CPAT Report No. 1359

Polygonisation of Traditional Farm Buildings in Radnorshire, Glastir Pilot Project

Cadw

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YMDDIRIEDOLAETH ARCHAEOLEGOL CLWYD-POWYS
CLWYD-POWYS ARCHAEOLOGICAL TRUST

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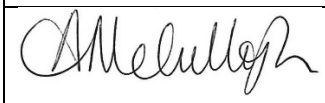	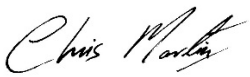	Paul Belford
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Cover: Farmhouse at Bronllys Farm, Llanbister, PRN 20632, CPAT photograph 1797-0125. An un-listed building whose footprint was recorded by the pilot project.

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Summary

This Cadw-funded project 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. Radnorshire was chosen for this pilot project due to its rural nature and relatively small size. The Landmark raster copy of the Ordnance Survey 2nd edition was used as a base map from which to identify likely farms and farmsteads, and where buildings shown on that map correlated with buildings shown on the Ordnance Survey MasterMap buildings layer, a polygon was created. In total, 7625 polygons were created on 1920 farms, of which 673 were for buildings already recorded in the Historic Environment Record. Of these, 404 are recorded as Listed Buildings, and 1191 potentially lie within the curtilage of Listed Buildings.

25 farms, containing 112 buildings, were assessed in a field verification exercise. Of the 98 buildings that could be seen, 91 appear to be surviving traditional farm buildings, although some of these have been converted to one degree or another.

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 5 years, historic features on farmland, on commons and within woodland have been 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. This pilot project was set up to establish whether an accurate enough dataset could be produced just using map regression, as this would be by far the most cost-effective method.

Methodology

1.3. Using MapInfo GIS, the Landmark OS 2nd edition (1902-1905) 25"to 1 mile scale maps were used as a base map, overlaid with the 2009 OS MasterMap buildings layer (which has been improved for positional accuracy). The 2nd edition 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.

1.4. 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.

1.5. No attempt was be made to categorise or identify building type. 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.

1.6. 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.

1.7. Other data was then added to the table of polygons. X and Y coordinates were derived automatically from MapInfo (National Grid References and 6"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 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.

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

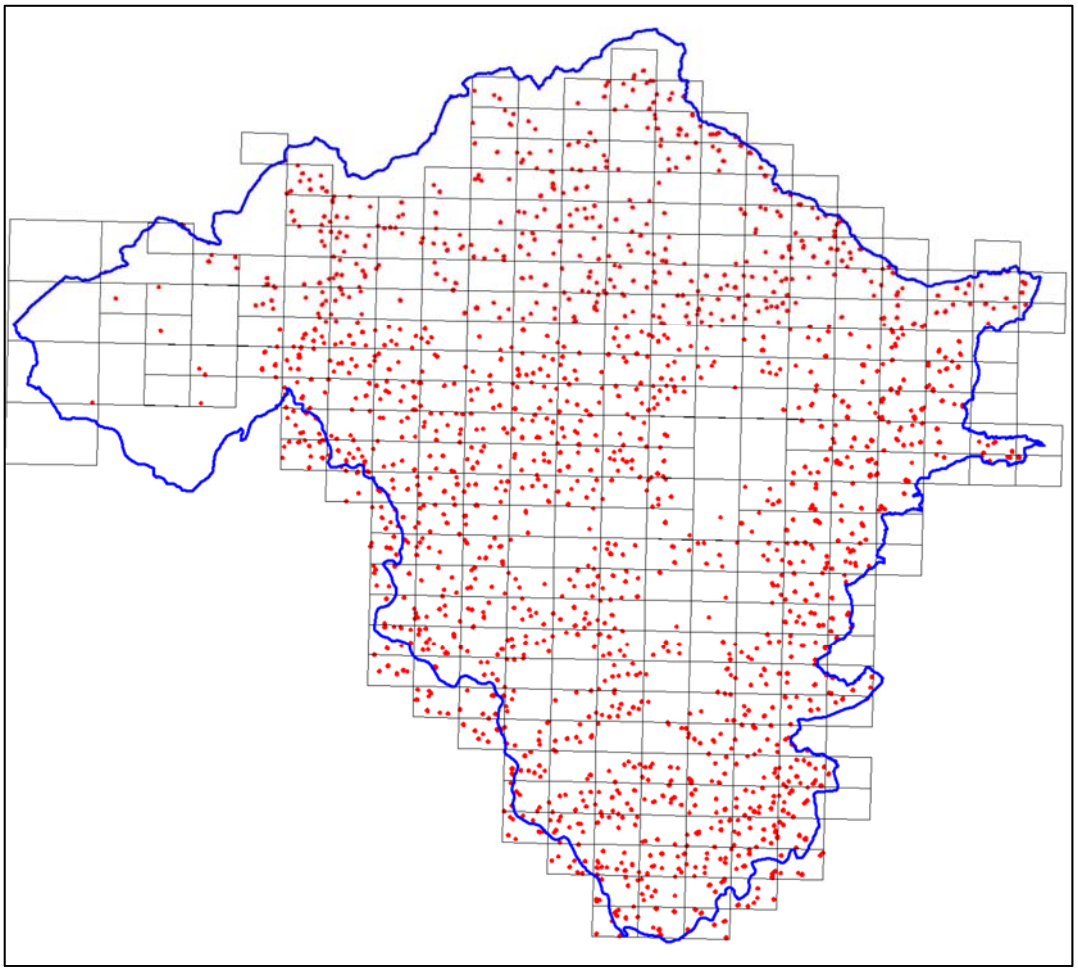

Fig. 1 Distribution of Traditional Farm Buildings in Radnorshire, overlain by index the to the 2nd edition 25" to 1 mile Ordnance Survey maps.

2 Digitisation Process

2.1. The Landmark map indices were used to methodically work through the whole county, and were shaded to indicate progress. Around the edges of Radnorshire, it became apparent that it would be necessary to use the Landmark maps of Montgomeryshire, Shropshire, Herefordshire and Brecknockshire to provide complete coverage. In order to save time the northern and southern edges of the study area (Montgomeryshire and to a lesser extent Brecknockshire) were not fully transcribed on the assumption that these could be done during any subsequent project.

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 322 25"map sheets and 6 6" map sheets had their traditional farm buildings 'gathered' in 23 days.

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, 7625 polygons were created for 1920 farms. Of these, 673 polygons were for buildings already recorded in the HER. Of these, 404 were Listed Buildings, and 1191 were potentially within the curtilage of Listed Buildings. The various levels of designation were identified in the TFB table.

2.5. Initially the automated production of polygonal data directly from the raster map by means of a computer algorithm was considered. However experiments with this method ran very slowly and produced poor quality results which did not clearly distinguish buildings from general 'background noise' well enough to be in any way useful. This idea was quickly abandoned in favour of the approach outlined above.

Problems encountered

2.6. 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 (Fig.2) 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.

2.7. 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.

2.8. Isolated barns and other buildings not within an obvious farm yard also presented a problem. It is not always possible to tell the age or purpose of a building from a desktop exercise and some isolated traditional farm buildings will have been missed because of this. A random check of existing photographic data collected during farm visits made under Tir Gofal (the previous all Wales agri-environment scheme) identified a small number of such buildings. Although this would extend the time taken (and the cost), it would be worth putting a systematic cross check into any future projects.

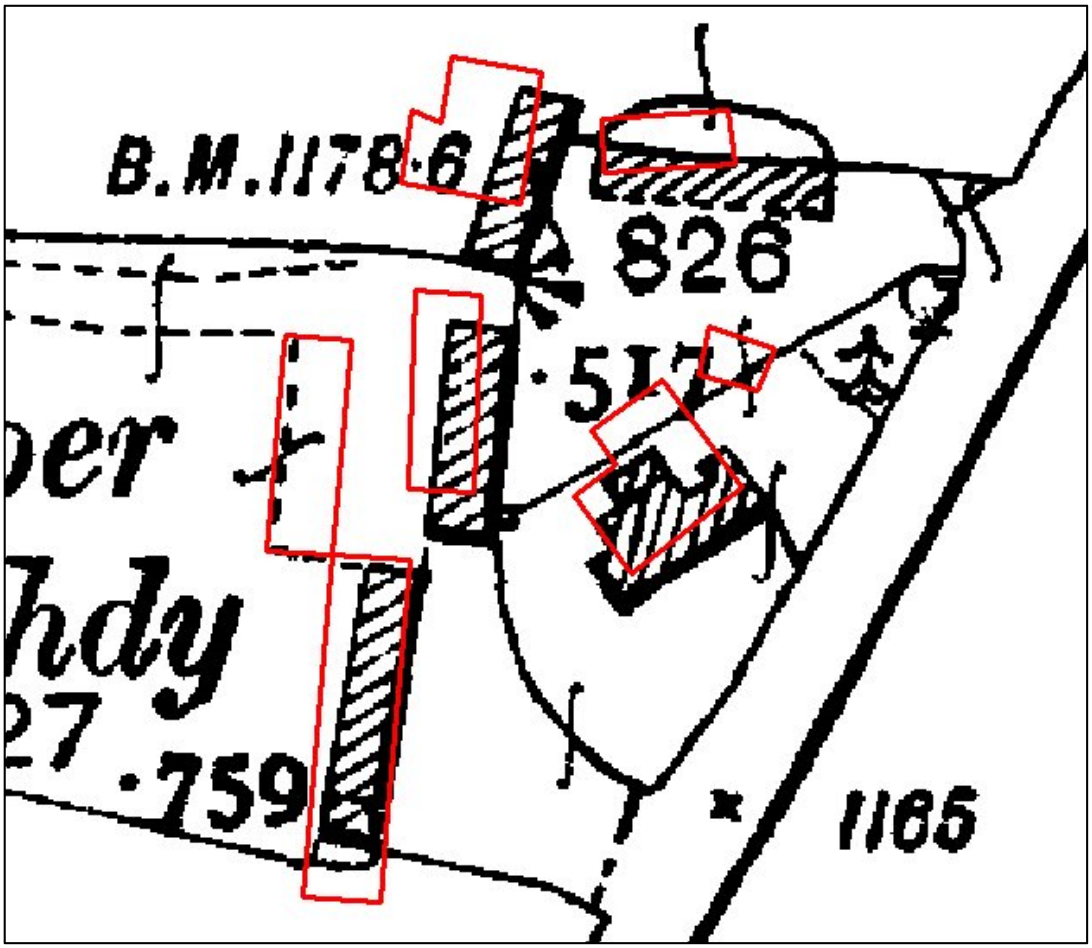

Fig. 2 MasterMap polygons in red overlying 2nd edition OS map.

2.9. 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 one instance was picked up in the field verification exercise. On the farm shown in Fig. 2 above, it was assumed that the building at top left had disappeared and been replaced, when in fact visiting the farm showed that the building survives and is as depicted on the 2nd edition map. The reason for these apparent 'errors' in MasterMap are not known.

2.10. 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.

2.11. 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. It is also true that these areas, mainly upland in the west of the county, have far fewer buildings in them and on the whole this was not seen as a significant issue.

2.12. The original estimates of the time the pilot would take were slightly optimistic. The basic digitization and data capture process overran by 3 days – firstly because of the additional time taken to cross reference the table with PRNs from the HER and secondly because of the failure to take into account the surprisingly large number of maps from other sets that covered the edges of Radnorshire (hence the decision not to look in detail at the overlaps within Powys). However, the various additions and edits to the prepared table, the preparation and transfer of the data to the HER and Glastir polygon data set took 2 days and the report production and etc. took another 2 days. The whole therefore took 27 rather than the estimated 24 days.

3 Field Verification

A day was 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. A route covering as many different parts of Radnorshire as possible, while keeping to relatively major roads and maximising the numbers of farms seen, was chosen. It examined 112 buildings (including houses) on 24 farms, and one field barn.

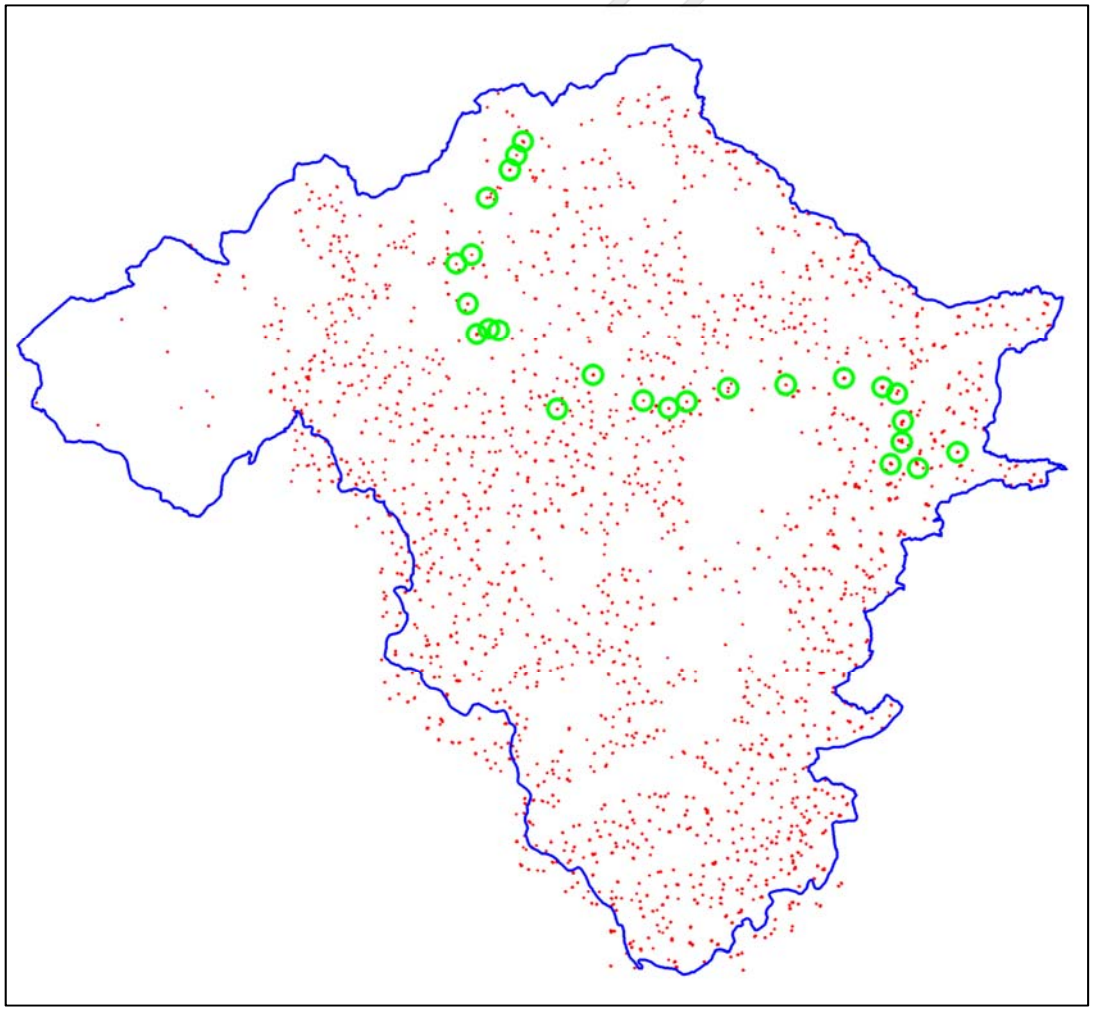

Fig. 3 Farms looked at during field verification

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

14 of the 112 buildings were obscured from view so could not be verified,

so of the 98 buildings seen
7 (7%) buildings had disappeared or had been replaced by modern buildings
91 (93%) were surviving traditional buildings, as identified by the pilot

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 field verification indicates that of the 98 buildings seen 91 were traditional farm buildings while 7 had disappeared or had been replaced by modern buildings - this is a 93% '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 14 buildings not seen during the field verification must also be traditional. While nearer to 100% could no doubt be achieved by visiting all 1920 farms, the cost of this is assumed to be prohibitive. It can therefore be concluded that this desktop method of identifying traditional farm buildings is probably the most cost effective one, using existing resources.

4.3. With minor adjustments to the estimates of time allowed to capture and process the data it is envisaged that the system could easily be rolled out over the remainder of Wales.

4.4. It would be sensible to look systematically at photography gathered during the ten years of Tir Gofal farm visiting, as this may identify buildings, particularly isolated buildings, which might fall into the traditional farm building category but which may not be readily identified as such from mapping. However this will add to the time taken to complete the exercise and therefore add additional cost. For example 33 farms were visited in Radnorshire under Tir Gofal – visits which produced over 1700 photographs. Although most, but not all, of these are digital it is estimated that examining them all may take anything up to an additional two days. Because of the presence of the large Environmentally Sensitive Area in east Radnorshire, relating to the agri-environment scheme that predated Tir Gofal, it was one of the least active areas for Tir Gofal applications. In Montgomeryshire, for example, significantly more farms applied to join Tir Gofal and 64 visits were undertaken producing some 3500 photographs, a higher percentage of which are not digital. This process will therefore take longer outside Radnorshire.

4.5. It is hoped that the dataset created may form a starting point for further project work on this valuable landscape resource, developing a holistic approach to understanding and protecting the historic environment in Wales, and informing planning and development control decision-making in addition to research outputs. Many farms and farmsteads have long histories, which are manifested in a palimpsest of buildings and earthwork features. Individual elements may not, in themselves, be sufficiently significant to trigger designation in their own right. However the assemblage as a whole has the potential to tell a fascinating and important story of the development of the rural economy of mid-Wales in the medieval, post-medieval and modern periods. These places are potentially under threat – partly from

development pressures such as road-widening or residential conversion, as well as agricultural practices, but in many cases simply from neglect or lack of understanding.

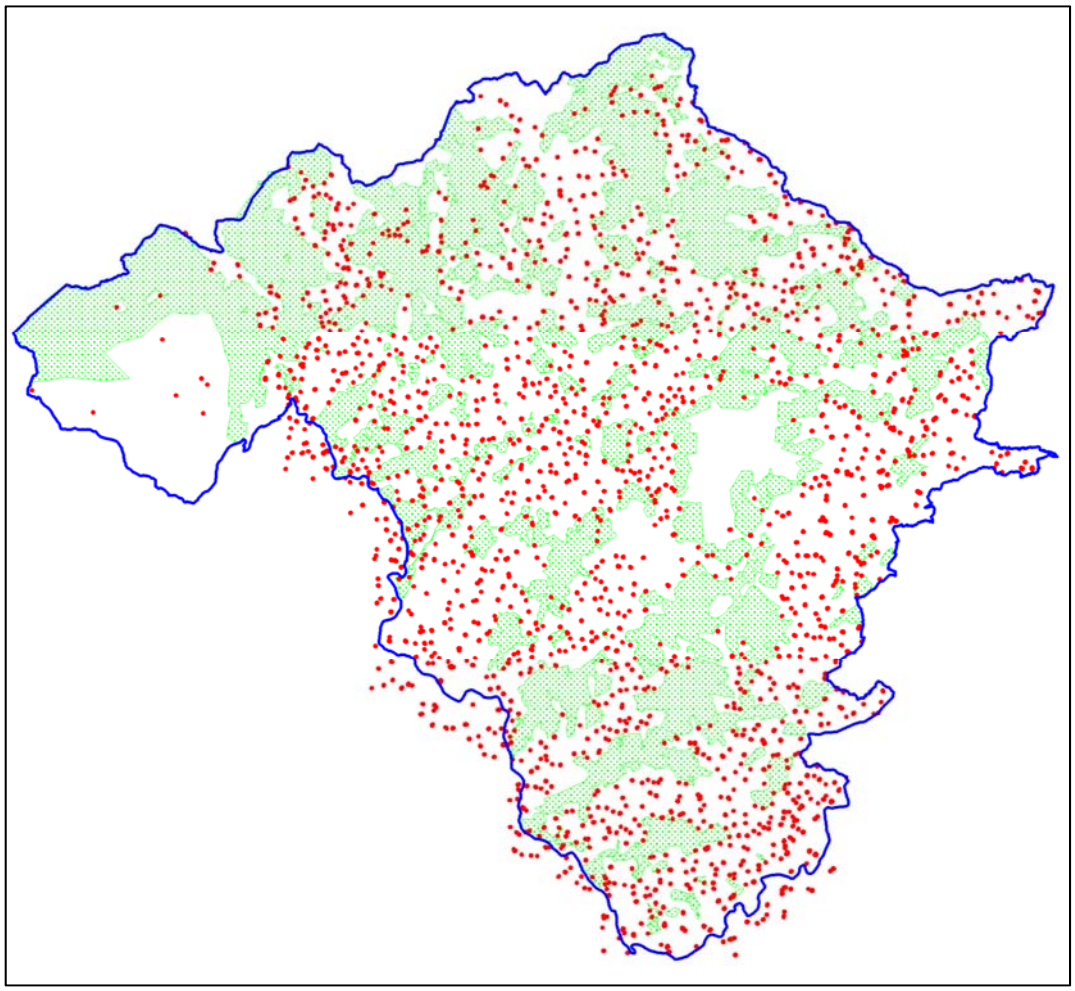

Fig. 4 Traditional Farm Buildings plotted against areas of common land drawn from the Tithe Survey.

4.6. Looking at Fig. 4 above, for example, an immediate correlation can be seen between the areas of common land, taken from the tithe survey, and the occurrence of traditional farm buildings in Radnorshire identified by this pilot project. There is an almost total absence of traditional farm buildings on the commons, which while not perhaps totally surprising may form an avenue for future research.

4.7. Other avenues might for example be concerned with the extensive rural building data collected for some areas by the Royal Commission on Ancient and Historic Monuments in Wales, or learning from the intensive recording and visiting projects undertaken in some areas by English Heritage in recent years.