

South Wales Gas Pipeline Project Site 25.07 Land South-West of Brynwgan Manordeilo and Salem Carmarthenshire

Archaeological Excavation

for

Rhead Group on behalf of

National Grid

CA Project: 9150 CA Report: 13310 Event: DAT108805

November 2013

South Wales Gas Pipeline Project Site 25.07

Archaeological Excavation

CA Project: 9150 CA Report: 13310 Event: DAT102846

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GLOSSARY

- CA Cotswold Archaeology
- CAP Cambrian Archaeological Projects
- CPAT Clwyd Powys Archaeological Trust
- DAT Dyfed Archaeological Trust
- GGAT Glamorgan Gwent Archaeological Trust
- FTP Felindre to Brecon gas pipeline
- HER Historic Environment Record
- MHA Milford Haven to Aberdulais gas pipeline
- NAL Network Archaeology Ltd
- NLMJV Nacap Land & Marine Joint Venture
- UPD Updated Project Design

SUMMARY

Project Name:	South Wales Gas Pipeline Project
Location:	Site 25.07, Land South-West of Brynwgan, Manordeilo and Salem,
	Carmarthenshire
NGR:	SN 6407 2470
Туре:	Excavation
Date:	6 June–9 July 2007
Location of Archive:	To be deposited with RCAHMW (original paper archive) and
	Carmarthenshire Museum (digital copy of paper archive; accession
	number CAASG 2008.0282)
Site Code:	MHA06

An archaeological excavation was undertaken by Cambrian Archaeological Projects during groundworks associated with construction of gas pipelines (part of the South Wales high pressure gas pipeline scheme) between Milford Haven and Aberdulais, and Felindre and Brecon, which were conducted between 2005 and 2007.

Four pits were identified, from which charred cereals were recovered. These were probably crop-processing ovens and were associated with radiocarbon dates within the late 9th to mid-13th centuries AD. Comparable, although earlier medieval, ovens were found 160m to the north-east at Site 25.08, suggesting that collectively these features can be regarded as field ovens, used for crop processing within the hinterland of an as-yet unidentified early medieval settlement located in the near vicinity. Two undated postholes, though stratigraphically unrelated to the ovens are interpreted as likely to have been contemporary with the crop processing activity.

A residual charred hazelnut shell from one of the medieval pits was radiocarbon dated to the Early Neolithic period, and a former field boundary, probably part of the medieval or later agricultural landscape, were also revealed.

1. INTRODUCTION

- NACAP Land and Marine Joint Venture (NLMJV), on behalf of National Grid, 1.1 commissioned RSK Environment (part of the RSK Group) to manage the archaeological works (non-invasive surveys, desk based assessment, evaluation, watching brief, and open area excavation) on a 216km-long section of pipeline from Milford Haven (Pembrokeshire) to Brecon (in Powys). The high pressure gas pipeline (part of the 316km-long pipeline route from Milford Haven to Tirley in Gloucestershire) was required to reinforce the gas transmission network. The archaeological work performed in advance of this pipeline was undertaken in a number of sections by a number of archaeological companies. The westernmost section of 122km, from Milford Haven to Aberdulais, was investigated by CA (then Cotswold Archaeological Trust) during 2005–2007 with some additional excavation work carried out by CAP. The section of 89km, from Felindre to Brecon was investigated by CA during 2006–2007 and CAP during 2007. Assessment reports on the works were completed in January 2012 (NLM 2012a, 2012b) and the current reporting stage was commissioned in February 2013.
- 1.2 Between 6 June–9 July 2007 CAP carried out an archaeological excavation at Site 25.07, Land South-West of Brynwgan, Manordeilo and Salem, Carmarthenshire (centred on NGR: SN 6407 2470; Fig. 1). The objective of the excavation was to record all archaeological remains exposed during the pipeline construction.
- 1.3 The excavation was carried out in accordance with professional codes, standards and guidance documents (EH 1991; IfA 1999a, 1999b, 2001a, 2001b and IfA Wales 2008). The methodologies were laid out in an Archaeological Framework Document (RSK 2007) and associated Written Statements of Investigation (WSIs) and Method Statements.

The site

1.4 The site is located within a field just off the eastern edge of a 71m AOD-high plateau close to the confluence of the Rivers Dulais and Towy (Fig. 1). It lies at approximately 65m AOD on land that falls away gently to the south and east, and numerous small streams originate on the high ground.

1.5 The underlying solid geology of the area is mapped as the Nantmel Mudstone Formation of the Ordovician Period; no superficial deposits are recorded (BGS 2013).

Archaeological background

1.6 No archaeological remains have been recorded previously within the site. The preliminary Archaeology and Heritage Survey identified a Bronze Age standing stone 200m north-west of the site (CA 2006, ref. ID 1532; HER ref. 11358). A burnt mound was recorded 100m south-west of the site during the pipeline construction (CA 2013a, Site 25.06), and possible Bronze Age pits associated with a possible prehistoric ditch and a possible pennanular ditch were recorded along the pipeline route 100m to the north-east of Site 25.07 (CA 2013b, Site 25.08). Site 25.08 also included three pits associated with early 5th to early 7th-century AD radiocarbon dates and containing charred, processed cereals. These pits were 160m north-east of the current site and may relate to a previously unidentified early medieval settlement (ibid.). Further to the north-east features associated with metalworking debris were found at pipeline Site 25.12 and although these were technically undated, the metallurgical items recovered are suggestive of Roman to medieval dating.

Archaeological objectives

- 1.7 The objectives of the archaeological works were:-
 - to monitor groundworks, and to identify, investigate and record all significant buried archaeological deposits revealed on the site during the course of the development groundworks; and
 - at the conclusion of the project, to produce an integrated archive for the project work and a report setting out the results of the project and the archaeological conclusions that can be drawn from the recorded data.

Methodology

- 1.8 The fieldwork followed the methodology set out within the *WSI* (NLM 2006). An archaeologist was present during intrusive groundworks comprising stripping of the pipeline easement to the natural substrate (Fig. 1). The site was originally numbered as Sites 25.7a and 25.7b but is reported on collectively here as Site 25.07.
- 1.9 The post-excavation analysis and reporting was undertaken following the production of the UPD (GA 2012) and included re-examination of the original site records.

Environmental and radiocarbon-dating evidence was taken from the assessment report (NLM 2012b) except where the UPD recommended further work, in which case the updated reports were used. The archaeological background to the site was assessed using the following resources:-

- the Archaeology and Heritage Survey which was undertaken in advance of the pipeline construction and which examined a 1km-wide corridor centred on the pipeline centre line, including the then existing HER record (CA 2006);
- Dyfed Archaeological Trust HER data (received July 2014); and
- other online resources, such as Google Earth and Ordnance Survey maps available at <u>http://www.old-maps.co.uk/index.html</u>.

All monuments thus identified that were relevant to the site were taken into account when considering the results of the fieldwork.

1.10 The archive from the excavation is currently held by CA at their offices in Kemble. The original paper archive will be deposited with the RCAHMW and a digital copy of the paper archive will be deposited with Carmarthenshire Museum under accession number CAASG 2008.0282.

2. RESULTS (FIGS 2–5)

- 2.1 This section provides an overview of the excavation results; detailed summaries of the recorded contexts, environmental samples (palaeoenvironmental evidence) and radiocarbon dates are to be found in Appendices A, B and C. Full, original versions of the specialist reports are available within the project archive.
- 2.2 The natural geological substrate was cut by four oven pits, two postholes and a ditch. With the exception of one oven pit, all the features formed a group towards the northern end of the site. The remaining oven pit was found 90m to the south-west (Figs 2 and 3, inset).
- 2.3 The oven pits (257001; 257010, Fig. 4; 257014 and 257021, Fig. 5) were all oval to circular bowl-shaped cuts 1.2m–4.2m long, 0.5m–1.8m wide and 0.15m–0.55m deep. With the exception of oven 257014, the substrate surrounding each of these had been scorched. These scorched deposits were sometimes recorded on site as

fills, but were more probably scorched substrate fused with burnt elements of the oven contents.

- 2.4 All four oven pits contained silty clay backfill deposits. Samples from these and from the underlying scorched deposits yielded charred cereals, predominantly oats; an assemblage suggestive of a medieval date. Charred remains within the northernmost ovens included both grains and weed seeds, whilst those within the southernmost oven were largely composed of grains, with few weed seeds present. The suggestion that the cereals were medieval was confirmed by radiocarbon dates from ovens 257010, 257014 and 257021 which fell into the range of 1040–1240, 890–1030 and 890–1030 cal. AD (Beta analytic -257722, -257724 and -257725; 95% probability). In addition, a Neolithic radiocarbon date was obtained from a hazelnut shell within oven 257014 (3940–3850 and 3820–3700 cal. BC; Beta analytic 257723, 95% probability) but, given the resilience of charred hazelnut shells within the archaeological record (James Rackham pers. comm.), this example was probably residual.
- 2.5 Downslope from the southernmost oven, 257021, a layer of burnt material was identified. This was recorded on site as a large charcoal-filled pit but post-excavation re-examination of the site records suggests that this was more probably a natural hollow/break of slope into which debris from the pit had accumulated (either naturally or as a result perhaps of scouring out waste from the pit and disposing of it downhill). Charcoal from this deposit was comparable in composition to that from the nearby and upslope oven, 257021.
- 2.6 The postholes (257016 and 257018) were somewhat irregular in plan with steep sides and flattish bases, and both included post-packing stones. Samples from posthole 257016 produced charred weed seeds and oat grains similar to those from the nearby oven pits.
- 2.7 Ditch 257008, located immediately to the south of the concentration of pits and postholes, was north-west/south-east aligned cut 0.55m wide and 0.1m deep with a U-shaped profile. It conformed to the alignment of existing field boundaries and may have been later in date than the other features, although its stratigraphic relationship with pit 257014 was not established.

Discussion

- 2.8 The Neolithic hazelnut shell, possibly along with further undated hazelnut shell fragments, reveals that the site was used during this period, although the nature and intensity of this use remains unknown.
- 2.9 The ovens date to the early medieval period, with radiocarbon dates from them ranging from the late 9th to mid-13th centuries AD. It is possible that these dates point to long-term episodic activity. Such field kilns are unlikely to have survived in operational condition for an extended period of time, and they are likely to have been easily constructed when needed, so the ovens may have fulfilled the same role but at slightly different times. On the basis of the cereal assemblages, this activity can be confidently described as cereal processing.
- 2.10 The difference in composition between the charred plant assemblages within the northern ovens as compared to the southern oven, with only the latter containing clean grains with few weeds seeds, may be functional: at other sites (for example, Site 25.08, 160m to the north-east), it has been suggested that clean grains may point to settlement foci, the grain having been transported to a settlement following primary processing within field ovens. In contrast, the mixture of grains and weeds seeds found within the northern ovens is more characteristic of primary processing undertaken within field ovens which were typically located at the edges of the crop fields, away from settlement.
- 2.11 Given the paucity of other diagnostically domestic debris from the site, and the restricted extent of the excavations, it is not possible to make much more of this evidence other than to observe that comparable ovens were found at Site 25.08, 160m north-east of the northern part of the site (and within 70m of the southernmost oven). The radiocarbon dates obtained from Site 28.08 were early 5th to early 7th-century AD, so somewhat earlier than those from the current site, but it seems likely that together these sites represent field ovens located in the hinterland of an as-yet unidentified early medieval settlement located in the near vicinity. It is not known what structure the two posts would have supported, although it seems likely that it would have been associated with the use of ovens.
- 2.12 The undated ditch conformed to the alignment of the current field boundaries, so may have been part of the medieval or later agricultural landscape.

3. **PROJECT TEAM**

Fieldwork was undertaken by Cambrian Archaeological Projects. This report was written by Jonathan Hart with illustrations prepared by Daniel Bashford. The archive has been compiled by Jonathan Hart and prepared for deposition by Hazel O'Neill. The fieldwork was managed for CAP by Kevin Blockley and the post-excavation work as managed for CA by Karen Walker.

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APPENDIX A: CONTEXT DESCRIPTIONS

Context No.	Fill of	Interpretation	Description	L (m)	W (m)	Depth (m)	Spot date
257001		Oven	Irregular oval in plan, wide bowl- shaped profile; natural substrate had been scorched	3.2	1.8	0.55	
257002	257001	Oven fill	Upper fill: mid grey-brown silty clay with frequent charcoal and stones	3.2	1.8	0.25	
257003	257001	Oven fill	Lower fill: mid brown sandy silt with occasional charcoal	3.2	1.3	0.15	
257004			Natural features				
257005			Natural feature				
257006	257001	Oven fill	1st fill: charcoal	1.2	0.5	0.1	
257007			Number assigned to scorched substrate around edges of 257001				
257008		Ditch	NW/SE aligned, u-shaped profile		0.55	0.1	
257009	257008	Ditch fill	Light brown silt		0.55	0.1	
257010		Oven	Oval in plan, wide bowl-shaped profile; natural substrate had been scorched	1.6	1.15	0.2	
257011	257010	Oven fill	Upper fill: light brown silt with occasional charcoal and stones	1.6	1.15	0.1	
257012	257010	Oven fill	Lower fill: dark brown black charcoal-rich silt with burnt stones	1.6	1.15	0.1	Cal AD 1040 to 1240
257013			Number assigned to scorched substrate around edges of 257010				
257014		Oven	Oval in plan with bowl-shaped profile	1.2	0.5	0.15	
257015	257014	Oven fill	Light brown silt	1.2	0.5	0.15	Cal AD 890 to 1030
257016		Posthole	Circular in plan, vertical sides, flat base		0.7	0.25	
257017	257016	Posthole fill	Mid grey-brown silty clay with packing stones around cut edges		0.7	0.25	
257018		Posthole	Oval in plan, vertical sides, uneven base		0.45	0.1	
257019	257018	Posthole fill	Mid grey-brown silty clay with disturbed packing stones		0.45	0.1	
257020			Context not used				
257021		Oven	Oval in plan, wide bowl-shaped profile; natural substrate had been scorched	4.2	1.05	0.5	
257022			Natural hollow/break of slope	5.8	4.4	0.3	
257023	257021	Oven fill	Upper fill: light yellow-grey silty clay	3.0	1.05	0.35	
257024	257021	Oven fill	Lower fill: charcoal with burnt stones with occasional thin bands of orange sand	2.6	1.05	0.15	
257025			Number assigned to scorched substrate around edges of 257021				Cal AD 890 to 1030
257026			= 257024				
257027	257022		Brown silty clay, frequent charcoal	5.8	4.4	0.2	
257028	257022		Light yellow-grey silty clay	5.8	4.4	0.25	
257029	257022		Brown silty clay, occasional charcoal	5.8	4.4	0.15	
257030	257022		Mid brown-grey silty clay	5.8	4.4	0.1	

APPENDIX B: THE PALAEOENVIRONMENTAL EVIDENCE BY JAMES RACKHAM

Environmental Soil samples

Thirteen environmental samples were taken (Table 1). Eight of these were taken from three oven features, two from a pit and posthole near to these and three from the fills of a natural hollow to the south. The samples were processed in the manner described in the assessment report (Carruthers 2008). The residues for all the samples were located and refloated. The processing sheets for CAP do not record any finds from the samples but upon refloating the residues were checked by the EAC team, sorted for finds and a magnetic component extracted (Table 2).

The secondary processing produced a little fired earth and burnt stone from the samples and a magnetic component composed of burnt mudstone, the most deriving from the primary fills of ovens 257001 and 257021. Interestingly the scorched deposits in ovens 257001 and 257021 (samples 3004 and 30012) produced little or no magnetic material. The posthole and pit fills also produced no magnetic fraction although some burnt stone was present in the posthole fill.

sample no	context no	feature	description	Wt kg.	Vol. I.*	Date
2573000	257002	257001	Upper Oven fill	20.5	2 tub	Medieval
2573001	257006	257001	1 st oven fill	18.5	1 tub	Medieval
2573002	257011	257010	Upper oven fill	11	1 tub	Medieval
2573003	257012	257010	Lower oven fill	6	1 tub	cal AD 1040-1240 (oats)
2573004	257007		Scorched substrate around 257001	10	1 tub	Medieval
2573005	257015	257014	Pit fill	11	1 tub	cal AD 890-1030 (oats); 3950-3670 cal BC (hazelnut) – Neolithic?
2573006	257017	257016	Posthole fill	9	1 tub	Undated but probably medieval
2573007- 3009			Not used			
2573010	257023	257021	Upper oven fill	7	15	Medieval
2573011	257024	257021	Lower oven fill	7.5	15	Medieval
2573012	257025		Scorched substrate around 257021	5	15	cal AD 890-1030 (oats)
2573013	257027	257022	Fill of natural hollow/break of slope	7.5	10	Medieval
2573014	257028	257022	Fill of natural hollow/break of slope	8.5	10	Medieval
2573015	257029	257022	Fill of natural hollow/break of slope	10	10	medieval

Table 1. Bulk environmental samples from Site 25.07

* - volume recorded on site - not accurate

Sample no	Context no	Pro- cessed wt kg	1st flot vol ml	2nd flot vol	residue wt g	pottery	burnt clay wt g.	burnt stone wt g.	coal	flint	magnetic wt g.	burnt bone	comments
2573000	257002	20.5	1000	3	1969			12			3		
2573001	257006	18.5	700	3	1923		2.8	62			12.6		
2573002	257011	11	244	8	1180						2		
2573003	257012	6	30	1	711						3.4		
2573004	257007	10	15	-	1382			18.6			0		
2573005	257015	11	30	1	1607						0		
2573006	257017	9	20	5	931			10.4			0		
2573010	257023	7	180	2	1252						7		
2573011	257024	7.5	300	2	1097						9.4		
2573012	257025	5	10	17	2075						0.6		
2573013	257027	7.5	250	3	2423			106			3.6		
2573014	257028	8.5	10	5	1890						1		
2573015	257029	10	40	2	2354			19.4			1		

Table 2. Data for the environmental samples from Site 25.07

Charred Plant assemblages (John Giorgi)

All 13 bulk soil samples produced identifiable charred plant remains (Tables 3 and 4), the richest assemblages being in the eight samples associated with the three medieval ovens 257001, 257010, 257021 and two of the three samples from the natural hollow 250022 to the south-east. Smaller amounts of material were recovered from the other sample from the hollow and from the single fills of pit 257014 and posthole 257016. Over 5,000 charred items were quantified, consisting of cereal grains (65% of the counted remains) and other plants (35%), largely wild plant/weed seeds. Only a little cereal chaff, all of which belonged to *Avena* (oat), was recovered from five samples.

Cereal grains were present in variable amounts in all samples although poor preservation meant that 42% of the quantified grains could not be identified further. Avena (oat) was the dominant cereal, accounting for almost 99% of identifiable grains and present in 12 of the 13 samples. Oats can only be reliably identified to species on the basis of the chaff, limited to a few floret bases and fragments in four samples but including evidence for Avena strigosa (bristle oat) in two of these samples. Three complete oat florets in the same two samples confirmed the presence of this species. Morphological characteristics of the oat grains (including size and shape) may be used to tentatively separate out the different species. Initial examination of the oat grains showed a wide range in size from 3.5mm to just over 7mm (although with a tendency towards the lower end of this scale), a range that encompasses both cultivated types, Avena sativa (common oat), Avena strigosa as well as wild oats (Avena fatua). Further analysis of the well-preserved grains may provide a better indication of the relative proportions of the different oat species. Occasional oat awn fragments were present in four samples. Other cereals were represented by only small numbers of grains belonging to Secale cereale (rye), Triticum (wheat) and Hordeum vulgare (barley) in eight, six and four samples respectively. The well-preserved wheat grains were identified as free-threshing Triticum aestivum type wheat, the rounded squat morphology of the grains with a flat dorsal side tentatively suggesting the presence of hexaploid bread wheat. The barley grains included one hulled twisted grain indicative of six-row hulled barley. The only other potential cereal debris from the site was represented by a few culm nodes in two samples which may be from either cereal straw and/or wild grasses. Small numbers of leguminous seeds were recovered from ten samples although these remains could only be identified at best as Vicia/ILathyrus (vetch/tare/vetchling) or Vicia/Lathyrus/Pisum (vetch/tare/vetchling/pea); therefore it was not possible to establish if these seeds were from cultivated and/or wild pulses. These legume seeds were small, most being less than 2mm with some measuring between 2mm and 3mm.

	Date Feature number Feature type Context number Sample number Flot Proc. Vol. (I)		medieval 257001 upper oven fill 257002 2573000 1 st 2 nd 2 tubs 20.5		medieval 257001 1 st oven fill 257006 2573001 1 st 2 nd 1 tub		medieval 257010 Upper oven fil 257011 2573002 1st 2nd 1 tub		AD 1040-1240 257010 Lower oven fill 257012 2573003 1 st 2 nd 1 tub		<i>med.</i> 257001 <i>strata</i> 257007 2573004 1 st 1 tub	3950-3670 BC (?Neolithic) 257014 Pit fill 257015 2573005 1 st 2nd 1 tub		Unda prol mec 257 257 257 1 st	ated – bably lieval 7016 nole fill 7017 3006 2nd tub
	Proc. Wt (kg)		20.5		18.5		11		6		10	11		9	
	Vol. flot (ml)	1	000	3	700	3	244	8	30	1	15	30	1	20	5
	% flot sorted	25%		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	% flot scanned		75%												
Cereal grains															
Triticum aestivum s.l.	free-threshing wheat		+												
Triticum spp.	wheat		+												
Triticum/Secale cereale L.	wheat/rye						1								
Secale cereale L.	rye		+	1	6		7		1		1			1	
cf. S. cereale	?rye			1	1		4								
Hordeum vulgare L.	barley hulled indet.		+												
Avena strigosa L.	bristle oat floret				2						1				
Avena sp(p).	oat floret				2						1				
Avena sp(p).	oat	32		7	270		52		12	1	43	1			
cf. Avena spp.	?oat	61	+++++	19	214	1	61		31		28				
Cerealia indet.	Indeterminate grains (estimate)	71	++++	8	190		96	2	45	2	23	5			
Chaff															
Avena strigosa L.	bristle oat floret bases				4						2				
Avena sp.	oat floret bases				1										
Avena sp.	oat floret fragments				1										
Avena sp.	oat awns					+					+				
Other plants															
Corylus avellana L.	hazel nut shell fragments no./wt.	1/ <0.1g	++		7/ <0.1g	1/ <0.1g	2/ <0.1g	3/ <0.1g			1	25/ 0.1g	8/ <0.1g		2/ <0.1g
Chenopodium sp(p).	goosefoots etc.	1	++												
Atriplex sp(p).	orache	1	+		4						1				

Table 3. Site 25.07: The Charred Plant Remains (Northernmost Features)

Stellaria media (L.) Vill.	common chickweed							1				
Spergula arvensis L.	corn spurrey	2	+++	2	12			4	6			
Persicaria lapathifoilia (L.) Gray	pale persicaria				1							
<i>Persicaria</i> sp(p).	knotweed		++		8		1		10			
Polygonum aviculare L.	knotgrass	1	+		7				3			
Fallopia convuluvulus (L.) A Love	black bindweed				1							
Polygonum <i>sp.</i>	knotgrasses	1										
Rumex acetosella agg.	sheep's sorrel		+++		9		15	19	8			
Rumex <i>sp(p).</i>	dock		+		1		1					
Polygonaceae indet.	Indet. knotweeds		++		6							
<i>Malva</i> sp.	mallow							1				
Raphanus raphanistrum L.	wild radish capsule		+		4		2	1				
Crateagus monogyna Jacq.	hawthorn	1	+		8							
Vicia/Lathyrus sp(p).	vetch/tare/vetchling (2-3mm)	1	+	1	4						1	
Vicia/Lathyrus sp(p).	vetch/tare/vetchling (<2mm)		+				2	3	6	1		
Vicia/Lathyrus/Pisum spp.	vetch/tare/vetchling/pea (<2mm)						2					
Fabaceae indet.	legumes (2-3mm)				1							
Fabaceae indet.	small round legumes (<2mm)		+		3		7	4	6	1		
Prunella vulgaris L.	self-heal		+		1							
Lamaiceae indet					3				1			
Plantago lanceolata L.	ribwort plantain	3	++	1	8		3	2	2	1		
Galium aparine L.	cleavers		+		2			1				
Centaurea sp(p).	knapweeds	2	++	1	5				3			
Lapsana communis L.	nipplewort	7	+++	6	114		36	23	78		1	
Anthemis cotula L.	stinking chamomile	7	+++	4	78		12	16	109			
Chrysanthemum segetum L.	corn marigold	26	+++++	16	351	1	41	22	195	1		
Tripleurospermum inodorum (L.) Sch. Bip.	scentless mayweed		+	1	3		3		3			
Asteraceae indet.	daisy family		++		40		7	10	44	1		
Cyperaceae indet.	sedges etc		+		1							

Bromus <i>sp(p).</i>	brome		+		1										
<i>cf.</i> Bromus <i>sp.</i>	?brome	1					1				1				
Poaceae indet.	grasses (large)	6	+++	2	34		8		10		11				
Poaceae indet.	grasses (small)		++		4		15		12		3				
Indet seeds		+	+	+			+		+		+				
Poaceae/Cerealia indet. stem	grass/cereal culm														
fragments	nodes/internodes		+												
Charcoal			+++++			+++	++-	+++	++-	+++	+++++	++-	+++	++	+++
	Total nos. of items	225	225 70			3	379	5	218	3	590	36	8	3	2
ltem de	Item density (per kg of processed soil) 57.6e			76	6.5	34	1.9	36	6.8	59		4	0	.6	

Item frequency: + =1-10; ++=11-50; +++=51-150; ++++=151-250; ++++=>250 items; e = projected item density per kg of soil

 Table 4: Site 25.07: The Charred Plant Remains (Southern Features)

	Data		medieval					AD 890-						
	Date		medievai			medieval			med	ieval	med	ieval	med	lieval
	Feature number		257021			257021		257021	257	022	257	022	257	7022
	Feature type	Uį	Upper oven fill 257023			ower oven i	fill	Strata	fill of natural hollow		fill of I hol	natural Ilow	fill of I ho	natural llow
	Context number					257024			257027		257028		257	'029
	Sample number		2573010			2573011		2573012	2573013		2573014		2573015	
	Flot	1	st	2nd	1	1 st		1 st	1 st	2 nd	1 st	2 nd	1st	2 nd
	Proc. Vol. (I)		15			15			1	0	1	0	1	0
	Proc. Wt (kg)		7			7.5		5	7	.5	8	.5	10	
	Vol. flot (ml)	18	180 2		300 2		17	250	3	10	5	40	2	
	% flot sorted	25%		100%	12.5%		100%	100%	100%	100%	100%	100%	100%	100%
	% flot scanned		75%			87.5%								
Cereal grains														
Triticum aestivum s.l.	free-threshing wheat					+		2					1	
T. cf. aestivum type	?free-threshing wheat		+		1			2						
<i>Triticum</i> sp(p).	wheat					+								
cf. Triticum spp.	?wheat							1	1					
Triticum/Secale cereale	wheat/rye				1	+								
cf. Secale cereale	?rye	1									1			1
Hordeum vulgare L.	barley hulled twisted		+											
<i>H. vulgare</i> L.	barley hulled indet.												1	
<i>H. vulgare</i> L.	barley indet								2					
cf. <i>H. vulgare</i>	?barley								1					
A <i>vena</i> sp(p).	oat	104		1	72	+++++		81	99		6		27	
cf. Avena spp.	?oat	170	*****		77		2	129	275	1	17		63	
Cerealia indet.	Indeterminate grains (estimate)	231	+++++	1	62	+++	1	182	362	3	28		163	
Chaff														
Avena sp(p).	oat floret base fragments					+		+						
Avena spp.	oat awns					+						+		-

Other plants														
Corylus avellana L.	hazel nut shell fragments nos/wt.	14/0.3g	+(+)	7/0.1g	27/0.8g	++	5/<0.1g	1	4/<0.1g	3/<0.1g	2/<0.1g	2/<0.1g		7/<0.1g
Stellaria media (L.) Vill.	common chickweed				1									
Spergula arvensis L.	corn spurrey		+		1	+								
	Sample number		2573010			2573011		2573012	2573	3013	2573	3014	257	3015
	Flot	1	st	2nd	1	st	2nd	1 st	1 st	2 nd	1 st	2 nd	1st	2 nd
Persicaria sp(p).	knotweed					+								
Polygonum aviculare L.	knotgrass	1	+											
Fallopia convuluvulus (L.) A Love	black bindweed								1					
Rumex acetosella <i>agg.</i>	sheep's sorrel		+		1	+			3					
Polygonaceae indet.	Indet. knotweeds		+		1									
Vicia/Lathyrus spp.	vetch/tare/vetchling (2- 3mm)	1			1	+			1					
Vicia/Lathyrus spp.	vetch/tare/vetchling (<2mm)		+		1				3					
cf. Prunella vulgaris L.	?self-heal		+											
Lamaiceae indet						+								
Plantago lanceolata L.	ribwort plantain					+								
Galium aparine L.	cleavers		+											
Lapsana communis L.	nipplewort	1	++		3	++		15	5		1			
Anthemis cotula L.	stinking chamomile				3	+		4			1			
Chrysanthemum segetum L.	corn marigold	1			3	+	1	13	3					
Tripleurospermum inodorum (L.) Sch. Bip.	scentless mayweed							1	1					
Asteraceae indet.	daisy family							3						
Carex spp.	sedge								2					

Bromus <i>sp(p)</i> .	brome					+		9			1			
cf. Bromus sp.	?brome										1			
Poaceae indet.	grasses (large)	5	+		4	+		8					2	
Poaceae indet.	grasses (small)							53						
Indet seeds			+			+			+					
Poaceae/Cerealia	grass/cereal culm													
indet. stem fragments	nodes/intern odes							1						
Charcoal		+++++		+++++		+++++	+++++		++++		+++++			
Total nos. of items		529		9	259		9	505	763	7	58	2	257	7
Item density (p	308.4e		285.9e		101	102.7		7.1		26.4				

Item frequency: + =1-10; ++=11-50; +++=51-150; ++++=151-250; ++++=>250 items. e = projected item density per kg of soil

Small amounts of Corylus avellana (hazelnut) shell fragments in 12 samples may represent the residues of gathered wild foods, the best assemblages being in the two fill samples of the oven 257021 and pit 257014. Charred hazelnut shell is a common find from various prehistoric sites along the route of the pipeline. A small number of charred fruits of Crateagus monogyna (hawthorn) were found in two samples of oven 257001. These fruits (haws) are edible and may have been collected for food or the plant gathered for use as fuel/kindling. Both hazel and hawthorn may be indicative of a scrub, woodland, hedgerow habitat close-by. There were a large number of weed seeds representing a fairly wide species range of potential arable weeds, particularly in the two fill samples of oven 257001. A good number of the weeds identifiable to species suggest the cultivation of (acidic) sandy (loamy) soils, including Chrysanthemum segetum (corn marigold), which was particularly well-represented, Rumex acetosella (sheep's sorrel), Spergula arvensis (corn spurrey), Raphanus raphanistrum (wild radish) (the last two both acid soil indicators), Plantago lanceolata (ribwort plantain) and Polygonum aviculare (knotgrass). This corresponds well with the present soils in the immediate vicinity of the site which consist of freely draining slightly acid loamy soils. A number of these weeds including Chrysanthemum segetum, Spergula arvensis, Raphanus raphanistrum and Fallopia convolvulus (black bindweed) are mainly found in spring-sown cereals. Two other well-represented weeds, Anthemis cotula (stinking chamomile) and Lapsana communis (nipplewort), along with occasional records for Galium aparine (cleavers), may however also point to the use of clay soils for growing crops. Galium aparine is mainly indicative of winter sown cereals. The weeds represented in the samples included both twining weeds, for example Galium aparine, Fallopia convolvulus, and free-standing weeds of various heights, both tall, for example Bromus (bromes), Chenopodium (goosefoots) and smaller weeds, for instance Spergula arvensis, Anthemis cotula, which may tentatively suggest the reaping of crops low on the straw.

Oats, the main grain, along with rye, free-threshing wheat and hulled barley, are the four cereals usually found on medieval sites (Greig 1991, 321) which includes a number of excavations along the route of the pipeline, for example in medieval deposits at Site 500 (Giorgi 2014), a post-medieval context at 4.22 (Carruthers 2014), an early medieval context at 201 (Giorgi 2014a), an immediate post-Roman context at 221 (Giorgi 2014b) and 293 (Giorgi 2014c). Oats would have been well-suited to the local soils with both common oat and bristle oat tolerating acidity and low soil fertility. Rye also grows well in such soils but barley has a poor tolerance to acidic soils while bread wheat grows best on heavy and rich soils. Oats are less frost hardy than other cereals and are best suited to spring sowing which appears to have been the case during the medieval period on the basis of the weed seed evidence from the site. Rye and barley is sown in autumn or spring while bread wheat is usually winter sown.

Discussion of the individual assemblages

Table 5 shows the proportion of grain to chaff to weed seeds in the 11 samples containing over 50 quantified items, from ovens 257001 and 257010 in the northernmost part of the site, and from oven 257021 and hollow 257022 in the south. There was no significant difference in the range of cereals and weeds represented in the individual assemblages; oat (including evidence for bristle oat in oven 257001) was the dominant cereal in all the samples with only traces of the other three grains while there were very small amounts of hazel nutshell in ten samples and a few haws in two samples. The range of weed seeds was also broadly similar, mainly small-seeded species, with *Chrysanthemum segetum, Lapsana communis, Anthemis cotula* and *Rumex acetosella* appearing in most of the samples. There were, however, significant differences between the individual assemblages in the proportions of grains to weed seeds (only insignificant amounts of oat chaff were present in five samples) with a far greater amount of weed seeds in the samples from the northern ovens 257001 and 257010 but relatively few weed seeds in the samples from oven 257021 and hollow 257022 in the south. The assemblages from the different features are considered in a little more detail.

Table 5. Composition of the individual charred plant assemblages with >50 items

feature/context/	no.items	Grains	chaff	weeds	comment
sample	(no./I soil)			etc.	
Northern Features	•				
Medieval oven 257001 sample 2573004	590 (59)	16%	<1%	83%	Oats (including bristle oat); single rye grain & hazelnut shell fragment Largely small-seeded crop weeds – best represented - (<i>Chrysanthemum segetum, Anthemis cotula, Lapsana communis</i>); traces of bristle oat chaff; dominance of crop-processing debris (weed seeds)
Medieval oven 257001 sample 2573001	1415 (76.5)	48%	<1%	51%	Oats (including bristle oat); traces of rye & a few hazelnut shell fragments & haws Small-seeded crop weeds – best represented - (<i>Chrysanthemum segetum, Anthemis cotula, Lapsana communis</i>); traces of bristle oat chaff; almost equal amounts of grain and crop weed seeds
Medieval oven 257001 sample 2573000	295 (57.6e)	68%	-	32%	Oats and traces of rye; occasional free-threshing wheat and hulled barley (in scanned fraction only); few hazelnut shell fragments & haws Small-seeded crop weeds – best represented - (<i>Chrysanthemum segetum, Anthemis cotula, Lapsana communis</i>); also <i>Spergula arvensis, Rumex acetosella</i> well represented in scanned fraction; traces of straw in scanned fraction; good representation of both grains and crop weed seeds
Medieval oven 257010 sample 2573002	384 (34.9)	58%	-	42%	Oats plus occasional rye and hulled barley grains and a few hazelnut shell fragments Small-seeded crop weeds – best represented - (<i>Chrysanthemum segetum, Anthemis cotula, Lapsana communis, Rumex acetosella</i> , Poaceae (small-seeded); almost equal amounts of grain and crop weed seeds
Medieval oven 257010 sample 2573003	221 (36.8)	42%	-	58%	Oats and one rye grain Small-seeded crop weeds – best represented - (<i>Chrysanthemum segetum, Anthemis cotula, Lapsana communis, Rumex acetosella,</i> Poaceae (small-seeded); almost equal amounts of grain and crop weed seeds
Southern reatures Medieval oven 257021 sample 2573010	538 (308.4e)	94%	-	6%	Mainly oat grains and one possible rye grain; traces of 6-row hulled barley and possibly free-threshing wheat in scanned fraction Wild plants mainly hazelnut shell fragments; few weed seeds (<i>Lapsana communis</i> best represented in scanned fraction); largely cleaned oat grains with relatively little
Medieval oven 257021 sample 2573011	268 (285.9e)	81%	+	19%	crop-processing debris (ie weed seeds) Mainly oat grains and a possible free-threshing wheat grain (also in scanned fraction); traces of oat chaff in scanned fraction Wild plants mainly hazelnut shell fragments; few weed seeds (<i>Lapsana communis</i> best represented in scanned fraction); largely cleaned oat grains with relatively little crop-processing debris (weed seeds)
Medieval oven 257021 sample 2573012	505 (101)	79%	+	21%	Mainly oat grains (also traces of oat chaff) and a few free-threshing wheat grains and a hazelnut shell fragment Relatively few weed seeds best represented being Poaceae (small-seeded), <i>Lapsana communis</i> , <i>Chrysanthemum segetum</i> ; one cereal straw fragment; largely cleaned oat grains with relatively little crop- processing debris (weed seeds)
Medieval hollow 257022 sample 2573013	770 (102.7)	97%	-	3%	Mainly oat grains and traces barley and possibly wheat Few hazelnut shell fragments and relatively few weed seeds; virtually clean oat grain deposit
Medieval hollow 257022 sample 2573015	264 (26.4)	97%	-	3%	Mainly oat grains and one free-threshing wheat grain and one hulled barley grain Few hazelnut shell fragments and virtually no weed seeds except 2 large grass seeds (possibly oats); cleaned oat grains
Medieval hollow 257022 sample 2573014	60 (7.1)	87%	+	13%	Mainly oat grains (and a few oat awn fragments) and one possible rye grain Few hazelnut shell fragments and only a few weed seeds (both large and small-seeded); cleaned oat grains

Key: e- projected estimate of density based on quantified sub-sample; + = presence only

The Northernmost Features - Ovens 257001 and 257010

The five samples associated with ovens 257001 and 257010 contained rich charred plant assemblages with an item density ranging from 35 to 77 per litre of processed soil. The composition of the two samples from oven 257010 was broadly similar containing almost equal amounts of grains and weed seeds (mainly small-seeded). There were differences, however, between the three fill assemblages from 257001; the scorched substrata 257007 (sample 2573004) of this feature contained more weed seeds (83%) than grain (17%) while the lower fill 257006 (sample 2573001) produced almost equal numbers of grains and weed seeds and the quantified fraction from the upper fill [257002 (sample 2573000) contained more grains (68%) than weed seeds (32%). It is difficult to establish whether the remains in these samples originate from one or more sources; thus it is possible that the charred plant remains in these two ovens represent accidentally burnt deposits of partially-cleaned oats following winnowing and initial sieving to remove contaminants coarser than the grain (Hillman 1981, Fig 6,135); this would also account for the virtual absence of straw fragments in the samples. The crop at this stage may have been dried before storage with final sieving out of the smaller weed seeds taking place at a later date before use. Another possibility is that the weed seeds, almost all from small-seeded species (with relatively little evidence for large-seeded weeds), could represent the by-products of the 'wheat' sieve (to remove contaminants finer than the prime grain) being used as fuel/kindling for the ovens and subsequently becoming mixed with the accidentally burnt oat grains. This could tentatively account for the greater amount of weed seeds in the basal fill of 257001. On the other hand, one might expect fuel/kindling to be also represented by other crop-processing by-products, such as straw, which however is virtually absent from these samples.

Other features

Two other features in the northern area produced only small amounts of charred plant remains; the fill (sample 2573006) of posthole 257016 contained just one rye grain, two hazelnut shell fragments and two weed seeds, on the basis of which no further comment may be made. The other feature, pit 257014 also produced only a small charred plant assemblage consisting mainly of hazelnut shell, a few grains including one of oat and a few weed seeds including *Plantago lanceolata* and *Chrysanthemum segetum*.

The Southern Features

All six samples associated with oven 257021 and natural hollow 257022 produced broadly similar assemblages consisting largely of oat grains and relatively few weed seeds.

Oven 257021

All three samples from this feature contained richer and higher concentrations of charred plant material than in the samples from the northern ovens, with item densities of 101, 286 and 308 (the latter two estimates based upon a sub-sample count) per litre of processed soil. The upper (257023) and lower fills (257024) produced similar assemblages dominated by oat grains (81% and 94% of the quantified remains) with other charred material consisting largely of hazelnut shell fragments and very few weed seeds, the best represented species being *Lapsana communis*. The other sample from scorched substrata (257025) around the oven produced slightly more weed seeds (21%) with small-seeded Poaceae, *Lapsana communis* and *Chrysanthemum segetum* being the best represented weeds. These assemblages represent almost fully cleaned oat grains which may have been accidentally burnt in the oven, possibly while being dried before storage or milling, with the few weed seeds representing persistent contaminants of the oat grains and/or the residues of fuel/kindling used for the oven.

Natural Hollow 257022

Three samples from the fills of a natural hollow immediately to the south-east of oven 257021 produced very similar charred botanical assemblages, dominated by oat grains (87% to 97% of the quantified remains). The other remains consisted of a few hazelnut shell fragments and very small numbers of weed seeds mainly from fill 257027 (sample 2573013) located in the north-east corner of the hollow. This fill sample contained the richest assemblage and highest density (103 per litre of soil) of remains of the three samples, with fill 257029 (sample 2573015), midway along the eastern boundary of the hollow, and fill 257028 (sample 2573014) (south-east corner of the hollow) producing smaller assemblages and lower densities (26 and 7) of material, suggesting a concentration of burnt oat grains in the north-eastern area of the hollow. These assemblages consist of virtually cleaned oat grains which may be from the sweeping out of accidentally burnt grains from the nearby oven.

Summary

The rich charred plant assemblages from Site 25.07 point to the cultivation of oats (including bristle oat) during the medieval period although it is difficult to comment on the importance of the other poorly represented cereals which may represent the residues of previous harvests in the ovens or the use of the same fields for growing other crops. The weed seed evidence suggests the use of largely acidic sandy loam soils for cultivation (similar to the local soils around the site) although heavier soils, possibly further afield, may also have been used. Evidence shows the spring-sowing of cereals and possibly the harvesting of the grain low on the straw. The charred plant assemblages are broadly similar across the site although radiocarbon dating of oat grains suggest that the cereals are from more than one event or harvest, with a date of AD 1040-1240 for the lower fill of oven 257010 in the northern area of the site, and a date of AD 890-1030 for oven 257021 in the southern area of the site. There were significant differences in the composition of the charred plant assemblages from the two areas of the site; the two ovens 257001 and 257010, in the northernmost area of the site, contained large numbers of weed seeds together with the oat grains which may represent semi-cleaned crops, accidentally burnt while being dried before storage, while oven 257021 in the south contained mainly cleaned cereal grains, possibly accidentally burnt before storage or milling. The clean oat grain deposits in the natural hollow close-by may represent the sweeping out of accidentally burnt grains from this oven. On the basis of the botanical evidence it is difficult to establish whether or not the activities in these two areas include contemporary material, with initial drying of the cereals (as semi-cleaned crops for storage) taking place in the north and the final preparation for use as cleaned grains (drying before milling) taking place in the south. The three relevant radiocarbon dates obtained on oat grains from the two areas (Table 1), however, produced different dates for pit 257014 and oven 257010 in the north, but a similar date to pit 257014 for 'spread' 257021 in the south, which could tentatively suggest a change in processing practices between the two periods from the drying and storage of cleaned, to semi-cleaned grain. This, however, is very speculative and based on only three radiocarbon dates.

Discussion

There is clearly early Neolithic activity on the site, as indicated by the radiocarbon date on hazel nutshell (Table 1), but a question remains as to whether pit 257014 is actually a Neolithic pit with contaminant medieval material, rather than a medieval pit with residual Neolithic material. The sample from the pit produced 33 fragments of nutshell and one oat grain (plus the grain that was radiocarbon dated) and five indeterminate cereal grain fragments. There is no problem with oat grains moving down through the soil into earlier deposits, nor is there with hazel nutshell being redeposited so with the absence of other datable material in the pit this is unresolved. Hazel nutshell is scattered in low numbers through several of the cereal rich medieval deposits, but only nutshell from pit 257014 has been dated. So another question remains, could more of the hazel nutshell derive from the early Neolithic phase of activity. The concentration of nutshell in 257014 is 3 fragments per kilogramme of

deposit, only oven 257021 in the southern area has higher concentrations with an estimate of 29/kg in the lower fill and 9/kg in the upper fill. These latter figures suggest relatively high concentrations perhaps suggesting the nutshell is contemporary with the deposit, but without a radiocarbon date on the nutshell this cannot be guaranteed. The other sampled features generally had significantly less than 1 fragment of nutshell per kilogramme. A few charred seeds (5) in pit 257014 are more likely to be associated with the cereals but could equally have moved down through the soil as a result of soil processes. Several isolated pits of Neolithic date have been recorded along the pipeline so the occurrence of one at this site need not be problematic, but if the nutshell in other features also included Neolithic material then this would imply a more significant Neolithic site but with only one negative feature recognised

Most of the features on the site can be confidently dated to the medieval period, on the basis of three radiocarbon dates, but also the dominance of oat grains throughout the site (Table 3), which has been found to be characteristic of dated medieval sites along the whole of the pipeline, and also previous archaeobotanical studies in Wales (Carruthers pers com.; Edwards *et al* 2010). The oat grain from pit 257014 in the north and that from deposit 257021 in the south both yielded a 9-11th century date suggesting that these two areas were broadly contemporary. The radiocarbon date on oats from oven 257010 indicates an 11-13th century date suggesting a slight later activity although all three dates would fit a period of activity in the first half of the 11th century.

The late 9-11th century date on oats from context 257025 effectively dates the assemblages from this context and those from the fills of oven 257021 (contexts 257023 and 257024) in the southern area. This oven has a similar radiocarbon date to the oat grain in pit 257014 in the northern area but cannot be associated in terms of date with the two cereal rich features, ovens 257001 and 257010, the latter of which has been dated to the 11-13th century AD, probably a little later than oven 257021. All three oven assemblages are dominated by oat grain, but there are traces of free-threshing wheat and barley in 257001 and 257021, and rye in 257001, 257010 and probably 257021. There is a little oat chaff in 257001 and 257021 but none recorded from 257010. The weed seed assemblages in 257001 and 257010 are similar with nipplewort, stinking chamomile, corn marigold, daisy family and grasses the major taxa. The weeds form a much smaller component of the assemblages in oven 257021, but nipplewort, stinking mayweed, corn marigold and grasses are still the dominant species and groups. So the major differences between the three oven assemblages are primarily the relative proportions of weed to grain, with the two northern ovens, 257001 and 257010 being very similar, and southern oven 257021 being relatively grain rich. Although such patterns in charred plant remains reflect functional origin rather than date we might tentatively suggest that the two northern ovens are contemporary or near contemporary and reflect the same processes being undertaken. The botanical analysis above has suggested that these two assemblages may represent 'semi-cleaned crops, accidentally burnt while being dried for storage'. An implication of this is that both these features may be associated with 'corn drying' and that they represent the remains of field kilns (Britnell 1984) of the type found elsewhere along the pipeline. The lack of any archaeological finds from the site and nothing more than a bit of fired earth/clay, burnt stone and magnetic material in the samples does not suggest domestic activity. It could be argued that the presence of a little hazel nutshell might suggest domestic waste, but with some question as to whether or not this might derive from earlier Neolithic activity on the site it cannot confidently be used in the argument. The location of the site near the edge of a lowland plateau of land on soils suitable for cereal cultivation would fit with a field kiln where threshing and winnowing was undertaken as well as drying.

The southern oven, 257021, is relatively grain rich with relatively few arable weed seeds, with 79-94% of the identified botanical assemblages being grain, compared to 16-68% in samples from the northern two ovens. This appears to reflect a 'cleaned' crop, possibly 'accidentally burnt before storage or milling'. This has more the character of a 'domestic' assemblage, and the samples from the adjacent hollow have a similar composition (Table 4). Nevertheless these deposits have no more evidence of 'occupation' than the northern features and it is

possible that 257021 could also be the surviving part of a field kiln. The hillside is slightly steeper at this point and the 'hollow' which lies just downslope of 'oven pit' 257021 could easily have accumulated material from the 'oven' during its period of use. The fact that these relatively isolated features are grain rich is itself an argument for them being related to crop processing since such rich deposits are not common in 'domestic' contexts, and the density of grain in the samples from the deposits filling hollow 257022, indicates that this deposit may contain many tens of thousands of charred cereal grains (an estimate suggests over 250,000 based on the size of the hollow) which can only indicate a fire of a grain store or repeated deposition of material as a result of something like crop drying activities. Nevertheless although a quarter of a million oat grains might seem a lot this represents only about 7.5kg of cleaned oats. In the case of oven 257021 the crop may have been cleaned before drying and then transported to the farm for storage or a mill for milling, much as suggested for Site 293 (Rackham et al 2014). The discrepancy between the date of oven 257001 in the northern area and oven 257021 in the southern area could be easily explained if these were field kilns simply because such structures are unlikely to survive in operational condition for any extended period of time, and are likely to have been easily constructed when needed, the ovens representing the same functional role but at slightly different times. It is possible that the difference in the two charred plant assemblages could merely be a result of differences in weather conditions at the time of harvest and standing the stooks, the weed rich assemblage being harvested or stood in damper conditions and requiring drying earlier in the crop processing routine, although it has been suggested above that initial drying could have been undertaken in the northern area and final preparation for use as a cleaned crop at oven 257021 in the southern area.

At Rhosmean, just over 600m to the south of the site, there was a former corn mill, and the mill race/leat runs for 1.71km approximately along the 34 and 33m contour to the south-east of the site, having been taken off the River Dulais at a weir just over 500m NNE of the farm at Brynwgan 350m NE of the site. The mill is recorded as post-medieval in date (Royal Commission; Ings 2013) and although it may have had a medieval predecessor it may be too much to expect a history back to the 12th century.

The site lies on free draining slightly acid loamy soils (http://www.landis.org.uk/soilscapes/) currently mainly under grassland for silage and grazing, although suitable for spring and autumn sown crops. There is some botanical evidence suggesting spring sowing which would be the preferred option for oats in the South Wales climate, and the fine slightly acid soils (derived from the underlying mudstones) are more favourable for oat cultivation than wheat and barley. *Avena strigosa* can be grown on poorer soils than common oat, *Avena sativa*, and therefore has been grown in more marginal areas, such as uplands. In recent times it was often cut early before fully ripe and fed unthreshed as fodder to cattle and horses (Chater, 1993). This is the only oat species positively identified but with so little chaff (the basis upon which the species are identified) the presence and importance of the other species, common oat, *Avena sativa*, and wild oat, *Avena fatua*, is not known. Free threshing wheat, barley and rye are present as traces, which may indicate their occasional local cultivation, but they could be contaminants in the oat crop.

On the basis of the archaeology, the cereal assemblages and the radiocarbon dates the 'ovens' on the site may perhaps be the surviving remains of field kilns for drying the harvested cereals before they were removed to the farmstead for storage or to the mill for milling. As such these features could be some distance from the contemporary medieval farmstead, and either of the two farms within 3-400 metres of the site, Brynwgan to the NE and Pen-plas to the NNW, or a settlement associated with the mill at Rhosmaen could have had medieval predecessors that worked the field in which the sites lie. Equally plausible is an associated medieval farmstead somewhere much nearer the site, although there is little evidence to suggest that these features are themselves part of the steading. If these features are field kilns then the environmental evidence suggests that the immediate fields were arable where primarily oats were grown, although occasional crops of barley, free-

threshing wheat and rye may have been cultivated, and that these fields may have been under intermittent cultivation (ie within a rotational or fallow period system) during the 10-12th centuries AD.

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APPENDIX C: THE RADIOCSARBON DATING EVIDENCE BY SEREN GRIFFITHS

For the analysis, radiocarbon measurements were produced on short-life, single entity charred plant remains. Samples were pretreated as detailed here http://www.radiocarbon.com/. Samples were combusted and graphitized and then dated by Accelerator Mass Spectrometry (AMS). The results are conventional radiocarbon ages, quoted according to the international standard set at the Trondheim Convention. The results have been calibrated using IntCal13, and OxCal v4.2. The date ranges have been calculated using the maximum intercept method, and have the endpoints rounded outward to 10 years.

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context	feature	sample	beta analytic sample	measured age	conventional radiocarbon age	2 sigma calibration (95% probability)	
257025	Oven/furnace 257021	2573012	257725	1070 +/- 40 BP	1070 +/- 40 BP	Cal AD 890 to 1030	
257015	Pit 257014	2573005 Oat	257724	1070 +/- 40 BP	1070 +/- 40 BP	Cal AD 890 to 1030	
257015	Pit 257014	2573005 Hazelnut shell	257723	4970 +/- 40 BP	5000 +/- 40 BP	Cal BC 3940 to 3850; Cal BC 3820 to 3700	
257012	Oven/furnace 257010	2573003	257722	870 +/- 40 BP	880 +/- 40 BP	Cal AD 1040 to 1240	

(dating undertaken by Beta Analytic, Miami; NLM 2012b)









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Oven pit 257010, looking north (scale 1m)

