

Radiocarbon dating archaeobotanical remains from Wolverton Mill

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In 2004, open-area excavation in advance of development was undertaken by Northamptonshire Archaeology at Wolverton Mill, Milton Keynes (Bucks). The excavations discovered settlement remains spanning the fifth to the twelfth centuries, including a large ditched enclosure created around the eighth century and perhaps continuing in use into the tenth century (Thompson *et al.* 2011). Although the settlement was abandoned by the end of the twelfth century, pit-digging activity continued during the thirteenth and fourteenth centuries. Environmental samples were taken from features throughout the excavated sequence, and produced a large assemblage of charred plant remains, along with some mineral-replaced plant remains (Carruthers 2011). The abundance and chronological spread of these archaeobotanical samples drew the attention of the Feeding Anglo-Saxon England project (FeedSax), which aimed to investigate developments in Anglo-Saxon and medieval farming using bioarchaeological evidence such as charred plant remains. Accurate dating of samples was considered essential, so that diachronic trends could be reliably discerned.

The FeedSax project therefore submitted charred grains from thirteen samples – with original dates ranging from the seventh to the thirteenth centuries – to the Oxford Radiocarbon Accelerator Unit for radiocarbon dating. These cereal grains were originally analysed by Wendy Carruthers, but were not sorted taxonomically in the site archive (Carruthers 2011). Grains were therefore identified, selected and photographed by the author at the University of Oxford; the photographs are included in the project's photographic archive (McKerracher *et al.* in prep.).

The radiocarbon determinations obtained for these samples have been calibrated using IntCal20 (Reimer *et al.* 2020) and OxCal 4.4.2 (Bronk Ramsey 2009), as shown in the table below and figures at the end of this report.

Results

sample	context	grains	laboratory no.	original phase	age BP	calibrated dates AD (confidence)
11	279	3 x wheat	OxA-37402	C8–9	1268 ±29	665–778 (84.0%), 787–828 (11.4%)
13	464	3 x wheat	OxA-37403	C7–9	1028 ±26	977–1044 (92.9%)
79	786	3 x barley	OxA-37631	C9–10(?)	1193 ±26	771–894 (92.9%)
54	709	3 x wheat	OxA-37404	C10–12	967 ±26	1024–1054 (23.6%), 1062–1158 (71.9%)
93	157	3 x wheat	OxA-39995	C9–12	970 ±19	1025–1053 (26.6%), 1078–1155 (68.8%)
75	211	5 x oat	OxA-40146	C9–12	1440 ±26	583–653 (95.4%)
58	658	3 x wheat	OxA-39994	C9–12	968 ±19	1025–1053 (25.2%), 1077–1156 (70.2%)
104	899	3 x wheat	OxA-37405	C10–12	1138 ±26	875–992 (87.3%)
132	1157	3 x oat	OxA-37632	C10–12	1018 ±24	990–1046 (90.8%)
110	944	3 x oat	OxA-37406	C10–12	903 ±26	1044–1087 (32.0%), 1119–1217 (59.0%)
98	808	3 x wheat	OxA-37407	C12–13	986 ±26	1016–1053 (36.1%), 1077–1156 (55.1%)
112	909	3 x wheat	OxA-37408	C12–13	958 ±26	1028–1158 (95.4%)
113	946	3 x wheat	OxA-37633	C12–13	955 ±25	1030–1158 (95.4%)

Sample 11 derives from the northern part of the large Middle Saxon ditched enclosure, whose ceramic contents – including Maxey-type and Ipswich ware – indicate that it had been created by the mid-eighth century (Thompson *et al.* 2011, 9). Earlier investigations at the southern end of the enclosure had produced two radiocarbon dates, from bone found at the base of the ditch, which were consistent with the ceramic chronology (*ibid.*).

laboratory no.	material	age BP	calibrated dates AD (confidence)
GrA-27203	bone	1245±35	675–880 (95.4%)
OxA-14200	bone	1223±28	689–742 (18.2%), 772–885 (77.2%)

The new calibrated radiocarbon date range (OxA-37402) confirms that sample 11 most likely dates from somewhere between the mid-seventh and late eighth centuries, a range similar to the earlier part of the two southern radiocarbon dates. If these three dates together represent the same broad period of ditch-use – which is possible, but cannot be demonstrated because the northern and southern parts were excavated independently – then that period can most probably be dated entirely within the eighth century (or possibly starting in the late seventh century), as the following OxCal model demonstrates.

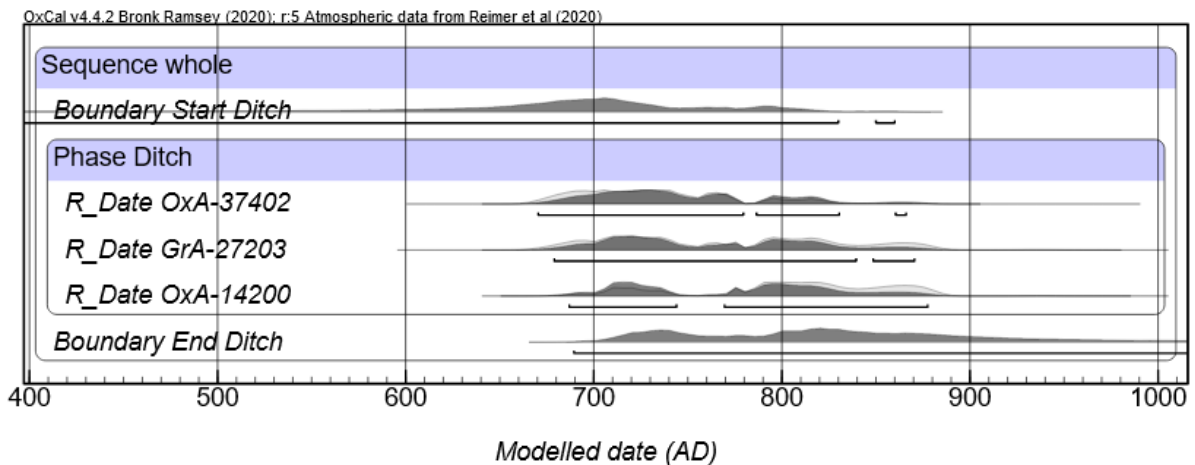
Chronometric model in CQL2 code

```
Plot() {
  Sequence("whole") {
    Boundary("Start Ditch");
    Phase("Ditch") {
      R_Date("OxA-37402", 1268, 29);
      R_Date("GrA-27203", 1245, 35);
      R_Date("OxA-14200", 1223, 28);
    };
    Boundary("End Ditch");
  };
};
```

Tabular representation of chronometric model

Name	Unmodelled (BC/AD)			Modelled (BC/AD)			Indices			Select	Page break
	from	to	%	from	to	%	A _{comb}	A	L P C		
Show all							A _{model} =93.8			All	
Show structure							A _{overall} =96.4			Visible	
▼ Sequence whole										<input checked="" type="checkbox"/> 2	<input type="checkbox"/>
Boundary Start Ditch				189	860	95.4				98.1 <input checked="" type="checkbox"/> 3	<input type="checkbox"/>
▼ Phase Ditch										<input checked="" type="checkbox"/> 4	<input type="checkbox"/>
R_Date OxA-37402	665	828	95.4	670	866	95.4		95		99.6 <input checked="" type="checkbox"/> 5	<input type="checkbox"/>
R_Date GrA-27203	675	880	95.4	679	870	95.4		106.7		99.6 <input checked="" type="checkbox"/> 6	<input type="checkbox"/>
R_Date OxA-14200	689	885	95.4	687	877	95.4		92.6		99.5 <input checked="" type="checkbox"/> 7	<input type="checkbox"/>
Boundary End Ditch				689	1412	95.4				97.5 <input checked="" type="checkbox"/> 8	<input type="checkbox"/>

Graphic representation of chronometric model



Sample 13 derives from a presumed cess pit, originally thought to be of seventh- to ninth-century date but not directly dated (Thompson *et al.* 2011, 8). The new calibrated radiocarbon date range suggests that the feature belongs instead to the site's Late Saxon phase, somewhere between the late tenth and mid-eleventh centuries. Sample 79 from a gully of 'Middle to Late Saxon' date (Thompson *et al.* 2011, Fig. 6) has returned a consistent radiocarbon date range spanning the late eighth to late ninth centuries (cal. AD 771–894 with 92.9% probability).

Sample 54, from a pit of 'Late Saxon/Saxo-Norman' date (tenth- to eleventh-century; Thompson *et al.* 2011, 12) returned a radiocarbon date range focused largely on the mid-eleventh to mid-twelfth centuries. This range gives a later focus than the broad dating of the Late Saxon/Saxo-Norman phase, but supported by the illustration of the feature as being 'later' within that period (Thompson *et al.* 2011, Fig. 13). Similarly, sample 93 from a posthole and sample 53 from a cess pit were both originally assigned to the 'Late Saxon/Saxo-Norman' phase but have now returned radiocarbon date ranges mainly spanning the mid-eleventh to mid-twelfth centuries.

Moreover, several samples originally dated to a later phase can now be dated, roughly, to between the early/mid-eleventh to mid-twelfth centuries: perhaps a very intensive period of activity at the site. Samples 98, 112 and 113, all from pits originally dated to the twelfth or thirteenth century, all returned very similar date ranges, again spanning (most probably) the early eleventh to mid-twelfth centuries. Sample 110 has returned a rather broad date range, spanning the early/mid-eleventh to the late twelfth (or even early thirteenth) century. The upper end of this date range is in fact the latest likely date of all the radiocarbon dates newly obtained.

Sample 104, from another pit assigned to the Late Saxon/Saxo-Norman date, can now be dated to the earlier end of that period, most probably between the late ninth and late tenth centuries. Sample 132, by contrast, can be dated to the latter part of this phase, between the late tenth and mid-eleventh centuries.

Finally, sample 75, from a posthole originally dated to between the tenth and twelfth centuries, has returned a much earlier – and unusually narrow – date range: cal. AD 583–653 (with 95.4% confidence), corresponding with the latter part of the 'Early Saxon' period, as conventionally defined (c. AD 450–650). This new date adds weight to the original suggestion (Thompson *et al.* 2007, 7) that there was a more extensive early settlement at the site, perhaps shortly preceding the construction of the large Middle Saxon enclosure.

Overall, the new radiocarbon dating results have resulted in several revisions to the published phasing of these environmental samples. In particular, the phasing of many samples – both earlier and later – has now been revised to fall most probably between the early/mid-eleventh to mid-twelfth centuries. A more generalized re-phasing of samples to this particular period is not warranted, however, since other samples discussed in this report have returned new radiocarbon date ranges earlier than, later than, or corresponding with their original phasing.

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References

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Calibration of radiocarbon determinations

