plant remains exhibited mixed levels of preservation ranging from moderate to very poor. The majority of the cereal grains showed signs of abrasion which prevented identification to species level. Table 3.5.42 presents the occurrence of constituent types in samples per period.

3.5.42. The occurrence of constituent types in samples per period

Period/constituent	Cereal grain	Weed seeds	Charcoal	Misc
Iron Age	1	-	8	-
Roman	10	3	22	3
Undated	1	-	5	-



3.5.73. Occurrence of cereal grain/weeds/misc per period/feature type



3.5.74. Charcoal abundance per period/feature type

Iron Age

Iron Age features sampled included seven ditch/gully cuts from Roundhouse 46.1 and a ditch cut from Field System 46.1. The charred plant assemblage from Roundhouse 46.1 comprised occasional to moderate charcoal and was abundant in ditch [460499]. Cereals were recovered from ditch [460485] and included occasional barley (*Hordeum* sp.) glume wheat (*Triticum* sp.) and cereal indeterminate grains. Ditch [460552] from Field System 46.1 contained occasional charcoal.

No bulk sediment samples were taken from context (460466), the fill of the drip gully of Roundhouse 46.1. This context contained a partial human skull which constituted the possible human burial uncovered by CAU during their 2009 evaluation.

Roman

Samples dating from the Roman period were taken from various features (ditches, pits, postholes, stake-hole) from Enclosures 46.1 and 46.2, sub-Enclosure 46.4 and Boundary 46.1.

The ditch/gully samples from Enclosure 46.1 and Boundary 46.1, as well as the unassigned ditch/gully sections, contained occasional charcoal; ditch [460042] also contained occasional wheat/barley grains. The pits contained charcoal and this was abundant in pit [640065], which also contained a small number of barley and indeterminate cereal grains. Pit [460007] also had occasional weeds seeds.

The plant assemblage from the postholes and stake-hole comprised occasional charcoal as well as occasional cereals including barley and indeterminate cereal. Arable weed seeds were also recorded in posthole [460215].

Enclosure 46.2 was a 3rd Century AD re-cut of Enclosure 46.1. Two ditch sections; [460200] and [460428] were sampled and contained moderate charcoal. Ditch [460200] also contained occasional indeterminate cereal grains. Ditch [460438] from sub-Enclosure 46.4 contained occasional charcoal.

Two features categorised as 'other' contained moderate charcoal and occasional cereals including barley, oats (*Avena* sp.) glume wheat and indeterminate cereal. Arable weed seeds were also recorded in 'other' feature [460028].

Undated

Undated features included 4 ditch/gully cuts and a ring-ditch. Charcoal was present in all features and was abundant in ring-ditch [460539], occasional barley and indeterminate cereal grains were recorded in ditch/gully [460446].

Summary and potential of the assemblage

The overall botanical assemblage comprised barley and glume wheat and these were generally present in occasional quantities. Weed seeds present, though few, were predominantly agricultural weeds. Charcoal was present in most samples and were abundant in a ditch from an Iron Age roundhouse, a Roman pit and an undated ring-ditch section.

The archaeobotanical assemblages assessed from TEA 46 have yielded plant remains which would allow limited investigation into agricultural practices and food consumption at the time of occupation. They have local significance in relation to the understanding of the area and its use, and the diet of its inhabitants, during the periods represented. Further botanical analysis will provide evidence on these aspects and on the nature of the natural environment.

Recommendations

The table below summarises the sample selected from TEA 46 for further analysis due to the abundant concentration of well-preserved plant remains. Full details of the sample can be found in the project's digital records.

3.5.43. Summary of samples from TEA 46 selected for analysis

Site code	Period	Feature	No. samples
A14-46	ROMAN	PIT	1
Total number of samples suggested for analysis			1

OVERALL NATURE AND SIGNIFICANCE OF TOTAL ASSEMBLAGE

This overview discusses the potential of the environmental evidence to address research questions outlined in the WSIs (Highways England 2015; Atkins CHS2M 2016a-k), the East of England Research Framework (Medlycott 2011) as well as research themes highlighted by the field team and environmental specialists.

NEOLITHIC

The overall Neolithic botanical assemblage from sites across the A14 was limited in size and botanical diversity and therefore offers basic information relating to economic and agricultural practices, though the presence of hazel nutshell within the assemblage indicates the use of wild plant resources as a dietary supplement. The botanical remains recovered from 'Henge' 2.1 and Ring Ditch 12.1 offer little insight into the function of these monuments but could be used in radiocarbon dating programmes to contribute towards building a chronology of Neolithic ring-ditches in the region. In particular, a full radiocarbon dating programme on the ring ditch monument on TEA 12 may help to ascertain a construction date and subsequent use of the monument.

Comparison of the overall botanical assemblage with other similar sites in the area or region may confirm whether the species present were common on such sites or form an exception to the norm. It would also help in characterising the local environment. The comparison and landscape characterisation could easily be undertaken using the assessment results; it is unlikely that further analysis on the botanical remains themselves would add anything further than already known.

Analysis of the charcoal from the cremation burials could provide information on cremation practices (pyre temperatures) as well as information regarding the nature of the local environment and the utilisation of available resources.

BRONZE AGE

The majority of features dating to Bronze Age were those associated with funerary practices including inhumation burials from TEAs 5, 7A, 10, 27, 28 and 31 and cremation burials from TEAs 10, 12, 16, 27, 28 and 29 as well as the ring-ditch barrow in TEA 10 and the barrow in TEA 16 with the associated pit alignment. Non-funerary Bronze Age features included the enclosures, field systems, pits and wells from TEA 32/33.

Cereal remains were present in low numbers across a range of features from all TEAs with Bronze Age activity occurring in both funerary and non-funerary contexts. The cereal remains exhibited mixed levels of preservation and were identified as barley, glume wheat indeterminate and cereal indeterminate. Spelt wheat was also present in several features on TEA 10 which raises the question of whether this particular species was in use in this area from the Bronze Age onwards. Radiocarbon dating to establish the date of the spelt would enable that particular question to be addressed. Despite its size, the botanical

assemblage appears consistent in the crop species present at each TEA as well as in the similarities in the numbers of specimens present. Analysis of the cereal assemblage would help determine the crop species favoured by the Bronze Age communities living and farming in the area. The weed seed assemblage may offer information relating to sowing times and harvesting practices and could provide insight in to the characterisation of the immediate landscapes at each TEA.

Despite having a small overall assemblage there is merit for taking this material further if it is used in a meaningful way. Plotting the distribution and presence of the types of weed seeds recovered could be used in conjunction with additional environmental datasets for palaeoenvironmental reconstruction to establish changes in environmental conditions both at a site and broader landscape level. This might, in turn, be used to address why sites were located at particular points in the landscape. Comparison of the assemblage from the A14 with Bronze Age assemblages from other areas or regions may contribute to the development of our archaeobotanical and general understanding of agricultural practices in Bronze Age Britain.

The waterlogged plant remains from the well in TEA 32/33 could also be used to contribute in developing our understanding of the nature of the local landscape at TEA 32/33. The presence of hedgerow species in the wells adds another potential avenue for investigation; specifically, whether these species were collected and consumed as a supplement to the Bronze Age diet or whether they were discarded with other materials/refuse as an unrequired product. The presence of charred hazel nutshell fragments in the assemblages from TEAs 5 and 32/33 also warrants further work. It would be useful to determine whether the hazelnuts represent a wild foodstuff consumed by the inhabitants of these sites or whether their presence is the result of burning hazel wood as a fuel, that just happened to still hold hazelnuts, or a combination of both. A study of the breakage patterns on the nutshells might be useful in order to determine if they were consumed or used as fuel, additionally, analysis on charcoal fragments would confirm whether hazel wood was being used as fuel.

The majority of the cremation burials contained abundant charcoal of a size sufficient for analysis. Given the number of burials involved there needs to be a clearly defined strategy for the selection of samples for analysis, to be driven by key research themes and questions. This will also determine the number of samples used from each site to create the dataset. Research themes could include cremation practices (pyre temperatures) as well reconstruction of the local environment. Comparison of the results between sites may indicate differences in wood use for pyres, though it would be difficult to conclude whether this choice was determined by local availability or cultural choice, more likely the former.

Several of the plant assemblages from cremations contained false oat tubers. There is the question of whether the presence of these tubers in cremation deposits represent tinder/fire starters, or possibly de-turfing around the pyre site to act as a fire break, or are burnt due to the proximity to the fire. Given than these tubers occur in many of the cremation samples as individual specimens and not consistently in all cremation samples suggests that this line of enquiry would not be pursuable.

A dating programme and Bayesian modelling undertaken for TEA 16 may help to understand the development of the barrow; its construction, use and disuse.

IRON AGE

A total of 22 TEAs revealed evidence of Iron Age occupation. During analysis, the sites will be categorised and assigned to a series of landscape blocks. These landscape blocks will form the main comparative units for analysis work that is carried out. Period specific phasing has been defined as early Iron Age (TEAs 29, 32/33), Mid Iron Age (TEAs 10,29, 38, 41) and late Iron Age (TEAs 7C, 10, 29, 38, 41), where tighter phasing could not be established an overall 'Iron Age' date was assigned (TEAs 2-4, 7A, 10B East, 11, 13, 14, 15, 16, 27, 28, 29, 31, 34, 41, 46).

Wells/waterholes were present on TEAs 5, 10B East, 14, 20, 29 and 32/33. Waterlogged deposits from non-well/waterhole features were encountered on TEAs 5, 10, 14, 20 and 29. The waterlogged plant assemblages deriving from these features would further contribute to the characterisation of the landscape and environment at each of the sites as well as at a wider landscape level. Further understanding of the utilisation of local resources would come from the analysis of the preserved wooden linings from the wells on TEA29 (Wells 29.1, 29.5 and 29.6) as well as from the tools and log ladders also recovered. The flax remains present in Pit [106207] (TEA 10) may potentially be evidence of flax processing and should be investigated further.

Cereals and associated arable weeds predominantly occurred in occasional to moderate numbers but there were instances of abundant assemblages on several TEAs (2-4, 7A, 7C, 13, 14, 20). Cereals present included hulled barley, emmer wheat, spelt wheat, bread wheat and oats. Glume wheat chaff (glume bases and spikelet forks) and undifferentiated culm nodes were frequently encountered alongside the cereal grains as well as weed seeds and could potentially be used to investigate crop processing methods and/or storage practices. In addition to the cereals, other plant remains recovered such as blackberry, sloe, raspberry and elder would provide information about wild plant resources collected as a supplement to the Ion Age diet as well as informing on the nature and composition of the local environment.

While analysis of the abundant assemblages may provide more nuanced information on cereal cultivation it would also be useful to integrate the assessment results from the smaller assemblages. Spatial plots of species present and size of assemblage could aid in defining areas of activity including buildings at a site level as well as highlighting similarities or differences in agrarian practices at each site and indicating scales of production which may be influenced by local environmental conditions as well as by demand.

Samples from inhumation burials were recovered from TEAs 10 and 41, and cremation burials from TEAs 5, 7B, 7C, 14, 29, 32, and 41. Plant remains, particularly the charcoal, could be used to investigate cremation practices as well as reconstructing the character of the local environment.

ROMAN

Evidence for Roman activity was recorded across most TEAs and included settlement and landscape features such as structural features, kilns, ovens, enclosures, burials, field systems, cultivation/bedding trenches, wells, ponds and trackways. Both charred and waterlogged plant remains were recovered

producing a rich and diverse botanical assemblage that appears robust enough to be used to address a range of research themes and questions including the refinement of phasing via a comprehensive radiocarbon dating programme.

The majority of the TEAs with evidence of Roman occupation also exhibited landscape features and occupation from the later Iron Age, and a number of these sites appear to be a continuation of Iron Age developments. One of the major research aims will be to determine the extent to which it is possible to identify changes in agricultural practices, particularly with regards to intensification practices (manuring) and increased productivity due to higher demand between the later Iron Age and the early Roman periods.

Wells were present on TEAs 5, 14 and 20 and waterlogged deposits from non-well features were encountered on TEAs 5, 10, 14, 20, 27, 28 and 32-33. The waterlogged botanical assemblage comprised plant species and material that could be used to address questions relating to the nature and character of the local environment and landscape, agricultural practices and the utilisation of local resources. Flax remains (seeds, capsule and stem fragments) from TEA 10 may potentially be evidence of flax processing and should be investigated further.

The charred plant assemblage was predominantly spelt wheat with emmer wheat, hulled barley, free threshing wheat, oats and rye. Abundant cereal assemblages were encountered on TEAs 5, 7A, 10B, 11, 15, 16, 27, 28, 32/33, 41, 38 and 46. Of interest is the presence of rye (TEAs 7C, 14) which was often encountered in assemblages in combination with barley, oats and free threshing wheat. The presence of rye and free threshing wheat merits further investigation particularly in determining their introduction into the Roman crop spectra. It would also be interesting to determine if the oats present in the assemblages were wild or cultivated, this would be dependent on the presence of oat florets in order to enable the identification to be made. Weed seeds were a mixture of arable weeds, wetland and aquatic taxa and woodland (including scrub and hedgerow) taxa and will contribute to the reconstruction of the local and wider landscape as well informing on agricultural practices.

Concentrations of spelt wheat and barley grains and cereal chaff were observed in kilns from TEAs 7A, 10, 10B, 11, 14, 16, 28 and 38. A high proportion of the grains were sprouted and were found alongside detached kernel embryos and glumes. It would be worthwhile investigating whether the kilns from the A14 served a similar function to corn-dryers ie being used to dry glume wheats prior to de-husking, or to dry grain as part of the malting process. A combined analysis of the plant remains, kiln lining/structures, pottery, millstones and querns should enable the relationship of the agricultural cycle (and food processing and preparation) with the pottery industry to be explored.

Weed seeds recovered included arable weeds, wetland and aquatic taxa and woodland (including scrub and hedgerow) taxa. A small number of the samples yielded potentially imported plant foods including fig (TEAs 10, 14 and 20), grape (TEAs 10, 20, 41) and olive (TEA 20). Spatial plots of the weed seeds will contribute to the reconstruction of the local and wider landscape, and, when viewed in conjunction with the cereals, would inform on agricultural practices. This will require species identifications to be undertaken on weeds from the assessment samples.

Four TEAs (21, 26, 27, 32/33) contained cultivation/bedding trenches. Unsurprisingly, the botanical assessment of the samples from these features contained no evidence to suggest the crops grown in the cultivation/bedding trenches. It is possible that pollen analysis undertaken on any remaining bulk sediment samples from these features may be more successful and determining what horticultural plants were being produced.

SAXON

Saxon occupation was noted across nine TEAs and included post-built structural features (TEAs 7C, 10, 11, 12, 32) sunken-featured-buildings (TEAs 2-4, 7C, 10, 11, 12, 14, 15, 16 and 32-33) and wells (TEAs 10, 12 and 32/33). The largest concentration of activity was at TEA 7C where 3000 postholes belonging to at least 38 buildings were uncovered. Cereals recovered from across the sites (including concentrations from TEA 7C) included free threshing wheat, barley, oats and rye. Cereal chaff was present in much smaller quantities and included glume wheat glume bases as well as barley, rye and free threshing wheat rachises. The low presence of chaff from the Saxon deposits is interesting due to the high concentration of plant remains found in these deposits. It would be worth investigating whether the removal of chaff from free threshing cereal, rye and oats were carried out nearby in the fields and/or in barns and only semi clean grain was brought into the houses.

Analysis of the plant remains from the SFBs and other structural features could be used to identify the functions of the buildings. Many of the pits adjacent to the SFBs also produced rich and varied plant assemblages, the analysis of which may also provide insight into agrarian and industrial activities taking place. Spatial plots of the remains would not only provide information on the type of activities and the use and allocation of space within buildings (postholes versus floors) but may also reveal information on the zonation and use of space across occupation areas/sites as a whole. It may also be possible to distinguish between different depositional events based on the composition of the assemblages.

The samples (particularly those from TEA 7C and TEA 32) yielded abundant cereals (grains and chaff) and weed seeds occurring in concentrations and patterns that would lend themselves well to the investigation of transitions in farming practices between the Roman and Saxon periods, as well as establishing the type of agriculture practiced at the different sites located along the route of the A14 in the Saxon period. In addition to informing on agricultural practices, the weed seeds recovered should enable the reconstruction of the vegetation and local environment at these sites.

MEDIEVAL

The remains of part of the deserted medieval village of Houghton were uncovered in TEA 7C covering an area of approximately 2.5ha. The village is in a slightly different location to the earlier Saxon settlement also located at TEA 7C and so there is the potential to investigate the transition between the two periods. Structural features including the remains of 12 buildings were excavated, although the function of these buildings is currently unknown, some of them seem to have served some type of industrial purpose. Others, due to the recovery of domestic pottery from them, seem to have been houses. Plant remains present included free threshing wheat, hulled barley and oat grains with lower numbers of chaff (free threshing wheat, barley, oat rachises). In contrast, the building deposits have

yielded a higher concentration of weed seeds than the Saxon buildings. Analysis of the weed seeds would contribute to the reconstruction and characterisation of the local environment as well as providing information on agrarian and potential industrial practices.

In addition to the buildings, 23 groups of pits and wells were identified within the area of the medieval village and were interpreted as having a variety of different functions. These deposits have produced the highest concentration of plant remains. Pits from Pit Group 7C.35 are thought to have an industrial function however the high presence of charcoal, remains of cereal products (bread, porridge, etc) and cereal grains and chaff suggests the use of these as refuse pits or perhaps as 'corn dryers' or ovens. Analysis of the plant remains from these pits may establish their actual function.

Also of interest is the relatively high presence of flax seeds in ditches and postholes from Structural Features 7C.10. This building was categorised during excavation as a "large barn" however the absence of chaff excludes the possibility of this building being used for crop-processing activities. Further analysis of the environmental assemblages will help to shed light on the role of this structure.

Spatial plots of the remains may provide information on the type of activities associated with specific buildings and features as well as the use and allocation of space within buildings. The plots may also reveal information on the zonation and use of space across the site, particularly the location of domestic and industrial areas. It will be interesting to see where the flax remains are concentrated, as flax retting and processing was one of the more undesirable processes that was often confined to the extremities of a settlement.

Many TEAs also contained evidence for medieval agriculture, including TEAs 14, 27, and 32/33. The plant remains recovered were poorly preserved and few in number, however, spatial plots of species present would enable basic landscape and environment characterisation to be undertaken, this could be achieved using the assessment data. Analysis of the assemblage is unlikely to add anything further than has already been concluded during assessment.

Radiocarbon dating should enable a more refined chronology to be produced.

POST-MEDIEVAL

Evidence for post-medieval activity was recorded on seven TEAs (2-4, 7, 10, 15, 20, 28 and 32/33). This included two 19th century brick kilns on TEA7C, structural features, pit and ditches. The charred plant assemblages comprised cereals, weed seeds and woodland (including scrub and hedgerow) taxa. The number of remains from each site were low and a large proportion of the features sampled exhibited signs of disturbance and so it is uncertain whether further analysis is warranted.

UNDATED

Each TEA contained features that remained undated during the assessment phase. A large proportion of the samples from the undated features contained abundant charred plant assemblages that fit the criteria being used for selecting samples for analysis. It is of the utmost importance that a review is undertaken of the undated features with abundant remains, with the aim of trying to phase/date as

many of these features as possible. There is no doubt that the plant remains from these features would make a valuable contribution during analysis and every effort must be made to include them.

SUMMARY

In summary, analysis tasks and potential research themes to be explored through the environmental data during analysis include:

- Full species identification of food plant remains (cereal, pulses, flax, etc) in samples selected for analysis. Spatial and chronological distribution of these species to investigate patterns in crop-choice and differential use (eg food, fodder, etc).
- Species identification of weed seeds on samples not fully identified during the assessment phase.
- Spatial plots using assessment data to look for patterns in species distribution which would inform on the nature of the local environment, utilisation of resources, agricultural practices, areas of activity on a site, areas of activity in buildings.
- Landscape characterisation: local and wider landscape for all sites/all periods.
- Establishing environmental conditions to investigate whether the environment influenced the choice of locations or whether the environment was modified and altered to suit occupation and utilisation.
- Robust AMS radiocarbon dating programme to support wider research themes.
- Identifying agricultural practices including type and intensity of agriculture (sowing, harvesting, weed ecology, manuring).
- Evidence for crop storage.
- Evidence for crop processing.
- Evidence for milling and grinding.
- Evidence for malting.
- Evidence for the seasonal use of kilns and the relationship between the agricultural cycle, food preparation and the pottery industry.
- Evidence for flax processing.
- Interrelationship between sites and how they fit into wider landscape units.
- Charcoal analysis on cremation burials to provide information on pyre technology.
- Charcoal analysis to provide information on fuel use: domestic and industrial.
- Charcoal analysis to provide information on woodland management.

RECOMMENDATIONS

The results of the assessment study of the charred and waterlogged plant remains from each TEA were considered alongside stratigraphic information, phasing data and the potential of each assemblage to address archaeobotanical and wider archaeological research themes.

Selection criteria for analysis included:

- Abundant concentrations of well-preserved plant remains
- Assemblages belonging to a context of high significance, as defined within the stratigraphic assessment report
- Samples containing unusual species and food remains
- Assemblages from deposits for which information on this type of deposit and/or period is scarce
- Charcoal fragments where of a size suitable for identification
- Material with secure radiocarbon dating potential

The following samples are provisionally recommended for full analysis, though this is dependent on secure dating of the current unphased samples.

3.5.44. Summary table of samples selected for full analysis (CPR, Charcoal and WPR)

Landscape/TEA	Neolithic	Bronze Age	Iron Age	Roman	Saxon	Medieval	Post-medieval	Undated	Total
Alconbury	**10**		**8**	**14**	**3**			**5**	**40**
A14-2	10				3				13
A14-4			1	3					4
A14-5			7	11				5	23
Bar Hill			**17**	**15**				**10**	**42**
A14-41			6					2	8
A14-46				1					1
TEA 38			11	14				8	33
Brampton South		**1**	**6**					**3**	**10**
A14-10B East			2					2	4
A14-13		1	4					1	6
Brampton West	**2**	**4**	**52**	**133**	**74**	**49**	**3**	**54**	**371**
A14-10		1	19	15	4		1	8	48
A14-11				17	5			2	24
A14-12	2	3		4	11		2	8	30
A14-7			33	97	54	49		36	269
Conington	**4**	**3**	**5**	**17**	**17**			**3**	**49**
A14-32	4	1		7	17			2	31
A14-33		2	5	10				1	18
Fenstanton Gravels			**46**	**127**				**22**	**197**
A14-26								2	2
A14-27				3				2	5
A14-28			17	122				17	156
A14-29			16						16
A14-31			13	2				3	18
River Great Ouse			**8**	**109**				**24**	**141**
A14-20			6	109				24	139
A14-21			2						2
West of Ouse	**1**	**8**	**11**	**23**	**6**			**7**	**56**
A14-14			5	8				1	14
A14-15			1	7				3	11
A14-16	1	8	5	8	6			3	31
Total	**17**	**16**	**153**	**438**	**100**	**49**	**3**	**130**	**906**

A full list of recommended samples is contained in the project post-excavation records.

These samples will be analysed for charred and waterlogged plant remains and charcoal as follows:

3.5.45. Number of samples selected for analysis divided into CPR, Charcoal and Waterlogged.

Landscape Block	CPR	Charcoal	Waterlogged
Alconbury	20	10	10
Brampton West	246	87	38
Brampton South	2	8	-
West of Ouse	35	16	5
River Great Ouse	101	23	17
Fenstanton Gravels	148	35	14
Conington	36	13	-
Bar Hill	28	10	4

During analysis charred and waterlogged seeds, grains, fruit stones, nutshell and other plant materials will be identified to the highest taxanomic level possible by comparison to modern reference collections housed at MOLAHeadland and seed atlases including Cappers et al (2006) and Zohary et al (2012). Nomenclature for domesticated crops including cereal taxa will follow Zohary et al (2012) while wild taxa will follow Stace (2010).

A minimum of ten charcoal or waterlogged wood fragments will be randomly selected from each sample for species identification with a minimum fragment size of 4mm. Wood charcoal fragments will be fractured manually, and the resultant anatomical features will be observed in transverse (TS), radial (RLS) and tangential planes TLS), using high power binocular reflected light (episcopic) microscopy at magnifications of x 50, x 100 and x 400. Identifications will be carried out to as high a taxonomic level as possible by comparison with material in the reference collections at MOLAHeadland, and various reference works (eg Schweingruber 1978; 1990; Hather 2000). Where possible, a record will be made, of the ring curvature of the wood as well as details of the ligneous structure, in order to determine the part of the woody plant which had been burnt and the state of wood before charring (Marguerie and Hunot 2007). The charcoal will also be examined for evidence of biological degradation in the form of fungal hyphae. It will also be inspected visually for any irregular patterns of channels which could result from boring insect or woodworm degradation (Marguerie and Hunot 2007).

Analysis results will be recorded onto the ORACLE analysis database. The analysis data will remain standardized in order to allow comparison to be made between plant remains from sites across the A14 scheme and sites across the UK. An integrated methodological approach will be applied in order to focus on areas which will include:

- Identification of crop choices and characterisation of botanical assemblages per period and landscape type.
- Identification of crop processing stages and food preparation practices to be determined through grain versus chaff and weeds ratio analysis, discriminant analysis and the physical characteristics of weed seeds.

- The investigation of cultivation practices including intensification, land preparation, manuring and tillage using a range of methods including the Functional Interpretation of Botanical Surveys (FIBS) looking at the functional attributes of weeds, and comparison of the A14 data to known weed floras associated with different husbandry regimes. This will also include a review of supporting archaeological evidence such as artefactual remains, field systems and marks.
- Spatial plotting using of analysis and assessment data to look for patterns in species distribution to inform nature of local environment, the utilisation of resources, areas of activity on a site and areas of activity within buildings.
- Landscape characterisation: local and wider landscape for all sites/all periods using charred and waterlogged plant remains including charcoal.
- The investigation of the seasonal use of kilns and other fire installations and the relationship between the agricultural cycle, food preparation and the pottery industry.
- The analysis of wood species used for structural features, domestic and industrial fuel as well as cremation pyre practices.

The main outputs for publication and dissemination include:

- Archaeobotanical contribution to developing the narrative for each landscape block, addressing research themes set at site, landscape, period, regional and UK wide levels
- Contribution to major project publications
- Contribution to peer-reviewed journals
- Creation of an online digital open-access archive of archaeobotanical data tables
- Contribution to the A14 Isotope analysis project

Discard Policy

Following the completion of the identification and analysis of the plant remains the intention is to select and retain botanical specimens that characterise assemblages associated with specific period types and ecological groups in order to create a comprehensive reference collection. It is intended for this reference material to be openly accessible for anyone to use.

Given the number of samples taken and the size and diversity of the archaeobotanical assemblage it would be worthwhile contacting Universities to determine if material could be utilised in current research projects or as part of Undergraduate or Postgraduate thesis projects.

The material could also be used as a teaching resource for environmental field schools targeted to participants from a range of backgrounds and academic levels ranging from undergraduate students, schools and general interest groups.

ARCHAEOBOTANICAL ANALYSIS OF REMAINS OF CEREAL-BASED FOODS

Lara Gonzalez Carretero

During the post-excavation assessment of the archaeobotanical samples from the different TEAs from the A14 project, a total of 268 flotation and residue samples were found to contain charred food remains. These remains were recovered by flotation and were identified as potential fragments of cereal-based foods during the assessment of the botanical remains present in the flotation samples. They have the appearance of amorphous charred lumps or organic matter and after observation under the low-powered binocular microscope these are believed to represent remains of cereal-based foods such as breads, porridges and beer/ale brewing residue among others.

Preliminary identification was possible using a low-powered binocular microscope and Scanning Electron Microscope (SEM) for a very small quantity of selected fragments. Their identification as possible bread-like, porridge-like and ale-like materials was done following the methodology stated in Gonzalez Carretero et al (2017) and Heiss et al (2017).

This project proposes the further in-depth analysis of the identified archaeological remains of cereal-based foods using systematic observation under Scanning Electronic Microscope (SEM) and comparison with experimentally prepared cereal-based foods. These analyses will investigate different plant (cereals, pulses, wild seeds, etc) and animal (milk, honey, animal fat, etc) ingredients used for the preparation of these cereal meals, in addition to the possible cooking methods which

Research Aims and Questions

The ultimate aim of this project is to provide insights into the *Chaîne opératoire* of cereal-based food production from the Iron Age to the medieval period in Cambridgeshire. In this sense, this study seeks to identify the plant and animal ingredients present in the recovered food fragments from different sites across the A14 Scheme, in addition to the observation and investigation of their different microstructures which are believed to be a result of different cooking processes such as boiling, baking or brewing.

This study seeks to answer the following research questions:

- Can we infer the nature and origin of the recovered archaeological food remains through high-resolution microscopy?
- How many and what are the characteristics of the different types of cereal-based foods recovered from the A14 excavations?
- How important was the role of bread-like products during the Iron Age Period in the area?
- How important was the role of porridge-like products across sites and through time in the area?
- How important was the role of ale or beer-like products across sites and through time in the area?
- Is there evidence for intra-site culinary variation across time?
- Is there evidence for culinary patterns or differences across sites and time?

- Can we infer differences in the use of cereal crops and other plant ingredients for the preparation of specific foods and through time?

Proposed Methodology

In order to investigate past culinary traditions and crop choice for the daily preparation of meals across sites and time periods from the A14 scheme, the aim is to apply an integrated methodological approach. The proposed methodology will focus on three main aspects:

- ✓ The analysis of the plant species composition present in the food fragments (main plant ingredients).
- ✓ The analysis of the food fragments' microstructure to determine different preparation and cooking processes, such as baking or boiling.
- ✓ The comparison of archaeological food fragments with experimentally prepared reference materials.

This integrated methodological approach will combine:

I. Low-Powered microscopy: the study of microstructures and plant cell-tissues under low-powered binocular.
II. Scanning Electronic Microscopy (SEM): more detailed characterisation under Scanning Electronic Microscope, including the study of the food matrix through semi-quantitative recording of voids and plant particles and anatomical description of any included recognisable plant tissues.
III. Experimental food preparation and charring experiments: the experimental preparation of cereal meals to use as reference materials for comparison with the archaeological charred food fragments.

Use of Facilities

Scanning and sorting of food residues will be carried out at Museum of London Archaeology (MOLA) in collaboration with Headland Archaeology. Scanning Electronic Microscopy (SEM) will be done at the UCL institute of Archaeology.

This project offers the opportunity of involving local communities, local and national businesses and students in the preparation and recreation of past cereal products. The proposed experimental work will involve the organisation of engagement and outreach activities involving the local communities, schools and university students.

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INSECT REMAINS

Enid Allison

Eight samples from waterlogged deposits in TEA 5 and TEA 10 were submitted for assessment of insect remains. Two of the deposits were Iron Age in date, two Roman, and the rest are currently undated. Sample selection was on the basis of observations of insect remains in particular samples during the earlier stages of the archaeobotanical assessment (Angela Walker, pers comm.). At the time of selection, only a fraction of the waterlogged samples from the site had been processed. Subsequently thirty-seven other samples, almost all from features of interest, with preservation by anoxic waterlogging have been flagged up as having abundant or moderate numbers of insect remains. These are mentioned where relevant below.

METHODOLOGY

The samples processed specifically for recovery of insects had volumes of 3 - 5 litres. The initial wet-sieving was carried out by Angela Walker at Headland Archaeology using the 'washover' method, which separates the organic component from mineral material. Recovery was to 0.25mm. Paraffin flotation was then carried out to extract insect remains following Kenward et al (1980) with recovery on 0.3mm mesh. The paraffin flots were scanned in industrial methylated spirits (IMS) in a petri dish under a low-power stereoscopic zoom microscope (x10). Abundance of beetles (Coleoptera) and bugs (Hemiptera) and their state of preservation was recorded, and the potential of the assemblages to provide detailed environmental data was assessed. Ecological groups shown in square brackets in 2.5044 are based on codes used by Kenward et al 1986, Kenward 1997 and Smith et al (in prep). Invertebrates other than insects were also noted. Nomenclature for Coleoptera follows Duff (2018). The paraffin flots are currently stored in jars of IMS.

RESULTS

The paraffin flots are of moderate size (in the order of 20ml or less) and all contain insect and other invertebrate remains. A list of all taxa noted during scanning is shown in Table 3.5.47. The list is provisional and provides only an incomplete record.

Identification has not been pressed to species level in many cases and the list should be regarded as provisional. Ecological codes shown in square brackets for Coleoptera (beetles) and Hemiptera (bugs) are as follows: d – damp ground/waterside, h – typical house/building fauna; oa – outdoor taxa (not found within buildings or accumulations of decomposing organic material), ob – probable outdoor taxa, p – plant-associated taxa, rd – dry decomposers, rf – foul decomposers, rt – eurytopic decomposers, sf – facultative synanthropes, st – typical synanthropes, u – uncoded, w – aquatics. Some taxa are uncoded pending closer identification. Nomenclature for Coleoptera follows Duff (2018).

3.5.46. Insects and Other Invertebrate Taxa noted during scanning the paraffin flots.

ANNELIDA
Oligochaeta (earthworm) egg capsules

CRUSTACEA
CLADOCERA (water fleas)
Daphnia spp. ephippia
Cladocera sp(p). ephippia (not *Daphnia*)
OSTRACODA
Ostracoda sp(p).

INSECTA:
DERMAPTERA (earwigs)
Dermaptera sp.
HEMIPTERA (bugs)
Heteroptera
Heterogaster urticae (Fabricius) [oa-p]
Lygaeidae spp. [oa-p]
Heteroptera spp. [u]
Homoptera
Delphacidae spp. [oa-p]
Auchenorhyncha spp. [oa-p]
?*Craspedolepta nervosa* nymph skins [oa-p]
Trioza urticae nymph skins [oa-p]

COLEOPTERA (beetles)
Haliplidae (crawling water beetles)
Haliplus sp. [oa-w]
Dytiscidae (diving beetles)
Agabus bipustulatus (Linnaeus) [oa-w]
Agabus or *Ilybius* sp(p). [oa-w]
Colymbetes fuscus (Linnaeus) [oa-w]
Hydroporinae spp. [oa-w]
Dytiscidae spp. [oa-w]
Carabidae (ground beetles)
Clivina sp. [oa]
Trechus obtusus or *quadristriatus*
Bembidion spp. [oa]
Pterostichus melanarius (Illiger) [ob]
Ophonus sp. [oa]
Harpalini sp. [oa]
Calathus fuscipes (Goeze) [oa]
Anchomenus dorsalis (Pontoppidan) [oa]
Carabidae spp. and sp. indet.[ob]
Helophoridae (grooved water scavengers)
Helophorus (*Empleurus*) sp. [oa]
Helophorus spp. [oa-w]
COLEOPTERA (beetles) continued:
Geotrupidae (dor beetles)

COLEOPTERA (beetles) continued
Hydrophilidae (water scavengers and allies)
Hydrobius fuscipes (Linnaeus) [oa-w]
Laccobius sp. [oa-w]
Hydrophilinae sp. [oa-w]
Cercyon spp. [u]
Cryptopleurum minutum (Fabricius) [rf-st]
Megasternum concinnum (Marsham) agg. [rt]
Sphaeridium sp. [rf]
Histeridae (clown beetles)
Onthophilus striatus (Forster) [rt-sf]
Hydraenidae (moss water beetles)
Hydraena testacea Curtis [oa-w]
Hydraena sp. [oa-w]
Limnebius sp. [oa-w]
Ochthebius ?dilatatus Stephens [oa-w]
Ochthebius (*Asiobates*) sp. [oa-w]
Ochthebius cf *minimus* (Fabricius) [oa-w]
Ptiliidae (featherwing beetles)
Acrotrichis sp. [rt]
Leiodidae
Cholevinae sp(p). [u]
Staphylinidae (rove beetles)
Omalium sp.(p) [rt]
?*Xylodromus concinnus* (Marsham) [rt-st]
Lesteva longoelytrata (Goeze) [oa-d]
Omaliinae spp. [u]
Metopsia clypeata (Müller)
Tachinus spp. [u]
Tachporus spp. [u]
Cypha sp. [u]
Cordalia or *Falagria* sp. [rt-sf]
Falagria sp. [rt-sf]
Aleocharíinae spp. [u]
Carpelimus spp. [u]
Platystethus cornutus group [oa-d]
Platystethus nitens (Sahlberg) [oa-d]
Platystethus arenarius (Geoffroy in Fourc.) [rf]
Anotylus nitidulus (Gravenhorst) [rt-d]
Anotylus rugosus (Fabricius) [rt]
Anotylus spp. [rt]
Stenus spp. [u]
Lathrobium sp. [u]
Gyrohypnus fracticornis [rt-st]
Xantholinus sp. [rt]
Staphylininae spp. [u]
DIPTERA (flies)
Melophagus ovinus (Linnaeus) puparia (keds)

Geotrupinae sp. [oa-rf]
Scarabaeidae (dung beetles and chafers)
Calamosternus granarius (Linnaeus) [ob-rf]
Nimbus contaminatus (Herbst) [oa-rf]
Oxyomus sylvestris (Scopoli) [rt-sf]
Aphodiinae spp. [ob-rf]
Onthophagus sp. [oa-rf]
Phyllopertha horticola (Linnaeus) [oa-p]
Cetonia cf *aurata* (Linnaeus) [oa-p]
Byrrhidae (pill beetles)
Byrrhus sp. [oa]
Elateridae (click beetles)
Elateridae spp. [ob]
Cantharidae (solider beetles)
Cantharidae sp. [ob]
Kateretidae
Brachypterus sp. [oa-p]
Nitidulidae
Meligethes sp. [oa-p]
Cryptophagidae) (silken fungus beetles)
Atomaria sp. [rd]
Ephistemus globulus (Paykull) [rd-st]
Corylophidae
Orthoperus sp. [rt-sf]
Corylophidae sp. [rt]
Latridiidae (minute brown scavenger beetles)
Latridius minutus group [rd-st-h]
Enicmus sp. [rd-sf]
Corticariinae sp. [rt]
Chrysomelidae (seed and leaf beetles)
Gastrophysa viridula (De Geer) [oa-p]
Prasocuris phellandrii (Linnaeus) [oa-p-d]
Neocrepidodera sp. [oa-p]
Longitarsus sp. [oa-p]
Phyllotreta nemorum group [oa-p]
Phyllotreta sp. [oa-p]
Psylliodes sp. [oa-p]
Alticini spp. [oa-p]
Chrysomelidae spp. [oa-p]
Apionidae
Apionidae spp. [oa-p]
Erirhinidae (wetland weevils)
Tanysphyrus lemnae (Paykull) [oa-p-w]
Curculionidae (weevils)
Ceutorhynchinae spp. [oa-p]
Curculionidae spp. [oa-p]
Coleoptera spp. and sp. indet. [u]

Diptera spp. puparia

HYMENOPTERA
Formicidae spp. (ants)
Parasitica spp. (parasitic wasps)

Insecta spp. larval fragments

ARACHNIDA
Acarina spp. (mites)
Aranae sp. (spiders)

TEA 5

Four samples were assessed: two from deposits associated with an Iron Age enclosure and two from pits that are currently undated. All four samples produced substantial insect assemblages with a good potential for further work. The remains are generally well-preserved although fragmentation is high for larger taxa.

Iron Age deposits associated with enclosure (Enclosure 5.8 and 5.9)

Aquatic and terrestrial beetles are abundant in the sample from ditch/gully [51963] (context (51966), sample <5260>). Water beetles include a number of predaceous forms suggesting a somewhat developed community in still water. Terrestrial taxa include ground beetles (Carabidae), scarabaeoid dung beetles (Geotrupinae, Aphodiinae), and plant-feeders such as ?*Phyllopertha horticola* which is associated with grassland, *Gastrophysa viridula* found on docks, and *Phyllotreta nemorum* group which feed on various wild and cultivated Brassicaceae. Relatively low numbers of synanthropic decomposers were noted during scanning.

The assemblage from a deposit categorised as 'other' (context (52211), sample <5280>) was similar to that from the above sample in many respects but aquatic insects included *Tanysphyrus lemnae*, a tiny weevil found on duckweed. Other plant-feeders included *Gastrophysa viridula* found on docks, *Trioza urticae* nymphs and *Brachypterus* found on nettles, and *Prasocuris phellandrii* found on wetland Ranunculaceae (buttercup family). Scarabaeoid dung beetles included *Calamosternus granarius*, one of the commoner dung beetles associated with occupation sites.

A further sample containing waterlogged plant material from a pit associated with the Iron Age enclosure (Enclosure 5.8) has been identified during the archaeobotanical assessment as containing abundant insect remains (context (51834), sample <5245>). This should be examined at the analysis stage to enhance information on Iron Age activity.

Undated Pit Fills

Aquatics in samples from pits [51161] (context (51160), sample <5046>) and [51201] (context (51202), sample <5052>) were dominated by *Helophorus* species which invade many types of water body, even if small or temporary. 'Outdoor taxa' (not usually found within buildings or in accumulations of decomposing organic material) were common among terrestrial taxa. Plant-feeders included *Trioza urticae* nymphs and *Brachypterus* found on nettles. Scarabaeid dung beetles (Aphodiinae) were common and decomposers were well-represented, notably by *Oxyomus sylvestris* chiefly found in vegetable refuse including dung heaps, but rarely in dung lying in fields (Jessop 1986, 19). A small group within the decomposer component in sample <5046> is suggestive of the disposal of litter from within buildings. The presence of fragmentary ked (*Melophagus ovinus*) puparia in the same sample suggests that these included buildings where fleeces or wool was cleaned.

TEA 7

Thirteen samples have been flagged up as containing insect remains, eleven of them from the fills of pits interpreted as wells/waterholes dating to the Iron Age, Roman and medieval periods. Selected samples from these features should be examined at the analysis stage.

TEA 10

Four samples were assessed: two from a Roman pit, and two from undated deposits categorised as 'other'. Three of the samples produced substantial insect assemblages with a good potential for further work, the fourth sample produced fewer and less diverse remains. The remains are generally well-preserved although fragmentation is high for larger taxa.

Roman Pit Fills (Pit Group 10.57)

Aquatic (mainly *Helophorus* spp.) and terrestrial taxa were recorded in sample <10305> from context 103788 and sample <10308> from context 103791. A richer assemblage was obtained from sample <10305> and it has a higher potential for analysis: 'outdoor' taxa and scarabaeoid dung beetles were common and a small group within the decomposer component suggests the disposal of litter from within buildings. The presence of fragmentary ked (*Melophagus ovinus*) puparia suggests that this included material from buildings where fleeces or wool was cleaned.

Undated Deposits

Scarabaeoid dung beetles (mainly Geotrupinae and *Nimbus contaminatus*) were notably common in sample <10300> (context 103817), where their remains accounted for almost all of the assemblage, and also in sample <10301> (context 103818) suggesting the close proximity of domestic animals or land used for grazing.

Additional Samples

A further 8 samples from pit fills, a ditch and a feature categorised as 'other' are recorded as having produced insect material.

TEA 14

A single sample from a Roman pit (context 141144, sample <14078>) was noted to contain insect remains during the archaeobotanical assessment.

TEA 20

Seven samples were flagged up as containing insects remains.

TEA 28

One sample was flagged up as containing insects remains.

TEA 29

Six samples were flagged up as containing insects remains.

CONCLUSIONS AND RECOMMENDATIONS

All but one of the eight samples examined during this assessment produced substantial assemblages of beetles and bugs that have a good potential for analysis, provided that dating evidence can be obtained for four of the deposits.

Although aquatic insects are well-represented in most samples, many of the beetles and bugs in all samples are from terrestrial habitats and these should provide information on vegetation, the local environment, land use, waste disposal practices and, in some cases, on craft activities associated with local settlement. The presence and relative abundance of synanthropic decomposer beetles in the assemblages may be useful in ascertaining whether particular features have been used for waste disposal.

Scarabaeoid dung beetles (predominantly Aphodiinae and Geotrupinae) appear to be notably common in Roman or undated samples providing strong indications that some areas were in agricultural use as grazing land during the periods represented. Dung beetles are relatively mobile but modern studies of insect remains from small water bodies has shown that such species will generally have arrived from within a 100-200 metre radius. The same studies have shown that the relative proportion of the group in insect assemblages can reflect the intensity of grazing in the surrounding area Smith et al (2010, 2014).

In addition to the assessed samples, 37 others from TEAs 5, 7, 10, 14, 20, 28 and 29 (mainly from waterlogged deposits), have been flagged up during archaeobotanical work as containing abundant or moderate numbers of insect remains. It is suggested that up to 20 of these extra samples, where good preservation of waterlogged plant material has been demonstrated, are examined specifically for insects during the analysis stage. If possible, separate sub-samples of sediment (3-5 litres) should be processed for this. The paraffin flots produced can be scanned and samples that are likely to produce the most useful information can be selected for detailed analysis, with the rest scanned to produce at least some information. There will be up 27 samples to be investigated at some level including the seven samples identified as suitable for analysis during the current assessment. Sample selection at all stages should be in consultation with the post-excavation and environmental managers to cover particular periods and areas of activity and features of interest.

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