

South Wales Gas Pipeline Project Site 25.08 Land South of Brynwgan Manordeilo and Salem Carmarthenshire

Archaeological Excavation

for

Rhead Group on behalf of

National Grid

CA Project: 9150 CA Report: 13276 Event: DAT108806

August 2013

South Wales Gas Pipeline Project Site 25.08

Archaeological Excavation

CA Project: 9150 CA Report: 13276 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 25.08, Land South of Brynwgan, Manordeilo and Salem,							
	Carmarthenshire							
NGR:	SN 6409 2475							
Туре:	Excavation							
Date:	25 May- 6 June 2007							
Location of Archive:	To be deposited with RCAHMW (original paper archive) and							
	Carmarthenshire Museum (material archive and digital copy of							
	paper archive; accession number CAASG 2008.0282)							
Site Code:	FTB 06							

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.

Part of a possible ring ditch, more fully visible on the plot of a geophysical survey undertaken in advance of the pipeline construction, was investigated. Although undated by finds, cereals from its fills suggest that the ring ditch was a Late Iron Age or Roman feature and further domestic debris from its fills suggest that it encircled a roundhouse. Metal processing debris found in association with this activity provides a rare (for Wales) example of iron working during this period.

A ditch and three pits found were found 100m north-east of this roundhouse. The ditch was undated but one of the pits produced early medieval radiocarbon dates and may have been the remains of a crop-processing oven. All three pits had comparable cereal assemblages suggestive of cleaned crops. Comparable, although somewhat later early medieval, ovens were found 160m to the south-west at Site 25.07, 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.

1. INTRODUCTION

- 1.1 NACAP Land and Marine Joint Venture (NLMJV), on behalf of National Grid, 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 May and June 2007 CAP carried out an archaeological excavation at Site 25.08, Land South of Brynwgan, Manordeilo and Salem, Carmarthenshire (centred on NGR: SN 6409 2475; 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 on the eastern slope of a 157m AOD-high hill (Fig. 1). It lies at 60m AOD and overlooks the River Dulais to the east and the River Towy to the south-east. The underlying solid geology of the area is mapped as the

Nantmel Mudstones Formation of the Ordovician Period; no superficial deposits are recorded (BGS 2013).

Archaeological background

1.5 No archaeological remains were identified within the site during the preliminary Archaeology and Heritage Survey (CA 2006). Features were first identified within the current site during a geophysical survey undertaken in advance of the pipeline construction works (BCC 2006). Within the wider vicinity, burnt mounds were recorded 200m south-west and 500m east of the site during the pipeline construction at Sites 25.06 and 26.01. At Site 25.07, 160m south-west of the site, three hearth/oven/furnace pits containing medieval-type cereals and associated with late 9th to mid-13th century radiocarbon dates were found whilst at Site 25.12, 400m east of the site, undated but possibly Roman or medieval features associated with metal processing were recorded.

Archaeological objectives

- 1.6 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

- 1.7 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).
- 1.8 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. Finds, environmental and radiocarbon-dating evidence was taken from the assessment reports (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.

1.9 The archive and artefacts from the watching brief are currently held by CA at their offices in Kemble. Subject to the agreement of the legal landowner the artefacts will be deposited with Carmarthenshire Museum under accession number CAASG 2008.0282, along with a digital copy of the paper archive. The original paper archive will be deposited with the RCAHMW.

2. RESULTS (FIGS 2–3)

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 contained within the archive.

Iron Age to Roman

2.2 The natural geological substrate (258020) was cut by a short ditch segment in the southern part of the field, and by a ditch and three pits 100m to the north-east. Ditch segment 258001 was the southernmost feature and comprised a slightly curvilinear north-east/south-west aligned cut 4.5m long, 0.7m wide and 0.3m deep. It had a steep-sided, flat-based profile and contained three fills (258002, 285003 and 285004), of which the second contained large quantities of stone (Fig. 2, section AA). All of the fills included charcoal and a sample from the upper fill 258002, taken from along the length of the ditch segment, yielded charred fuelwood, charred grain (some identifiable as emmer/spelt wheat) and charred hazelnut shell fragments as well as small quantities of burnt animal bones and burnt clay. The sample also contained three small slag pieces and two hammerscale flakes. Although the ditch

was undated by finds, the cereal assemblage from the samples suggests that it dated to the Iron Age or Roman periods (see Appendix B).

2.3 Although no features were identified at this location during the initial geophysical survey (BCC 2006), re-examination of the survey plot during the assessment stage suggested that this ditch may have formed part of a possible enclosure lying largely to the west of the easement (NLM 2012b). Further examination of the excavated ditch in comparison to the geophysical survey results suggests that it may have formed part of a ring ditch (Fig. 2). If real, this feature would have been approximately 16m in diameter and the results from the excavation suggest that it would have comprised a number of short ditch segments.

Undated and Late Roman to early medieval

- 2.4 Approximately 100m north-east, three pits and a second ditch were present. Ditch 258015 was north-east/south-west aligned and extended for 4.55m into the site before terminating at the south-west. It was undated but had been cut by pits 258005 and 258011, the latter of which was associated with Late Roman to early medieval radiocarbon dates. These pits were 1.4m to 2m long, 0.9m wide and 0.2 to 0.35m deep with U-shaped but somewhat irregular profiles. A smaller pit, 258012, was located just to the north-east of the first two pits and to the south of the line of the ditch. All of these pits contained silty clay fills with charcoal. Samples from all three pits yielded charred cereals. Two of the pits (258011 and 258012) were barley rich and the samples from pit 258011 also included small quantities of burnt stone and a larger magnetic component, the latter suggestive that in situ burning had occurred although the surrounding substrate was not scorched.
- 2.5 Statistically consistent Late Roman to early medieval radiocarbon dates were obtained from two fills within pit 258011 and Bayesian modelling of these dates suggest that they represent activity starting 230-570 cal. AD (95% probable) and ending in 430-800 cal. AD (95% probable). The duration of activity represented by these results is estimated as 1-170 years (95% probable). Although pit 258011 was stratigraphically the latest of the intercutting features, it seems likely that the pits were broadly contemporaneous on the basis of the comparable cereal assemblages within them (see Appendix B), although ditch 258015 might have been of a different period.

Discussion

- 2.6 Ditch 258001 may have formed part of an Iron Age or Roman penannular or ring ditch, given its apparent correlation to a ring-shaped anomaly on the geophysical survey plot. The material recovered from the ditch fills is suggestive of domestic debris (see Appendix B), indicating that the ditch was probably the location of a roundhouse. It is not known whether the ditch was structural or was a drainage feature encircling a roundhouse. The small quantity of ironworking debris suggests that small-scale smithing and smelting was undertaken on site. This was a common practice on sites of this period in Britain generally, but is currently far less well attested in Wales, although this may well be an accident of discovery, rather than a true indication that such metal processing was rarely undertaken.
- 2.7 The ditch to the north-east (ditch 258015) was undated but was earlier than the Late Roman to early medieval pits. Bayesian analysis of the pits suggests that they date to the Late Roman to early medieval periods and since all of the calibrated radiocarbon dates fell within the early medieval period, this would seem to be the most probable dating for these features.
- 2.8 The suggestion that burning probably occurred within pit 258011 may indicate that this and perhaps the other pits were the remains of ovens. Rackham (Appendix B) suggests that the absence of chaff and weeds from the cereals within these pits is an indication that they probably weren't comparable to field ovens of this period found on other sites along the pipeline: such ovens were located away from settlements, within the crop fields, and were used for the initial processing of crops. In contrast, the cereals from the early medieval features at the current site had most probably already gone through this primary processing and their burning may represent the accidental loss of processed grains or the destruction of spoilt grains. Processed grains were typically transported to settlements, and the implication here is that the features were located within or very near to a settlement. Although no further domestic remains were found, this could simply reflect the limits of the excavation and it is possible that some of the geophysical anomalies visible in this area (see Fig. 3, inset) relate to a settlement of this date.
- 2.9 However, an alternative possibility is that the features are the remains of field kilns, located within the agricultural hinterland of a settlement, and that cleaned grains were accidentally burnt or disposed of if spoilt. In light of this possibility, it is noteworthy that comparable ovens were found at Site 25.07, 160m south-west of the

site (with the closest features at both sites within 70m of one another) where three oven pits contained medieval-type cereals and were associated with late 9th to mid-13th century radiocarbon dates. One of these ovens contained predominantly cleaned grains whilst the other two contained weed seeds, and assemblage more suggestive of primary processing of the type that would be expected within a field oven. Given this, it seems likely that together those sites represent field ovens located in the hinterland of an as-yet unidentified early medieval settlement located in the near vicinity.

3. PROJECT TEAM

Fieldwork was undertaken by Cambrian Archaeological Projects. This report was written by Luke Brannlund with comments by Jonathan Hart and 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 was managed for CA by Karen Walker.

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4. **REFERENCES**

- BGS (British Geological Survey) 2013 *Geology of Britain Viewer*. Online resource at http://mapapps.bgs.ac.uk/geologyofbritain/home.html accessed 12 August 2013
- BCC (Bartlett-Clark Consultancy) 2006 Felindre to Tirley Proposed Gas Pipeline. Report of Archaeogeophysical Surveys 2005-6. Carmarthenshire. Typescript report.
- CA (Cotswold Archaeology) 2006 Felindre to Tirley Gas Pipeline: Archaeology and Heritage Survey. CA typescript report **05140**

Carruthers, W. 2008 'Assessment Report for Charred Plant Remains', in NLM 2012b

- EH (English Heritage) 1991 The Management of Archaeological Projects 2
- GA (Groundwork Archaeology) 2012 Milford Haven to Aberdulais and Felindre to Brecon High Pressure Gas Pipelines: Updated Project Design
- IfA (Institute for Archaeologists) 1999a Guidelines for Finds Work. IfA, Birmingham
- IfA (Institute for Archaeologists) 1999b Standard and Guidance for Finds and Ecofact Studies and Curation. IfA, Reading
- If A(Institute for Archaeologists) 2001a Standard and Guidance for the Collection, Documentation, Conservation and Research of Archaeological Materials.
- IfA (Institute for Archaeologists) 2001b Standard and Guidance for Archaeological Excavation
- IfA Wales (Institute for Archaeologists of Wales/Cymru) 2008 Introducing a Research Framework for the Archaeology of Wales, online resource at http://www.archaeoleg.org.uk/intro.html accessed December 2008
- NLM (Nacap Land and Marine) 2006 *Milford Haven to Aberdulais Natural Gas Pipeline:* Scheme of investigation for a programme of archaeological works
- NLM (Nacap Land and Marine) 2012a Milford Haven to Aberdulais High Pressure Gas Pipeline: Archaeology Assessment of Potential for Analysis
- NLM (Nacap Land and Marine) 2012b Felindre to Brecon High Pressure Gas Pipeline: Archaeology Assessment of Potential for Analysis
- RSK (RSKENSR) 2007 Felindre to Tirley Natural Gas Pipeline: Archaeological Framework Document, v7. Nacap Land and Marine Final, RSKENSR Environmental Ltd

Schmidl, A., Jaques, D. and Carrott, J. 2009 'Charcoal', in NLM 2012b

Wood J. 2008 'Assessment Report for Faunal Remains', in NLM 2012b

Context	Fill of	Interpretation	Description	L	W	Depth
No.				(m)	(m)	(m)
258001		Ditch	NE/SW linear with bowl-shaped	4.55	0.7	0.3
			profile			
258002	258001	Ditch fill	Yellow-brown clay silt with fragments of burnt clay and charcoal	4.55	0.7	0.2
258003	258001	Ditch fill	Brown silty clay with stones		0.5	0.1
258004	258001	Ditch fill	Grey-brown silt clay with charcoal	4.55	0.5	0.1
258005		Pit	Linear in plan and U-shaped in profile	1.6	0.9	0.35
258006	258011	Pit fill	Black silt with charcoal	1.6	0.9	0.2
258007	285005	Pit fill	Grey-brown silt with charcoal	1.4	0.25	0.05
258008	285005	Pit fill	Mid orange-brown clay silt	1.3	0.95	0.3
258009	258011	Pit fill	Pink silt clay with charcoal	1.1.	0.8	0.08
258010	258011	Pit fill	Black clay silt with charcoal	0.95	0.8	0.05
258011		Pit	Sub oval in plan with irregular bowl shaped profile	1.65	1.0	0.3
258012		Pit	Oval in plan with V-shaped profile	0.4	0.3	0.2
258013	258012	Pit fill	Mid brown clay silt with small stones	0.4	0.3	0.2
258014	258011	Pit fill	Grey-brown silt with charcoal	0.4		0.1
258015		Ditch	Linear cut in plan with shallow bowl-shaped profile	4.65	0.3	0.2
258016	285015	Ditch fill	Grey-brown clay silt	4.65	0.3	0.2
258017			Group Number for Ditch and pits			
258018		Topsoil	Dark brown silt clay			
258019		Subsoil	Red-brown silt clay			
258020		Natural				

APPENDIX A: CONTEXT DESCRIPTIONS

APPENDIX B: THE PALAEOENVIRONMENTAL EVIDENCE BY JAMES RACKHAM

Animal Bone

Animal bone was recovered from sample 2583000 (fill 258002 of ditch 258001. All the material is burnt (35g) except for a single fragment of heavily mineralised indeterminate bone (0.5g). Much of this material is very small unidentifiable fragments but several pieces indicate shaft fragments of long bones of cattle sized animals, a small number derive from the long bone shafts and rib shafts of sheep sized animals, while the remainder are indeterminate. No fragments could be confidently identified to a species but the range of bone size and texture is suggestive of animal rather than human material.

Environmental soil samples

Eight environmental samples were taken from the site (Table 1). A sample was taken from ditch 258001. The remaining samples were taken from a group of features approximately 100m north-east, with samples from three pits 258005, 258011 and 258012.

sample no	context no	feature	description	Wt kg.	Vol. I.*
2583000	258002	258001	Fill of ditch	129.5	12
2583001	258006	258011	Tertiary pit fill	8	1 tub
2583002	258007	258005	Secondary pit fill	7.5	1 tub
2583003	258008	258005	Primary pit fill	3	1 tub
2583004	258009	258011	Secondary pit fill	7.5	1 tub
2583005	258013	258012	Single pit fill	8	1 tub
2583006	258010	258011	Primary pit fill	0.453	1 bag
2583007	258014	258011	Primary pit fill	2	1 tub

Table	1	Bulk	environmental	samples	from	Site	25.08
Iabic	•••	Duin	environmentai	Samples	nom	OILE	20.00

* volume recorded on site - not accurate

Table 2. Environmental sample data for Site 25.08

Sample no	Context no	Pro- cessed wt kg	1st flot vol ml	2nd flot vol	residue wt g	pottery g.	burnt clay g.	burnt stone g.	flint	magnetic g.	burnt bone	comments
2583000	258002	129.5	540	41	24154	9.2	85	7477	+	27	28g	2g iron object; worked stone? Slag x3; Hammerscale x 2
2583001	258006	8	334	2	359			135		2.6		
2583002	258007	7.5	61	2	555			221		0.8		
2583003	258008	3	5	2	146					0.2		
2583004	258009	7.5	120	2	617			184		17		
2583005	258013	8	100	2	725			196	<1g	1		
2583006	258010	0.453	32	0	0							
2583007	258014	2	8	2	95					0.6		

A large sample was taken from ditch 258001. It was taken from throughout the feature from those areas where charcoal and bone were most concentrated. The 24kg residue after refloating was sorted and produced a little pottery crumb, burnt clay, over 7kg of burnt stone, a relatively high magnetic fraction composed of mudstone, some of it heat effected, burnt bone, an iron object, possible worked stone, three tiny fragments of slag and two flakes of hammerscale. This debris with the presence of spelt or emmer wheat in the flot suggests an Iron Age or Roman date for the feature. The hammerscale and small slag fragments would suggest iron working on the site. Although such material can move down through the soil from more recent deposits the lack of any recent or modern buildings within approximately 250m of the site suggests that it is contemporary with the deposits.

Pit 258011 produced early medieval radiocarbon dates (Appendix C) and on the basis of the very similar, barley dominated, cereal assemblages in the underlying and adjacent pits, 258005 and 258012, we might reasonably assume a similar age for these. Apart from the charred plant and charcoal assemblages recovered these fills contain no finds other than a small proportion of burnt stone and a magnetic component (Table 2), the latter sufficiently large in sample 3004 of pit 258011 that it suggests *in situ* burning. The assemblages from these three pits are quite different from that from feature 253001, with none of the latter's diversity and a 'domestic' context seems unlikely.

Charred plant remains (Wendy Carruthers)

Introduction and methods

Seven samples from the fills of three pits and a ditch were fully analysed. One sample, 2583000, was taken from a feature of probable Iron Age or Roman date, while the remaining samples are from features assigned to the 5-7th centuries AD. Sorting was carried out using an Olympus SZX7 stereoscopic microscope. Flots were first separated into three fractions to facilitate sorting (sieve sizes were 3mm, 1mm and 250 micron meshes). All of the modern material was removed prior to measuring the flot volume - for this site it amounted to small quantities of modern rootlets. Stace (2010) and Zohary and Hopf (2000) were used for nomenclature, the latter being used for cereal taxonomy. It should be noted that some changes to the identification and interpretation may be made once all of the Milford Haven site data has been gathered together in the synthesis.

Results

Table 3 presents the results of the analysis.

Barley - The large quantities of barley grains in samples from pits 258011 and 258012 were mostly plump and reasonably well-preserved, although possible distortion during charring and silt encrustation often made it difficult to determine whether the grains were straight (present in 2-row and 6-row barley) or twisted lateral grains (only present in 6-row barley). Although identifiable 6-row lateral grains were fairly low in frequency in most of the samples this is more likely to be the result of two factors creating biases within the data;

a) difficulties in identification caused by charring and burial

b) fine sieving during crop processing which would have resulted in the smaller twisted grains being lost through the sieves, alongside weed seeds and chaff fragments.

It was notable that very few weeds seeds and rachis fragments were present in the assemblages, indicating that the cereals had been fully processed prior to charring.

The best preserved grains showed clear signs of having been hulled, although occasional wrinkled, possibly naked grains were observed. These were likely to have been sporadic mutants within a genetically diverse hulled barley crop. Therefore it is most likely that six-row hulled barley was being grown (*Hordeum vulgare* subsp. *vulgare*) although it is possible that some two-row barley (*H. vulgare* subsp. *distichum*) was also present. For this reason the identification is left at *Hordeum vulgare*.

The two barley rachis fragments from sample <2583005> were robust and fairly compact, but this may be because they were from the lower segments of the rachis, rather than indicating that the whole ear had been of a compact type. Their fairly chunky morphology may also have been the reason why they were not removed by winnowing or coarse sieving during processing.

When large quantities of barley are recovered the possibilities of use for malt production are raised. No detached sprouts were observed, but these are often burnt away during charring. No sprouted grains with extended coleoptiles or grooves along the dorsal side were seen, but there were occasional signs of caved in grains, grains with the embryo end lost (possibly through sprouting) and slightly elongated embryo depressions, perhaps indicating the beginnings of sprouting. The percentages of grains showing these signs were 2%, 14% and 4% from samples <2583001>, <2583004> and <2583005> respectively. This amount of slight sprouting was probably due to damp storage conditions. There is no conclusive evidence that malting was taking place at this site.

Discussion

Preservation and identification: As with many of the Milford Haven to Brecon pipeline sites, the charred plant remains were quite silt-encrusted, making identification difficult at times. However, there were no signs of high temperature 'melting' of grains or vacuolation. It was notable that very few chaff fragments or weed seeds were recovered, indicating that the grain had been fully processed prior to charring. The absence of chaff from assemblages containing hulled wheat-type grains (samples 2583000 and 2583002) has made it impossible to confirm the identification or emmer or spelt. Since few grains of this type were recovered, and wheat grains are very variable in morphology (Jacomet 2006), it also makes it more unreliable to use cereal identification as a guide to date. This is discussed further below.

Sample descriptions:

Ditch 258001 contained three charcoal-rich fills which produced burnt bone. A large volume of soil from context 258002 was processed and this produced a low concentration of spelt-type hulled wheat grains (14 grains; *Triticum dicoccum/spelta*), two barley grains (*Hordeum vulgare*), a few hazelnut shell fragments (HNS), a hazel catkin fragment and occasional weed seeds (violet (*Viola* sp.), persicary (*Persicaria maculosa/lapathifolia*) and black bindweed (*Fallopia convolvulus*)). Because no hulled wheat chaff was recovered the hulled wheat identification is left as emmer/spelt, although the better-preserved grains were fairly blunt-ended, a characteristic typical of spelt. A large volume of charcoal was extracted from this flot, most likely explaining the presence of the hazel catkin fragment. Hazel catkins are borne on the tree from the autumn (September) through to the spring of the following year, and the compact nature of the fragment suggests that it was burnt prior to elongation in spring (February/March). This type of assemblage is most likely to be Iron Age or Romano-British in date if the hulled wheat is spelt rather than emmer. Whilst spelt can be found in mid to late Bronze Age assemblages in south-east England, in Wales it does not appear until the Iron Age.

Pit 258005 the sample produced only one hulled wheat-type grain, as well as 29 barley grains and a single HNS fragment. It is probable, therefore, that this features belongs with the two barley-rich pits immediately adjacent, with the hulled wheat grain being redeposited from earlier unrecognised activity at this location or nearby.

Table 3. Charred plant remains from Site 25.08

	Flot	1 st & 2 nd	1st & 2 nd	1 st & 2 nd	1 st & 2 nd			
	Feature no.	258001	258005	258011	258011	258011	258011	258012
	Context no.	258002	258007	258006	258009	258010	258014	258013
	Sample no.	2583000	2583002	2583001	2583004	2583006	2583007	2583005
	Proc. Vol. (I)	129.5	7.5	8	7.5	0.43	2	8
	Flot vol (ml) (includes charcoal)	1320	145	745	270	65	28	353
Cereal grains	Charcoal vol (ml)	800	75	500	175			200
Triticum dicoccum/spelta	emmer/spelt wheat grain	14	1					cf.1
	bread-type free-threshing wheat			7	2		1	11
Triticum aestivum type	grain			1	3		1	11
<i>Triticum</i> sp.	indeterminate wheat grain			6	3			
Triticum sp./ Secale cereale L.	wheat / rye grain							5
Hordeum vulgare L.	hulled barley grain	1	9	519	257	2	4	204
Hordeum vulgare L.	indeterminate barley grain	1	20	727	50		8	291
Hordeum vulgare L.	twisted barley grain			44	12		3	7
Hordeum vulgare L.	slightly sprouted barley			26	53			19
	[total barley]	[2]	[29]	[1316]	[372]		[15]	[518]
Avena sp.	indeterminate oat grain			3	4			3
Avena/Bromus sp.	oat/brome grain							1
Cerealia indet	indeterminate grains	4	12	533	142		13	247
Cereal chaff								
Hordeum vulgare L.	barley rachis frag							2
Other plant remains								
Ulex sp.	gorse seed Gesp				cf. 1f			
Corylus avellana L.	hazel nut shell fragments HSW	9	1		3		2	
Corylus avellana L.	hazel catkin frag HSW	1						
<i>Viola</i> sp.	violet seed GHW	cf.1						
Persicaria maculosa/lapathifolia	redshank/pale persicaria CD	1		4	2			1
Polygonum aviculare L.	knotgrass achene CDGo			1				
Fallopia convolvulus (L.)A.Love	black bindweed achene CD	1e						
Chenopodium album L.	fat hen seed CDn			4	1			
Galeopsis sp.	hemp-nettle nutlet AD			2				2
Centaurea sp.	knapweed ACDG			cf.1				
Lapsana communis L.	nipplewort achene CDHWo			8	cf.1			2
Bromus sp.	brome grass caryopsis CDG					cf. 1		1
Poaceae	small grass seed CG			3	1			
	indeterminate tuber/rhizome frag	1						
TOTAL		34	43	1888	533	3	31	795
CHARRED FRAGS PER LITRE		0.3	5.7	236	71.1	7	15.5	99.4

Pit 258011 Four samples from successive fills of pit 258011 were examined. The lowest two were small soil samples and these produced few plant remains (7.0 fragments per litre (fpl) and 15.5 fpl from the primary fill 258010 and secondary fill 258014 respectively). A bread-type free-threshing wheat grain (*Triticum aestivum*-type) and several barley grains were present, as well as occasional HNS fragments. The two upper samples, however, were much more productive (71.1 and 236 fpl for the third and upper fills 258009 and 258006). Both assemblages were very similar, although the fourth fill was the most productive, containing over a thousand barley grains in 8 litres of soil. A few bread-type wheat grains were present in the two samples (10 grains) but these amounted to only 1% of the total identifiable grains. Several poorly preserved wheat grains could not be identified further than *Triticum* sp.. Occasional indeterminate oat grains were also present (7 in total from the two samples). They may represent either relicts from an earlier crop grown on the same land as the barley or weeds, though the plump profile and long grains suggest the former is likely. Few weed seeds and no chaff fragments were recovered, suggesting that a fully processed crop (or crops) had been charred and deposited. In view of the slight evidence for sprouting noted above it is possible that the crop had been burnt because it had become damp and perhaps mouldy. There was no clear evidence to suggest deliberate sprouting for the production of malt.

The seven weed taxa represented included nipplewort (*Lapsana communis*) achenes, eight of which were found in the uppermost sample. This native annual of hedgerows, rough ground and open woodland is commonly found as a weed of medieval arable crops, but is much less common in earlier periods. Godwin (1975) records one Iron Age, two Roman and five medieval sites, but more recent evidence from the author's experience reinforce the tendency for this weed to be primarily found in medieval and later assemblages. Other weeds include hemp-nettle (*Galeopsis* sp.) and fat hen (*Chenopodium album*), the second of which indicates nutrient-enriched soils (e.g. manured land). Nipplewort and hemp-nettle were also recovered from pit 258012.

Pit [258012] - The single sample from pit 258012 contained a high concentration (99.4 fpl) of barley with several bread-type wheat grains (11 grains) and indeterminate oats (3 grains). Five grains appeared to have the bullet-shaped profile and elongated embryo typical of rye, but these have been listed as wheat/rye (*Triticum* sp./*Secale cereale*) because of their poor state of preservation. A single, incomplete grain was possibly a spelt-type hulled wheat grain (*Triticum* cf. *dicoccum/spelta*). Two robust barley rachis fragments were recovered from this feature (see 'Results' above), providing the only evidence of chaff from any of the seven samples. The similarity between this assemblage and that from pit 258011 suggests that they were filled around the same time, using similar sources of waste.

Comparisons between the pit fills:

Comparing the two barley-rich pits (258011 and 258012) with the other two feature (259001 and 258005) fills the following observations can be made:

• Hulled wheat grains (unfortunately unconfirmed by chaff fragments) were only recovered from pits 258001 and 258005. However only one hulled wheat grain was present in 258005, presenting the possibility that this was redeposited.

• Free-threshing wheat grains were only found in pits 258011 and 258012. However, some of the indeterminate wheat grains were longer and more hump-backed, possibly coming from hulled or free-threshing tetraploid wheats.

• Oat grains were only present in the two barley-rich pits. Oat tends to become more common in later sites across the British Isles, sometimes becoming dominant on medieval sites. However, occasional grains have been found on some IA and RB sites.

• Nipplewort was only present in the barley-rich pits. This weed tends to become more common in the medieval period. However, it has occasionally been found on earlier sites and is native to the British Isles. It's presence in the barley-rich pits could be because it prefers drier soils, and these types of soils would have been chosen for the cultivation of barley.

None of these observations provide reliable, conclusive evidence for dating the undated features. Taken together, the absence of free-threshing wheat, oats and nipplewort and the presence of hulled wheat grains might suggest that the features 258001 and 258005 might be Iron Age or Romano-British in date. The presence of several free-threshing bread-type wheat grains, occasional oat grains and the weed nipplewort in the second set of pits is consistent with the post-Roman radiocarbon date obtained from 258011. The juxtaposition of pit 258005 to the two barley rich pits, and the dominance of barley in the small sample from its fill would suggest that this feature can also be dated to the post-Roman period with the single hulled wheat reflecting residual material or a trace surviving in the new wheat crop being grown at the site.

General discussion and comparisons with other sites

The absence of hulled wheat chaff from sample 2583000, pit 258001 is unusual, particularly since other waste materials such as HNS and weed seeds were present (albeit in low quantities). It could indicate that fully processed grain had been brought to the site, and possibly, in view of the presence of burnt bone and other finds from the deposit, would be consistent with a domestic context where cleaned grain was accidently charred during food preparation.

Barley is a very tolerant crop, able to be grown in a wide range of conditions although it is usually associated with well-drained calcareous soils these days. It is a useful fodder crop but was probably also grown to be ground into flour for bread and grain for pottages in early medieval times because wheat is unlikely to have grown well on the poor Welsh soils. In many areas of Wales oats were found to be more suitable for both human and livestock consumption due to the nature of the acidic soils and damp climate. At sites in Pembrokeshire, however, such as West Angle Bay (Caseldine 2011) and Brownslade Barrow (Carruthers 2011), and South Hook (Carruthers 2010) both barley and oats have been shown to have been important during the medieval to later medieval/post-medieval periods, with dredge (a mixed crop of oats and barley) probably having been grown at South Hook in early medieval times. Documentary research by Christopher Dyer into the diet of farm labourers in Sedgeford, Norfolk, through the 13th to 14th centuries showed that bread for the working class was mainly made from barley flour, although this changed towards the end of the 14th century with the proportion of wheat flour increasing (Dyer 2000, p.85).

Charcoal (Dana Challinor)

Three samples of charcoal, from the post-Roman pits 258011 and 258012, were studied, following standard methodological practice. Charcoal was abundant, with variable preservation: the material in pit 258011 was black and very soft, with a tendency to dissolve on fracturing, while that of 258012 was hard and covered with whitish sediment deposits. Five taxa were positively identified: *Quercus* sp. (oak), *Alnus glutinosa* (alder), *Corylus avellana* (hazel), Maloideae (hawthorn group) and *Fraxinus excelsior* (ash). The undifferentiated *Alnus/Corylus* may include specimens of either or both species. Tyloses were rarely observed, but moderate to strong ring curvature was frequently noted, although whole stems with pith and bark were not preserved. The assemblages were quite mixed, with no single taxon dominant.

Table 4: Charcoal from pits at Site 25.08

	Feature number	258	258012	
	Context number	258006	258009	258013
	Sample number	2583001	2583004	2583005
Quercus sp.	oak	5	7 (hs)	8 (sr)
Alnus glutinosa Gaertn.	alder	4		5 (r)
Corylus avellana L.	hazel	17 (r)	11 (r)	5 (r)
Alnus/Corylus	alder/hazel	3	2	7
Maloideae	hawthorn group		10 (r)	1
Fraxinus excelsior L.	ash			4 (r)
Indeterminate	diffuse porous	1		
Total		30	30	30

h=heartwood;s=sapwood; r=roundwood; (brackets denotes presence in some frags only)

The taxonomic composition of the charcoal assemblages (fairly mixed assemblages with several taxa) and character of the wood (branches and small stems) used is appropriate for domestic fuelwood sources. The presence of charred cereal remains in the deposits of pits 258011 and 258012 may support a provenance for the charcoal of domestic debris, probably from cooking hearths. Oak-hazel woodland would have grown on the slopes of the Towy valley, with alder on riversides and on the lower-lying floodplain. Carruthers' observation that the charred plant assemblages from 258011 and 258012 are similar enough to suggest common waste sources is borne out by the charcoal assemblages, which were also comparable. The 5th-7th centuries date for these features provides an important dataset for the broader comparison of assemblages across the route of the pipeline, as this period is under-represented.

Discussion

Site 25.08 lies on freely draining slightly acid loamy soils (<u>http://www.landis.org.uk/soilscapes/</u>) on the west side of the Towy Valley at approximately 60m OD in a modern landscape of pasture and hay fields with some localised arable. Feature 258001, a pit or possible ditch segment in the southern half of the field (Fig.1), produced an assemblage that suggests domestic occupation and with hulled wheat (spelt or emmer) and evidence for iron smithing must surely date to the Iron Age or Roman period. This assemblage seems inconsistent in a single isolated feature and the geophysics plot for this area (Brannlund 2013, Fig. 2) suggests other archaeological activity, which was not observed after stripping, suggesting other features or a possible structure or ring ditch on the site.

The scatter of excavated features at the northern end of the field (Fig. 1) included three pits, all of which were sampled, and one of which is dated to the 5-7th centuries AD. The dated pit cuts an earlier pit with a very similar cereal assemblage, including bread type free-threshing wheat, suggesting a similar post-Roman date. The adjacent pit 258005 (Fig. 1) includes a single hulled wheat (spelt or emmer) grain, which might suggest a Roman or earlier date, but has like the two other pits a dominance of barley, and would again suggest a contemporary post-Roman date. The relative lack of oats, and dominance of barley, in these three pits assigned to the 5-7th centuries contrasts with a number of the medieval sites along the pipeline and may perhaps reflect either a short term local focus on barley in the adjacent fields or perhaps a preference at this time which the project wide study may resolve. The character of this settlement is slightly problematic. Unlike the earlier feature in the southern part of the field these three pits did not produce the diversity of material that suggested a domestic context, having

just a little burnt stone, evidence for *in situ* burning in pit 258011, and a charcoal and cereal rich charred plant assemblage. The cereal assemblages are nevertheless suggestive of a cleaned crop, with little or no chaff and relatively few weed seeds, and with occasional shell fragments of hazelnut this would imply the accidental charring of a barley crop ready for milling or consumption, or perhaps the intentional discard of a spoilt crop store. Either way this would indicate a domestic type of site rather than the waste from, for instance, a field kiln in which chaff, culm nodes and more weeds might be expected. The lack of other debris, such as pottery and smithing waste, could be a reflection of the date of the site. In contrast to the southern area the geophysics does not suggest any other significant features in the immediate vicinity (i.e. within a few metres), although two of the pits cut an earlier linear. These three pits might reflect a period of short term occupation, with the cereals brought to the site already processed and not necessarily grown on the local fields. If the site was more permanent other features might be expected or perhaps the site was heavily truncated, conceivably by later medieval ploughing. The relatively diverse charcoal assemblage, including roundwood, of oak, hazel, alder, hawthorn group and ash could be seen as more typical of domestic fuel (cooking fires) than ovens or kilns, making use of local woodland, hedgrows and stream side trees. The site is some 280m or more from the nearest water courses, the Afon Dulais and one of its tributaries, but the alder could have grown in local pockets of poorly drained land.

REFERENCES

- Carruthers, Wendy (2010) Charred Plant Remains *In* Peter Crane & Kenneth Murphy, Early medieval settlement, iron smelting and crop processing at South Hook, Herbranston, Pembrokeshire, 2004–05 *Arch Cambr.* **159**, 163-181.
- Carruthers, Wendy (2011) Charred Plant Remains from Brownslade. In Polly Groom, Duncan Schlee, Gwilym Hughes, Pete Crane, Neil Ludlow & Ken Murphy, Two early medieval cemeteries in Pembrokeshire: Brownslade Barrow and West Angle Bay. *Archaeologia Cambrensis* **160**, 159-163.

Dyer, Christopher (2000) Everyday Life in Medieval England. Hambledon and London, London

Griffiths, S. 2015 Welsh pipelines palaeoenvironmental samples radiocarbon results. Archive report for Rhead. Jacomet, Stefanie and collaborators (2006) *Identification of cereal remains from archaeological sites*. 2nd Edition. Archaeobotany Lab IPAS, Basel University.

Pannet, A. 2008 Felindre to Tirley Natural Gas Pipeline Project 2007. Preliminary Report. CAP Report 534.

Rackham, J., Giorgi, J.A. and Challinor, D. 2015 Site 25.07 Environmental Archive.

Stace, Clive (2010) New Flora of the British Isles. Third Edition. C.U.P.

Zohary, D. & Hopf, M. (2000) Domestication of Plants in the Old World. Oxford: OP, 3rd Edition.

Marguerie, D. and Hunot, J., 2007. Charcoal analysis and dendrology: data from archaeological sites in northwestern France. *Journal of Archaeological Science*, 34 (9), pp.1417-1433.

APPENDIX C: THE RADIOCARBON DATING EVIDENCE BY SEREN GRITHIFFS

For the analysis, radiocarbon measurements were produced on short-life, single entity charred plant remains. Samples with the 'SUERC-' laboratory code were pretreated using an acid-base-acid process. 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.

Four statistically consistent radiocarbon results were produced on samples of oat and wheat grains from two contexts (SUERC-57293; SUERC-57294; SUERC-57295; SUERC-57296; T'=3; T'5%=7.8; df=3; Fig. 4.). These results could therefore be of the same actual age. A Bayeisan model for the results from this site estimates the start of activity associated with the cereal crops in 230-570 cal AD (95% probable; Start 25.8; Fig. 4), and the end of activity associated with these results in 430-800 cal AD (95% probable; End 25.8; Fig. 4). The duration of activity represented by these results is estimated as 1-170 years (95% probable; no figure).

Fig. 4 A Bayesian model for the results from site 25.8. For each distribution two ranges have been plotted. The range in outline represents the calibrated radiocarbon result, the solid distribution represents the posterior density estimate — or Bayesian statistical model output. The large square brackets and CQL2 OxCal keywords define the model exactly.





Sample	Sample	Context	d13C	Lab code	Result	Calibrated
						date range (95% confidence)
charred plant remains; free threshing wheat grains x3	2583004	258009	-22.7 ‰	SUERC- 57293	1531 ± 30	420-610 AD
charred plant remains; Hordeum vulgare grains x3	2583004	258009	-23.8 ‰	SUERC- 57294	1569 ± 30	410-570 AD
charred plant remains; hulled barely grains x3	258001	258006	-24.3 ‰	SUERC- 57295	1479 ± 30	540-650 AD
charred plant remains; free threshing wheat grains x3	258001	258006	-23.9 ‰	SUERC- 57296	1563 ± 30	410-570 AD

Table 5 Radiocarbon samples





