PREHISTORIC TO MEDIEVAL DISCOVERIES ALONG THE A21 TONBRIDGE-PEMBURY DUALLING SCHEME

TIM G. ALLEN

With contributions by
Enid Allison, Hugo Anderson-Whymark, Michael Donnelly, Julia Meen, Rebecca Nicholson, Ruth Pelling and Mairead Rutherford.

Excavations along a 4km stretch of the A21 between Tonbridge and Pembury uncovered evidence of activity from the early prehistoric period to the Middle Ages. Earlier prehistoric results comprise two Mesolithic flint scatters (one little-disturbed) and an isolated pebble hammer, a Neolithic pit, a widespread but sparse spread of other struck flints and a middle Bronze Age burnt mound with two rectangular pits. Late Bronze Age and early Iron Age activity was absent. In the middle Iron Age, and broadly contemporary with the Castle Hill hillfort 1.5km to the north, a sub-circular ditched enclosure some 50m across was constructed, with traces of a former house enclosure inside, and occasional pits and ditched boundaries to the north. Associated finds were very few. Scattered along the scheme, south of the hillfort, circular shallow features with in situ burning and much oak charcoal suggest exploitation of the wooded landscape, possibly for charcoal production. The ditch of the circular enclosure was still partly open in the Roman period and was used for smithing.

In the medieval period a further scatter of circular features burnt in situ, now with mainly beech or birch charcoal, was found, and probably indicate a resumption of charcoal production, presumably for local industries based in Tonbridge. Environmental evidence from a medieval channel downstream of Bourne Mill indicates a reduction in tree cover at this time and that, unusually, spelt wheat was being grown locally in the late 13th or 14th century, while synanthropic beetles suggest that the mill was occupied from at least the twelfth century.

Oxford Archaeology (OA) was commissioned by Balfour Beatty Plc to undertake the archaeological mitigation for the construction of the A21 Tonbridge to Pembury Dualling Scheme for Highways England running between NGR TQ 5960 4480 and 6115 4200 (**Fig. 1**). The scheme is 4km long, and rises from 45m AOD at the north-west to around 116m AOD in the centre, dropping again to around 99m AOD at the south. The north-western end of the scheme sits upon the Ashdown Formation – sandstone, siltstone and mudstone. The central part of the scheme is underlain by the Wadhurst Clay Formation – mudstone, with the Tonbridge sand formation at

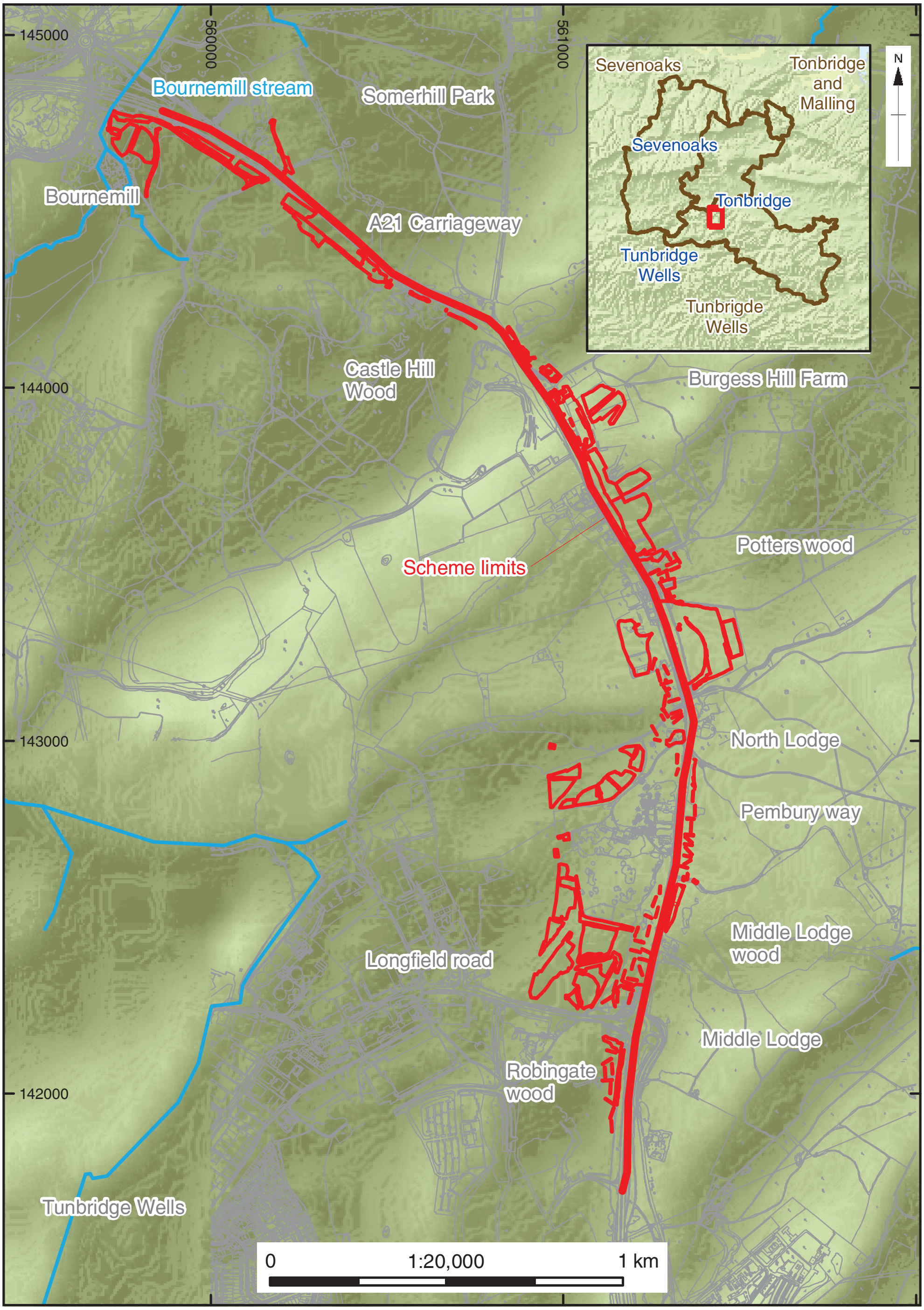

Fig. 1 The location of the dualling scheme showing relief shading and topographical features.

the south end, and in outcrops in the centre (BGS nd). Archaeological mitigation involved the stripping and recording of seven predetermined excavation areas (IA1-IA7) and strip mapping and sampling of other Woodland Creation (WC) areas, totalling over 20ha, took place between October 2014 and October 2017.

Post-medieval findings, including a brickworks and discoveries made while recording Burgess Hill Farm during and following demolition, will be published as a separate Oxford Archaeology monograph. This article summarises the discoveries made up to the early post-medieval period, and includes eight Specialist Reports: on the lithic finds (1-2), radio-carbon dating (3-4) and various environmental aspects (5-8) – see pp. 216-31.

A full account of the discoveries, including the supporting data and methodological details for the specialist reports, can be found in the full report (OA 2020) available both in the Kent HER and as a digital download from OA's online library (https://library.thehumanjourney.net/).

Archaeological background

Prior to the scheme, known archaeology within a 1km-wide study area was limited. A small assemblage of struck flint of Mesolithic date, together with body sherds of decorated middle or late Neolithic pottery, were found on Castle Hill during investigation of the Iron Age hillfort (Money 1975, appendices 1 and 2). Further Mesolithic flints had previously been recovered from Castle Hill and are in Tonbridge Museum (*ibid*.). A few findspots of struck flints of probable Mesolithic date were also recorded by the Kent HER in the south-eastern half of the scheme. The scheduled Iron Age hillfort at Castle Hill (132m AOD) lies adjacent to the A21 on the south-west side, and the ramparts and ditches have produced radiocarbon date ranges of 410-200 cal BC (BM-810; 2265±50 BP) and 390-50 cal BC (BM-809; 2178±61 BP) at 95% confidence (*ibid*., 64).

No Roman or Saxon archaeology was known previously, although Tunbridge Wells has Roman remains. Tonbridge has the remains of an important castle and adjacent medieval town, but only a couple of possibly medieval hollow-ways cross the area of the scheme.

Geophysical survey along the route provided little clear evidence, although a possible metalworking site was suggested at the north-west end. Nevertheless, potential archaeological features were identified in many areas, and so archaeological mitigation was agreed for most of the scheme.

Research objectives were focused on determining the environment and use of the area around the hillfort at Castle Hill, both for settlement and industrial activity, and the transition from the late Iron Age to early Roman period, during which it was abandoned (WSP 2015, section 2). Other objectives were to look for Saxon activity, to investigate the origins of the Norman and later medieval landscape and its development, and to look for evidence of later medieval settlement, industrial activity (particularly metalworking) and woodland management.

In the event, discoveries spanned a wider range of prehistoric periods, and the main interest of the archaeology lies in the evidence for exploitation of the landscape and the associated evidence for the environment over time.

MESOLITHIC AND NEOLITHIC EVIDENCE

Mesolithic: worked flints were found in a variety of contexts across the site (**Fig. 2**). (A selection is illustrated in **Specialist Report 1**, where the flints are labelled by catalogue number.) A burin on a backed blade from pit 2505 in IA3 (c.314) is of early Mesolithic or late Upper Palaeolithic date, and some pieces are dated to the later Mesolithic, but struck flints were rarely recovered in concentrations, and with much of the material a distinction within the Mesolithic, or between the later Mesolithic and the early Neolithic, was not clear.

The clearest evidence of Mesolithic activity was found in the north-west part of Area IA4 (Fig. 2), where a flint scatter was found in the layer overlying the natural geology (**Fig. 3**). The material is fresh in appearance, with no significant wear or plough-damage, so is unlikely to have moved far from where it was originally deposited.

The first flints from the scatter were recovered during surface cleaning. This area was then laid out in a grid of 1m squares, which were excavated in spits 0.05m deep. All pieces more than 10mm long were surveyed in by GPS, while small chips and burnt unworked flint were bagged by the metre square and retrieved later by sieving.

The main deposit containing struck flints was a firm yellowish grey silty sand with occasional inclusions of manganese, which may represent the remains of an ancient land surface. Only a couple of worked flints (carried down in root holes) were recorded in the underlying geology, and as a result, the scatter was only a maximum of three spits thick.

In total, 42 squares containing a total of 68 spits were excavated by hand, producing 235 pieces of hand-recovered worked flint. Another 3 worked flints were also recorded on the surface of the natural geology just west of the main scatter.

The focus of the scatter covered approximately 9.0m x 5.0m and was centred upon feature 2753, a slight hollow in the natural that was filled with the yellowish grey silt deposit (Fig. 3).

Tree-throw hole 2750, just to the north of the gridded area, was also excavated completely in spits, retrieving 2 hand-recovered flints and 9 flint chips. Another 5 flints were scattered to the north, and a further patch of relict soil (2756) found 3m north-north-east of the main scatter was also excavated in metre squares, recovering 7 seven more pieces of worked flint.

A second concentration of Mesolithic flint was found against the north edge of Area IA4 as residual finds in three features: cut 359 of an Iron Age enclosure ditch (34 flints), tree-throw hole 329 (13 flints) and pit 341 (33 flints). (See Iron Age enclosure plan below.) No other finds were recovered from the pit or tree-throw hole, but charcoal from the lower fill (340) of the pit was dated to 1650-1500 cal BC (SUERC-90238; 3287±23 BP). The flint from all three features, which lay only 7m apart, was of similar earlier prehistoric blade technology and included flints refitting between them, strongly suggesting that they derived from the same surface scatter.

Another small assemblage of twelve residual struck flints was recovered from medieval feature 1415 and from the surrounding topsoil and subsoil at the east edge of Area IA4. These may have been of either late Mesolithic or early Neolithic date.

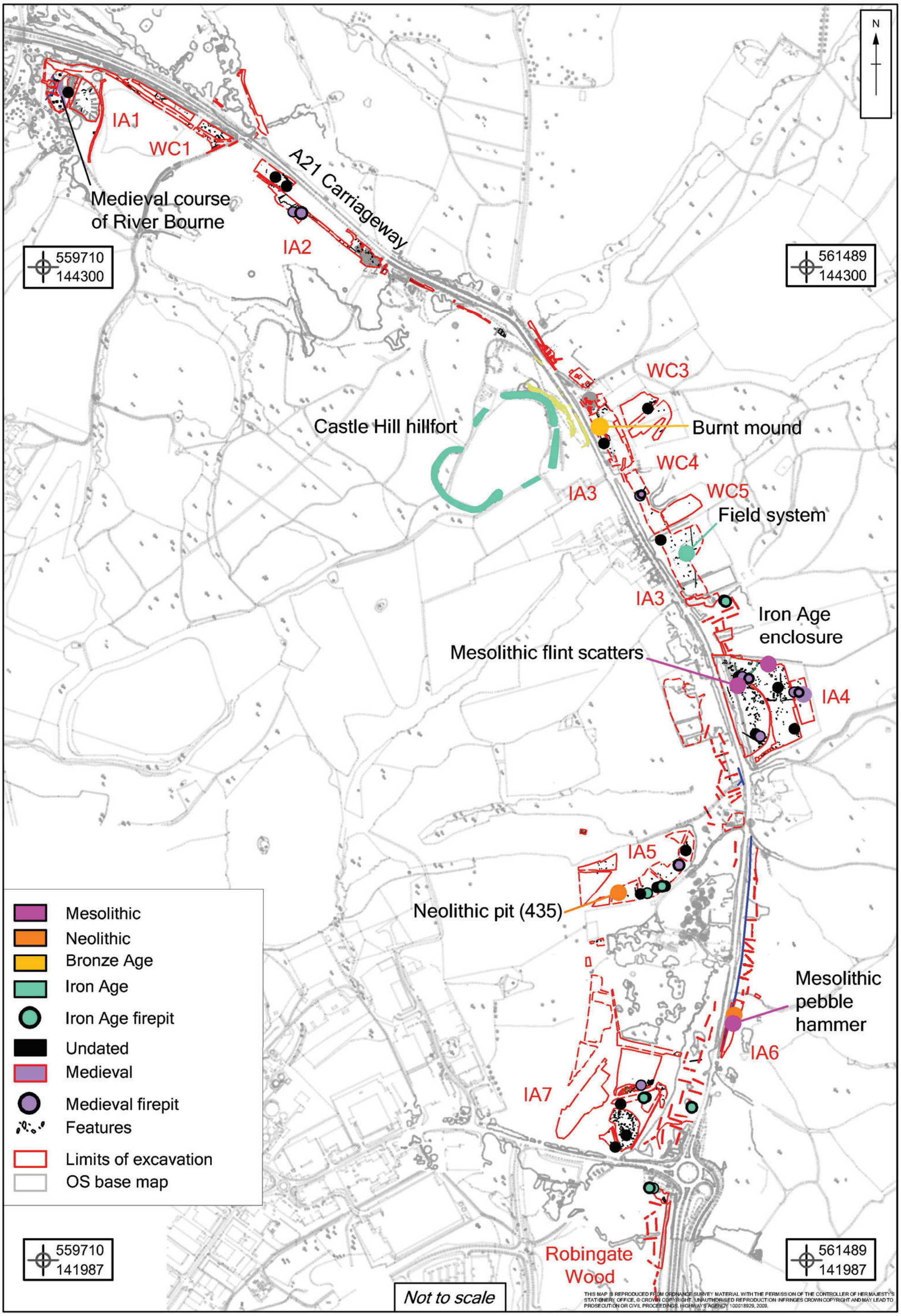

Fig. 2 Plan of excavation areas (IA1-IA7) and Woodland Creation (WC) areas together with phased discoveries discussed in the text.

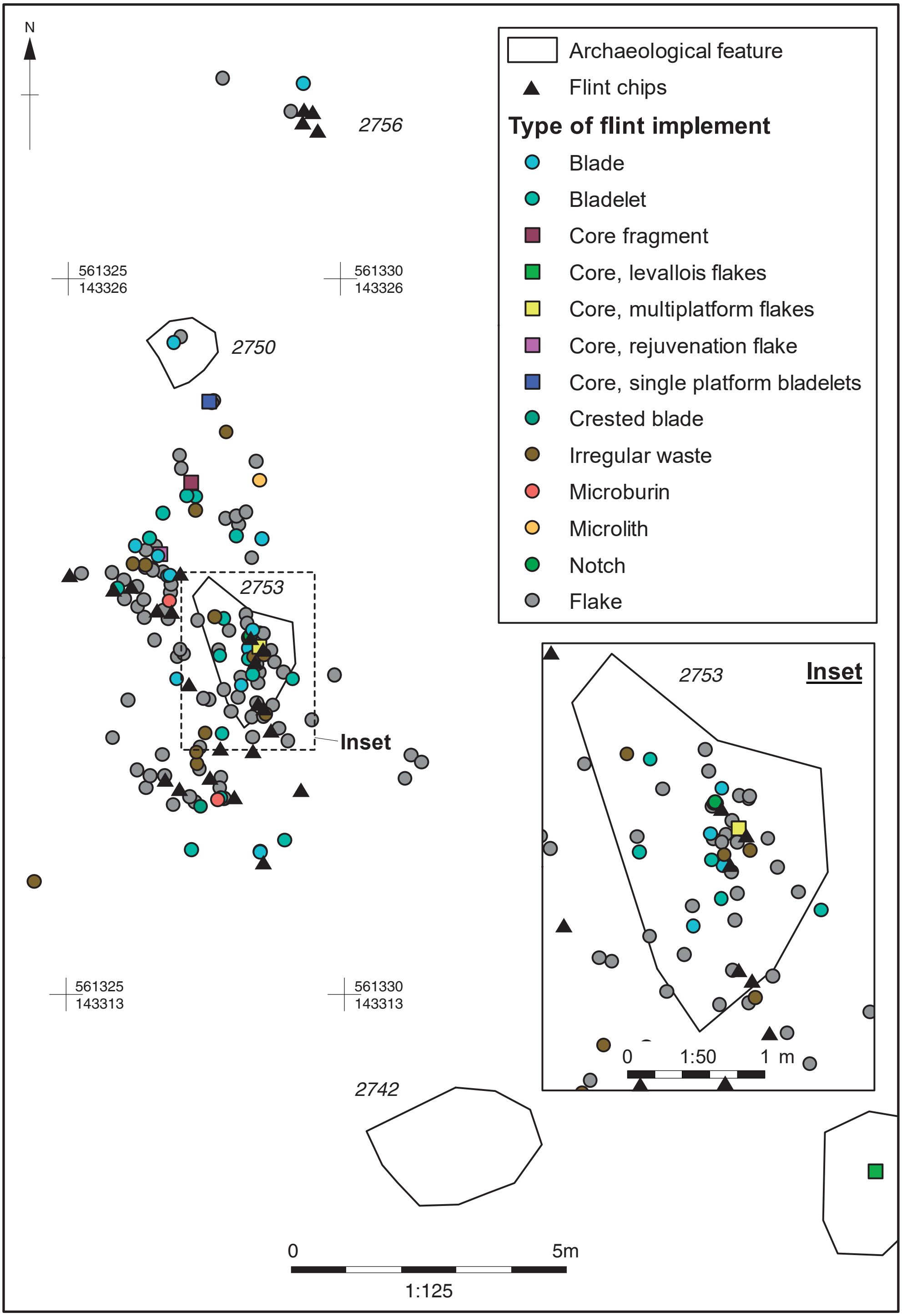

Fig. 3 Plan of *in situ* struck flint scatter (with key).

Neolithic: area IA5 was excavated in a series of plots for woodland translocation (Fig. 2), and revealed a scatter of pits and tree-throw holes. Circular pit 435 was around 0.6m in diameter and 0.14m deep, with steep sides and a flat bottom. The single fill (434) was a mottled grey sandy silt with much charcoal and some small burnt sandstone, but no finds. Oak heartwood charcoal produced a radiocarbon date of 3630-3370 cal BC (SUERC-73962; 4693±30 BP). All radiocarbon dates are quoted at 95% confidence unless stated otherwise. Even allowing for the possibility of an offset of up to 300 years for the heartwood, the date must fall in the early or middle Neolithic period.

Analysis confirmed that the charcoal assemblage is exclusively oak, mostly heartwood, and some fragments have very closely grown rings, indicating slow growth. Slow growth can result from restricted access to soil nutrients, light and water caused by competition from neighbouring trees in closed woodlands, or by climatic factors.

Several other features within Area IA5 contained struck flints and could also have been earlier prehistoric but were not securely dated. A large shallow pit 467 had a crested flint blade (c.263) of Mesolithic or early Neolithic date in the middle fill. A large deep pit 415 had three fills, with 2 flint flakes in the basal fill and 7 struck flints (4 of them chips) in the middle fill. The condition of the flints was, however, variable and as all three fills were disturbed by tree roots, this may not be a coherent assemblage. Oval pit 438 had a flint denticulate of early prehistoric date in its fill.

Features in Area IA7 to the south also produced occasional early prehistoric struck flints. A blade and two flakes came from pit 1849, a bladelet from pit 1808 and a backed knife (probably early Neolithic) from ditch 1804, while a denticulate was found in ditch 1863 and a flake in pit 1806. Details of all of these features can be found in the full report.

Pebble hammer: a residual stone pebble hammer was recovered from the subsoil (context 1009; SF4) during stripping in Area IA6, but no archaeological features were seen in this area. (See **Specialist Report 2**.)

Bronze Age burnt mound: on the lower slope of Castle Hill in Area IA3 two large pits and a gully containing much charcoal and burnt stone were uncovered (Fig. 2 and **Fig. 4**). The charcoal and burnt stone deposit extended above the limits of the features and was first exposed within the lower part of the subsoil, but this part was removed by machine because the reddened sandstone closely resembled the patches of modern and Victorian ceramic building material also found close to Burgess Hill Farm.

The more northerly pit (2045) was sub-circular in plan, measuring 2.32 by 2.34m, with almost vertical sides 0.68m deep, a gradual break of slope and a flattish base (Fig. 4). There were four fills but no finds. The basal fill (2046) was a firm, light grey silt with brownish yellow mottles, charcoal flecks and burnt, round and angular pieces of sandstone. This was sealed by deposits 2047 and 2062. Fill 2047, which was confined to the centre of the pit, was a friable, blackish-red sandy silt with very frequent charcoal flecks. Hazel charcoal from this layer produced a radiocarbon date of 1400-1200 cal BC (SUERC-73970 (GU44329); 3034±30

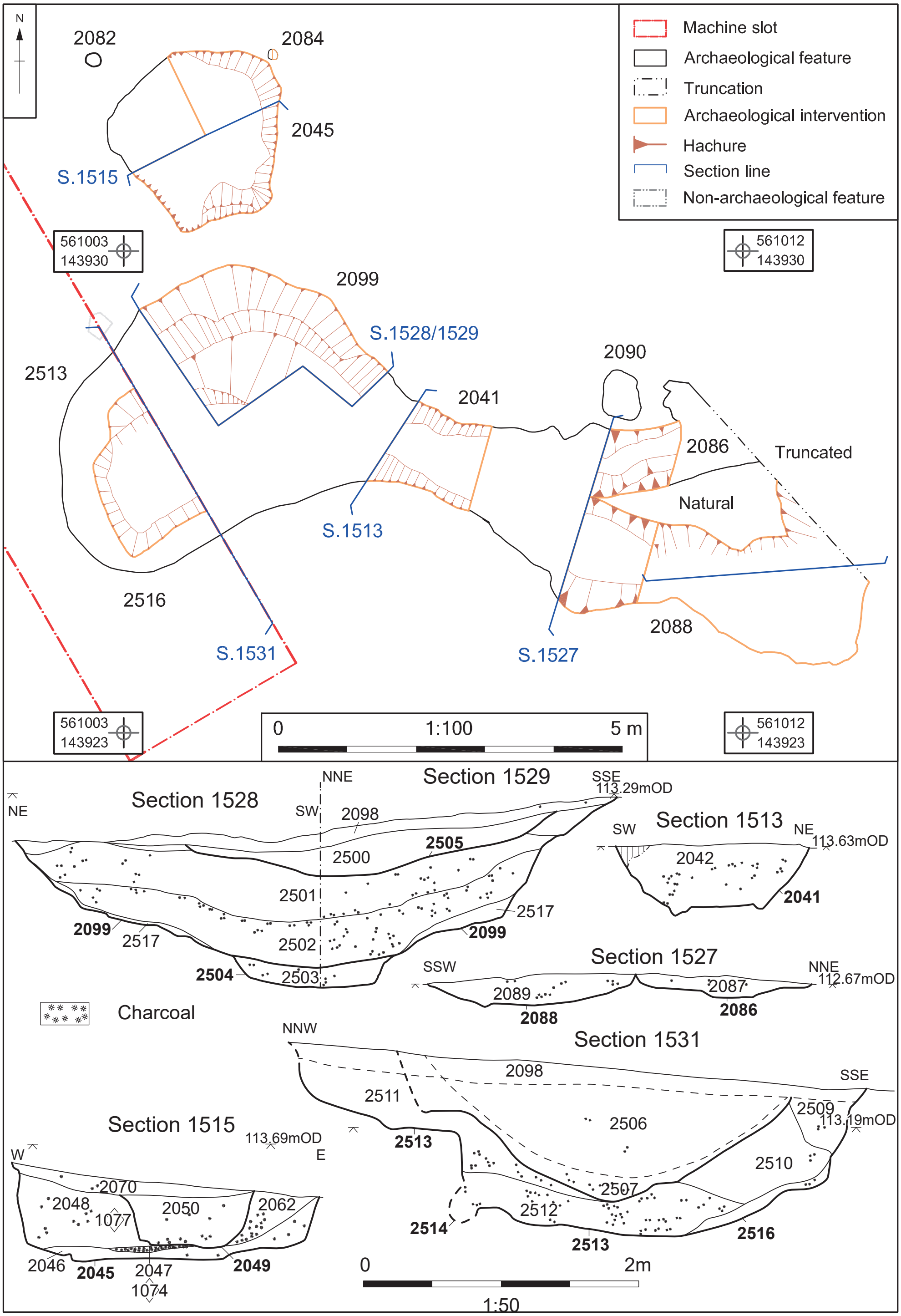

Fig. 4 Bronze Age burnt mound plan and sections.

BP). (See also **Specialist Report 3**.) Fill 2062 formed the main fill of the pit and consisted mostly of burnt and cracked pieces of sandstone and charcoal flecks in a matrix of firm silty clay and small patches of sand. This fill was reddish-black with blueish grey patches.

Fill 2062 was cut by recut 2049, which was sub-circular, 0.88 in diameter and 0.37m deep. The re-cut had a firm, dark grey silty clay fill (2050) with very frequent poorly sorted angular pieces of burnt sandstone and much charcoal. *Betula* charcoal from this fill was dated to 1395-1220 cal BC (SUERC-90233; 3045±22 BP). Both fills 2062 and 2050 were sealed by deposit 2070, which covered the whole of the pit to a depth of 0.10m. This deposit was similar to fill 2062 but had fewer sandstones.

About 0.5m south of pit 2045 was the larger pit 2099/2513 (Fig. 4). This was sub-oval in plan, 5.1m long, 3.5 wide and 0.9m deep, with steep, stepped sides, gradual breaks of slope and a flattish base. From the south-eastern side shallower ditch 2041 ran east down the slope. The eastern half of the pit was exposed first and had several fills. The basal fill (2503/2512) was a firm, dark grey to black silty clay with patches of charcoal and burnt sandstones and was 0.15m thick. *Betula* charcoal from this was dated to 1450-1300 cal BC (SUERC-90228; 3125± 22 BP) (See also Specialist Report 3.). Around the sides a thin layer of eroded natural (2517), consisting of yellowish-brown, slightly sandy clayey silt, overlay 2503, and it and layer 2503 were sealed by fill 2502/2510, which consisted of burnt sandstones, patches of charcoal and whitish (burnt?) pieces of mudstone in a matrix of firm greyish-brown silty clay. This was 0.35m thick.

Layer 2502/2510 was overlain by fill 2501/2507, a firm, very dark brownish-black silty clay with very frequent charcoal flecks, frequent burnt pieces of sandstone and weathered (burnt?) mudstone. This was 0.45m thick, and *acer* charcoal from this was dated to 1440-1300 cal BC (SUERC-90232; 3113±22 BP). This was overlain by deposit 2500/2506, which consisted of a firm, bluish yellow clayey silt with occasional small-sized angular burnt sandstones and occasional patches of manganese. A residual flint burin on a backed blade and a sherd of pottery weighing 13g, tentatively dated to the late Iron Age or early Roman period, came from this layer, which had a diffuse boundary with the overlying deposit 2098, a firm, brownish-yellow slightly silty clay some 0.1m thick, very similar to the natural clay into which the pit was cut, but somewhat lighter in colour and slightly siltier.

Because of the similarity of the top fill to the surrounding natural the western limits of this pit were unclear, and as time was pressing, the western part of the pit was largely excavated by machine and uncovered an identical sequence (Fig. 4, Section 1531) with the addition of a deposit resulting from a localised collapse (2509). In this part of the pit, the northern side had only one clearly defined and long step. No finds were recovered from any of the fills, but (as in pit 2045) environmental samples were taken from key deposits, and the pollen and charcoal from these are reported upon in **Specialist reports 4 and 5**.

Ditch or gully 2041 ran down the slope from the south-east corner of pit 2099. It was 1.3m wide, with steep sides, gradual breaks of slope and an undulating base, but was only 0.53m deep (Fig. 4, Section 1513). A section excavated at the junction of the pit and the ditch did not show any cut, suggesting that they were contemporary. The single fill of the ditch was a friable, greyish black silty clay with charcoal (possibly also ash) and rounded and angular pieces of burnt sandstone (2042) and was equivalent to 2501 within the pit, but again there were no finds.

The ditch shallowed as it ran downhill, and 1.6m to the south-east it forked into two. The southern arm (2088) was 1.53m wide and 0.22m deep, with symmetrical, sloping sides and a concave base; the northern arm (2086) was 0.65m wide and only 0.13m deep (Fig. 4, Section 1527). The single fills of both (respectively 2089 and 2087) were very similar and consisted of a firm, dark greyish-brown silty clay with very frequent angular pieces of burnt sandstone, but 2087 also included pieces of burnt/weathered mudstone and a residual early prehistoric flint blade. Both ditches shallowed as they ran south-eastwards and petered out after *c*.3m.

Adjacent to pit 2045 was a circular feature 0.17 across (2084). It had symmetrical steep sides and a pointed base and was 0.16m deep. It was filled with a firm, dark brown silty clay and charcoal and occasional pieces of burnt sandstone, but no finds. This is interpreted as a stake-hole related to the pits.

Just north of the forking ditches and close to pit 2045 was a similar circular feature (2082), 0.21m in diameter and filled with dark brown clayey silt with frequent charcoal flecks and frequent pieces of angular burnt sandstone. No finds were visible in the surface, and this feature was not excavated.

LATER IRON AGE AND ROMAN ACTIVITY

In Area IA4 a large part of a sub-rectangular enclosure was found against the northern baulk (Fig. 2 and **Fig. 5**). This was exposed in several phases. A haul road along the north-west edge of the area, which involved levelling the natural slope, did not find the north-west arc, although this was visible in the north section afterwards. Stripping of the rest of the excavation area exposed the ditch circuit from the north-east around to the south and the west, and revealed two entrances, one 6m wide on the east and a narrower one 3.7m wide on the south-west. Clearance for a service beyond the north edge of the area exposed the western part of the north side.

The enclosure measured 57m east-west and the ditch varied from 1.2m to 2.5m wide. The eastern side was represented by two curvilinear ditches. To the north the ditch was generally about 1.8m wide and was 0.74m deep in cut 359 (Fig. 5, Section 174). Here, the ditch contained four fills. The lower three fills consisted of light grey silty sand (360-2), while the upper fill was a firm brown silty clay (363). Residual struck flints were recovered from the fills, which also contained charcoal flecks and sandstone fragments, but no other finds. At the terminus (312) the ditch shallowed rapidly, and although 2.2m wide was only 0.15m deep. A similar shallowing was observed at the south-west entrance.

The southern terminus of the east entrance (322) was 0.32m deep, and the fill 323 was a firm, dark brown/grey clay silt with stone fragments. *Pomoideae* charcoal from this fill gave a date range of 350-50 cal BC (SUERC-73969 (GU44328); 2130±30 BC) at 95% confidence, or 200-50 cal BC at 85% confidence. The ditch was shallow along the south-east side, varying between 0.22m and 0.32m deep in Sections 356 and 351 (Fig. 5, Section 171), although it was 0.58m deep and 1.8m wide in cut 558 at the south-western entrance (Section 720). A smithing hearth

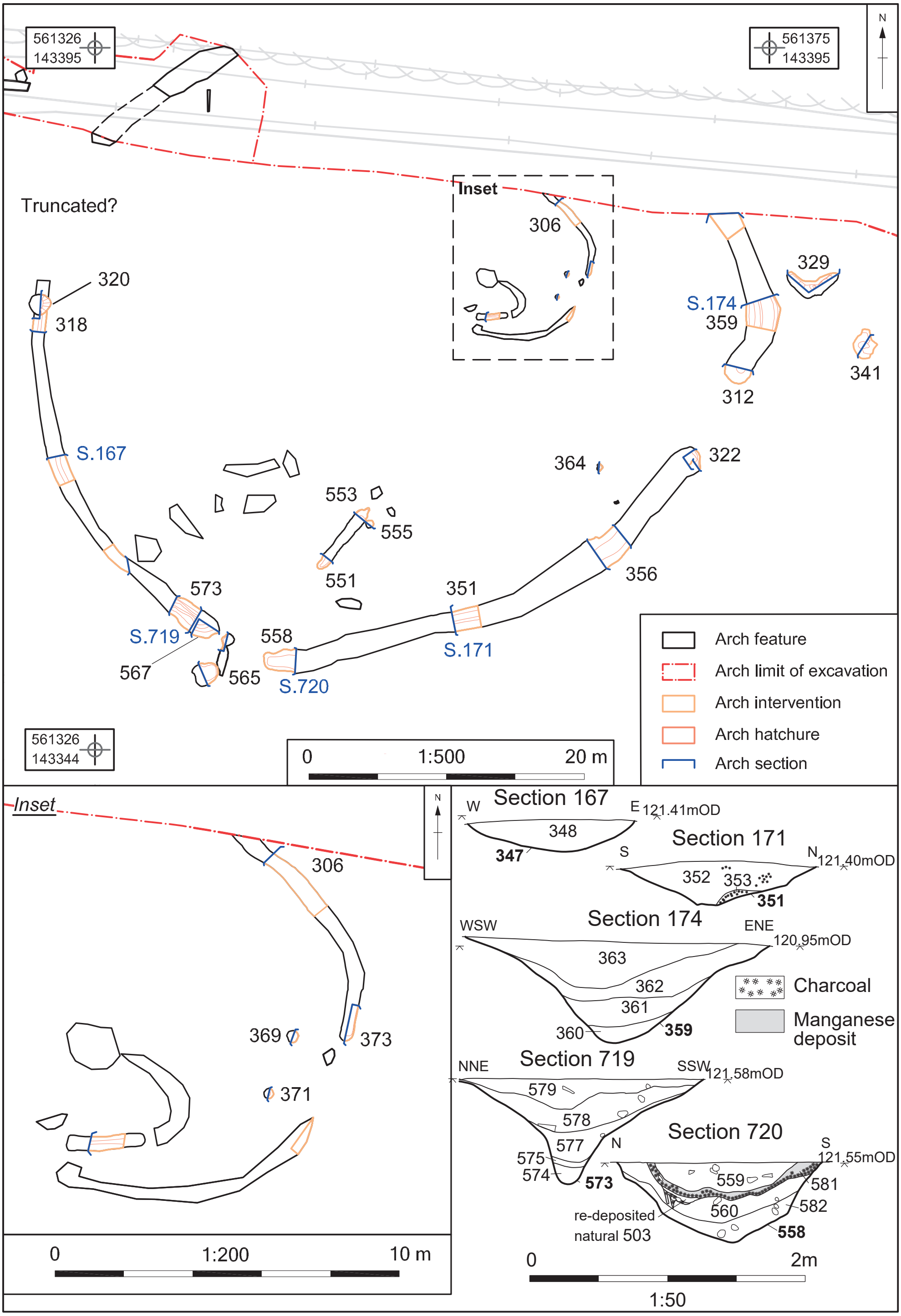

Fig. 5 Plan and sections of Iron Age enclosure in IA 4 and detail of internal structure 306/373.

bottom and a sizeable quantity of oak charcoal were found in cut 351 (fill 353) on the south-east side. Oak heartwood charcoal from this deposit gave a date range of cal AD 80-250 (SUERC-73964 (GU44327); 1826±30 BP) at 95% confidence.

South of the haul road the western side of the enclosure was followed south from where it was cut by pit 320, and here again it appeared to be only 1.2m wide and 0.24m deep (Fig. 5, Section 167). The ditch appears to have increased in size significantly towards the south-west entrance, to a maximum of 1.8m wide and *c*.0.8m deep in cuts 573 and 567 close to the southern terminus (Fig. 5, Section 719). A single worked flint was recovered from fill 319 in cut 318 of the ditch.

The western part of the northern arc of the enclosure ditch was visible in section in the northern side of the haul road, where it was 0.85m deep and 2m wide and was traced during excavation of a water main. It is possible that the intervening stretch of ditch across the haul road was truncated during machining before the feature was recognised, as weather conditions were difficult during this work and there was ground-water flooding. Alternatively, it may indicate that there had been a third entrance gap here.

The fills of the enclosure ditch were generally similar in character, sandy lower down with no finds and little charcoal, suggesting initial rapid silting from the ditch sides. The laminations and banding observed suggest standing water on occasions and in-washing following rainfall, all of which is consistent with natural silting. At one point a deposit on the inner side of the ditch may indicate the collapse of an up-cast bank, perhaps suggesting a bank on the inside. The upper fills were more clayey, consistent with slower natural silting and again with periodic standing water from rainfall. The presence of charcoal indicates activity in the vicinity, and possibly that the ditch was no longer a significant boundary. Other than the residual struck flints, the only find from the ditch was the smithing hearth bottom from Roman layer 353, which suggests only very limited or occasional use of the enclosure.

There were few archaeological features in the interior, most of the soilmarks being tree-throw holes of unknown date. Gully 306/373, which was up to 0.47m wide and 0.19m deep, consisted of two arcs forming an approximate semi-circle some 12m in diameter with a gap 2.5m wide between them on the east-south-east, and lay just north-east of the centre of the enclosure (Fig. 5). The gullies were filled with dark brown clay with sandstones, except on the northern side of the entrance, where an upper fill was darker and contained more charcoal. There were no finds. Set back 1.5m west of the gully termini were postholes 369 and 371 (Fig. 5, *inset*), 1.8m apart centre to centre, which were respectively 0.37m and 0.34m in diameter and 0.14m and 0.09m deep. Their fills were identical with the upper fill of the gully terminus. A third possible posthole (not investigated) lay on the line of the gully in front of 369, just 0.4m from the northern terminus. The gully entrance was aligned upon the eastern enclosure entrance, so despite the lack of finds, they are likely to have been contemporary.

A short length of undated gully (551/553) was aligned roughly along the line between the eastern terminal of the south-western enclosure entrance and the west ends of enclosure 306/373 to the north, so may mark part of an internal division. A short gully just outside the west side of the south-western entrance (565), also undated, may have been associated, intended to constrain access from the south.

The only other archaeological feature was an undated pit 364 on the east side, 4.6m from the enclosure ditch.

Between this enclosure and the Castle Hill hillfort, pit 2063 in Area IA3 south was ovoid in plan, measuring 2.80m x 2.30m and 0.52m deep, with symmetrical sloping sides curving to a flat base (**Fig. 6**, Section 1520). Three-quarters of the pit were excavated, and five fills were distinguished. Basal fill 2075 was a firm brown silty clay 0.16m thick, with blueish grey patches of clay and frequent pieces of charcoal. On the north this fill was sealed by deposit 2073, similar to the basal fill but without charcoal. Both deposits were overlain by a firm, compact, brown clayey silt 0.42m thick, containing very frequent flecks and larger fragments of charcoal (2065/2072). Fill 2065 contained the base of a coarse pottery vessel, and *Corylus* (hazel) charcoal from this fill gave a date range of 400-230 cal BC (SUERC-90237 (GU53057); 2280±21 BP). Fill 2065 was overlain by 2064, a firm, light brownish-grey silty sand.

Pit 2116, which was found 70m to the north-east, was oval, measuring 0.63 x 0.56m, and was 0.16m deep, with steep sides and a flat base (Fig. 6, Section 1605). It was filled by deposit 2117, a friable, greyish silty clay with charcoal but no traces of burning *in situ*. There were no finds, but *quercus* (oak) charcoal from the fill gave a date range of 360-100 cal BC (SUERC-90242 (GU53059); 2145±21 BP).

Running north-south between the two right across BP2 and for 45m across Area IA3 south was ditch 2066. This was up to 0.55m wide and 0.3m deep (Fig. 6), but varied along its length, and petered out at the south end, probably due to truncation by ploughing. The single fill was a light, yellowish grey, slightly silty clay with occasional charred pieces of roundwood (2067). No finds were recovered from any of the seven interventions, but at the south, *Quercus* (oak) roundwood charcoal produced a radiocarbon date of 170 cal BC-cal. AD 20 (SUERC-73971 (GU44330); 2048±28 BP).

IRON AGE AND MEDIEVAL FIREPITS

A class of circular shallow features whose primary fill consisted of charcoal, and which had reddened natural at the base and sides from burning *in situ*, but which did not contain any finds, were classed on this scheme as 'firepits'. These occurred on several of the first sites to be examined, and in order to clarify whether they were of recent or ancient date charcoal from two of them was radiocarbon dated and proved to be Iron Age.

All subsequent examples of these firepits within the main excavations were excavated, and most were sampled. Analysis of the charcoal has shown a general difference between those containing exclusively or mainly oak charcoal and those with a mix of species in which beech or birch predominated (Meen 2019). Charcoal from a further selection of these pits was submitted for radiocarbon dating, and they proved to be of either middle to late Iron Age or medieval (mainly eleventh to thirteenth century) date. All of the six samples in which beech or birch predominated, or were nearly as common as oak, were dated as medieval, while five of the six containing predominantly oak charcoal that were dated proved to be Iron Age (**Table 1**). The sample containing very similar frequencies of oak and beech and birch was very heavily mineralised, resulting in the preferential survival

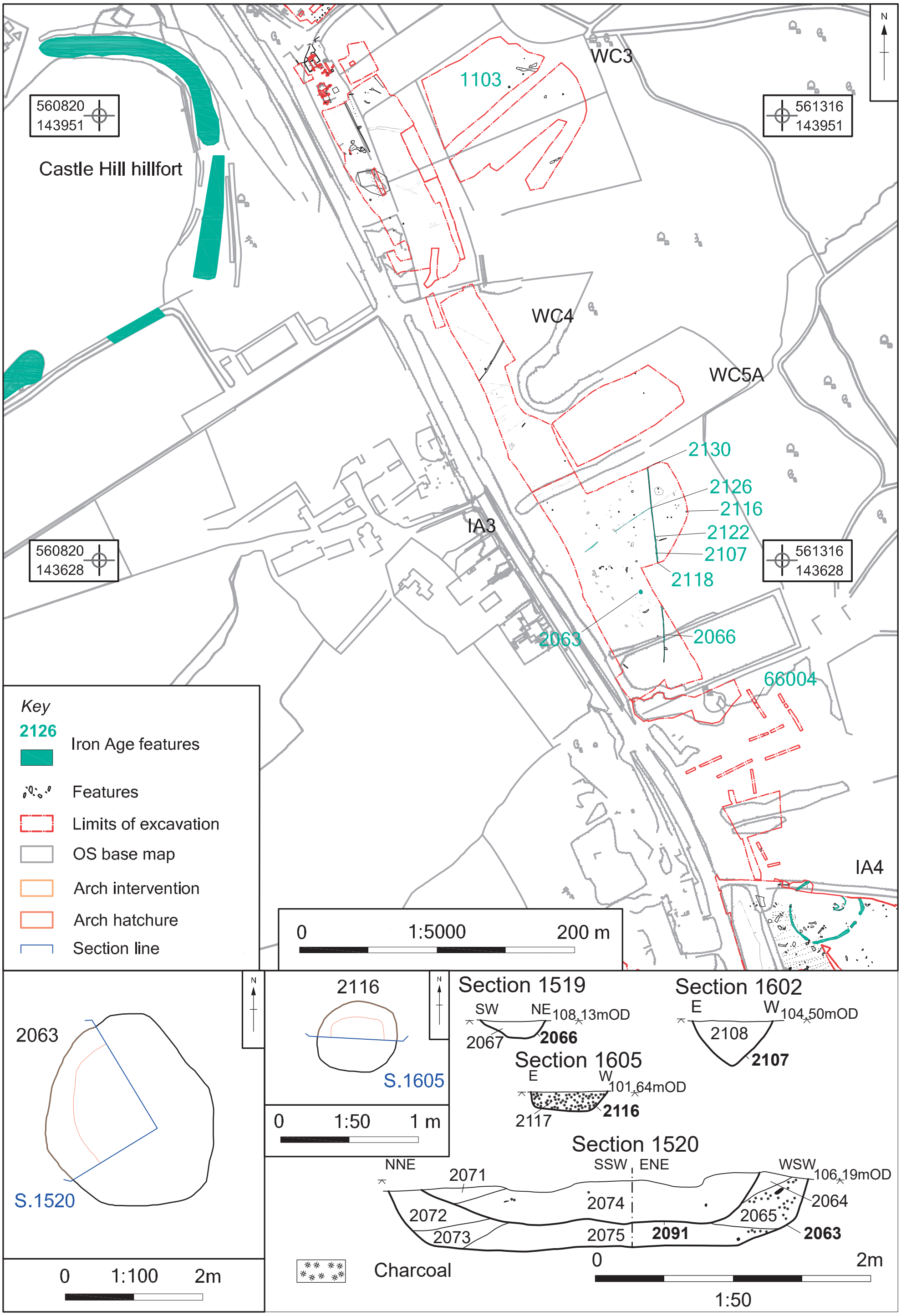

Fig. 6 Iron Age ditches and pits in relation to IA 4 enclosure and Castle Hill hillfort.

TABLE 1. RADIOCARBON DATES FOR FIREPITS

Lab. No.	Sample	Context and location	Type	Material	$\delta^{13}C$ (‰)	Radiocarbon Age (BP)	Calibrated date (at 95.4%)
SU-ERC-75173	1051	1320 (IA7)	Firepit 1318	*Quercus* charcoal	-25.3	2249±30	400-200 cal. BC
Beta-405802	1020	909 Robin gate Wood	Firepit 908	*Quercus* charcoal	-26.1	2240±30	390-200 cal. BC
Beta-405801	1016	416 (IA5)	Firepit 415	*Quercus* charcoal	-27.0	2210±30	380-190 cal. BC
SU-ERC-73963	1041	74005 (IA7)	Firepit 74004	*Quercus* tree bud charcoal	-26.7	2068±30	180 cal. BC – cal. AD 10
SU-ERC-73959	1039	66004 Potters Wood	Firepit 66005	Pomoideae charcoal	-27.0	2063±28	170 cal. BC – cal. AD 10
Beta-565026	1001	321 (IA4)	Firepit 320	*Hedera* charcoal	-28.8	910±30	cal. AD 1030-1210
SU-ERC-74743	1068	2029 (IA7)	Firepit 2028	*Betula* charcoal	-25.2	899±26	cal. AD 1040-1210
SU-ERC-90234	1019	454 (IA5)	Firepit 453	*Betula* charcoal	-26.3	857±26	cal. AD 1050-1260
SU-ERC-73960	1042	1408 (IA4)	Firepit 1407	*Betula* charcoal	-25.8	843±30	cal. AD 1050-1080 (2.3%) 1150-1270 (93.1%)
SU-ERC-73961	1114	2746 (IA4)	Firepit 2745	*Fagus* charcoal	-27.6	827±27	cal. AD 1160-1270
SU-ERC-74085	1010	701 (IA2)	Firepit 702	*Fagus* charcoal	-26.8	782±29	cal. AD 1220-1300
SU-ERC-90236	1182	1511 (IA7)	Firepit 1510	*Fagus* roundwood charcoal	-26.0	777±32	cal. AD 1200-1290

of the larger oak heartwood samples over other species. The same mineralisation was present in the charcoal from firepit 321, but here no evidence of beech or birch charcoal was found.

The difference in composition of the charcoal in the dated samples shows a broad chronological separation, although oak also appears in the later period of charcoal production. To test whether this distinction was restricted to firepits, two undated pits, one each dominated by oak and beech charcoal, were also radiocarbon dated, and these too proved to be Iron Age and medieval respectively. Whether this reflects a change in character of the woodland landscape between the different periods, or strong differences in the preferred wood for burning between the two periods, is discussed further below.

In the following discussion, the undated firepits in which oak charcoal clearly predominates (other than the exceptions mentioned above) are described as 'provisionally Iron Age', and all of those in which beech or birch clearly predominate as medieval. The very few samples that contain similar proportions of both oak and beech or birch are treated as probably medieval.

Before the first radiocarbon dates were received, excavation of these firepits had followed the agreed excavation procedure, which involved only excavating (and sampling) a proportion of those revealed. In addition, during the final watching brief phase of the fieldwork, there was not always sufficient time to obtain environmental samples. As a result, a number of the firepits that have been plotted cannot be phased. These are included on the plans for both periods (see below).

Iron Age firepits: a total of 12 firepits have been attributed to the later Iron Age. Detailed plans and sections, together with their distribution, are shown in **Figs 7 and 8**. The timespan covered by the dated examples is 400 BC to AD 10, with three examples securely middle Iron Age (400-200 cal BC) and two dating between 180 cal BC and cal AD 10. The size of these features varied from 0.64m to 2m in diameter, and they survived from 0.07m to 0.25m deep; the undated but provisionally Iron Age examples had a very similar size range, except that the largest was 2.38 x 2m across. Most were circular or very nearly so, and were between 1.4m and 1.6m in diameter and under 0.2m deep.

All of the dated Iron Age firepits, and all of the undated examples containing predominantly oak charcoal, occurred south of the Castle Hill hillfort (Fig. 8), with the greatest density towards the southern end of the scheme in Areas IA5 and IA7. Even if all of the undated firepits were Iron Age, this would not affect the predominance of Iron Age firepits in IA7.

Medieval firepits: a total of eight firepits are considered to be medieval. Detailed plans and sections, together with their distribution, are shown in **Figs 9 and 10**. Seven of these firepits have radiocarbon dates (Table 1), and the eighth has an equal mix of oak and beech charcoal and so is also likely to be of this date. A selection of these features is illustrated in Fig. 9. As with the Iron Age firepits, most were circular or nearly so. The firepits range from as little as 0.79m by 0.58m to just over 3m by 2.8m, and from 0.1m to 0.22m deep, though all of the dated examples are over 1.2m across, and they cluster at around 1.6m and most are less than 0.16m deep.

The medieval firepits occur along almost the entire length of the scheme, with a concentration in Area IA4 (Fig. 10). Taking the undated firepits into consideration, there would still be a low level of activity at the south end of the scheme. If the undated firepits from the other sites were all medieval, but none of those from Area IA4, then the numbers in other sites could equal those in IA4, but the probability is that were the undated firepits to have been dated, the same concentration in IA4 would be evident.

Undated firepits: there are eleven of these, spread from the north end of the scheme as far south as Area IA5. The range of size and depth of these features is very similar to that of both the dated groups of firepits, but includes the smallest firepit,

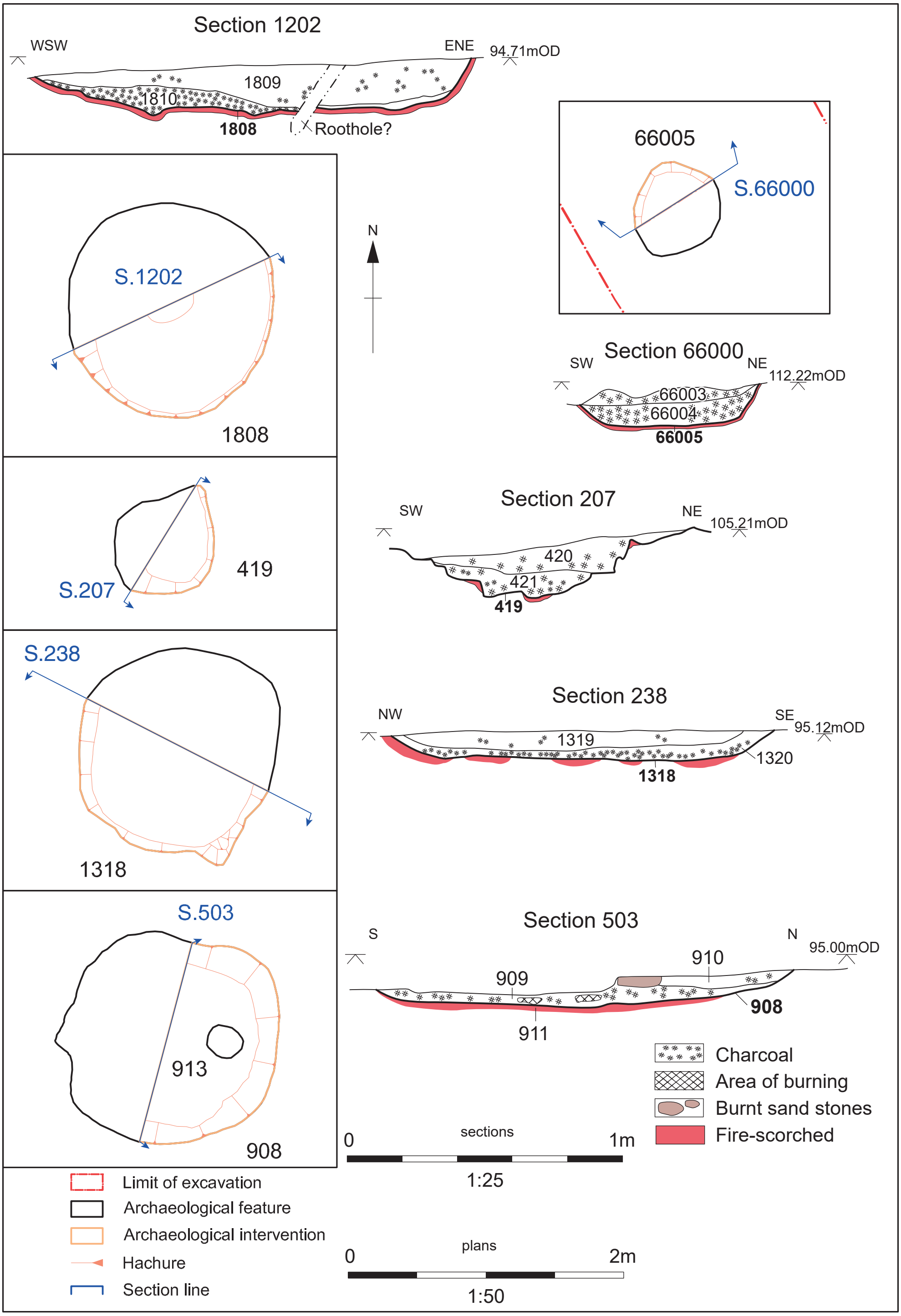

Fig. 7 Detailed plans and sections of Iron Age firepits.

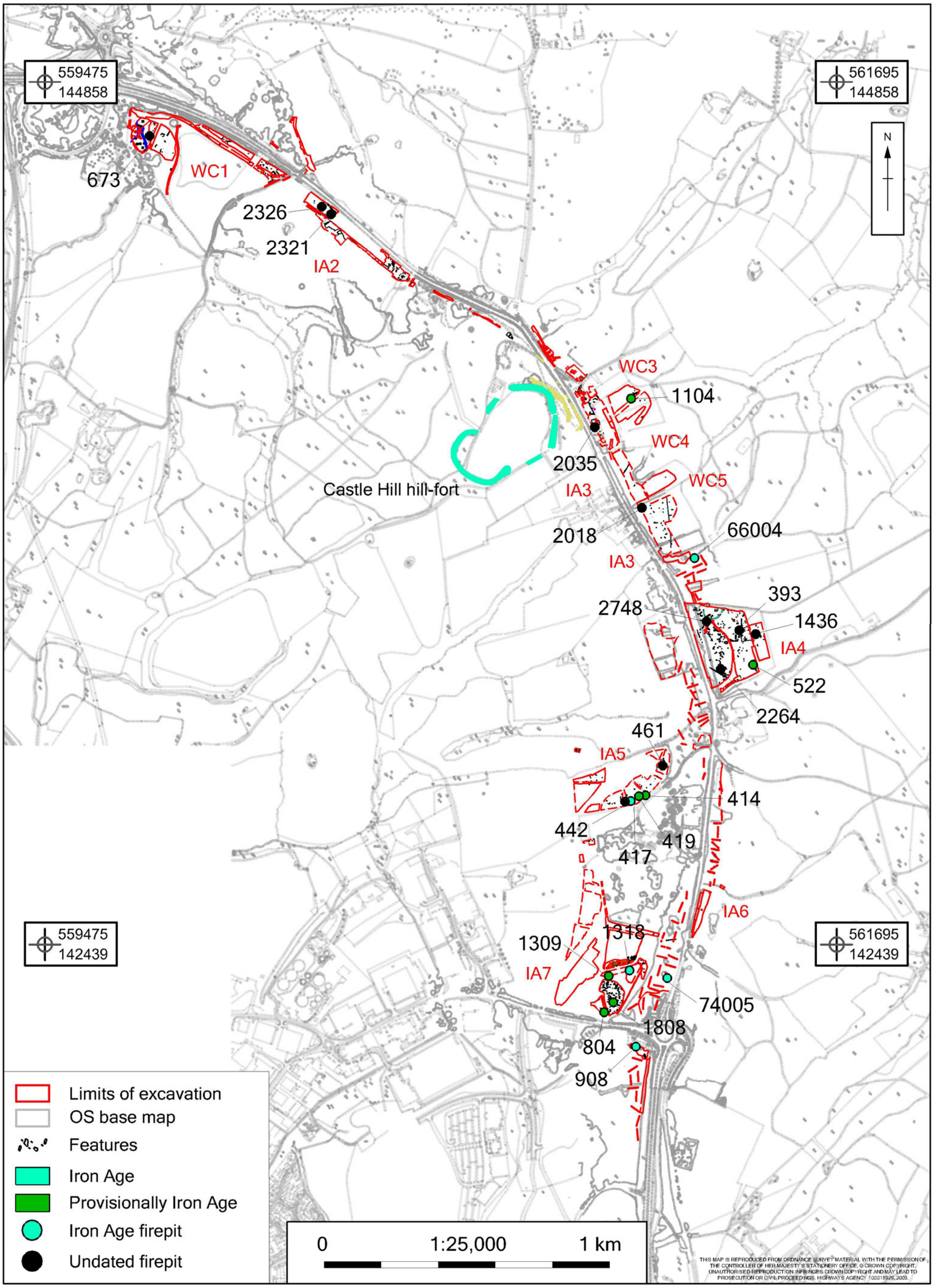

Fig. 8 Distribution of Iron Age firepits in relation to Castle Hill hillfort.

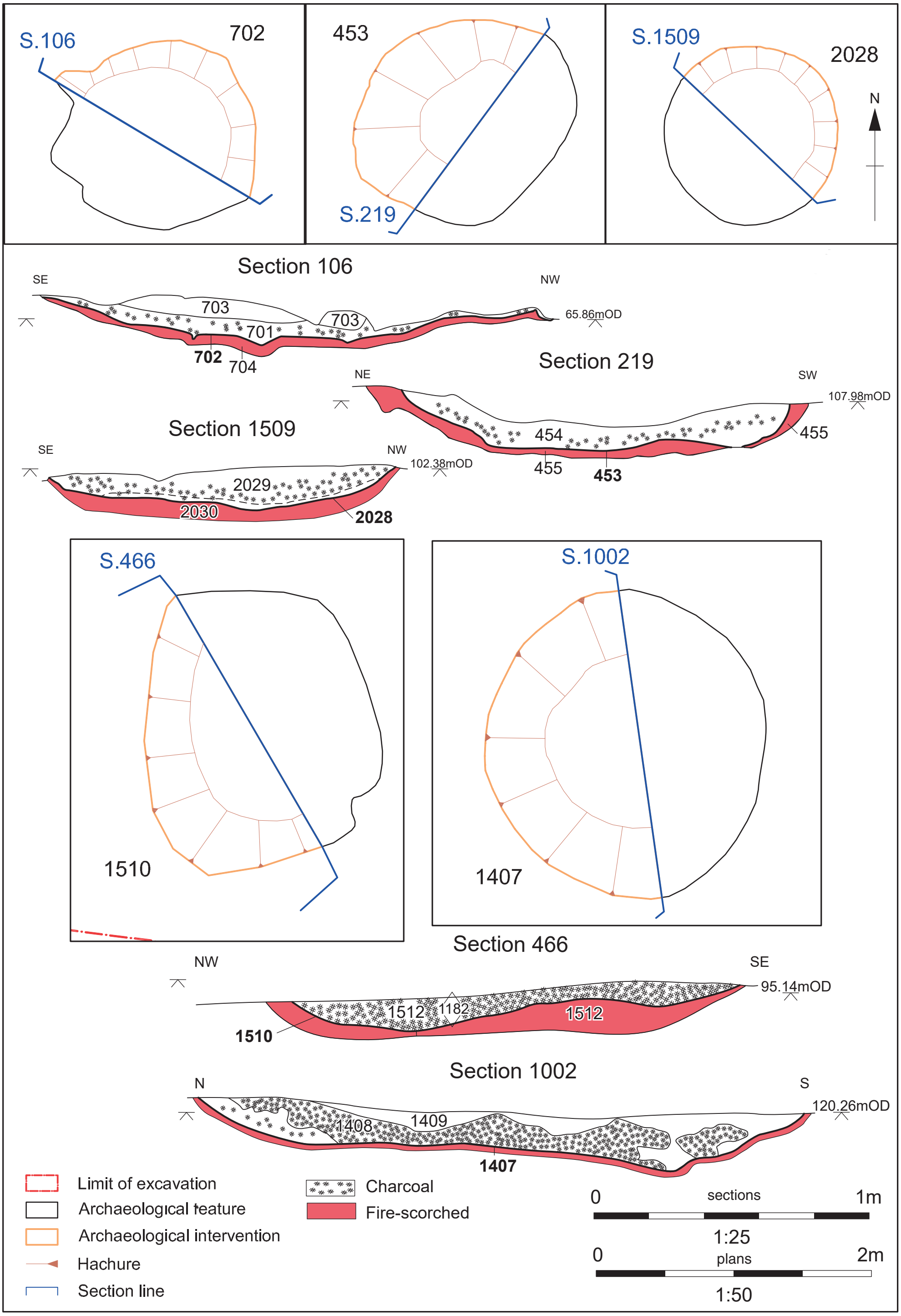

Fig. 9 Detailed plans and sections of medieval firepits.

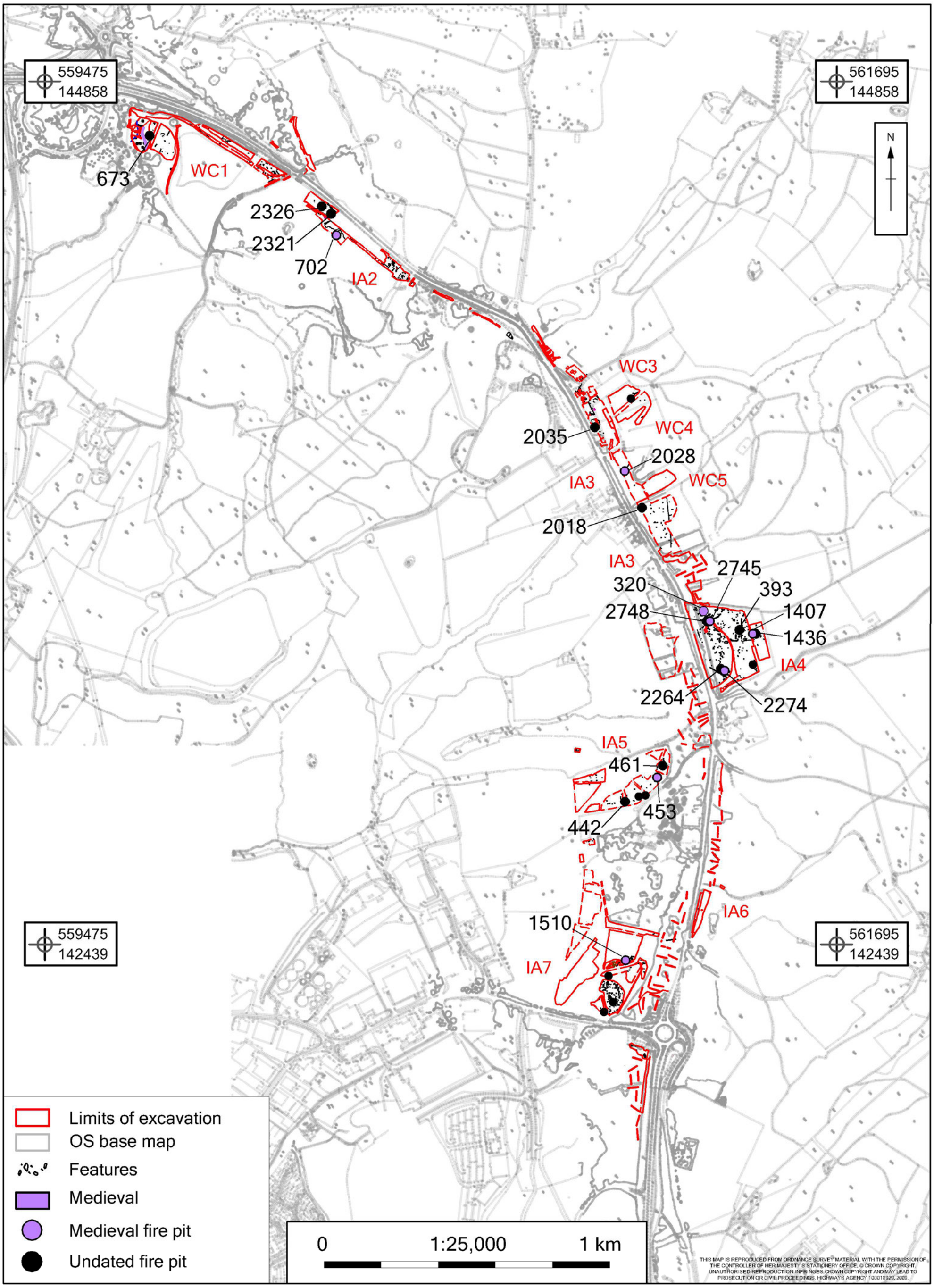

Fig. 10 Distribution of medieval and undated firepits and other features.

at only 0.6m across, and the deepest, at 0.31m deep. Four of the firepits under 1m in diameter, or half of the total, are included in this group. In the absence of samples of the charcoal they contained, there is nothing to suggest to which of the dated groups they belong.

OTHER MEDIEVAL FEATURES

The only other features of medieval date were located at the east side of Area IA4, and comprised either a very large tree-throw hole or more likely one or more pits later overlain by a large tree (Fig. 2) This feature contained much charcoal and also produced four joining rim and shoulder sherds together weighing 73g from a medieval cooking pot in North-west Kent shelly ware (Kent Fabric EM35, *c*.1050-1225). Charcoal was submitted for radiocarbon dating, and gave a date range of cal AD 1050-1260 at 95% confidence (SUERC-73972; 850±30 BP).

Medieval channel of the River Bourne

Test-pits dug in advance of the excavation of a balancing pond in IA1 revealed waterlogged deposits at depth, and stripping under archaeological supervision uncovered two palaeochannels of the River Bourne (Fig. 2 and **Fig. 11**).

The western channel ran along the western edge of the area and was substantial, continuing beyond the western limit of excavation, although up to 8m of its width was exposed within the site. The eastern edge of the channel was investigated by two machine-dug slots (Trench 1 and Trench 2, Fig. 11). In Trench 1 the cut (20009) was steep, and was not bottomed, despite being exposed to a depth of more than 1m. Six fills were exposed, the sequence (lowest to highest) being 20008, 20007, 20006, 20005, 20004, 20003 and 20002 (Fig. 11). No finds came from any of the fills.

The earliest context (20008) was a deposit along the edge of the channel and was very similar to the natural, perhaps indicating erosion of the side. Overlying this, layer 20007 was a bluish-grey clay more than 0.26m thick that included both lenses of sandstone and some organic material, suggesting a fluvial deposit of moderate flow. An acorn cup from this deposit was dated to cal AD 1050-1270 (SUERC-75175(GU45043); 849±31 BP), with a 90% chance that the date lies in the later twelfth or thirteenth century. Deposit 20006 was a dark grey silty clay 0.32m deep, again with lenses of sandstone, but with more organic material including wood, probably indicating deposition in slower-moving water. A twig with buds from this was dated to cal AD 1220-1390 (SUERC-75176 (GU45044); 718±31 BP), and a sample of glume bases of charred spelt wheat was dated to cal AD 1280-1400 (SUERC-94076 (GU55251); 642±24 BP). Pollen, waterlogged plant remains and insects from 20007 and 20006 are reported upon in **Specialist Reports 6, 7 and 8**).

Deposit 20006 was followed by two thin layers of clay (20005 and 20004), both probably representing flooding and fluvial deposition close to the edge of the active channel. Layers 20003 and 20002 overlay 20004 and probably represent deposition above the level of permanent water level, although the blueish-grey colour of layer 20002 and the preservation of occasional organic material within it

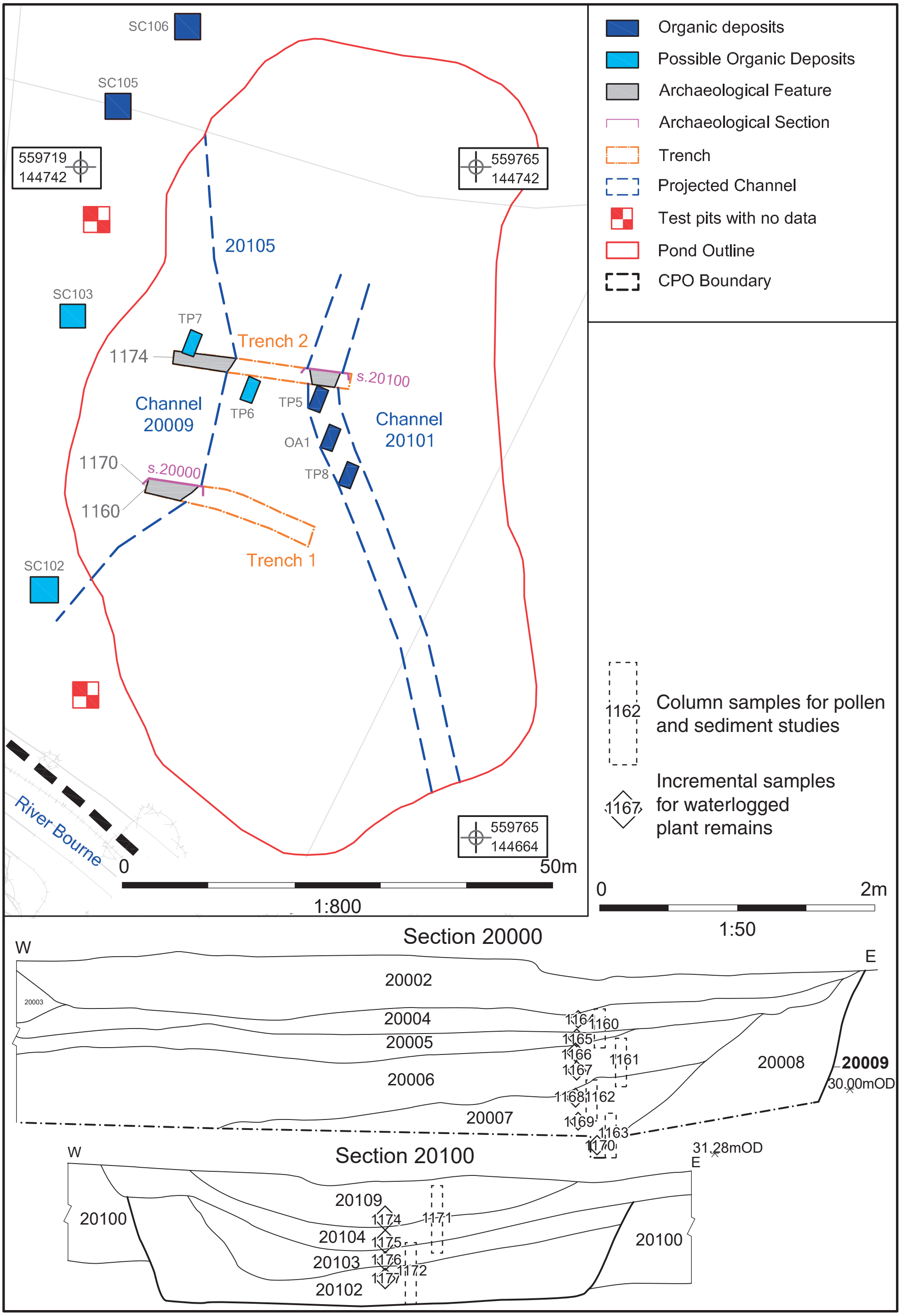

Fig. 11 Plan and sections of exposed palaeochannels of the River Bourne.

perhaps indicate that this was under water for much of the time at the margins of the channel.

In Trench 2 the cut (20105) was again steep, but as the exposed fills were not visually rich in organic material, they were not sampled.

The eastern palaeochannel (20101) was only 3.8m wide and its full width was exposed within the IA1 excavation. This channel had steep sides and a flat bottom and where sectioned was just over 1m deep. There was a sequence of four fills (20102-20104 and 20109). Layer 20102 was eroded material deposited once the scouring of the original channel had ceased and was followed by a phase of slow deposition under standing water represented by organic layer 20103. This was followed either by a reactivation of the channel or by flooding, which deposited eroded natural from upslope (20104), following which there was a further phase of slow accumulation in standing water (20109).

Waterlogged material from both 20103 and 20109 gave similar post-medieval date ranges, the greater probability being after AD 1800, indicating that this channel was silting up relatively recently. For this reason the samples taken from the two waterlogged fills were not analysed.

DISCUSSION

The later Mesolithic flintwork from the A21 widening scheme is provisionally dated to the latest part of the Mesolithic due to its similarity to assemblages recently recovered and dated from Bexhill in Sussex (Donnelly *et al*. 2019). Radiocarbon dating of charcoal from a tree-throw hole in which some of this flintwork was found demonstrated only that the flint had been redeposited in the early-middle Bronze Age. The reduction sequence of these assemblages is unusual for the Mesolithic, and has not previously been recognised in Kent, although some elements have strong similarities to the specialist assemblages from Finglesham and Darenth, which have good evidence of axe manufacture (Specialist Report 1, below).

The late Mesolithic activity took place close to the edge of a slightly elevated plateau with valleys to the north, south and west (Fig. 2), views from which may have influenced the choice of this site. In broader terms, it is part of a pattern of relatively widespread activity in Kent. In a recent review Garwood stated that ‘the evidence to date suggests concentrations of late Mesolithic activity along the Greensand Ridge, with a thin presence on the chalkland to the north and the high Weald areas to the south’ (Garwood 2011, 48 and fig. 3.9). The South East Research Framework for the Upper Palaeolithic and Mesolithic periods (Pope *et al.* 2018) notes a concentration of activity associated with the rock shelters of the Tunbridge Wells sandstone of the Central Weald, notable examples including hearths being sites at High Rocks and Eridge south-west of the A21 scheme (Money 1960; Greatorex and Seager Thomas 2000). These sites include evidence of late Mesolithic activity, broadly contemporary with the proposed date of the scatters at the A21, and it is possible that, separated by only 7km, both were part of the territory of the same hunter-gatherer groups. More locally, Mesolithic flints have been found at Castle Hill (Wymer 1975) only 800m to the north-west, and occasional Mesolithic flints have also been found in and around Tudeley Woods, the nearest only 800m south of the scatters in Area IA4, while residual struck flints have also been recovered from excavations in Tonbridge itself, some 2.2km to the north-west (Wragg *et al.* 2005). Open sites revealing *in situ* material, in contrast to disturbed plough scatters or individual findspots, are still however very rare in Kent, and this is one of the most important aspects of the A21 main scatter.

The pebble hammer (or macehead) was an isolated find but is an important addition to the corpus of these artefacts in Kent. Another example of a macehead with an hour-glass perforation was found only 10km to the north at Shipbourne (ARCHI Maps).

Earlier Neolithic activity is rare in this part of Kent; the nearest significant monuments lie at least 15km to the north-east (Garwood 2011, figs 3.10 and 3.11). Away from such major sites, activity in Kent follows a wider pattern of small-scale episodes that leave only limited below-ground features and artefacts (*ibid.*, 59-60), but in the absence of diagnostic artefacts, such sites remain unconfirmed. Radiocarbon dating of undated features where earlier prehistoric flintwork is present would doubtless reveal more such sites. Locally, a few sherds of middle or late Neolithic pottery were found during the excavation at Castle Hill hillfort (Money 1975), but not in contemporary features.

Bronze Age burnt mounds are common in much of Britain, and significant numbers are known in East Sussex, particularly near to the coast at Bexhill (Oxford Archaeology 2019), but they are currently rare in Kent. A small example from Deptford was dated to 1690-1520 at 95% confidence (Hammond 2010, 265), and a shallow hollow containing burnt flint and pottery of late Bronze Age date was found at Dartford (Simmonds *et al.* 2011, 68-71). There is also a much more extensive burnt spread (30m x 15m) alongside the Loose stream currently under excavation at Langley near Maidstone (Masefield *pers. comm.*) but the example found alongside the A2 is the first in this area of Kent.

A pair of pits like those at the A21 is fairly common, although these are particularly large; such pits are very common at Bexhill to the south-west (Oxford Archaeology 2019), but there they are only up to 2.5m across. Previous reports have generally considered both pits to be contemporary, rather than successive as the radiocarbon dates from the A21 strongly suggest; even here, however, the dates do not entirely exclude the possibility that the pits were contemporary, and that rather than indicating a change in preferred type of wood over time, the difference may indicate the desire for a different intensity of burning in the two pits.

Burnt mounds are usually closely associated with water, and in this respect the location of the A21 example is unusual, as it is partway up a hillside, and not close to an obvious water course. The same was true of the large shallow pit at Dartford (Simmonds *et al.* 2011, 69), but no pits were found there, and the feature contained significant numbers of finds, so its use may have been very different. During the A21 excavation it was noted that a natural gully, one of a number created by water erosion down the sides of Castle Hill, was cut by the larger pit, and even though it had silted up by the time the pit was dug, it is possible that such gullies still channelled water underground in times of wet weather, providing a source of water on occasions.

The presence of burnt flints at most examples provides good evidence that their function involved the immersion of heated stones in water. At the A21 it was the local sandstone that was burnt, which is more likely to have disintegrated in water, and so have been less suitable if water was involved. Nevertheless, the gullies leading downslope from the larger pit also suggest the likelihood that water was draining away downslope, and one burnt mound at Bexhill apparently had one pit draining into another. At the A21 the base of the gully is much higher than that of the pit, so could only have acted to prevent overflow, suggesting that a large volume of water was involved. It is alternatively possible, however, that the gullies were used to assist in manual emptying of rainwater from the base of the pit prior to use.

The absence of finds from burnt mound sites is usual, indicating that the activities they represented were not closely associated with settlement activity. In this case, the only other evidence of Bronze Age activity on the scheme was a pit of somewhat earlier date in Area IA4, and a very few struck flints of potentially later prehistoric character. Bronze Age sites are not common in the wider landscape, but cinerary urns were found only 3km away at High Brooms north-east of Tunbridge Wells, and at Parker's Green 5.5km to the north (ARCHI Maps). The environmental evidence is consistent with wood pasture rather than extensive arable cultivation, and so perhaps indicates a relatively mobile population.

The two radiocarbon dates from the ditch of the enclosure in Area IA4 are not consistent. Although not roundwood, the Pomoideae charcoal giving a middle Iron Age date would allow an offset of only up to 100 years for 'old wood' effect, and the same effect for the oak heartwood charcoal giving a Roman date could indicate a date in the very late Roman period. It is therefore likely either that that the Pomoideae charcoal was residual, or that the fill from which the Roman date was obtained was not primary, and that a deeper enclosure ditch cut, or a later feature cut, was missed here. On balance, the latter seems more likely. The deeper lengths of ditch were not confined to the terminals at the entrance, so this was not a consistent pattern, and although following hand-excavation a machine-cut sondage was dug to check that the ditch on the south-east had been bottomed, the natural and fills were clayey here, and distinctions much less clear than in the areas of more sandy natural around the circuit, where a deeper profile was identified. A localised cut containing the slag could also have been missed in the wet midwinter excavation conditions.

The Iron Age enclosure is one of relatively few middle-late Iron Age enclosures excavated in Kent. Comparable enclosures include the D-shaped or sub-rectangular example at Farningham Hill, which was 52m by 43m externally with a V-profiled ditch surviving up to 1.5m deep and three entrances, two close together on the south and south-west, respectively 6.3m and 5.4m wide, and one on the north-east only 2.9m wide (Philp 1984, fig. 4).It had one possible house inside, marked by one arc of curving gully 7m long and a scatter of postholes, which lay north-west of a line between the north-east and south-west entrances, and is unlikely to have marked a building more than 7m in diameter. Another possible roundhouse, also poorly preserved, was found at Darenth and was marked by two short arcs of gully with a gap 4.1m wide between them, suggesting a circle up to 12m across (Philp *et al*. 1998, fig. 12).

Other enclosures were found during the HS1 excavations. The inner of the concentric middle Iron Age enclosures at Beechbrook Wood was sub-rectangular and of similar dimensions, 54m x 50m across, but had only one entrance on the south-east just under 5m wide (Champion 2011a, fig. 4.15). The only surviving internal features were two lengths of gully, a four-post structure and a single large pit, although Champion suggested that this was largely due to truncation. This enclosure was however surrounded by one enclosing nearly 1ha, and the ditch was much more substantial, leading Champion to interpret this as a heavily defended site similar to the hillforts of the north side of the Weald (*ibid*., 212-213).

Three late Iron Age enclosures were also possibly of similar size, although none was completely uncovered. That at Hockers Lane was originally D-shaped and 48m by at least 35m across, but was extended to a sub-circular shape measuring over 60m by at least 35m, and a more substantial enclosing ditch was dug in the late Iron Age-early Roman period (Booth 2011, fig. 5.14). There were entrance gaps on the north-west and on the south, none being wider than 4m. A pair of linked enclosures was found at Northumberland Bottom south of Gravesend, and formed an hour-glass shape (*ibid*., fig. 5.13). The larger enclosure was sub-rectangular and 57m by at least 72m in size, with an entrance some 7m wide on the north and one 4m wide halfway down the east side. More regular was the rectangular enclosure at Thurnham, which measured 55m by at least 50m. No certain entrances were present in the revealed north-east portion, although an early Roman recut on the south-east side had probably removed gaps on this side. The interior contained one penannular enclosure gully and one semi-circular gully, two four-post structures and a pit.

Champion (2011a, 188-90) remarked on the rarity of domestic settlement sites, and particularly enclosed settlements, of middle Iron Age date in Kent, and although there are more examples in the late Iron Age, these still remain relatively rare in the South-East generally (Taylor 2007, 24). What distinguishes the enclosure at the A21 from all these other examples is the absence of domestic debris, even though several of the other enclosures similarly lack many internal features. This difference strongly suggests that the enclosure was not permanently, or even seasonally, occupied as a settlement, but was instead a space created for particular seasonal activities that required the occasional use of the single house in the interior. This difference may perhaps be due to the close spatial relationship between the enclosure and the contemporary hillfort at Castle Hill, such that it was used by the inhabitants of the hillfort, who returned to Castle Hill at the end of the day. Not all hillforts were used as permanent settlements, and the evidence for Castle Hill remains unclear, but the survival of the enclosure at Area IA4 into the Roman period, and its use for smithing then, certainly implies that it was maintained in some way over a reasonably long time by a community close by.

Another significant discovery is the firepits scattered throughout the landscape in the later Iron Age and medieval periods. The size range and character of these features is similar in both periods, although the very largest example is medieval, and the common factor is charcoal, mostly in the form of heartwood. Illustrations of charcoal production on the Continent from the late medieval and early post-medieval periods, for example De la Pyrotechnia by Vannoccio Biringuccio 1540, indicate that this was commonly carried out using circular stacks of timber up to 3m in diameter, and this seems the most likely interpretation of the use of these features at the A21.

The wood was stacked around a central chimney through which the stack was set alight, and covered with turf or earth to ensure slow burning (Kelley 1986). Various methods were used to create the chimney, including central posts, groups of upright stakes and horizontal timbers interlocking around a central cavity, and the absence of a central posthole at the A21 suggests that the last method was preferred here.

The Iron Age date range appears broadly to match that of the hillfort, and the distribution of firepits appears to indicate a focus to the south of the hillfort, in the same general area in which other broadly contemporary features have been found. This is important evidence for the exploitation of the hinterland of a Wealden hillfort, even if no ironworking sites have yet been found in the vicinity to which to link the charcoal production. The presence of firepits of small diameter, as well as those over 2m across, suggests that charcoal-burning was carried out on an as-need basis, rather than always on a larger scale, and possibly for smithing and other purposes than for iron smelting.

In the medieval period the spread of firepits is larger and may be focussed further to the north; the fact that most of the medieval examples are larger may indicate the growing demand from the iron industry around Tonbridge. Recent excavations have demonstrated the presence of iron-working on some scale from the later twelfth century onwards there (Swift and Blackmore 2010), and this timeframe appears to fit with the probable restart of the exploitation of the surrounding landscape for charcoal.

The change in preferred wood between the two periods is also evident in pits of other types, and an overall shift in the composition of woodland between the Iron Age and the medieval period is also known from pollen from several sites near Rye in Kent (Waller and Schofield 2007), and was interpreted by them as a change to wood pasture during the Saxon period. It is therefore likely that the change was not principally due to a change in the timber species preferred, and the oak-dominated medieval firepits support this. Beech is known to have been favoured for the production of potash (Charleston 1991), but there is no physical or documentary evidence for glassmaking in the area at this time, so this is unlikely to have influenced the types of wood selected.

The environmental evidence from the former channel of the River Bourne exposed at WC1 consisted of samples from two successive waterlogged deposits, the lower (20007) radiocarbon dated to cal AD 1050-1270 and the upper (20006) to cal AD 1220-1390 and cal AD 1280-1400 at 95% confidence. There is however a 90% chance that the sample from 20007 dated between cal AD 1150 and 1270, so the activity they represent is very likely to belong to the later twelfth to later fourteenth centuries.

The insect remains from both samples from the upper deposit show that the sediments contained significant quantities of occupation waste from human settlement upstream, including wood-boring beetles normally found in houses. Bourne Mill lies only 100m upstream and is most probably the source of this domestic evidence. The evidence therefore confirms that the mill was active from the late thirteenth or fourteenth century onwards. There was also evidence of occupation waste from the lower layer (20007), suggesting that the mill may have been present earlier, starting between the later twelfth and earlier thirteenth century.

The evidence for the cultivation of spelt wheat in the late thirteenth and/or fourteenth centuries is the first evidence confirmed by direct dating for England in the high medieval period. The significance of this important discovery is discussed in more detail by Meen and Pelling in Specialist Report 7. It was cultivated in Europe at this time, and its presence here was probably due to contacts with Europe. While the precise mechanism remains uncertain, there was certainly heightened direct contact between Englishmen and a variety of European peoples during the Hundred Years War in France from 1337 onwards, and between then and 1360 English victories resulted in the ceding of much land in France to England, and the construction or embellishment of a number of houses and estates in the south-east of England by the victors. This might have been the context in which this crop was adopted, at least for a time, in Kent.

The earliest documentary evidence for Bourne Mill is *Newefrith juxta Bournemelne* in a document concerning the lease of an ironworks there by Robert Springet in 1340 (Guiseppi 1913, 145-64; SC6/891/5 National Archives). This environmental evidence therefore provides important, if indirect, evidence of the medieval mill considerably earlier than its documented existence.

The pollen from the channel indicates a significant reduction in woodland in the wider landscape between the later eleventh (or more likely the mid-twelfth) century and the fourteenth century (more likely early in the century). This is the period that corresponds to the medieval firepits, and charcoal production may therefore have been a factor in the changing character of the landscape. Microcharcoal was also noted, increasing towards the top of the sequence, and this may have derived from charcoal-burning, although it could equally have come from domestic activity at Bourne Mill close by. The reduction in tree pollen was, however, predominantly of hazel and alder pollen, and neither was a large component of the charcoal from any of the dated medieval firepits, so there were clearly other factors involved as well.

The A21 excavations have demonstrated a pattern of intermittent use of this Wealden landscape from the later Mesolithic to the medieval periods. For the late Bronze Age and Iron Age periods, this fits Champion's view of recolonization of the Weald in the middle Iron Age after a period of very little activity (Champion 2011b, 9-13), although it needs to be remembered that the scheme constitutes only a narrow slice through this landscape. Although limited by the distribution and date range of suitable deposits, the A21 scheme has also shed light on the past environment of this part of the Weald in the earlier Neolithic, the middle Bronze Age, the later Iron Age and the medieval period.

ACKNOWLEDGEMENTS

The OA team was responsible to Julia Baker, A21 Scheme Environmental Manager for Balfour Beatty, who were Principal Contractor for Highways England. Monitoring of the archaeological work for Balfour Beatty was entrusted to Tony Hanna of designers WSP, and technical assurance and site supervision for Highways England were provided by Jenny Wylie of HHJV. The archaeology was also monitored by Wendy Rogers for Kent County Council Archaeological Services.

The project was managed for Oxford Archaeology by Tim G. Allen and the fieldwork was directed on a day-to-day by Mariusz Gorniak, who also drafted most of the on-site reports. Survey, digitizing and much of the watching brief were carried out by David Jamieson. Thanks are due to all of the field team, to the specialists who assessed and analysed the finds and environmental remains, and to the geomatics/graphics staff who prepared the illustrations and plates. Lisa Brown identified the few prehistoric pottery sherds, Paul Booth the Roman sherds and John Cotter the medieval ones. The author is grateful to Deborah Cole of the Tonbridge Historical Society for drawing attention to the documentary evidence regarding Bourne Mill.

EIGHT SPECIALIST'S REPORTS

Specialist Report 1. Struck flint *by Michael Donnelly*

The excavations recovered an assemblage of 814 flints made up of 264 flakes, 98 blades and bladelets, 15 cores and rejuvenation flakes, 5 microburins, 22 assorted retouched tools, 380 chips (324 of them sieved) and 28 pieces of irregular waste. The majority of the assemblage came from Area IA4, most from flint scatter 2753, with much of the remainder originating from three adjacent features (329, 341 and 359) containing residual pieces that probably derive from a second, disturbed scatter. Away from this area flint was scarce, and mostly residual, but was also early in date. However, period-specific artefacts were very rare in this assemblage, so much of the dating is based on technological indices. In the following report, the term 'early prehistoric' is used to describe blade technology, which can apply to the late Upper Palaeolithic, Mesolithic or early Neolithic periods.

The assemblage was generally in good condition with fresh or lightly edge-damaged lateral margins and light cortication. Unsurprisingly, the *in situ* scatter was better-preserved than the remainder of the flints, which displayed heavier levels of edge damage and are more corticated. Even these, however, were mostly relatively well-preserved, suggesting that the flintwork had not moved far from its original depositional contexts, and that some of the flints from pits and tree-throw holes across the scheme may be contemporary with those features.

Cortex included chalk (69), weathered chalk (19), weathered/thin (47, North Downs flint most likely), thermal (9, clay with flints), rolled (5), indeterminate (4) and three examples of Bullhead Beds cortex (Dewey and Bromehead 1915), showing that the flint was recovered from a wide range of sources. All the thermal pieces were from scatter 2753.

The *in situ* scatter and its immediate vicinity produced 630 flints, which comprised 268 significant pieces (more than 10mm long), 329 chips (281 sieved) and 23 pieces of larger irregular waste. This assemblage had a moderate blade index of 25.90% (65/251), contained mostly flake cores (e.g. **Fig. 12**, c.1, c.25 and c.356) and had a very low tool count at just three pieces: two microliths (c.50 and c.503) and a notch (c.29). The assemblage also contained four microburins, indicating microlith production on site, of which three are illustrated (c. 5, c.107, and c.509). There were no direct refits, but several groups of near refits were identified.

The assemblage displayed high levels of burning (30.95%) and breakage (38.81%), but there was no obvious pattern to the spread of burnt or broken material.

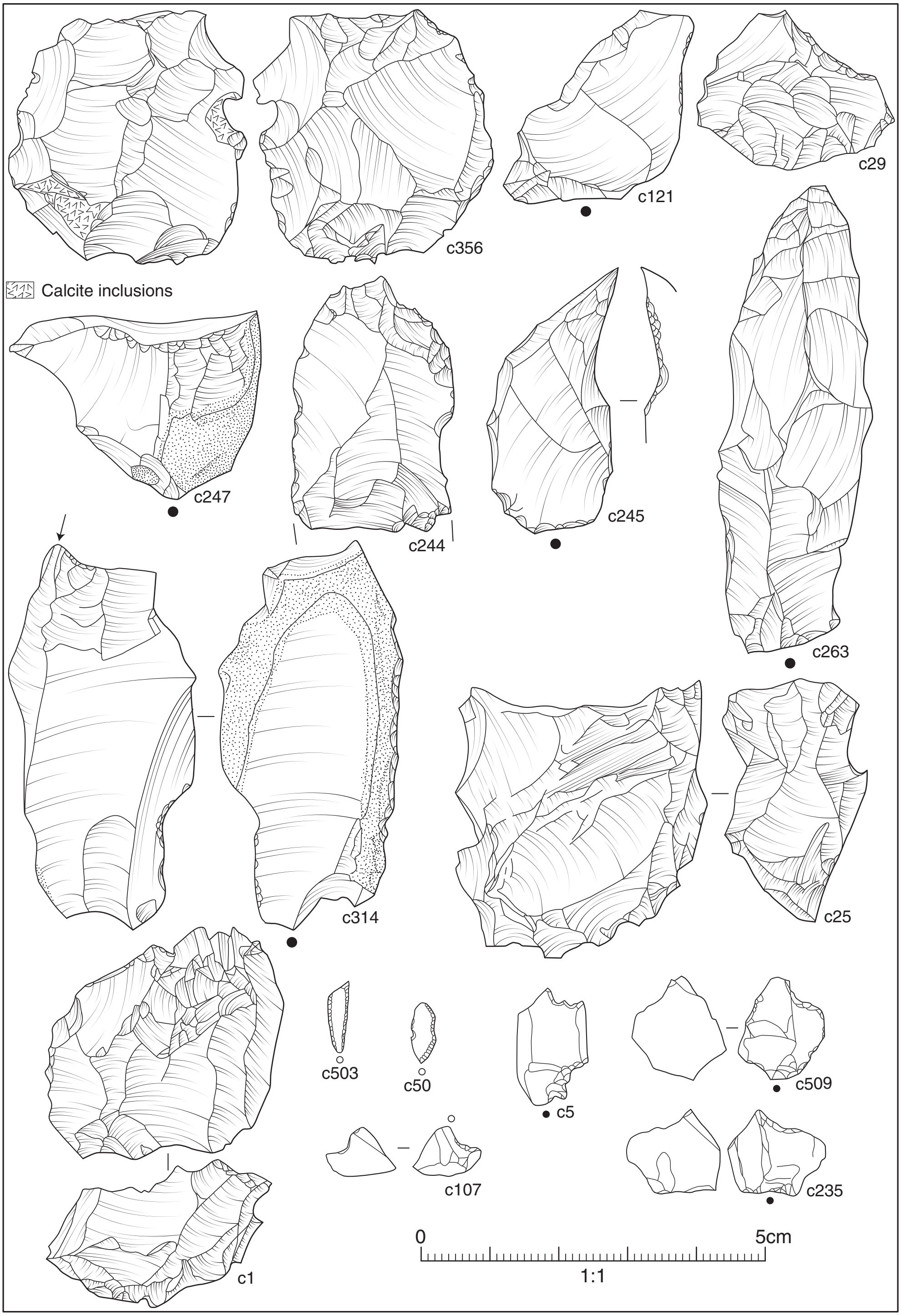

Fig. 12 Struck flint.

Levels of fine chips also showed great variety but little pattern, and no correlation between squares with more significant pieces and the numbers of chips (hence chips are not shown on Fig. 3). This may suggest that the scatter was disturbed, although the fresh condition of the material suggests that this is likely to have been during prehistory rather than more recent reworking or truncation. Alternatively, the scatter may have been made up of a series of very small knapping events whose patterning is not observable at the scale of the 1m grid.

There are several points of interest in the flints from scatter 2753. In terms of the debitage, the length:breadth ratios show a very low percentage of material defined as narrow, that is with blade dimensions and ratios greater than or equal to 2:1, and a far larger percentage of broad/squat flakes with a ratio of less than 1:1. Similar ratios were also obtained from the smaller assemblage from features 329, 341 and 359. Such figures are very far removed from typical late Mesolithic assemblages such as Streat Lane in Sussex (Butler 2011) and more nearly resemble later prehistoric assemblages such as the middle Bronze Age Site A on the A2 excavations in North Kent (Anderson-Whymark and Donnelly 2012). The ratios are, however, very similar to those from the Mesolithic axe/adze working site of Finglesham in east Kent (Butler 2014). They are also very comparable to several late Mesolithic flint scatters from Bexhill (Sussex) some 40km to the south-east.

The main reason for the low length:breadth ratio would appear to be that blade cores were mostly converted into Levallois-style cores in their final stages of reduction. The site contained significant assemblages from three or four cores/nodules, with a single final, Levallois core from each group, all of which had earlier blade removals from proper prepared single-platform blade cores. Slightly higher levels of complex, faceted and dihedral platforms (8.25%) were also evident in this and other similar assemblages than would be expected in a typical narrow-blade late Mesolithic site. The method of working a Levallois core is actually quite similar to the preparation and shaping that went into creating axe/adzes, so the technique was clearly known to late Mesolithic groups. Adze-working would also generate very squat debitage such as that found at Finglesham, Kent (Butler 2014) with a blade index of just 9.4% and a very similar length:breadth ratio figures to those at the A21, but there were no adzes here and the cores that were recovered suggest that the nodules were not large enough for adze production. Some of the illustrated worked-out adzes from the late Mesolithic site of Darenth, in north-west Kent, actually look very much like Levallois cores (Philp *et al*. 1998, fig. 11:47) and that site also saw the use of probable anvil-knapped bipolar cores (*ibid*. fig. 11:55), another method of maximising returns from a flint core more commonly found in northern Britain where flint is generally far more scarce.

Tree-throw hole 329, pit 341 and ditch 359: these three features, all located within 7m of each other, together yielded 80 pieces with low levels of tools, clear Mesolithic material and a blade-based industry. Tree-throw hole 329 contained 13 hand-recovered flints comprising eight flakes and five blade forms but was not sampled. It had a high blade index of 38.46% and lacked formal tools or tool debitage. Pit 341 lay south-east of 329 and contained 33 flints, the vast majority of which originated from an environmental sample, but was not fully excavated. The assemblage consisted of 7 flakes, 4 blades and 22 sieved chips for a blade index of 36.36%. Again, there were no tools present.

Ditch slot 359 contained 34 hand-recovered flints, which came from all four fills, but was not sampled for microdebitage. The flints from this feature were clearly part of the same technological industry and share many features in common, such as colour, inclusions and cortex type. The assemblage consisted of 19 flakes and 10 blades, giving a blade index of 34.48%, together with a broken awl formed on a large blade, a retouched blade with an awl-like tip (Fig. 12, c.244) and a classic proximal/right microburin (c.235). The assemblage also contained one core rejuvenation flake (c.247), a piece of irregular waste and a small chip.

The flints from features 329, 341 and 359 share many similarities in colour and cortex, and there is a probable near refit between blade segments from ditch 359, with a blade and a flake from tree-throw hole 329, so they probably formed part of the same scatter, now dispersed. This scatter is clearly late Mesolithic in character but is noticeably more blade-based than scatter 2753. However, it displays a more complex platform typology (dihedral/faceted percentage 18.18%), suggesting that many of these pieces were knapped from complex multi-platform and Levallois-type cores similar to those in the scatter. Moreover, the length:breadth ratio was also very similar (although many of the blade forms were broken, this is quite common for blade-based assemblages and would factor into most of the statistics presented).

The likelihood is that despite the differences in blade percentages between these features and scatter 2753, these two scatters are probably part of the same industry and may well have been contemporary or closely related in date. The differences in technology may relate to different activities being carried out between the two scatters.

Pit 1415 and topsoil/subsoil 1401/1402: medieval tree-throw hole/pit 1415 contained a small assemblage of residual flint, comprising four flakes, a bladelet and an awl on a preparation flake. One flake was of Bullhead Beds flint (Dewey and Bromehead 1915) and another piece of Bullhead flint, a core rejuvenation flake, was recovered from the topsoil, one of six pieces from the topsoil and subsoil here including a notch. The assemblage lacked fully diagnostic pieces, but the general character suggests an early prehistoric date. Bullhead Beds material saw increased favour in the early Neolithic period and was very often used in the production of regular blades for use as microdenticulates. If not of similar date to the larger Mesolithic scatters, it is therefore possible that these flints may be of (early) Neolithic date.

Nearly all the flints were from Area IA4 (753/814, 92.51%). Outside this area the numbers of flints were low, the largest groups coming from IA3-WC5 (18/814, 2.22%) and IA5 (14/814, 1.72%).

Specialist Report 2. Pebble Hammer *by Hugo Anderson-Whymark*

A residual stone pebble hammer was recovered from the subsoil (context 1009; SF4) during stripping in Area IA6, but no archaeological features were seen in this area. The artefact, which measures 72.8mm long, 50.3mm wide by 20.2mm thick and weighs 106g, was manufacture from a well-rounded flattened ovoid pebble of mid grey quartzite with a thin buff-coloured surface staining (**Fig. 13**). Although comparatively rare, quartzite pebbles can be found in gravels across southern

Fig. 13 Pebble hammer.

Britain, including Kent. The pebble exhibits a centrally located circular hourglass-shaped perforation measuring 22-3mm in diameter at its mouth and 12.9mm by 13.9mm at its centre. The surface of the perforation has been ground smooth, but slight traces of pitting remain visible, suggesting that the perforation was produced by pecking with a hammerstone rather than boring. The centre of the perforation exhibits a polished band probably caused by friction against a handle.

The surface of the artefact has a low to moderate polish, which is not unusual for unworked quartzite pebbles, but the surface sheen has been enhanced by handling and use, particularly toward the ends; no striations were observed to indicate deliberate surface grinding and polishing. Occasional surface marks and iron-stained streaks indicate contact with agricultural machinery. Both narrow ends of this artefact exhibit use-wear that takes the form of finely pecked facets c.22mm long by 8mm wide, which probably result from delicate use as a hammer. These areas of use-wear exhibit a slight asymmetry indicating the orientation of hafting (i.e. the bevel is on the lower edge facing the handle).

About 710 examples of pebble hammers have been recorded in Britain, with examples widely distributed across England and Wales, extending as far north as Aberdeenshire (Roe 1979, 40). The majority of these tools were manufactured from quartzite pebbles, although some were made from raw materials commonly used for axeheads. Rankine (1949) demonstrated Mesolithic associations for quartzite pebble hammers with hourglass perforations, comparable to the current example, found in South-East Britain. The dating of this class of artefacts is, however, not entirely straightforward and typologically similar artefacts may also have been used in the Neolithic or Bronze Age. Roe (1979, 36) highlights examples manufactured from raw materials sourced from Neolithic axe quarries and notes the recovery of fragments from Neolithic sites such as Durrington Walls and Windmill Hill. However, no secure Neolithic or Bronze Age associations have been identified.

Specialist Report 3. Radiocarbon dates from burnt mound pits 2045 and 2099
by Rebecca Nicholson

The radiocarbon dates from two fills in each pit provide combined date ranges of 1450-1300 cal BC for pit 2099, and 1400-1220 cal BC for pit 2045. Although the date ranges overlap, the more likely range for 2099 is 1450-1370 cal BC, whereas the emphasis of the dates from pit 2045 is on the later half of its range (**Fig. 14**).

Specialist Report 4. Pollen from pit 2099 *by Mairead Rutherford*

Sample 1085 from the base of the pit was analysed for pollen. Tree and shrub pollen comprise approximately 54% of the total pollen counted, herbs 26% and ferns approximately 20%. Tree pollen is dominated by oak (*Quercus*; 35% of the total pollen sum), followed by hazel-type (*Corylus avellana*-type; *c*.10% total pollen count) with fewer counts of birch (*Betula*), pine (*Pinus*), alder (*Alnus*), lime (*Tilia*), holly (*Ilex*), ash (*Fraxinus*), ivy (*Hedera*) and heather (*Calluna*).

A diverse herb assemblage is also recorded, including abundant grasses (Poaceae, *c*.10% of the total pollen count), ribwort plantain (*Plantago lanceolata*), docks/sorrels (*Rumex*-type), goosefoot family (Amaranthaceae, formerly Cheno-podiaceae, including taxa such as good king henry, fat-hen and many-seeded

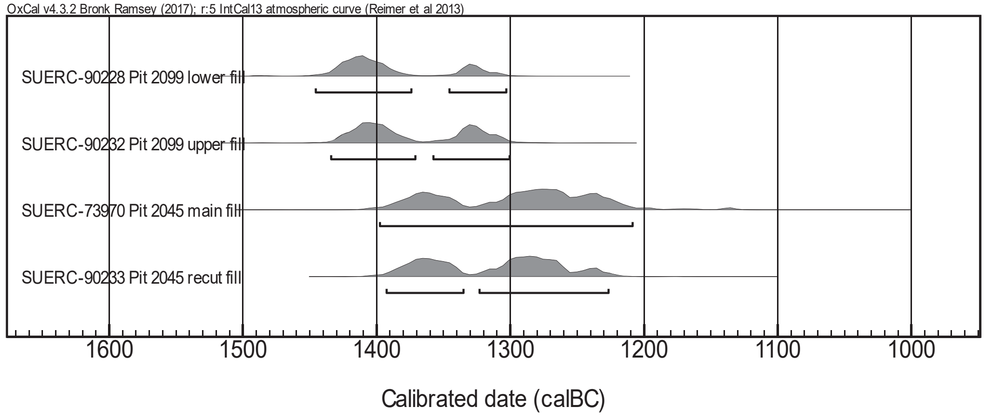

Fig. 14 Radiocarbon determinations from the two pits associated with the burnt mound in IA 3.

goosefoot), dandelion-type (*Taraxacum*-type), daisies (Asteraceae, a large group including taxa such as hawkbits, oxtongues and sow-thistles), carrot family (Apiaceae, including diverse plants such as cow parsley, pignuts and water-dropworts), buttercup-type (*Ranunculus*-type), pinks (Caryophyllaceae), mugworts (*Artemisia*), meadowsweets (*Filipendula*), cinquefoils (*Potentilla*-type), pea family (Fabaceae, including vetches, clovers and peas) and redshank (*Persicaria maculosa*). Several grains of cereal-type pollen/large grass pollen were recorded.

Fern spores were also recorded and include, in particular, bracken (*Pteridium aquilinum)*, with fewer counts for common polypody (*Polypodium vulgare)* and monolete ferns (Pteropsida). Microscopic charcoal particles were commonly recorded.

The pollen data from this sample suggests a mosaic of landscapes. Pollen from trees is overwhelmingly dominated by oak. Although this pollen type is dispersed by wind, the abundance of oak (when compared with other wind-dispersed tree pollen such as alder and hazel-type) suggests that oak was a significant component of the arboreal landscape, or that stands of oak existed close to the site. Oak may have occurred as a dominant constituent of mixed deciduous woodlands; other trees/shrubs probably included hazel-type, alder, birch, ash, lime and holly. Coniferous pine trees were also present, but in view of its relative scarcity probably not very locally, as the pollen of pine is very easily transported by wind. The openness of the woodland is indicated from pollen of ash and holly, trees that takes advantage of open spaces, and the occurrence also of ivy, which may possibly indicate opportunistic presence in a more open woodland (Garbett 1981). Heather is derived from acid moorland, suggesting either the existence of moorland nearby or deliberate collection of heather, perhaps for specific purposes such as bedding and roofing.

Pollen of herbs accounts for just over a quarter of the total pollen count and is dominated by grasses, indicative of open areas including, for example, along field edges or hedgerows, trackways, on rough or waste ground, as well as, potentially of cleared areas within or adjacent to woodlands. A wide variety of other herbs is also recorded, including those associated with disturbance, such as ribwort plantain, docks/sorrels, mugworts and the goosefoot family. Ribwort plantain has been interpreted as an indicator of grazing pressure (Tipping 2002) and is commonly found in grassy areas (Stace 2010) and may be indicative of wet meadows/pastures (Behre 1981). However, no fungal spores associated specifically with grazing animals were recorded.

Low numbers of cereal-type pollen grains, the dimensions of which include probable occurrences of barley (*Hordeum*-type) as well as wheat/oats (*Triticum/ Avena*-type), are also recorded. Cereal-type pollen may be indicative of arable agriculture in the vicinity or local cereal processing, or cereal-type pollen grains may have entered the sequences along with straw or animal dung. The dimensions of cereal-type pollen overlap with those of wild grasses, such as sweet-grasses (*Glyceria* spp.), which are known to occur in damp areas (Stace 2010), but can be distinguished with careful identification and within the context of the overall pollen assemblage (Andersen 1979, Tweddle *et al.* 2005, Joly *et al.* 2007). The occurrence of pollen of redshank and goosefoot family, which grow on waste, open or cultivated ground, and mugworts, found on waste/grassy places, support an interpretation of open ground that may have been suitable for small-scale arable cultivation.

The assemblage also includes fern spores, comprising bracken, common polypody and monolete ferns, all of which are common components of understory woodland and epiphytic on woodland trees. Bracken is known as an aggressive invader of open spaces (Wiltshire 2008) and may thrive in woodland edge locations, from where it might have been collected, potentially for use as bedding for people or litter for animals. Bracken is also known to grow preferentially in areas subject to burning (Innes 1999). Moderate to common counts of microcharcoal particles also suggest wood burning, as is evident from the macro-charcoal reported upon below (see Specialist report 5).

Specialist Report 5. Charcoal from pits 2045 and 2099 *by Julia Meen*

One of the aims of the analysis was to look for differences in the composition of the assemblages between the two pits, radiocarbon dates from which suggest they may have been successive rather than contemporary. The four samples contain taxa in varying proportions, but the variations are probably not great enough to be considered significant. Oak, field maple (*Acer campestre*), hazel, birch (*Betula* sp.), willow/poplar (*Salix/Populus*) and Maloideae charcoal were found in samples from both pits, although a sample from pit 2099 additionally contained blackthorn (*Prunus spinosa*) and lime (*Tilia* sp.) While oak was abundant in all four samples, however, the two from pit 2045 were mostly heartwood, yet heartwood is rare in the oak from one of the samples from pit 2099 and absent from the other. This is the opposite trend to what would be expected if there was increased pressure on the availability of mature oak, and is in agreement with the pollen evidence that oak woodland was extensive in the local landscape in this period (Rutherford, above). It may simply reflect the earlier fuelwood collector's preference for using easily obtained smaller branches. However, this distinction between the two pits perhaps supports the suggestion that they were not in use simultaneously.

Also of note is the use of lime, which was also present in the pollen from pit 2099 (*ibid*.). Lime tends to be underrepresented in both pollen and charcoal assemblages, being insect-pollinated, and having charcoal that tends to crumble easily, as well as being a poor fuelwood. Its presence as pollen and charcoal therefore suggests it was growing locally and was probably quite common. Lime struggles to recolonise secondary woodland but was a significant element of mid-Holocene primary woodlands (Grant *et al.* 2011), and its decline across lowland Britain during the late Neolithic to the late Bronze Age is generally attributed to clearance of primary woodland. Elsewhere in the Weald, the lime decline has been dated to 2000 BC at both Brede Bridge and Pannel Bridge, but both Peasmarsh and Lea Farm show continuing high values for lime pollen after this date, indicating variations in the extent of clearance across the area (Waller and Schofield 2007).

Specialist Report 6. Pollen from the channel *by Mairead Rutherford*

Taphonomy: the taphonomic processes leading to the accumulation and preservation of pollen in alluvial sediments are complex and pollen may derive from a variety of sources. For instance, it may represent airborne pollen or water-transported pollen, pollen derived from pastoral and arable environments, from fen-carr woodlands, from aquatic and mire communities, from wet meadows or from grassland areas subject to flooding. Pollen could be derived from upstream and/or downstream, eroded from older alluvial sediments or derived from anthropogenic activities, such as coppicing or pollarding or crop processing, or as a result of animal trampling. Despite these difficulties, valuable palaeo-environmental data can be obtained from alluvial deposits and palaeochannel sequences, especially, in an archaeological setting, when layered deposits are available for analysis. Pollen analysis is of particular value, as regularly spaced samples through continuously deposited sediments provide a more coherent picture of palaeo-environmental change.

The pollen assemblages: from the profile analysed for pollen from the palaeochannel, tree pollen accounts for just under 70% of the total pollen counted at the bottom, and approximately 30% at the top. The deepest sub-sample is dominated by hazel-type (*Corylus avellana*-type) pollen, with significant counts also for pollen of alder (*Alnus*). Other tree types represented include oak (*Quercus*), birch (*Betula*), heather (*Calluna*) and pine (*Pinus*) with occurrences only of beech (*Fagus*), holly (*Ilex*) and ivy (*Hedera*). Following a gap in sub-sampling of *c*.0.4m, the pollen profile shows a decrease in overall tree pollen, to approximately 40% of the total pollen counted, declining to 30% in the topmost sub-sample analysed. This decrease in tree pollen may be attributed largely to a decrease in hazel-type and alder. Values for pollen of oak and beech increase towards the top of the profile and there are sporadic occurrences of ash (*Fraxinus*), honeysuckle (*Lonicera*), willow (*Salix*), lime (*Tilia*) and walnut (*Juglans*).

Pollen of herbs includes primarily pollen of grasses (Poaceae), dandelion-type (*Taraxacum*-type), daisies (Asteraceae, a large group including taxa such as hawkbits, oxtongues and sow-thistles), ribwort plantain (*Plantago lanceolata*), common knapweed (*Centaurea nigra*), sedges (Cyperaceae), cabbage family (Brassicaceae, a large group including plants such as garlic mustard, cabbages and radishes) and goosefoot family (Amaranthaceae, formerly Chenopodiaceae, including taxa such as good king henry, fat-hen and many-seeded goosefoot). Other herbs include occurrences of the pollen of pinks (Caryophyllaceae), the pea family (Fabaceae, including vetches, clovers and peas), hoary/greater plantain (*Plantago media/major*), knotgrass (*Polygonum aviculare*), docks/sorrels (*Rumex*-type), willow-herbs (*Epilobium*-type), buttercup-type (*Ranunculus*-type) and mugworts (*Artemisia*).

Cereal-type pollen, the dimensions for which suggest grains of both barley (*Hordeum*-type) and wheat/oats (*Triticum/Avena*-type), or large grass pollen, is absent from the deepest sub-sample but present consistently through the rest of the analysed section. Fern spores are also recorded and include decreasing levels of common polypody (*Polypodium vulgare),* increasing spores of bracken (*Pteridium aquilinum)* and varying quantities of monolete ferns (Pteropsida). *Sphagnum* moss spores are present in low numbers and there is a record for pollen of the aquatic lesser bulrush (*Typha angustifolia*). Fungal spores of *Cercophora* (HdV-112) are present in small quantities within deposit 20006. Microcharcoal particles increase from low levels to moderate levels through the sequence sub-sampled. Pollen grains that are unidentified through deterioration (crumpled, concealed or broken) represent *c*.10% of the total pollen count.

Interpretation of pollen assemblages: the arboreal pollen data suggests declining woodland abundance from the bottom to the top of the section analysed from the palaeochannel deposits. In particular, values for pollen of hazel-type fall significantly through deposit 20007. However, the overall composition of woodland taxa increases to include a range of trees and shrubs, in particular, beech and oak, with occurrences also of ash, honeysuckle, willow, lime and walnut. Pollen from several of these taxa may have been derived from managed woodland or ornamental gardens and may have arrived at the site via fluvial transport from elsewhere in the catchment.

Overall declining numbers of tree/shrub pollen are matched by increasing values of herbs, in particular grasses. These data suggest increasing openness in the surrounding landscape, with evidence of both possible arable and pastoral cultivation. Cereal-type pollen, which is absent in the deepest sub-sample but present in the remaining overlying sub-samples, may be indicative of arable agriculture or cereal processing in the catchment; the pollen grains may have been fluvially transported. Cereal-type pollen, the dimensions for which suggest pollen of barley as well as wheat/oats, may alternatively be attributable to wild grasses of similar dimensions, such as sweet-grasses (Andersen 1979, Tweddle *et al.* 2005, Joly *et al.* 2007), which are aquatic or marsh plants that grow on mud or in shallow water, marshes and wet meadows (Stace 2010). That some cereals were present is shown by the waterlogged seeds (Meen, below). Pollen of the goosefoot family, which potentially includes many species of waste or cultivated ground, for example, many-seeded goosefoot, fat-hen (Stace 2010), and pollen of knotgrass, are also consistent with cereal cultivation, although knotgrass is also known from fallow land, footpaths and ruderal communities (Behre 1981).

The pollen data suggest an increasingly open environment, supporting herb-rich grassland. Ribwort plantain, for example, is commonly found in grassy areas (Stace 2010) and may be indicative of wet meadows/pastures (Behre 1981). Wet fields and meadows adjacent to a channel may have been used as pasture-land; the occurrence of low numbers of the coprophilous fungal spore *Cercophora* (HdV-112), may support animals grazing; however, these fungal spores can also occur on decaying wood (van Geel and Aptroot 2006). Sedge pollen, also present in the assemblage, derives from plants of aquatic or wet areas, and willow-herbs are largely known from damp ground, although they can also occur on cultivated or waste land (Stace 2010). There is an isolated occurrence of pollen from the lesser bulrush, known to grow in or by reed-swamps, slow rivers and ponds (Stace 2010). Pollen of plants that grow in grassy places, rough ground and waysides are also well represented and include common knapweed, dandelion-type and buttercup-type.

Ferns, including common polypody and bracken, are common components of understory woodland but also occur on woodland edges. Bracken is known as an aggressive invader of open spaces (Wiltshire 2008) but is also known to grow preferentially in areas subject to burning (Innes 1999). Bracken may possibly have been used as bedding for people or litter for animals. Microcharcoal particles suggest burning episodes, with some evidence for an increase in such events towards the top of the section. These particles could have originated from wood burning (possibly of hazel-type and alder, as values for the pollen of these tree types decreases towards the top of the diagram, coincident with increasing levels of microcharcoal) as a product of using domestic hearths or ovens, or could possibly have been derived from an industrial source, for example, from iron or pottery industries. The particles may have been wind-derived or may have arrived at the site via fluvial transport.

Pollen from the profile available through the medieval palaeochannel suggests a reduction in woodland cover (from *c*.70% to 30%) between the later twelfth and the end of the thirteenth centuries AD. The pollen study also provides evidence for expansion of more open, grassy environments with potential for both arable and pastoral farming. There is evidence also for woodland management, including increases in oak and beech trees, while hazel-type and alder decline.

The small irregular fields typical of the Weald are generally thought to date from the twelfth and thirteenth centuries (Harris 2004, 49-50), and while no fields have been identified at the A21, the medieval environmental sequence is in keeping with this. The few other sites recording pollen sequences during the medieval period show that the landscape of the Weald comprised a mosaic of open ground, fields and woodland, and indicate a diversity of trees including oak, elm, beech, hornbeam and ash, all managed and exploited for the iron industry (Rippon *et al.* 2015, 133). This is also consistent with the sequence observed at the A21, and although there is no clear link between the changes at this site and the iron industry, the evidence from Tonbridge itself shows that iron working was well-established in the thirteenth century there.

The medieval woodland economy of Kent included the conversion of wood pastures to enclosed woodland, to address the demand for wood around the coast of Kent and East Sussex (Witney 1990).

Specialist Report 7. Waterlogged plant remains from the channel *by Julia Meen*

Medieval date ranges of 1050-1270 cal AD and 1220-1390 cal AD have been obtained for samples of waterlogged seeds from the bottom and top of the waterlogged fills in the western palaeochannel. Any changes in composition of the waterlogged plant assemblages between these two samples thus reflect local vegetation change during the medieval period and can be directly compared with the pollen record from the same sequence (Rutherford, above). More than one sample was taken from each of the two main waterlogged fills, but only the richest, which were the lowest within fill 20007 (sample 1170) and the uppermost within fill 20006 (sample 1166), were fully analysed.

Full quantification of the waterlogged plant remains identified from both samples can be found in the full report. **Fig. 15** shows the relative proportions of plant taxa (calculated from absolute counts of seeds) that are associated with distinct ecological groupings. In this case, almost half of the macrofossils from the channel belong to taxa which are habitat specific. As is to be expected from a channel, the most strongly represented grouping is of aquatic and damp ground taxa, with the proportion at around 17% of the total in both samples. Sedges (*Carex* spp.) and rushes *(Juncus* sp.) are the most common taxa in both assemblages, and presumably would have been growing at the margins of the channel.

Fig. 15 also illustrates a large rise in the number of plants associated with cultivated, waste or open ground habitats, with overall seed numbers in this category almost doubling by the top of the sequence. This rise is mostly accounted for by the increase in two plants, nettle (*Urtica dioica*) and knotweed (*Persicaria* sp), which, together with a rise in grasses (Poaceae), indicates an expansion of waste ground. However, there is also a greater diversity of arable weeds, including

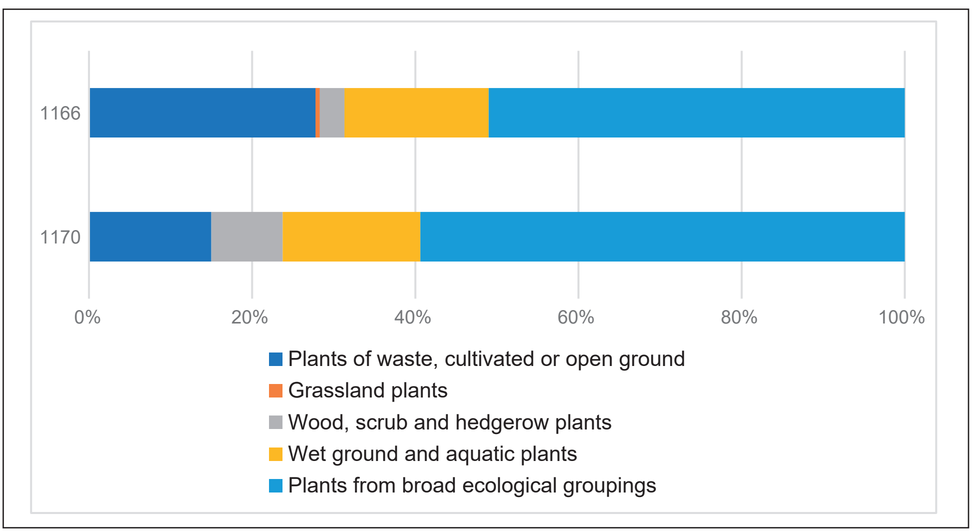

Fig. 15 Relative proportions of charred and waterlogged plant taxa associated with distinct ecological groupings from the two medieval channel samples.

corn marigold (*Glebionis segetum*), wild radish (*Raphanus raphanistrum*) and scarlet pimpernel (*Anagalis arvensis*).

In parallel with the rise of open ground taxa is a decline in tree, scrub and hedgerow taxa. The basal sample includes fruits of birch (*Betula* sp.), alder (*Alnus glutinosa*), whole immature nuts of hazel (*Corylus avellana*) and, as noted above, a fruit scale of beech (*Fagus sylvatica).* While birch seeds disperse on the wind and may have come from further afield, the heavy hazelnuts and beech scale must have been growing close to the channel, whether on the site itself or further upstream. Only two alder seeds and a single seed of birch are present in the upper sample.

These trends agree with the results of the pollen from this sequence (Rutherford, above). While the two forms of evidence have different sized catchments, both point to extensive woodland cover in the early part of the sequence. Arboreal pollen is dominated by hazel and alder, with birch and beech also represented. As the pollen sequence progresses, there is a drop in hazel and alder pollen, while grass and cereal pollen increases. The waterlogged plant remains provide further evidence that the local environment became increasing open through the medieval period, with areas of waste ground and arable cultivation.

Discussion of spelt wheat (by Julia Meen and Ruth Pelling): sample 1066 from channel deposit 20006 also contained evidence of cereal cultivation in the form of 182 spelt wheat glume bases (*Triticum spelta*). No glume bases were found in context 20007, but a scan of sample 1167 from lower fill 20006 found three further examples. The majority of the glume bases are waterlogged, with 17 preserved through charring. These 17 charred glume bases were all submitted for radiocarbon dating to ensure there was sufficient material. The analysis confirmed that the glume bases themselves date to the fourteenth century, 1280-1400 cal AD (642±24BP SUERC 94076 (GU55251)), and are not residual. This medieval date for spelt wheat is highly significant.

Spelt is a glumed or hulled wheat, the grains of which are enclosed in hulls which need to be removed before the grain can be processed further, and the discarded glume bases are extremely common on later prehistoric and Roman sites in Britain, usually charred. While the cultivation of spelt wheat may have continued locally following the withdrawal of Roman administration, by the Saxon period glumed wheats had been largely replaced by free-threshing bread type wheat (*Triticum aestivum*) (Van der Veen and Palmer 1997; Carruthers and Hunter-Dowse 2019) or, by the late Saxon period, free-threshing rivet wheat (*Triticum turgidum*) (Carruthers and Hunter-Dowse 2019, 213-6).

Charred spelt wheat grains or glumes have been recorded in a number of Saxon and medieval contexts across Britain, but in most cases the quantities are very small, and may have been residual from earlier phases of activity. There are, however, a few instances of directly dated glume bases or grains that show that hulled wheats were locally cultivated in these periods.

Spelt wheat has been recorded from two mid-Saxon coastal sites in south east England: Bishopstone, Seaford, East Sussex (Ballentyne 2010) and Lyminge, Kent (McKerracher 2017). A 12th-century assemblage of emmer grain and glume bases was recorded from the site of the Olympic Park close to London in the Lea Valley, a tributary of the lower Thames (Wyles *et al*. 2012, 321). Elsewhere in Britain there are also a few dated examples; at Stansted near Southgate in Essex, for example, spelt-type grain was dated to 960-1040 cal AD (1022 ± 30 BP; NZA23235) (Carruthers and Hunter Dowse 2019).

At Lyminge the author interpreted the presence of spelt as evidence for continued cultivation. In contrast, emmer wheat (Triticum *dicoccum*) has been found at sites of Saxon date in the Thames Valley (Pelling and Robinson 2000) and has been attributed to the influx of settlers from Saxony, where emmer continued to be cultivated; emmer wheat had largely disappeared from the Thames Valley by the Iron Age and its occurrence in Saxon deposits with an otherwise 'Saxon' suite of cereals including free-threshing wheat and rye (*Secale cereale*) suggested reintroduction rather than continuation of cultivation. The long gaps in the record for spelt wheat in Britain also suggests importation and reintroduction rather than continuing cultivation: both mid-Saxon sites in Kent are coastal, and the Olympic Park sits close to the trading centre of London. Hulled wheats including spelt were certainly being grown in mountainous parts of mainland Europe during the medieval period, known from both archaeological and historic sources (Peña-Chocarro *et a*l 2019; Peña-Chocarro and Zapata 2014).

Following the Norman conquest, connections to the continent through trading, migration and military campaigns increased, and the evidence from the current site adds another century during which spelt was brought to England by landowners, farmers or merchants and cultivated for a period of time.

Specialist Report 8. Insects *by Enid Allison*

The methodology for the analysis of the insect remains is provided in the full report, as are the main statistics for the two assemblages that contained over a hundred individuals and the lists of insects recorded from each sample.

Insect remains were present in low concentrations in context 20007 (sample 1170). A small assemblage of 29 beetles and bugs of 25 taxa (six individuals per litre) was recovered. Four of these were water beetles, including *Ochthebius bicolon*, found in damp mud by running water. Occasional water flea ephippia were also present. Terrestrial insects included two species of weevil with leaf-mining larvae (*Orchestes* spp.), indicating the presence of trees beside the channel, and *Ocys harpaloides*, a ground beetle found under bark or stones on damp soils. *Orchestes quercus* is specifically associated with oak (*Quercus*). *Microplontus melanostigma*, found on mayweeds (*Matricaria* and *Tripleurospermum*), is suggestive of disturbed ground. Several synanthropic beetles were suggestive of the introduction of occupation waste into the stream at some point (*Coprophilus striatulus*, *Oxytelus sculptus* and *Cryptophagus*). *Ptilinus pectinicornis*, which has wood-boring larvae and often infests structural timber, may have arrived with this material, although it frequently attacks deciduous trees in natural situations. Two samples from later parts of context 20007 (samples 1169 and 1168) produced only occasional undiagnostic water beetle leg segments.

Considerably larger assemblages of beetle and bugs (100-200 individuals) were recorded from context 20006, sequential samples 1167 and 1166. In sample 1167 aquatic beetles accounted for 11% of the whole assemblage and they included two species of riffle beetles (*Elmis aenea* and *Oulimnius*), suggesting clean, clear running water, while *Ochthebius dilatatus* and *Heterocerus* are typical of waterside mud. The aquatic weevil *Eubrychius velutus* lives on water milfoil (*Myriophyllum*), *Conomelus anceps*, a small planthopper, on rushes (*Juncus*), and *Notaris acridulus* is primarily associated with reed sweet-grass (*Glyceria*) and perhaps other semi-aquatic grasses. *Contacyphon*, found on waterside plants near shallow water, was quite common. Several taxa were indicative of the presence of trees close to the channel. The most numerous of these, accounting for 10% of the terrestrial fauna, were *Orchestes* weevils: *Orchestes quercus* is associated with the foliage of oak. An oak pinhole borer *Platypus cylindrus* was also recorded; this beetle makes tunnels initially into oak sapwood and subsequently into the heartwood (Bevan 1987, 42). The red-legged shield bug *Pentatoma rufipes* is usually associated with oak and elm (*Ulmus*). There were suggestions of disturbed or cultivated ground from *Phyllotreta* spp. and *Ceutorhynchus*, which predominantly feed on crucifers (Brassicaceae), and hints of grassland habitats from taxa such as *Sitona*, which is associated with Fabaceae, *Longitarsus*, apionid weevils, and perhaps some of the click beetles (Elateridae) that were not closely identified. *Aphodius* dung beetles made up 3% of the terrestrial fauna.

A range of synanthropic beetles indicated the introduction of occupation waste into the channel, at least some of which was from within buildings. A typical 'house fauna' (Kenward and Hall 1995; Carrott and Kenward 2001) consisting of *Xylodromus concinnus*, *Crataraea suturalis*, *Ptinus*, *Cryptophagus* spp., *Atomaria* and *Latridius minutus* group, together accounted for 8% of terrestrial insects. Woodworm (*Anobium punctatum*) and powder-post beetles (*Lyctus linearis*) were probably associated with this component as both can be serious pests of structural timber.

The assemblage from later sample 1166 was very similar to that from 1167. Aquatic insects were proportionally better represented (20% of the whole assemblage), but this appears to be because *Eubrychius velutus*, found on water milfoil (*Myriophyllum*), was notably common with nine individuals. Other water beetles included *Hydraena pulchella* or *pygmaea* associated with clean, running water habitats. Duckweed (*Lemna*) growing on the water surface in places was indicated by the tiny aquatic weevil *Tanysphyrus lemnae*. *Donacia simplex* is usually associated with bur-reeds (*Sparganium*) and *Chaetocnema arida* group with rushes (*Juncus*) and grasses. Evidence for trees, including oak, growing close to the channel came from *Orchestes* species and bark beetles (Scolytini). One of the latter, *Dryocoetes villosus,* will attack several tree species but is most commonly associated with oak. Scarabaeoid dung beetles (Geotrupinae, *Aphodius* spp.) made up 5% of the terrestrial fauna. A small house fauna (3% of terrestrial insects) and other synanthropes typically associated with occupation waste suggest that limited amounts of such material, including litter from within buildings, was entering the stream.

Discussion of the insect assemblages: the samples are from a water channel and there may have been transport of some insect remains and other biological material along its length; any transported material would tend to settle out in places where the water was flowing more slowly. The evidence obtained from these samples therefore potentially pertains to conditions upstream of the sampling point.

Evidence from the lowermost fill (20007) was limited by the small size of the assemblage, although there were good indications for the presence of trees, including oak, growing close to the channel, and for the limited entry of occupation waste at some point.

Aquatic beetles from the two larger assemblages from later fill 20006 included species indicative of clean, clear, running water, and several taxa suggesting waterside mud. Water milfoil was specifically indicated by the aquatic weevil *Eubrychius velutus* and there were indications of tall vegetation at the water margins that included bur-reeds, rushes and semi-aquatic grasses such as reed sweet-grass. Duckweed was probably present on the surface of slower-moving water or in backwaters. There was good evidence for the presence of trees alongside the channel, and specifically for oak. Evidence for other habitats was limited however, although there were suggestions of disturbed ground and grassland, mainly in sample 1167. Scarabaeoid dung beetles made up 3-5% of the terrestrial fauna, suggesting low-level grazing on adjacent land (Smith *et al*. 2010, 2014), although some species overwinter in flood debris (Jessop 1986, 19-25).

Decomposer beetles with synanthropic associations were recorded in small numbers from all three samples. Significantly, both samples from context 20006 included 'house faunas' characteristically associated with litter in ancient buildings. This component made up 8% of terrestrial insects in sample 1167 and 3% in sample 1167, suggesting that limited amounts of occupation waste had regularly entered the channel, perhaps upstream. The insect evidence was insufficient to suggest direct dumping of significant amounts of organic occupation waste at the sampling point.

BIBLIOGRAPHY

Allen, T., Donnelly, M., Hardy, A., Hayden, C., and Powell, K., 2012, *A road through the past: archaeological discoveries on the A2 Pepperhill to Cobham road-scheme in Kent*, Oxford Archaeology monograph 16.

Andersen, S.Th., 1979, 'Identification of wild grass and cereal pollen', *Danmarks Geologiske Undersogelse*, 1978, 69-92.

Anderson-Whymark, H., and Donnelly, M., 2012, 'Struck flint', in Allen *et al*. 2012, 48-62.

Ballantyne, R., 2010, 'Charred and mineralised biota', in G. Thomas (ed.), *The Later Anglo-Saxon settlement at Bishopstone*, CBA Research Report 163, 164–176 (York).

Behre, K.E., 1981, 'The interpretation of anthropogenic indicators in pollen diagrams', *Pollen et Spores*, 23, 225-245.

Bevan, D., 1987, *Forest insects: a guide to insects feeding on trees in Britain*, Forestry Commission Handbook 1 (HMSO).

Booth, P., Champion, T., Foreman, S., Garwood, P., Glass, H., Munby, J. and Reynolds, A., 2011, *On Track: the archaeology of High Speed 1 Section 1 in Kent*, Oxford Wessex Archaeology Monograph 4.

Butler, C., 2011, 'Prehistoric flintwork', in Riccoboni, P. and Swift, D., 2011, 'A Mesolithic site at Tong's Meadow, West Street, Harrietsham', *Archaeologia Cantiana*, 131, 291-303.

Butler, C., 2014, 'Struck flint', in Parfitt, K. and Halliwell, G., 232-254.

Carrott, J. and Kenward, H., 2001, 'Species associations among insect remains from urban archaeological deposits and their significance in reconstructing the past human environment', *Journal of Archaeological Science*, 28, 887-905.

Carruthers, W.J. and Hunter Dowse, K.L., 2019, *A Review of Macroscopic Plant Remains from the Midland Counties*, Historic England Research Report Series no. 27.

Champion, T., 2011a, 'Later Prehistory', in Booth *et al*., 151-241.
Champion, T., 2011b, *South East Research Framework Resource Assessment and Research Agenda for the Middle Bronze Age to Iron Age periods* (2011 with additions in 2018 and 2019), downloaded from https://www.kent.gov.uk-data/assets/pdf 3/12/19.
Charleston, R.J., 1991, `Vessel Glass', in J. Blair and N. Ramsey (eds), *English medieval industries* (London).
Dewey, H., and Bromehead, C.E.N., 1915, *The geology of the country around Windsor and Chertsey* (London).
Donnelly, M., Grant, R., Kennard, L., Lawrence, T. and Souday, C., 2019, 'The flint scatters (Palaeolithic to Bronze Age): factual data', in Oxford Archaeology 2019.
Garbett, G.G., 1981, 'The Elm Decline: the depletion of a resource', *New Phytologist*, 88, 573-585.
Garwood, P., 2011, `Early Prehistory', in Booth *et al*., 37-150.
Grant, M.G., Waller, M.P. and Groves, J., 2011, 'The *Tilia* decline: Vegetation changes in lowland Britain in the mid and late Holocene', *Quaternary Science Reviews*, 30, 394-408.
Greatorex, C. and Seager Thomas, M., 2000, Rock Shelter Stratigraphy: Excavations at Eridge, *Sussex Archaeological Collections*, 138, 49-56.
Hammond, S., 2010, 'Bronze Age features, including a burnt mound, at Deals Gateway (former Deptford Pumping Station), Deptford', *Archaeologia Cantiana*, 130, 259-276.
Harris, R.B., 2004, *The making of the High Weald. Informing the High Weald AONB Management Plan* (High Weald AONB Joint Advisory Committee).
Innes, J.B., 1999, `Regional vegetational history', in D.R. Bridgland, B.P. Horton and J.B. Innes (eds), *The Quaternary of north-east England Field Guide* (Quaternary Research Association).
Jessop, L., 1986, *Dung beetles and chafers. Coleoptera: Scarabaeoidea* (Royal Entomological Society, London).
Joly, C., Barille, L., Barreau, M., Mancheron, A. and Visset, L., 2007, 'Grain and annulus diameter as criteria for distinguishing pollen grains of cereals from wild grasses', *Review of Palaeobotany and Palynology*, 146, 1-4.
Kelley, D.W., 1986, *Charcoal and charcoal burning*, Shire Album 159 (Shire Publications Ltd, Haverfordwest).
Kenward, H.K. and Hall, A.R., 1995, 'Biological evidence from 16-22 Coppergate', *The Archaeology of York*, 14 (7), 435-797 (York).
McKerracher, M., 2017, 'Seeds and status: the archaeobotany of monastic Lyminge', in G. Thomas and A. Knox (eds), *Early medieval monasticism in the North Sea Zone*, 127-134 (Oxford: University of Oxford School of Archaeology).
Meen, J., 2019, 'Wood charcoal from the prehistoric and medieval fire-pits', in Oxford Archaeology, A21 Tonbridge to Pembury Dualling Scheme, Kent: post-excavation assessment and updated project design, 101-111.
Money, J.H., 1960, 'Excavations at High Rocks, Tunbridge Wells, 1954-1956', *Sussex Archaeological Collections*, 98, 173-221.
Money, J.H., 1975, 'Excavations in the two Iron Age hill-forts on Castle Hill, Capel, near Tonbridge, 1965 and 1969-71', *Archaeologia Cantiana*, 91, 61-85.
Oxford Archaeology, 2019, 'A259 Bexhill to Hastings Link Road: post-excavation assessment and updated project design'.
Oxford Archaeology, 2020, 'A21 Tonbridge to Pembury Dualling Scheme, Kent: Final report on Archaeological Discoveries', unpubl. report prepared for Highways England on behalf of Balfour Beatty.
Parfitt, K., and Halliwell, G., 2014, 'Exploiting the Wildwood: evidence from a Mesolithic activity site at Finglesham, near Deal', *Archaeologia Cantiana*, 134, 221-262.

Peña-Chocarro, L., Pérez- Jordà, G., Alonso, N., Antolín, F., Teira-Brión, A., Pedro Tereso, J., Montes Moya, E.M. and López Reyes, D., 2019, 'Roman and medieval crops in the Iberian Peninsula: A first overview of seeds and fruits from archaeological sites', *Quaternary International,* 499, 49-66. https://doi.org/10.1016/j.quaint.2017.09.037

Peña-Chocarro, L. and Zapata, L., 2014, 'Versatile hulled wheats: farmers' traditional uses of three endangered crop species in the western Mediterranean', in Chevalier, A., Marinova, E. and Peña-Chocarro, L. (eds), *Plants and People: Choices and Diversity through Time* (Oxford: Oxbow Books), 276-281.

Pelling, R., 2003, 'Early Saxon cultivation of emmer wheat in the Thames Valley and its cultural implications', in Robson Brown K.A. (ed.), *Archaeological Sciences 1999. Proceedings of the Archaeological Sciences Conference, University of Bristol, 1999*, British Archaeological Reports (Oxford), 103-110.

Pelling, R. and Robinson, M., 2000, 'Saxon emmer wheat from the Upper and Middle Thames Valley, England', *Environmental Archaeology*, 5(1), 117-119.

Philp, B., 1984, `The Iron Age farmstead on Farningham Hill', in Philp, B., *Excavations in the Darent Valley, Kent*, Fourth Research Report in the Kent Monograph Series (KARU), 7-71.

Philp, B., Garrod, D. and French, D., 1998, *Neolithic and Iron Age sites at Darenth, Kent* (KARU).

Pope, M., Wells, C., Scott, B., Maxted, A., Haycon, N., Farr, L., Branch, L.N. and Biddulph, E., 2011 (revised 2019), 'The Upper Palaeolithic and Mesolithic Periods', in *South East Research Framework Resource Assessment and Research Agenda*, 1-42.

Rankine, W.F., 1949, 'Stone "maceheads" with Mesolithic associations from south-eastern Britain', *PPS*, 15, 70-76.

Rippon, S., Smart, B. and Pears, B., 2015, *The fields of Britannia* (OUP).

Roe, F.E.S., 1979, 'The typology of implements with shaftholes', in T.H.M. Clough and W.A. Cummins (eds), *Stone Axe Studies*, 23-48 (London).

Simmonds, A., Wenban-Smith, F., Bates, M., Powell, K., Sykes, D., Devaney, R., Stansbie, D. and Score, D., 2011, *Excavations in North-West Kent 2005-2007: One hundred thousand years of human activity in and around the Darent Valley*, Oxford Archaeology monograph No. 11.

Smith, D., Whitehouse, N., Bunting, M.J. and Chapman, H., 2010, 'Can we characterize "openness" in the Holocene palaeoenvironmental record? Modern analogue studies of insect faunas and pollen spectra from Dunham Massey deer park and Epping Forest, England', *The Holocene*, 20(2), 215-229.

Stace, C., 2010, *New flora of the British Isles*, third edn (CUP).

Swift, D. and Blackmore, L., 2010, 'Archaeological investigations at the site of the former Capitol Cinema, High Street, Tonbridge, Kent', MOLA report, http://www.kent-archaeology.ac/archrep/archrep.html.

Taylor, J., 2007, *An Atlas of Roman Rural Settlement in England*, Counc. Brit. Archaeol. Res. Rep. 151 (York).

Tipping, R., 2002, 'Climatic variability and "marginal" settlement in upland British landscapes: a re-evaluation', *Landscapes*, 19, 333-348.

Tweddle, J.C., Edwards, K.J. and Fieller, N.R.J., 2005, 'Multivariate statistical and other approaches for the separation of cereal from wild Poaceae using a large Holocene dataset', *Vegetation History and Archaeobotany*, 14, 15-30.

van der Veen, M. and Palmer, C., 1997, 'Environmental Factors and the Yield Potential of Ancient Wheat Crops', *Journal of Archaeological Science*, 24, 163-182.

van Geel, B. and Aptroot, A., 2006, 'Fossil ascomycetes in Quaternary deposits', *Nova Hedwigia*, 82(3-4), 313-329.

Waller, M., 2002, 'The Holocene vegetation history of the Romney Marsh region', in A.

Long, S. Hipkin and H. Clarke (eds), *Romney Marsh: Coastal and Landscape Change through the Ages*, OUSA Monograph 56, 1-21.
Waller, M.P., and Schofield, J.E., 2007, 'Mid to late Holocene vegetation and land use history in the Weald of south-eastern England: multiple pollen profiles from the Rye area', *Vegetation History and Archaeobotany*, 16, 367-384.
Wiltshire, P.E.J., 2008, 'Palynological analysis of sediment from Roman water holes', in Booth, P., Bingham, A-M. and Lawrence, S., *The Roman Roadside Settlement at Westhawk Farm, Ashford, Kent, Excavations 1998-9*, Oxford Archaeology Monograph no. 2, 337-343.
Witney, K.P., 1990, 'The woodland economy of Kent 1066-1348', *Agricultural History Review*, 38:1, 20-39.
Wragg, E., Jarrett, C. and Haslam, J., 2005, 'The development of medieval Tonbridge reviewed in the light of recent excavations at Lyons, East Street', *Archaeologia Cantiana*, 125, 119-150.
WSP, 2015, 'Archaeological Mitigation Design for the A21 Tonbridge to Pembury Dualling Scheme', unpubl. document prepared for Highways England on behalf of Balfour Beatty.
Wyles, S.F., Stevens, C.J. and Grant, M.J., 2012, 'Economic plants: charred and waterlogged remains and pollen', in Powell, A.B. (ed.), *By river, fields and factories: the making of the lower Lea Valley. Archaeological and cultural heritage investigations on the site of the London 2012 Olympic and Paralympic Games*,Wessex Archaeology Report 29, 313-326 (Salisbury).
Wymer, J., 1975, 'Flints', in Money, J.H., 81-85.