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Polygonization of Traditional Farm Buildings in Wrexham

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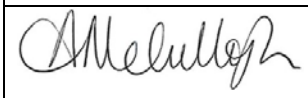	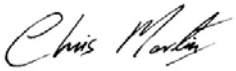	Paul Belford
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Cover: Building at Little Overton Farm, PRN 129289, CPAT photograph 2940-IMG_1050.
A non-listed building recorded by the pilot project, and visited during field verification.

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Summary

This Cadw-funded project followed on from the pilot held last year in Radnorshire, which was set up to investigate the feasibility of creating a set of GIS polygons of traditional farm buildings, for use as reference and objective layers in the Glastir scheme. Wrexham was chosen as a second candidate because of its perceived differences from Radnorshire - Wrexham being a more industrialised area by the end of the 19th century and having less open countryside in which farms and farmsteads might survive. As with Radnorshire the Landmark raster copy of the Ordnance Survey 2nd edition was used as a base map from which to identify likely farms and farmsteads. Where buildings shown on that map coincided with buildings shown on the most recent Ordnance Survey MasterMap buildings layer, a polygon was created.

In total, 3604 polygons were created on 851 farms, of which 303 were for buildings already recorded in the Historic Environment Record. Of these, 229 are recorded as Listed Buildings, with 642 potentially lying within the curtilage of those listings.

The project also trialled a new element based on work previously undertaken by English Heritage (now Historic England). In a trial area, covering approximately a third of the authority, farms were cross referenced against a number of predefined categories, developed by English Heritage and in part based on earlier work on traditional farm buildings in north east Wales by Euryn Wiliam, and a boundary drawn around the maximum extent of the farm. Other metadata was also added to the database created. During this exercise, 210 farms were digitised. This was, by and large, successful and it should allow a greater depth of analysis of the final product once finished for the whole project area.

47 farms, containing 215 buildings, were assessed in a field verification exercise. Of the 182 buildings that could be seen, 179 appear to be surviving traditional farm buildings, although 29 of these have been converted to residential use.

1 Introduction

1.1. When the Glastir agri-environment scheme was set up, it was decided that a set of polygonal data to define known un-Scheduled archaeological sites was essential in ensuring that appropriate management of those sites was undertaken. Over the course of the next 5 years, historic features on farmland, on commons and within woodland was digitised across Wales by the Welsh Archaeological Trusts.

1.2. Within the Glastir scheme, repairs to traditional farm buildings have always been popular options with farmers. It was felt that a set of polygonal data defining which buildings on the farm might be considered *traditional farm buildings*, and therefore eligible for Glastir grant-aid, would be useful, and may well have other uses beyond Glastir.

1.3. The advent of Brexit has thrown the long term future of Glastir into doubt. However, it has been decided, in view of the Government's decision to support agri-environment schemes at their present level of funding until 2020, and on the assumption that there will be some form of agri-environment scheme thereafter, to continue the project into a second year.

1.4. Wrexham was chosen as the candidate for this second year's work not least because it differs markedly from Radnorshire - in both its physical and political geography. By the end of the 19th century large parts of the central areas of what has now become Wrexham County Borough where already industrialised, and it is suspected that many farms had already disappeared under a cloak of urbanization, but with significant areas in the east and west of the county still retaining their rural purpose. Subsequently, parts of these eastern and western areas have fallen prey to urban and suburban expansion and many traditional farm buildings, while not subsumed have been converted into domestic units. It was hoped that undertaking work in Wrexham would further test the methodology produced for Radnorshire.

Methodology

1.5. Using MapInfo GIS, the Landmark the Ordnance Survey 2nd edition (1898-1899) 25" to 1 mile scale maps for Flintshire, the Ordnance Survey 2nd edition (1899-1900) 25"to 1 mile scale maps for Denbighshire and the Ordnance Survey 2nd edition (1900-1901) 6" to 1 mile scale maps for Merioneth were used as a base map, overlaid with the 2014 OS MasterMap buildings layer (which has been improved for positional accuracy). The 2nd edition map was chosen as across Wales it is the closest in date to the end of the First World War – a date used, by Glastir, as a 'terminus ante quem' for the creation of traditional farm buildings. The 2006ff Next Perspectives vertical aerial photography GIS layer was used to check choices made from the maps.

1.6. Where buildings shown on the 2nd edition maps corresponded with a building shown on MasterMap, they were copied into a newly created 'traditional farm buildings' table. They were given the name shown on the 2nd edition map, and if no name was shown, they were named for the nearest farm or house.

1.7. No attempt was be made to categorise or identify the type or purpose of an individual building. It was felt that such attempts may be grossly misleading. Similarly no attempt was made to draw those buildings which could be seen to have vanished

from the modern mapping, as the primary purpose of the exercise was to identify extant traditional farm buildings not vanished ones.

1.8. Once complete, the polygons were then cross-referenced manually with the Historic Environment Record (HER) and Primary Record Numbers (PRNs) added to the database if buildings were in the HER. Those not in the HER were allocated new PRNs.

1.9. Other data was then added to the table of polygons. X and Y coordinates were derived automatically from MapInfo (National Grid References and 1:10,000 map sheet numbers were generated from these), political geographic data was added from existing MapInfo tables, listed building cross references for buildings and potential curtilage buildings were added from Cadw's Listed Buildings database, and standard descriptions, site type data and a range of other metadata were generated. A copy of this table was then converted to MySQL and used to populate the HER with new records and to make edits to existing ones.

1.10 Each polygon was given a Unique Identifier (UID) reference.

1.11 During the project it was decided that the work could also be used to trial a categorization exercise developed by English Heritage (now Historic England). Following discussions with ex-English Heritage staff member, Jeremy Lake who had been responsible for much of their work of this type, it was decided to attempt to classify each farm in a trial area according to its plan, using a set of predetermined categories, and then to capture the extent of the farm from the map evidence.

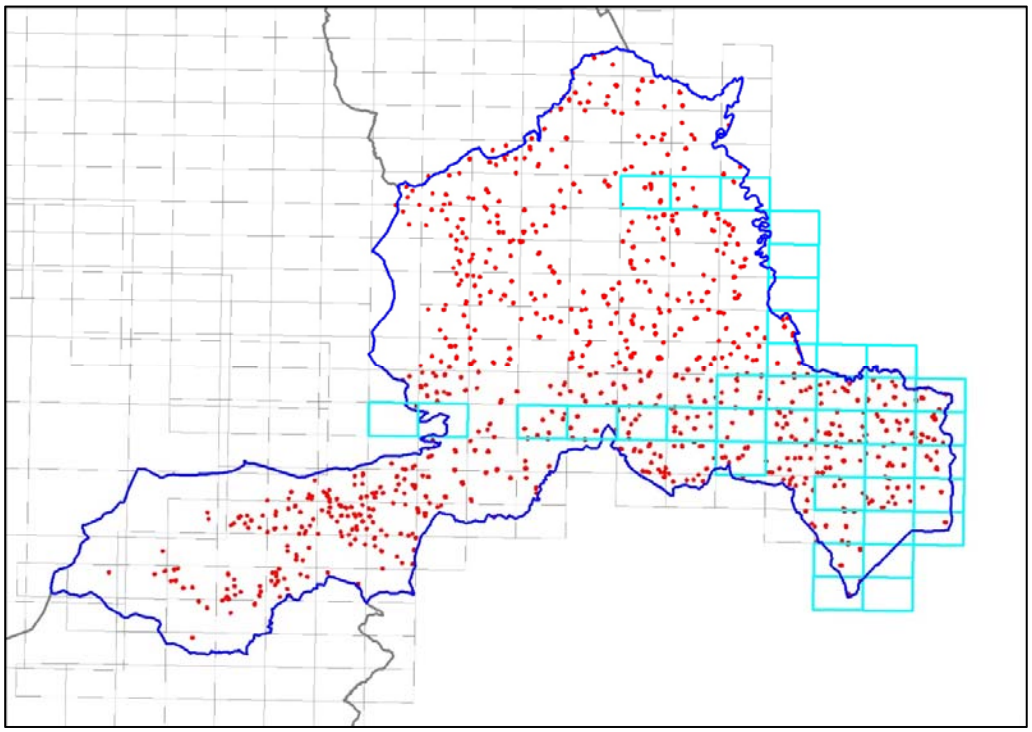

Fig. 1 Distribution of Traditional Farm Buildings in Wrexham, overlain (for Flintshire and Denbighshire) by the index to the 2nd edition 25" to 1 mile scale and (for Merioneth) the index to the 6" to 1 mile scale Ordnance Survey maps. The maps outlined in light blue are those for which categorization and the collection of extended metadata was trialled within this project.

1.12 This trial work was successful, and will hopefully allow the metadata collected to be analysed to a greater degree. It was only possible to complete a part of the authority area – 40 of the 128 map sheets surveyed - within the time allowed, but it is hoped that this trial can be completed in subsequent years.

2 Digitisation Process

2.1. The Landmark map indices were used to methodically work through the whole county, and were shaded to indicate progress.

2.2. With the Traditional Farm Buildings (TFB) layer editable in MapInfo, it was quick and simple to select the relevant building polygons in MasterMap and copy them into the layer. In this manner **37** 25"to 1 mile scale map sheets for Flintshire, **87** 25" to 1 mile scale map sheets and **4** 6" to 1 mile scale map sheets for Denbighshire and **3** 6" to 1 mile scale map sheets for Merioneth had their traditional farm buildings 'gathered'.

2.3. Deciding which buildings to add to the TFB layer, however, was not always simple (see 'Problems encountered' below), but various techniques were used to aid the process. Some of the buildings had already been recorded in the HER, which was a useful tool for verification. Occasionally, Listed Building descriptions and the National Monument Record (Coflein database) were also used to identify extant traditional farm buildings. In some instances, if a farm was on a road and there were still doubts about the buildings, Google Streetview proved to be useful.

2.4. In total, 3604 polygons were created for 851 farms. Of these, 303 polygons were for buildings already recorded in the HER. Of these, 229 were Listed Buildings, and 642 were potentially within the curtilage of those listings. The various levels of designation were identified in the TFB table.

2.5. During the trial of farmstead digitisation, 210 farms in English Maelor were characterised using the English Heritage categories. 172 (82%) of these had buildings arranged around a courtyard - 110 (52%) of which had *a Regular Courtyard* plan of varying layouts with 62 (30%) of *Loose Courtyard* plan. 22 had a *Dispersed* layout, 7 a *Linear Plan*, 7 a *Parallel Plan*, and there was one each of *L-plan* (with attached house) and *Row Plan*. So all of the English Heritage predetermined Primary Plan Types were represented to a greater or lesser degree.

2.6. While defining the primary plan type (regular courtyard, loose courtyard, dispersed, L-plan, parallel, etc.) was mostly very easy to do, the secondary plan type was not always as simple and it soon became clear that the categories identified in the English Heritage project could not always be applied (see Fig.3). Some further work will be needed to refine the categorization system before or as part of future projects.

2.7. Many farms (60%) also contained detached buildings separate to the main plan type, which also confused the categorisation process.

2.8. In addition to categorising the building layout, the location of the farm, an indication of the survival of traditional farm buildings, an indication of whether buildings had been converted and the presence of modern buildings, including large agricultural sheds, were also recorded. PRNs and building dates if known were added, as was a field to show 'confidence' in the categorization process. The same range of other metadata, as described above for individual buildings in paragraphs 1.9 - 1.10, was added automatically.

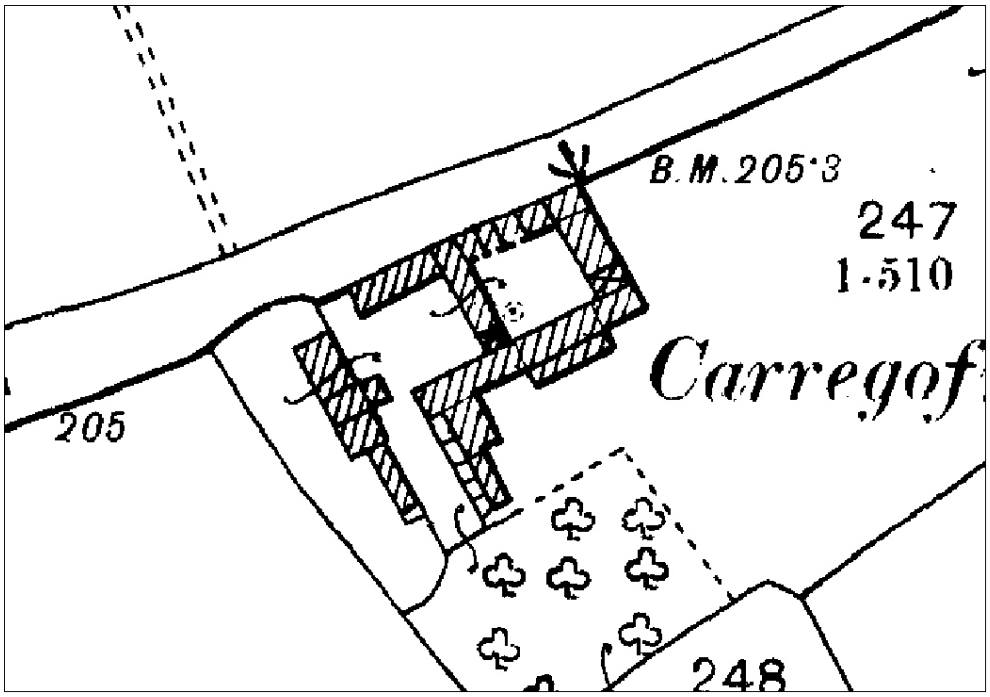

Fig.2 This farmstead has a Primary Plan Type 'Regular Courtyard', but the options for Secondary Plan Type – L-plan, U-plan, E-plan, F-plan, H-plan, T-plan, Z-plan – did not fit. The layout most resembles an R shape or possibly an A.

Problems encountered

2.9. One immediately apparent – yet anticipated - problem was the different projections used by OS 2nd edition and OS MasterMap. In all cases, the polygons of the MasterMap buildings were offset from those shown on the Landmark maps to a lesser or greater degree. Often the pattern of buildings was easily relatable, so this was not so much of an issue, but sometimes it was difficult to discern which of the MasterMap buildings were shown on the 2nd edition maps. This is where other resources - vertical aerial photography, photographs (aerial and terrestrial) in the CPAT archive, building descriptions in the HER, Listed Building data, and Coflein - and even viewing road-side buildings in Google Streetview – proved useful.

2.10. One inherent problem was that it was not always possible to tell if the building on MasterMap was actually the surviving traditional building, or if a new building had been built on the footprint. It was assumed that in most cases, if an older building were to be demolished so a new one could be built, the new one would probably have a different footprint - however this cannot be guaranteed. A more common problem is when a new building is built adjoining the old one. It is possible to tell from the roof line and roofing colour on aerial photography if the older building is extant, but sometimes a new roof is built to cover the old building as well as the new. Often there is no way of knowing if the older building survives entirely inside a modern counterpart, and it is likely that some buildings have been missed in this way.

2.11. A particular issue in Wrexham is the relatively high number of conversions of traditional farm buildings into domestic dwellings. However it is usually possible to see if a building retains its original footprint. Converted buildings tend to be accompanied by very tidy gardens and mostly look quite unlike farmyards on

modern aerial photography – which is also helpful. It was assumed that, where the footprints match, these conversions retain at least some element of the former farm building.

2.12. Problems were anticipated in the urban areas of Wrexham where the extent of modern development might have served to mask older, originally agricultural, buildings. However this did not prove to be so much of a problem as the pattern of the traditional farms was still relatively easy to spot through the pattern of later development.

2.13. Where this did prove to be more of an issue was in the ex-industrial areas surrounding Wrexham where there are many isolated buildings of uncertain function. As well as the usual number of isolated farm buildings there are also a significant number of isolated industrial buildings, and it can be difficult to tell the difference between the two when working from a map base. Modern data, such as aerial photography, can help but it is simply not always possible to tell the purpose of a building from a desktop exercise and some isolated traditional farm buildings will have been missed because of this. Of course it could be argued that these isolated ex-industrial buildings are as important to the HER as farm buildings (and therefore to some extent to schemes such as Glastir) and perhaps thought should be given to collecting their polygons in future projects?

2.14. In some cases, the OS MasterMap table appears to be inaccurate. This could be seen when comparing the maps to the aerial photographs, and in two instances were picked up in the field verification exercise. The reason for these apparent 'errors' in MasterMap are not known.

2.15. Equally in some instances the early OS edition is clearly wrong, with some buildings being wrongly positioned or depicted on the maps. As with MasterMap the reasons for these errors are not apparent.

2.16. It was also apparent in some cases that MasterMap has drawn what appear to be single buildings as a composite of smaller polygons. While many of these can be seen to be lean-tos or the like, some of them have no clear explanation. Given that it is not possible to determine from the mapping or other desktop sources exactly why some of these buildings appear to be a composite, all the polygons captured have been treated as individual buildings and numbered as such.

2.17. In areas where 25"maps were not produced, or where digital versions were not available, it was necessary to use 6" to 1 mile scale maps. The scale meant that the exact nature of smaller buildings could not be seen as well, but generally it was possible for data to be picked out from the overlying MasterMap table. As it was necessary to use only 4 such maps this is not seen as a significant issue

2.18. The original estimates of the time the project would take were probably sound. However the decision to trial an additional methodology, in categorizing farms, drawing their extents and collecting additional metadata, part way through the project did mean that it was not possible to produce a finished revised product containing this secondary data for the whole of the area. It is hoped that the categorization for Wrexham can be returned to in subsequent years.

3 Field Verification

Two days were spent in the field looking at buildings identified to verify that they were traditional farm buildings. To view as many buildings in one day as possible, it was decided that buildings beside roads would be chosen, so that they could be seen without entering the farm (and without having to seek permission from the owner). It was also decided not to take photographs of any buildings as this would have added to the time taken and may have led to issues with landowner permission. Because Wrexham is a county with diverse character and topography, three areas were chosen to visit - the industrial upland of Minera, and the Ceiriog Valley and the lowland of the English Maelor, where the validity of the English Heritage categorization could also be tested. 215 buildings (including houses) on 47 farms, and one field barn were examined.

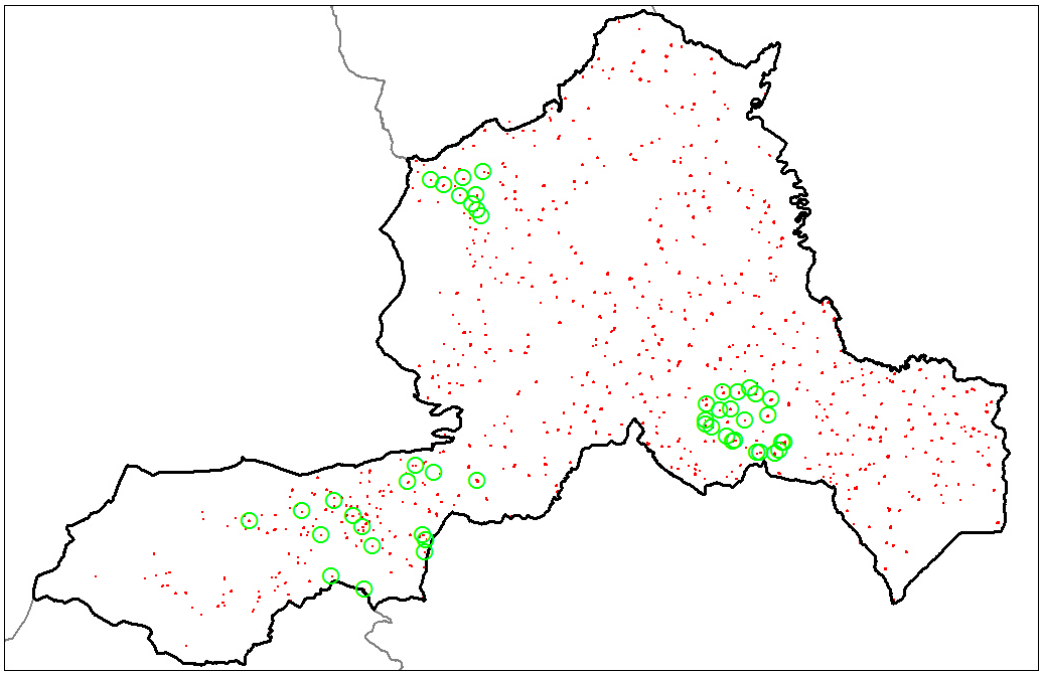

Fig. 3 Farms looked at during field verification

The results of the farm visiting can be broken down as follows:

33 of the 215 buildings were obscured from view so could not be verified,

so of the **182** buildings seen:
3 buildings had disappeared or had been replaced by modern buildings
179 (98%) were surviving traditional buildings, as identified by the pilot

3 buildings on two farms had been 'missed' during the mapping exercise, due to MasterMap inaccuracies.

Farms looked at within the English Maelor 'trial area' also confirmed that the English Heritage categorization of primary farm type was sound.

4 Conclusion

4.1. The process arrived at for capturing the digital boundaries, using the MasterMap and Landmark OS mapping, was found to be quick and easy to manage. The addition of the metadata and database data to the acquired table of traditional farm buildings was also straightforward, with much of it being an automated process from existing MapInfo or other databases.

4.2. The trial to produce an additional table showing extents of farms and categorizing the farm plan also worked well, but added significantly to the time taken to complete the recording of each farm. It was therefore not possible to complete the exercise for the whole of Wrexham within the time allocated to the project. Additional time will need to be allowed to carry out such an exercise in future.

4.3. The overall numbers of traditional farm buildings recovered per map sheet was slightly up on Radnorshire - 28 as opposed to 23. As were the numbers of sites not previously recorded in the HER – 25 per sheet as opposed to 21. However the percentage of those buildings that were recorded in the HER and were listed was considerably higher – 75% as opposed to 60% in Radnorshire. The total area of Wrexham is 502 sq km, while that for Radnorshire is 1213 sq km.

4.4. The trial categorization of farms according to the English Heritage types worked well, clearly showing that the primary farm type in the trial area were predominantly variations on a courtyard plan – 172 of the 210 farms looked at were of this type. However it became clear that identifying secondary farm type within the primary categorization was much more difficult, with many of the farms not really fitting any of the prescribed secondary types. It is assumed that further work will be needed on the classification system to make it a better fit for work in Wales.

4.5. The field verification indicates that of the 182 buildings seen 179 were surviving traditional farm buildings while just 3 had disappeared or had been replaced by modern buildings - this is a 98% 'success rate' for identifying traditional farm buildings using this methodology. Indeed a higher percentage than this could fairly safely be assumed as at least some of the 33 buildings not seen during the field verification must also be traditional. In addition, only 3 buildings were 'missed' during mapping, and this was due to inaccuracies in the MasterMap data.

4.6. It can therefore be concluded that this desktop method of identifying traditional farm buildings, which has now been used across two physically and politically different unitary authorities, is a cost effective way of using existing resources. The addition of an extra metadata table identifying the type and extent of each farm will aid analysis of farm data considerably – particularly if used in conjunction with other resources such as Historic Landscape Characterization. It should be built into any subsequent project to record Traditional Farm Buildings.

5 Archive deposition Statement

5.1 The project archive has been prepared according to the CPAT Archive Policy and in line with the CIfA *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives guidance* (2014). The archive will be deposited with the regional Historic Environment Record, maintained by CPAT in Welshpool.

6 References

6.1. References

English Heritage, 2009. *Historic Farmsteads: a manual for mapping.* Grey literature report

McCullough, A E and Martin, C H R, 2015, *Polygonisation of Traditional Farm Buildings in Radnorshire, Glastir Pilot Project*, CPAT Report 1359

Wiliam, E, 1982. *Traditional Farm Buildings in North-East Wales 1550-1900*