7618MAIN:
A Resource Assessment of Ridge and Furrow: Challenges for Conservation in Landscapes of Change

Final Report

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Contents

List of Tables

List of Figures

1 Summary

The Historic Environment Record of Worcestershire Archive and Archaeology Service was undertaken to enhance the recording, understanding and conservation of ridge and furrow earthworks in the county of Worcestershire through the mechanisms of the HER, as the primary database and collection of sources, and its capacity as an advisory service to planning, development and land management professionals.

The condition assessment project reported in this document was developed out of the recognition that, once commonplace, ridge and furrow earthworks have been affected by agents detrimental to their conservation. These drivers for change are increasing as a result of pressures on land for alternative management and land use.

The results from this project identified that ridge and furrow earthworks in the study area have been lost to agricultural land use, including equestrianism, diversification of farm activities, waste management, as well as to housing and road developments.

The study area covered 6013.18ha over 64 parishesthat hat been included in an earthwork survey running since 1997. It recorded the visible form of earthworks or cropmarks from aerial photographs and LiDAR coverage. The most common form recorded in Worcestershire was straight ridge and furrow, which made up 44% of the results, followed by curved/reversed S with 27%, with the remainder being classed as not clear, none or watermeadow.

The condition of these earthworks 34% is classed as well preserved, or slightly degraded but the remainder, the majority, is classed as heavily degraded, absent or uncertain. Land use was recorded for the whole study area, based on the most recent aerial photographic coverage available in the GIS, and this showed that 28% of the study area is in use for arable crops, 58% under pasture, with woodland and 'other' as 5% and 6% respectively.

The results showed that no earthworks are recorded as being in good condition where the land use is arable; only 3% were recorded as slightly degraded but, on checking the aerial photographs, these had only recently been ploughed. Permanent pasture, especially when grazed by sheep and managed carefully for supplementary feeding in wet weather, provides the best conditions to preserve ridge and furrow earthworks.

This project has brought together the results from over 20 years of fieldwork, undertaken by volunteers, and integrated it in to the HER database using GIS mapping, aerial photographs and LiDAR coverage, to provide an assessment of ridge and furrow earthworks in Worcestershire.

2 Background

The main driver for this condition assessment project has arisen out of a noticeable but unquantified loss of ridge and furrow across a broad spectrum of contexts.

Ridge and furrow earthworks and cropmarks are remnants of former field systems that are often medieval in origin although they have continued to evolve and become modified over time. In a planning context, ridge and furrow is too often perceived as ubiquitous and in some way (not inaccurately) degraded in condition, and therefore it is often assessed as low significance within the scope of historic environment and landscape features, unless part of a complex site where designation has been applied. Widespread take-up of agri-environment land management agreements has contributed towards better preservation. However, this is time-limited and has not prevented piecemeal loss evident through land use change, development and erosion.

Ridge and furrow is an historic landscape asset that is distinctive in its own right, but also contributes towards the setting of contemporary or later historic assets, including historic buildings, farmsteads and settlements. It is often a feature of historic orchards in Worcestershire where the earthworks were repurposed during the 19th and early 20th centuries, and it can be an indicator of unimproved, species rich grassland, offering multi-disciplinary benefits and opportunities.

The significance of ridge and furrow along with an assessment of risks affecting it were addressed in the Turning the Plough Projects (1995-2012). These recorded surviving ridge and furrow across 40 parishes and then mapped the loss that took place between 1999 and 2011. These led to a methodology for assessment and a discussion of risks aimed at informing future assessment and opportunities for conservation (Catchpole and Priest 2012). Although not part of the Turning the Plough Project area, South-east Worcestershire is part of the county with landscape types associated with the Central Province, with features in common with many of the parishes studied in Turning the Plough. Elsewhere, the county is associated with the North and Western Province where ridge and furrow is encountered as more discrete and less obvious areas.

In Worcestershire, in 1997, a project was developed by a small group of volunteers to record and photograph ridge and furrow earthworks in the county with a view to updating the Historic Environment Record (HER). This earthwork survey project pre-dated GIS and availability of accessible aerial coverage and LiDAR imagery. Therefore, being largely field observation-led, data from the volunteer earthwork survey project has delivered a sequential output of precisely dated and measured field and earthwork surveys. Using extant field boundaries as the unit of survey, the volunteers have recorded the number of surviving ridges, height and depth of the furrows, and produced rough sketch plans and photographic evidence (Figure 5 shows the parishes completed) which has been input in to a separate Access database. The field record cards are stored in the HER office.

Prior to commencement of the volunteer earthwork survey project, there was an expectation that a large proportion of earthworks would have been erased from the landscape, based on the assumption that intensive farming practice would have had significant impact. Indeed this was the case, with large tracts of ridge and furrow lost, which included the ploughing-up of previously permanent pasture during the war-time and post-war intensification of agriculture. The extent of survival was predicted to be very low, but actually the rate of survival is highly variable and we have little understanding of the key drivers for loss, or the rate at which loss is continuing.

Given the limited resources available the volunteer earthwork survey has delivered excellent results across 64 parishes and work continues. All data generated thus far has been input to an Access database which has been linked to a GIS shapefile, and used within the HER. To date, there has been no synthesis of the data in the context of strategic HER sources, such as Landscape and Historic Landscape Characterisation (HLC), Historic Farmsteads Characterisation. LiDAR imagery and digital historic maps were not available when the volunteer earthwork survey project began. Drawing together these sources can be used to inform desk-based assessments of setting and significance. These can then support a stronger case for the preservation of ridge and furrow earthworks where typically this has proven difficult due to the perception, in planning, of ridge and furrow as somewhat abstract, ubiquitous and low-significance feature.

This condition assessment project is mainly concerned with developing a process that can be used elsewhere to undertake a similar exercise. It is therefore focussed on what is already recorded within Worcestershire rather than looking to add new records to the HER. As of September 2018 the HER for Worcestershire contained 3208 ridge and furrow records across the whole county; the 64 parishes covered by the ridge and furrow volunteer earthwork survey project contain 1607 records. These 1607 records will be condition assessed as part of this desk-based project. Fieldwork for volunteer earthwork survey will continue in the winter months once vegetation cover has died back and volunteers have time to restart the surveys.

For a list of the parishes included in the project see Appendix I – Condition Assessment Project Study Area and for their location, Figure 5.

3 Aims and objectives

The desk based condition assessment project design set out three ambitious aims, principal amongst which is the need to establish an up-to-date evidence base of ridge and furrow in the project area. This 'point in time' measure is a key step towards delivering the other two aims that begin with this project, but could be developed in a future stage of work (see section 4.3).

- Establish the extent of survival of previously recorded ridge and furrow earthworks in the county

- Improve the management of ridge and furrow in the county by better understanding the history, extent, survival, significance and threats to the resource

- Provide a methodology that can be replicated elsewhere in the country

The range of objectives also reflects an iterative process that has steered the trajectory of both this project and the next stage of work:

1. Assess the level of loss and degradation of ridge and furrow through the creation of a dataset showing the survival and condition of previously recorded and previously surveyed ridge and furrow earthworks from the volunteer earthwork survey project;

2. Test and characterise the drivers affecting ridge and furrow: the trends, dynamics and agents affecting both loss and survival;

3. Incorporate the volunteer earthwork survey project dataset fully into the HER;

4. Define a list of priority sites and areas for more detailed survey through the ongoing volunteer earthwork survey project;

5. Best preserved patterns, highest priority for preservation and best examples;

6. Identify and characterise the variety of forms and their associated landscapes; -

7. Identify priority areas or candidates that are deemed at greater risk from one or more drivers for change

8. Identify measures that could be taken to preserve and understand what remains;

9. Analyse field patterns in different settlement pattern areas and understand their sensitivities and relationships to other assets;

10. Deliver and present the results within the research and methodological framework developed for Turning The Plough and Turning The Plough 2

11. Set out a strategy to inform site masterplanning and land management to deliver protection of earthworks, their relationship to setting and promote interpretation through the mechanisms of designation, agri-environment schemes or inclusion within local authority lists and Neighbourhood Plans

4 Project Methodology

This section covers a brief summary and any deviations or issues encountered that differ with tasks set out in the original methodology for the desk based condition assessment project.

4.1 Stage 1 – Project design

The project design was submitted to Historic England and accepted for grant funding support in November 2017. The project commenced in the same month following a 12 month delivery programme.

4.2 Stage 2 – Main project delivery

The project was designed to be undertaken as a single piece of work, a desk based assessment focussing on existing records within the Worcestershire HER, based on the parishes covered in a previous earthwork survey undertaken, and ongoing, by volunteers, starting in 1997.

4.2.1 Stage 2.1 Project start-up and Project Team (Tasks 1 - 3)

The project contract period for the desk based condition assessment commenced on 20th November 2017 with the first project team meeting held on 23rd November 2017. Regular, short progress and review meetings between the project leader and project manager have followed at (where work schedules have permitted) fortnightly intervals. The HER and Advisory team leader and Project Executive, Emma Hancox, has been briefed on progress throughout the programme as part of established, monthly one-to-one meetings.

4.2.2 Stage 2.2 Review: Literature review and collation of datasets (Tasks 4 - 5)

The collation of datasets was actioned immediately following the project inception meeting. The literature review was also programmed for delivery in the first week of the project, however, in practice this task began during development of the project and reference to key literature has continued to inform the tasks throughout the main phase of delivery.

4.2.3 Stage 2.3 Training and Recruitment: CPD training and Volunteers (Task 6 - 7)

The CPD session (Task 6), an introduction to aerial photographic and Lidar interpretation, was delivered by Damian Grady and Simon Crutchley (Historic England) to the assembled HER and Advisory teams of WAAS on 15th March 2018. This session was originally programmed to be delivered during the period late-January to mid-February. The date was varied to March based on the availability of the project leader and Historic England staff.

The training was well-received by all present and has proven to be very valuable in, not only up-skilling the project delivery team, but also the wider HER and Advisory staff. The benefit of this has been an enhanced understanding of interpretation, circumstances affecting condition and the context within which the project results nest.

The volunteers were chosen and approached based on previous work undertaken within the county, knowledge of the county (in one case extensive farming knowledge), and an aptitude for the data input and GIS aspects of the project. A document (see Appendix III - Training document for Volunteers). This was written to guide them through the input process, to summarise the information from the CPD training day and to help them understand the project requirements and the nature of the work. All were good choices.

4.2.4 Stage 2.3 Mapping: Countywide mapping (Task 8-9)

Mapping the condition of the recorded ridge and furrow records was completed in a separate layer so that there is a 'point in time' record for this condition assessment project, which there is not for the whole volunteer earthwork survey project. To do this the software, HBSMR from Exegesis (version 5), was customised to create a new designations layer. The spatial information was recorded as polygons in a Geographical Information System (GIS); ArcMap version 10.5.1, supplied by ERSI.

Using the HBSMR software with the ArcMap GIS allowed full multi-user editing capabilities and a standardised approach for each record; each designation record is attached to the monument record(s) for ridge and furrow. An Event record, WSM70696, was also set up within the HER for this survey and has been added to all monument records where condition has been assessed as part of this project. The study area was

the 64 completed parishes from the volunteer earthwork survey, listed below (see Appendix I – Condition Assessment Project Study Area). No new HER records for earthworks visible on LiDAR or aerial photographic coverage were added (there was no time for this in the condition assessment project because it was an unknown quantity) even though there were places within the study area where there are unrecorded earthworks, some very well preserved.

The recording of condition in the designation records is an assessment of current condition, as validated by the most recent source (see below). It would have been ideal to record condition across the spectrum of designation records at the 'start point' validated by 1999 aerial coverage, however this proved difficult to achieve with any degree of confidence due to the limitations of the imagery; recorded in the high summer resulting in poor definition of earthworks. Further work could be undertaken to address this as part of a future project.

The following sources of information were consulted for this task:

Aerial photographic coverage

Table 1: Aerial photographic sources consulted

Date	Source	Description
1999	Get Mapping GIS layer	Available through the County Council server/GIS
2005	Get Mapping GIS layer	Available through the County Council server/GIS
2013-16	ESRI World Imagery	Available through a web mapping service
2015-18	Aerial Photographs Great Britain	Available through the County Council server/GIS

This coverage is what is available through the County Council's GIS and was supplemented by making use of Google Earth and the historical coverage on there, where things were not clear on any of the above layers. Any features/conditions/land use that did not fit any of the prescribed values in the table was expected to be recorded in the general description part of the record on HBSMR.

LiDAR coverage, provided by the Environment Agency, used was downloaded in 2013 and processed using ArcMap as per the guidelines produced by Oliver Davis (2012). It was viewed as a hill-shade digital terrain model, illuminated from 45 and 315 degrees, although other directions were checked where appropriate; the angle of elevation was 30 degrees.

Geological information, from the British Geological Survey (BGS), issued on CD in 2013, mapped at a scale of 1:50,000. This was useful to see the existence or otherwise of alluvium deposits which may mask earthworks. Any pertinent information was added to the description on the designation record as appropriate.

Historic mapping consulted included the Epoch 1 and 2 coverage for Worcestershire (full county surveys), original scale 25 inches to the mile (approximately 1:2500), ranging in date from 1882 to 1888 and 1902 to 1905 respectively. Epochs 3 (1917 to 1928) and 4 (1937 to 1940) were not complete county surveys and so were less useful. Also consulted was the 1954-63, 6 inches to the mile (1:10560), digital mapping. These were mainly consulted to assess the presence or absence of orchards. In some areas in

Worcestershire, the tithe maps from circa the 1840s, have been digitised and are loaded in a layer file with other historic maps. Where information about former field boundaries, field names or land uses were of interest they were added to the description on the designation record.

Area of designation record shapes:
The area of monument records within the study area was expected to be matched by the area of designation records created and much care was taken, using standard GIS tools, in order to achieve this (within a sensible margin).

- All polygons were created to cover the same area as the existing monument records (which meant perpetuating poorly drawn/overlapping shapes in the monument records) so that any quantification of the totals will be as accurate as possible.
- Some monument records were still 10mx10m in area, converted from old point records when the GIS was first set up. The area of these records was not changed, therefore the total area of all ridge and furrow earthworks included in the study does not represent the total area on the ground.

Condition Assessment
The values recorded were for the **form** of the ridge and furrow (based on the values used in Turning the Plough 2, plus a new value), the **condition** and the most recent **land use**; where appropriate comments were added to the general description of the designation to record any further details. The scope notes created for these conditions are shown below in Table 2

Table 2: Scope notes for Designation Record terms; used for form, condition and land use

Scope Notes for Designation Record Terms	
Form	
Straight	Earthworks run very straight, without the curve associated with earlier earthworks
Reversed S	Earthworks clearly show the curving shape associated with earlier creation
Curving	Earthworks do not show the full reversed S shape but are definitely not straight
Not Clear	Earthworks are truncated by later development/land use and their form is not clear
Watermeadow	Earthworks that are clearly associated with a watermeadow, rather than only ridge and furrow
None	Where a record covered a larger area than the earthworks were recorded in
Condition	
Well preserved	Earthworks are clearly visible on either the latest aerial photographs or LiDAR coverage
Slightly degraded	Earthworks may have been ploughed in the past but are back under permanent pasture and still clearly visible on either aerial photographs or LiDAR coverage
Heavily degraded	Earthworks are very subtle, and are not clearly visible on LiDAR, and only as crop or soil marks on aerial photographs
Uncertain	Where evidence of survival is not clear due to land use, cloud cover or lighting conditions on aerial photographs, add any other comments to the description field

Scope Notes for Designation Record Terms	
Absent	Where it is obvious that earthworks have been removed or ridge and furrow earthworks never existed (in combination with Form of None, i.e. recorded in error) based on the most recent aerial photographic and LiDAR coverage, based on criteria used in Turning the Plough 2
Land Use	
Arable	Where field has been ploughed and crops are planted
Ley Pasture	Where the field is under grass but it is not permanent pasture
Permanent pasture	Where the field is under permanent pasture
Building	Where the land has been redeveloped and construction has taken place
Woodland	Where the field is under woodland but earthworks are visible on LiDAR DTM/DSM coverage
Road	Where a road has removed earthworks
Other	Where no other category fits the reason, please add comment to the description field to describe how the earthworks have been destroyed/damaged

Input for the Condition Assessment Project

Input for the desk based condition assessment was undertaken by HER staff and volunteers. Members of staff already had experience of inputting to the HER, were briefed on the goals of the project, what to record and encouraged to discuss their decisions, so as to ensure the same values were being applied to all records. To help them with learning the procedures required to update the GIS and the HER database, as well as the layers to consult in their assessments of the records, a training document was created to cover the basic procedure (see Appendix III - Training document for Volunteers).

The volunteers contributed 197 hours in support of HER staff time for this desk based assessment. For the volunteers this task still required one to one help with what to do. The training document worked well as long as all records had common characteristics, but this is not the case in reality, so a lot of time was invested in training and support where records were subtly different. To have included the actions required in the GIS and database would have made the document difficult to use and would have taken very much longer than was available.

More than one designation record was created for each monument record and in some cases, where the condition was assessed to be the same for a group of monument records (such as those covered by a landfill site), one designation record was created to cover the area of many monument records.

In summary, the methods used were suitable and complete for the scope of this project, the volunteers felt a good sense of achievement in learning to use the software and contributing to the project and are keen to do more. The information is still integrated in to the HER and therefore will be available for decision making in the future.

All the volunteers are keen to make use of these skills again with one, in particular, very keen to pursue more research on ridge and furrow earthworks, including how historic mapping, which shows land use, relates to surviving earthworks.

4.2.5 Stage 2.4 Reporting: Define the case study area(s) and produce an interim report (Tasks 10 – 12)

Task 10 is focused on dissemination of the desk based assessment project results to wider stakeholders. The output of this task was originally focused on the presentation of a paper at the WAAS annual Archaeology Day (formerly Dayschool). Upon reflection and discussion at project team meetings it was concluded that, while the Archaeology Day is a valuable forum for dissemination, a wider range of stakeholders could be communicated with through the medium of the WAAS blog 'Explore the Past' and its associated social media network. The website currently receives an average of 4,800 views per-month. The conclusion has been that production of a blog post promoting the results of the project will reach a wider audience and also has the capacity to easily deliver updates on future work. In addition, if any further investigation is undertaken (see section 4.3) then WAAS proposes that delivery of a paper at a national level conference and the Archaeology Day will be included in the outputs.

4.3 Opportunities for future investigation

Due to structural changes within WAAS in early 2019 it is very unlikely that the originally planned, more detailed, third stage to this project will run on from the desk based condition assessment. This was where much of the more detailed investigation was to have been undertaken. There are, however, opportunities to be developed and areas of the county to be investigated in more detail using the information provided from this part of the project and so this section of the report has been retained for future reference.

4.3.1 Future case study area(s)

Two areas have been assessed for the prospect of further investigation by Historic England, for a more detailed aerial survey and interpretation of the results, if an opportunity arises. This would be more like the TTP studies in that it would choose an area of good existing earthworks to study which should give results more closely resembling those from the TTP projects.

The areas selected, which may need further refining before any further work could be agreed, focus on areas where extensive earthworks are visible on LiDAR coverage and the land use on the most recent aerial photographic coverage suggests they are still likely to remain. They are also areas of field system earthworks with associated deserted or shrunken settlements, trackways, moated sites, meadows and woodland; some of which are Scheduled.

Not all the parishes selected for further study were included in the condition assessment project but they are known to contain good earthworks, through previous investigation such as preparation of data for searches and site visits for past farm environment plans. Recording these in detail would be very important. Where parishes were included in both projects, not all ridge and furrow earthworks have been recorded on the HER, which has been the starting point for the condition assessment project, and more are visible remaining on the LiDAR coverage.

Unlike the criteria used to select townships for TTP and TTP2 no documentary research has been carried out in advance of the project. The existing HER records, with the volunteer earthwork survey project data added to fill in any gaps, has been the starting

point. This means that the results do not fully show the loss or preservation in a parish because not all earthworks are recorded.

Each of the areas shows early origins in place-names and with the presence of other features in the landscape such as hollow way route systems, deserted or shrunken settlements, some Scheduled, and moated sites, with their associated water management features. Local knowledge of the volunteers who are out surveying the areas or live locally to them, as well as staff experience and knowledge from previous projects, documentary research using old maps and day-to-day work in maintaining the HER database has provided the background for the areas selected.

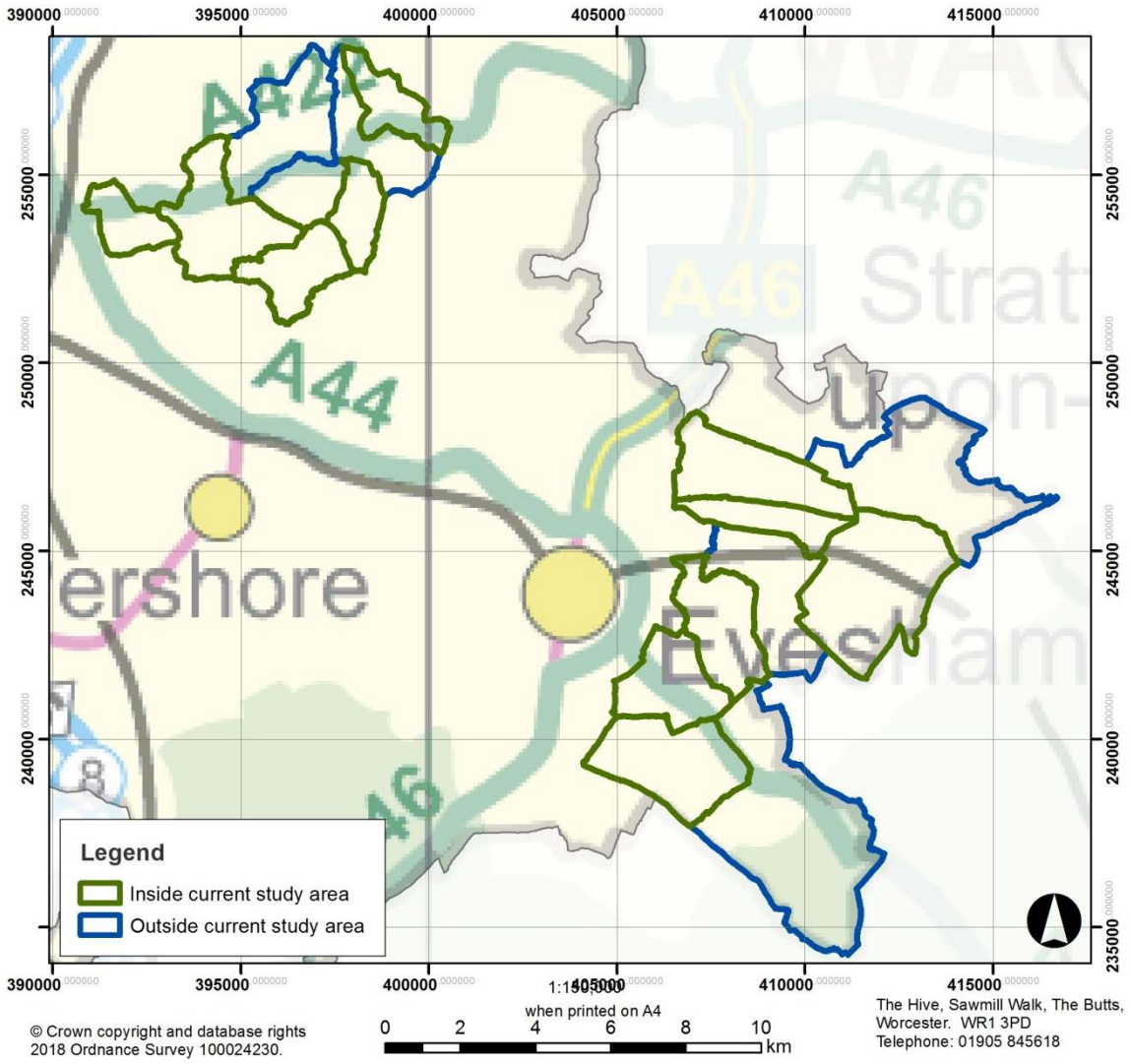

Figure 1: Potential areas for further study

Northern Study Area

This area includes the parishes of Chuchill, Dormston, Flyford Flavell, Naunton Beauchamp and Upton Snodsbury, included in both the earthwork survey project and the condition assessment project; as well as North Piddle, Grafton Flyford and Kington where the earthwork surveys are still in progress or have not yet been undertaken.

The area around Naunton Beauchamp contains some very well preserved and extensive earthworks (see Figure 2) as well as the Scheduled area of the shrunken settlement. This area has also been a concern for damage to the same with phone calls from concerned residents and observations made by volunteers who know the area reporting damage from ploughing to give a flat field for horses to graze and also possibly from infilling of earthworks.

The land use in this part of Worcestershire is mixed with some large areas of permanent pasture, which favours the preservation of earthworks. The A422 Worcester to Stratford Road, has not been 'improved' and so retains an older character (mid 20th century) and is slower than using more recently updated routeways. This may be partly why the area has not, thus far, attracted major development.

There are not many major settlements along this road although larger villages are expanding. What there is mainly nucleated on solid geology of Mercia Mudstone with areas of alluvium along watercourses and small areas of sand and gravel deposits. The soils have impeded or slightly impeded drainage (Soilscape) with moderate to high fertility.

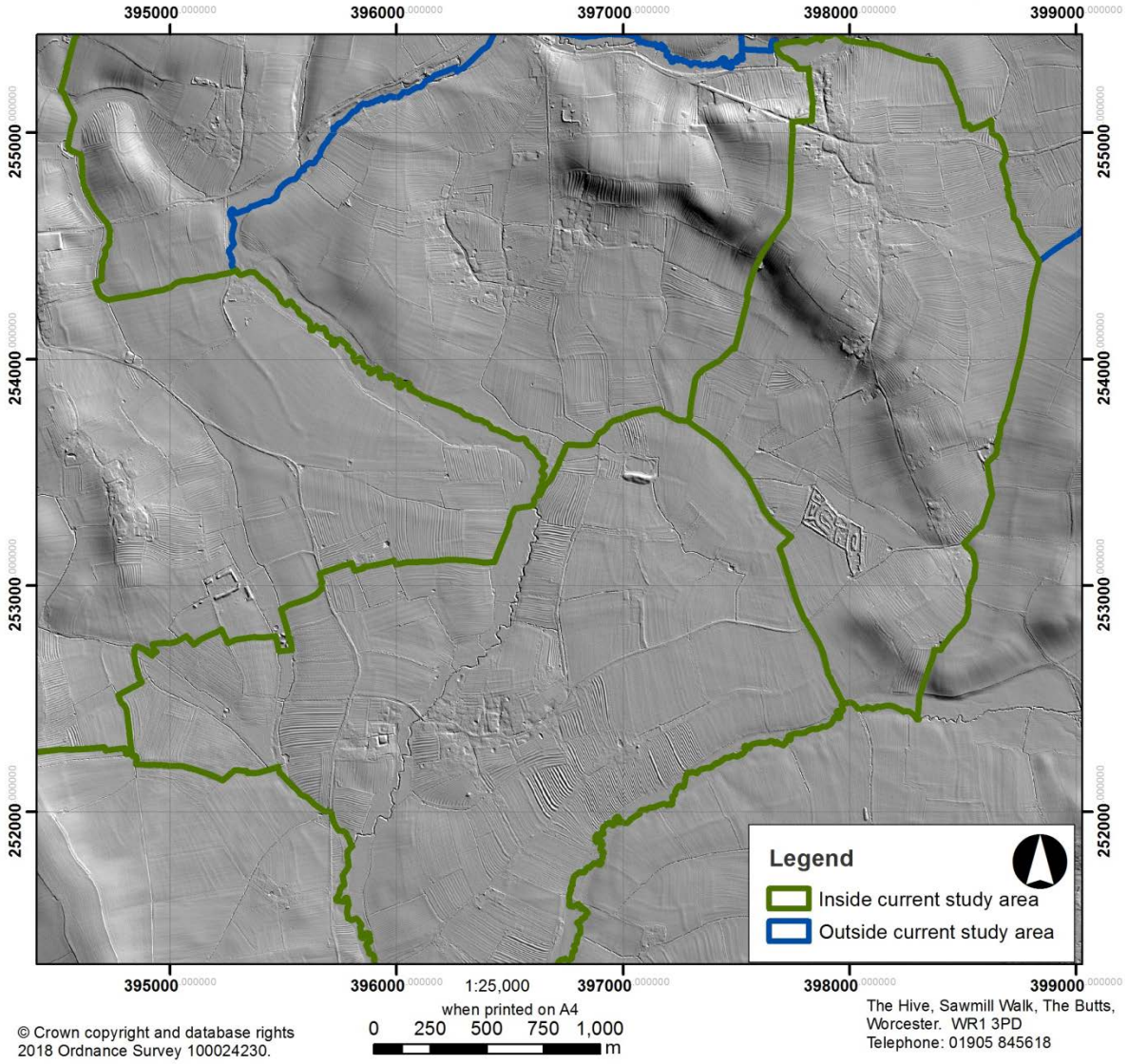

Figure 2: Naunton Beauchamp - North Study Area

David Hall visited the area around the Scheduled deserted settlement at Grafton Flyford in 2004 and the notes and comments from his visit provide a starting point to measure further the degree of change in the earthworks. He identified the earthworks here as 'midland broad ridge'. There are also areas of earthworks which are very definitely earlier than the current field pattern, which is mostly present from the late 19th century mapping onwards. Earthworks (around the hamlet of Libbery) do not fit with any current field boundaries, which are also on late 19th century mapping, and do not necessarily look the easiest to have been created using a plough. This area also contains more earthworks classified as having a curving or reversed S form, which are not so well represented in other areas of the county.

Southern Study Area

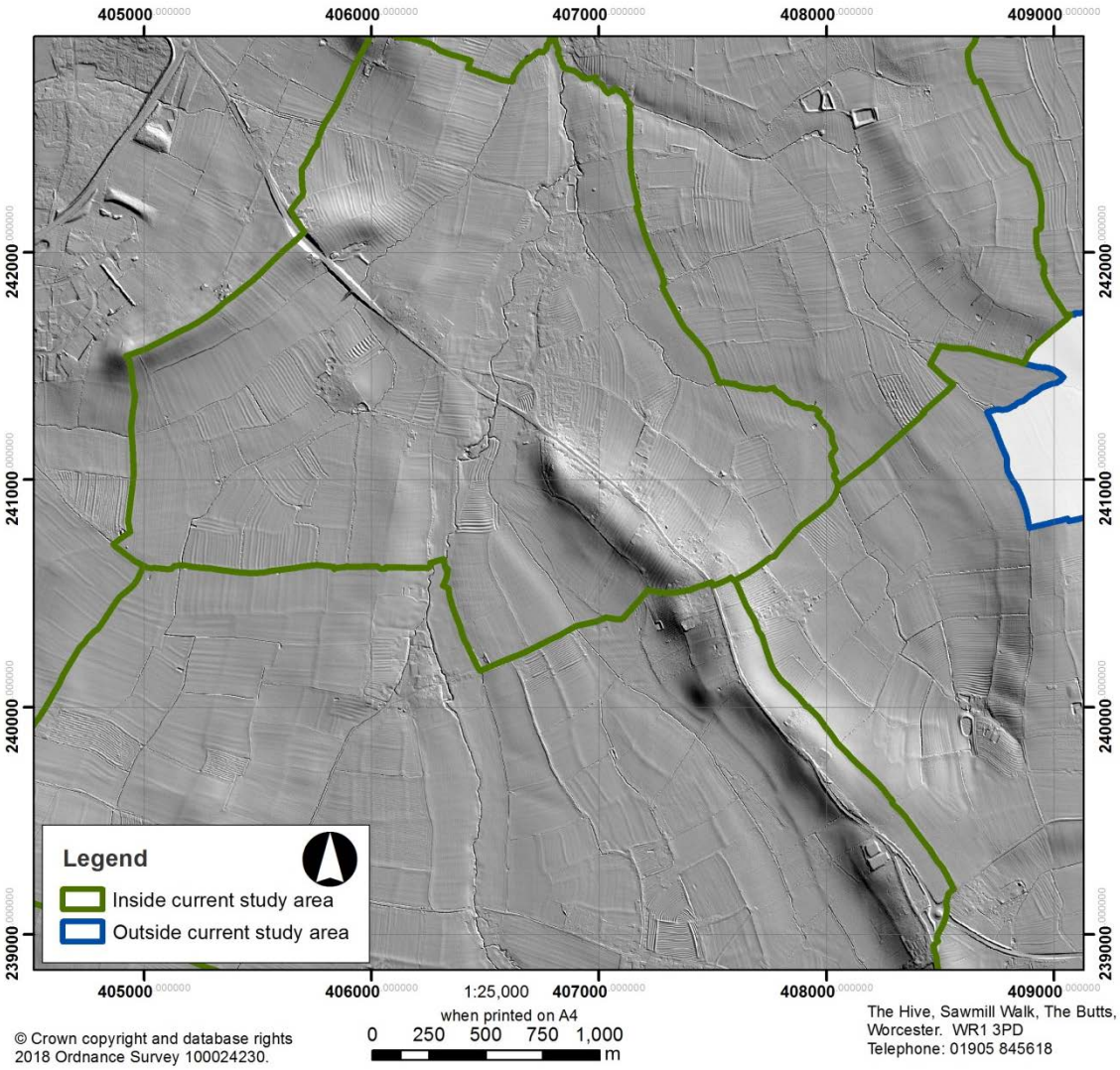

Figure 3: Wickhamford, Childwickham and Broadway - South Study Area

The southernmost study area is partially covered by the condition assessment project and includes the parishes of Honeybourne, North and Middle Littleton, South Littleton, Childswickham, Badsey, and Wickhamford, as well as Bretforton and Broadway, which were not in this study area. These parishes contain some very deep and prominent earthworks, visible from the train and the road when passing through the area. Land use is becoming more arable and includes a large amount of market gardening (see Figure 4). The parish of Broadway is on the border with Gloucestershire and two parishes which were included in TTP2: Weston Subedge and Easton Subedge are very close and border Honeybourne.

Pressures for change in this area have also been settlement edge development, including an area in Honeybourne where some well preserved earthworks have recently been built over.

The aerial photograph below in Figure 4: Potential area for further study including Childswickham gives an example of the land use and visibility of earthworks within it; these are clearly visible when driving along the road to the south.

Figure 4: Potential area for further study including Childswickham (2005 aerial photograph)

It also shows the characteristic land use in this part of the county: market gardening and arable and demonstrates how invisible earthworks in this area have become. The 1940s aerial coverage in Google Earth shows these field systems covering a much wider area than what survives today.

5 Results

5.1 Project study area

The study area for the condition assessment project was based on the completed parishes in the previous volunteer earthwork survey in progress since 1997. The area is shown in Figure 5 and the results and areas studied are given in the tables and maps over the following pages.

The total number of records added to the HER, as new designation records, the number of monument records this relates to and the areas covered, are given below:

Records	Total	Area covered (ha)
Designation (condition assessed) records	2300	6013.18
Associated HER Monument records	1607 (from GIS – selected inside study area, with records on the borders removed manually)	6021.97

The resulting areas of monument records to be included and designations records created from these were within 8.79 ha of each other. The total area of records used in this report is the designations records (at 6013.18 ha). The reason for this was not investigated in detail because it was a very small difference but some records appear to have very slight gaps between them (where the trace tool was not used) when creating the designation records.

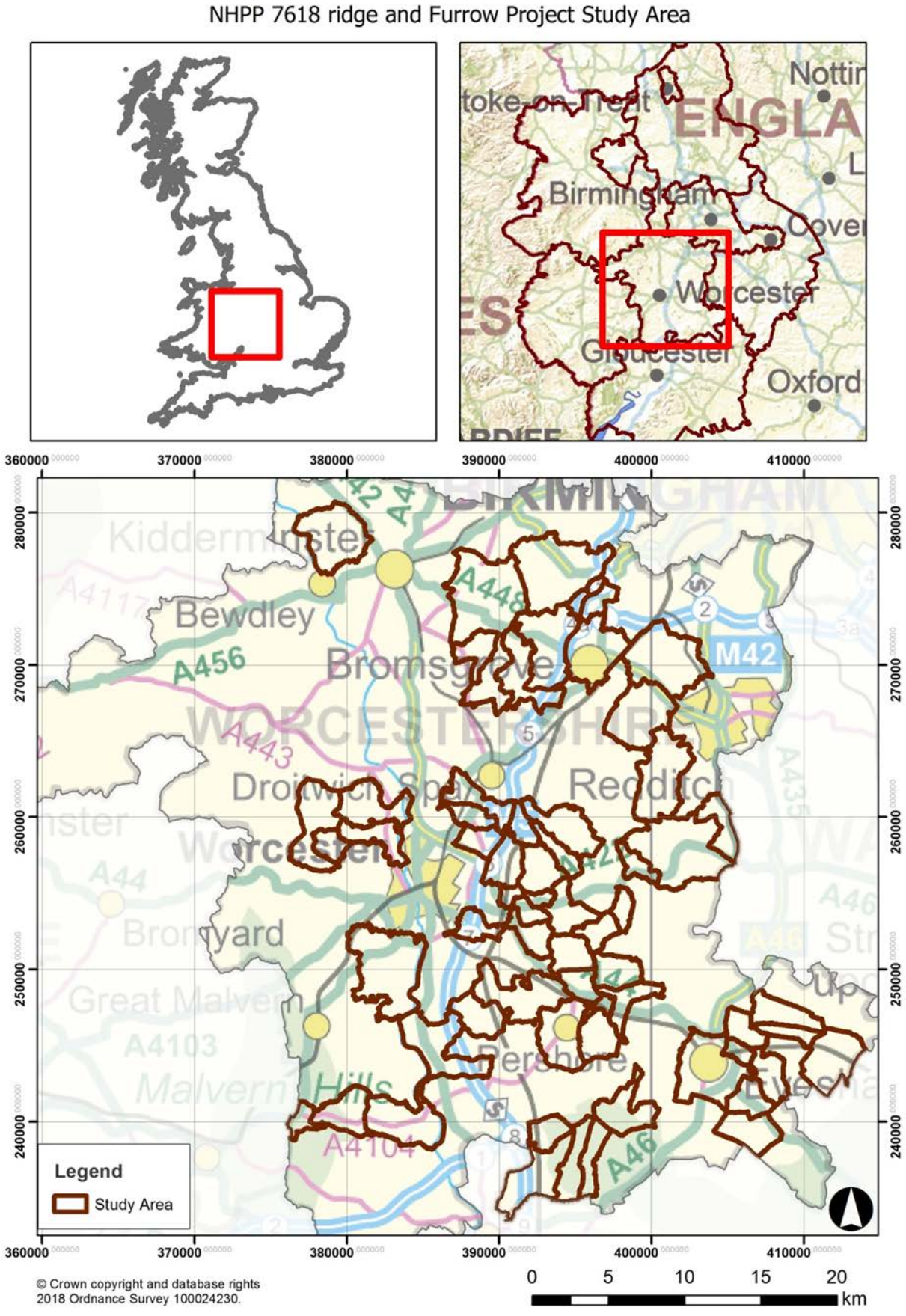

Figure 5: Study area location and parishes included

5.2 Project results

Maps with a breakdown of results for form, land uses and condition are discussed in the following section. The figures in brackets in the map legend are the number of records. The figures given in the pie charts are hectares and the percentage of the total for each chart.

The following pages are formatted so that the results and the description display together when viewing two pages on a screen.

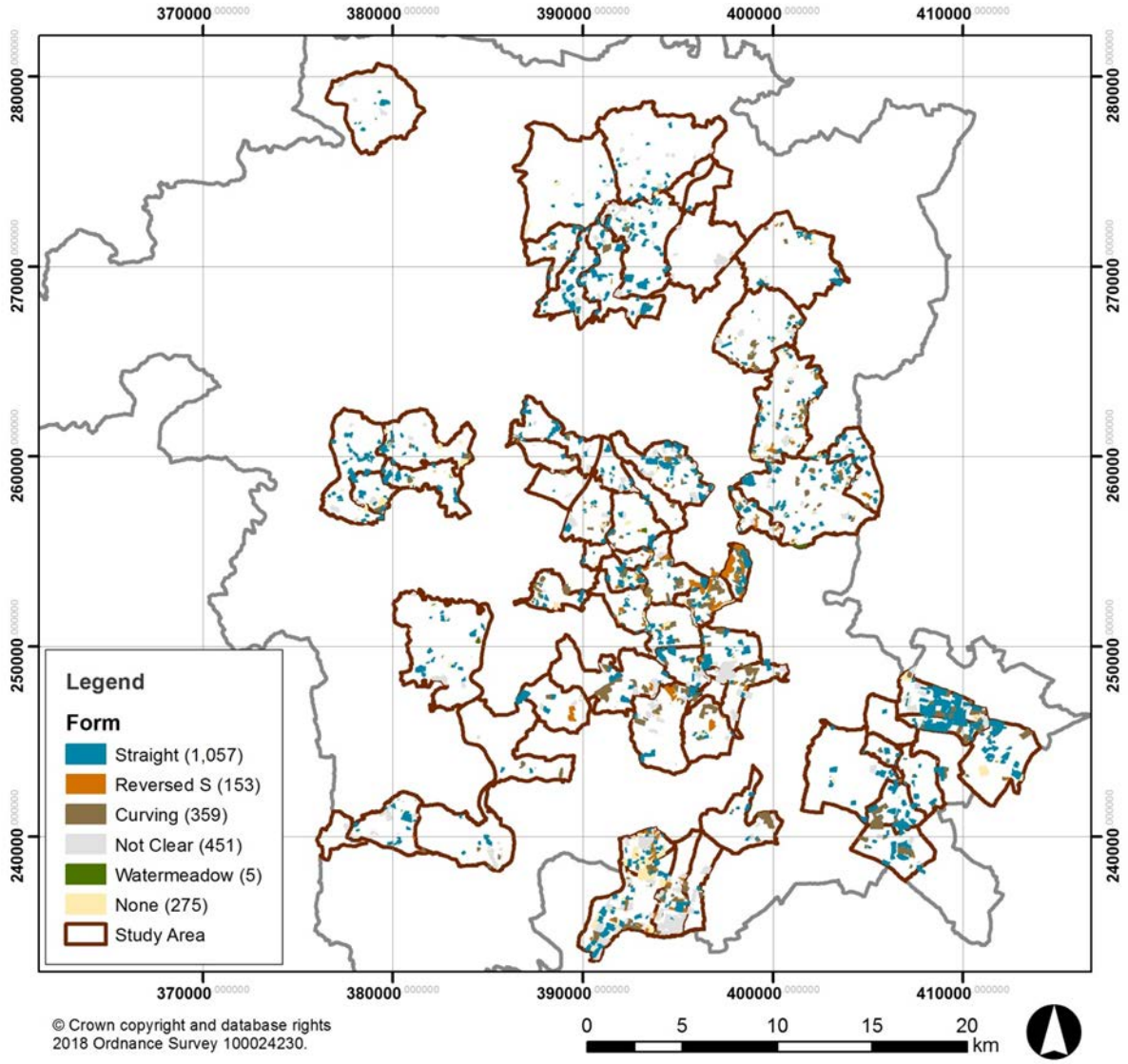

Figure 6: Results showing form, all records

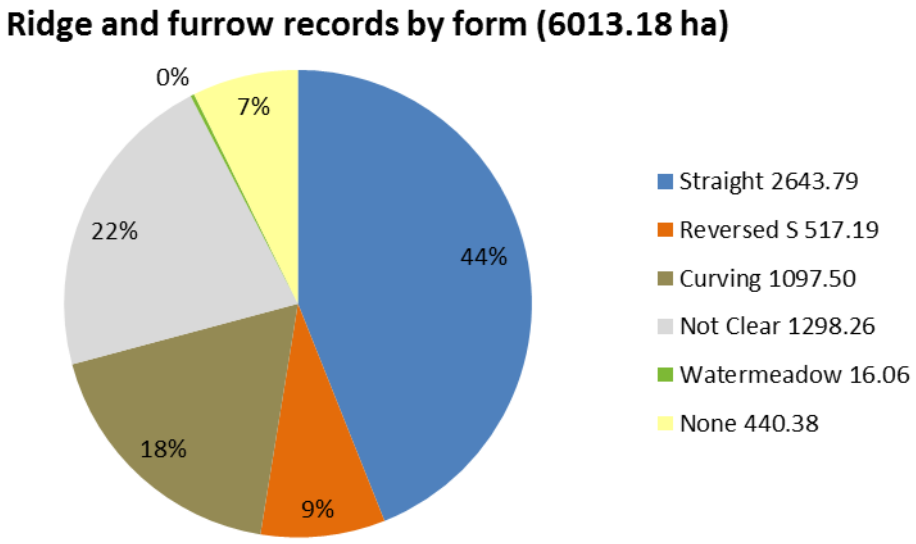

Figure 7: Breakdown of results by form, all records

Form:
The results showed that nearly half of the ridge and furrow in Worcestershire is straight in form, and therefore probably later in date and created by steam plough in the 19th century. Some parcels were clearly identifiable as watermeadows but were left included in the survey area to ensure the figures for total area balanced and a new value added to the table so that this could be quantified.

A new (not used in TTP2) condition of curving was added to the table because so many records did not fit the reversed S category, but were definitely not straight in form.

A new form of None was intended to be used for areas where ridge and furrow earthworks are unlikely ever to have been, for example where other earthworks, such as those where earthworks associated with a deserted or shrunken settlement, were clear and the area of the monument record covering this had not been split down to cover only ridge and furrow, or the record had been created too large or inaccurately. The scope notes (see Table 2) were updated for the manual to ensure the intended use of this value was understood and not used to describe any earthworks which had been destroyed.

Form	Area	Records	Percentage
Straight	2643.79	1057	43.97
Reversed S	517.19	153	8.60
Curving	1097.50	359	18.25
Not Clear	1298.26	451	21.59
Watermeadow	16.06	5	0.27
None	440.38	275	7.32
Totals	6013.18	2300	100.00

The high proportion of earthworks recorded as straight in form was questioned and could be investigated further as this is perhaps an area of mis-identification. This was not recorded in TTP2 so there are no figures to compare to help with understanding this.

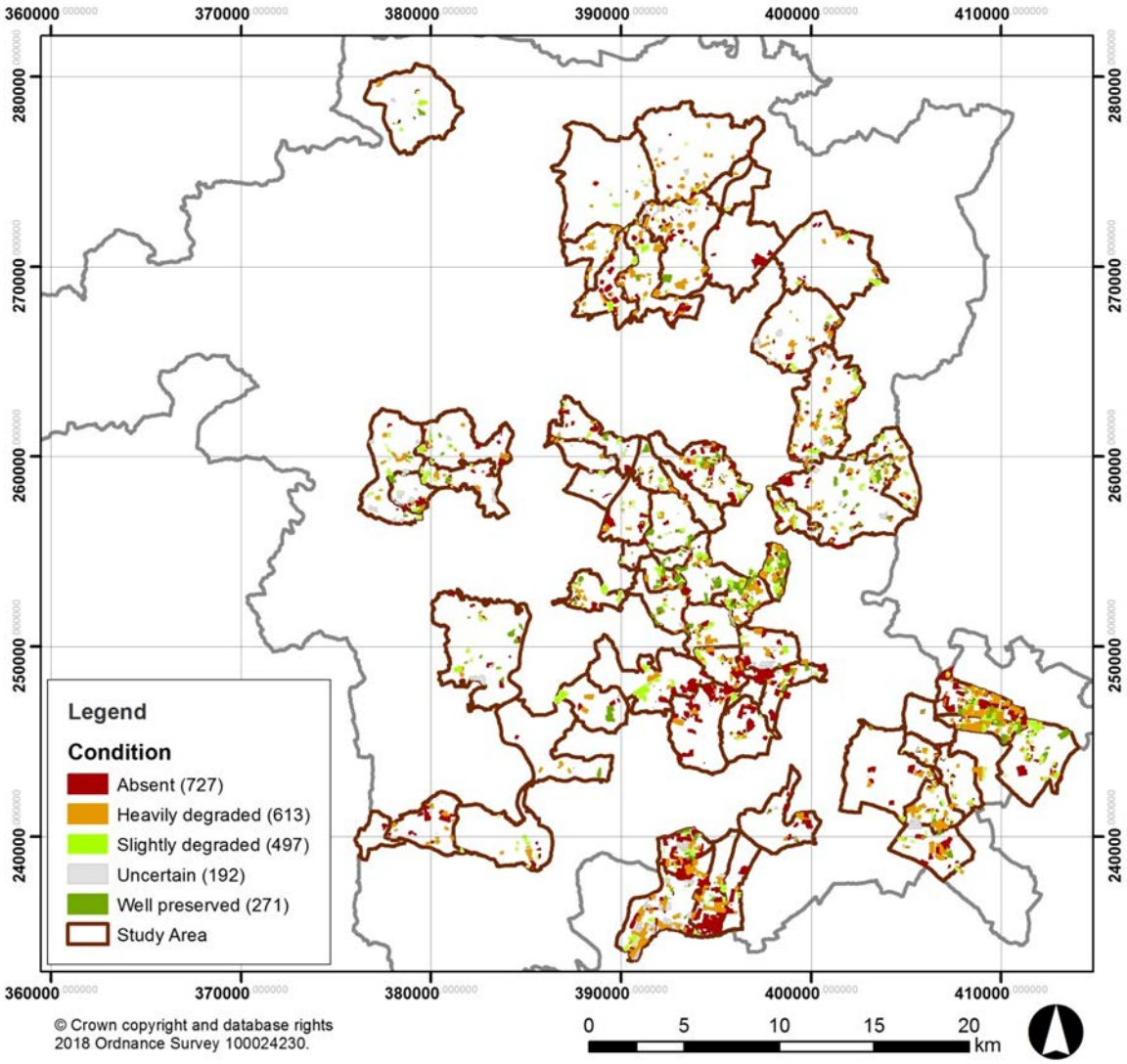

Figure 8: Results showing condition, all records

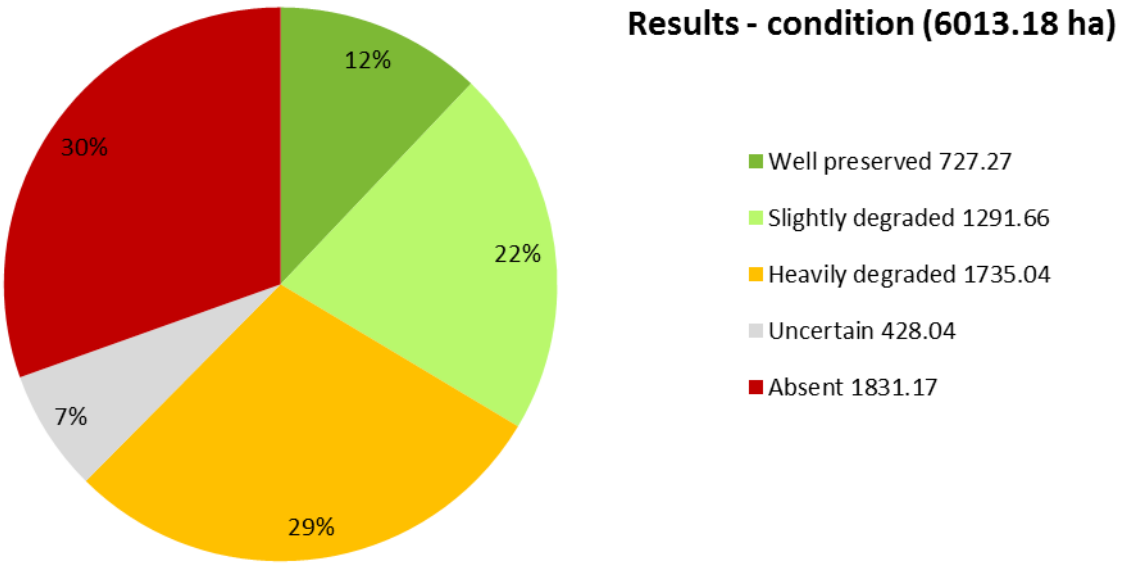

Figure 9: Breakdown of results by condition, all records

Condition:

Only 12% (727.27 ha) of the area of ridge and furrow recorded in the study area in Worcestershire is classed as Well Preserved (see Figure 8 and Figure 9) and 21% (1291.66 ha) as Slightly Degraded.

The largest area in the county is that classed as Absent, 30% of the total area (1831.17 ha), closely followed by that classed as 'Heavily Degraded' (29%, 1735.04 ha). Together these account for 59% of the total area in the county where earthworks are deteriorating.

Seven percent (428.04 ha) of the area recorded in the study area is classed as Uncertain; either there was no LiDAR coverage, aerial photographic coverage was not clear enough to determine, or the land use was such that earthworks may remain in a garden/orchard/area of open space in a development/area of parkland/caravan site or similar.

Condition	Area	Count	Percentage
Well preserved	727.27	270.00	12.09
Slightly degraded	1291.66	498.00	21.48
Heavily degraded	1735.04	613.00	28.85
Uncertain	428.04	192.00	7.12
Absent	1831.17	727.00	30.45
Totals:	6013.18	2300.00	100.00

Areas where the condition has been recorded as absent and the form is none could be removed from the totals but this hasn't been done as it represents only a small proportion of the total. Alternatively, another form type could have been added for 'earthwork, not ridge and furrow', which could have replaced the watermeadow type and covered more surviving earthworks. This would have catered for all areas which showed earthworks, mostly associated with former settlement sites that were well preserved but not ridge and furrow which is the focus of this project.

Areas where the condition is recorded as absent also include HER records which included ridge and furrow in part but other earthworks, such as those associated with a deserted settlement, are visible on LiDAR coverage.

The values used for condition were the same as those used in TTP2.

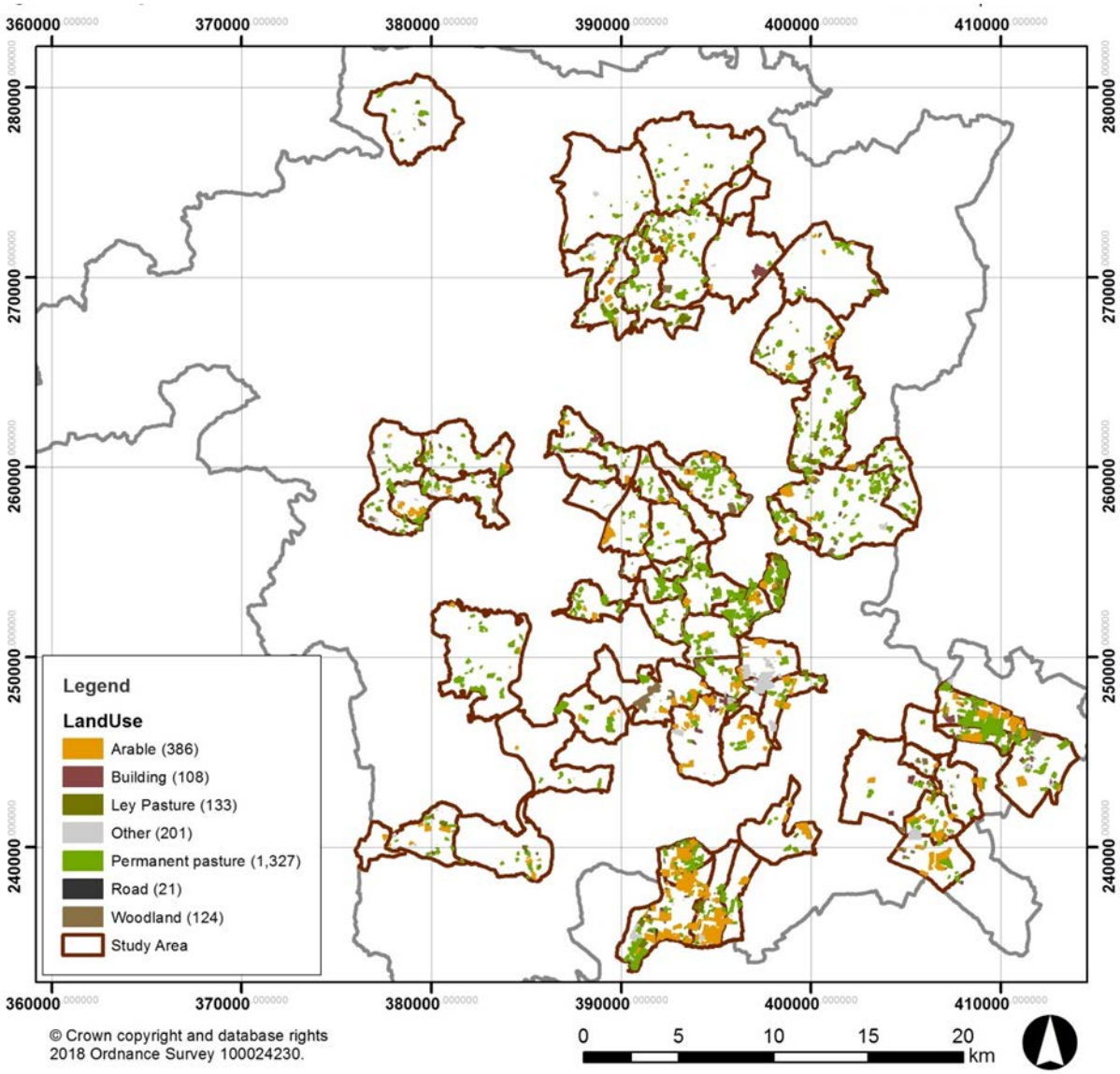

Figure 10: Results showing land use, all records

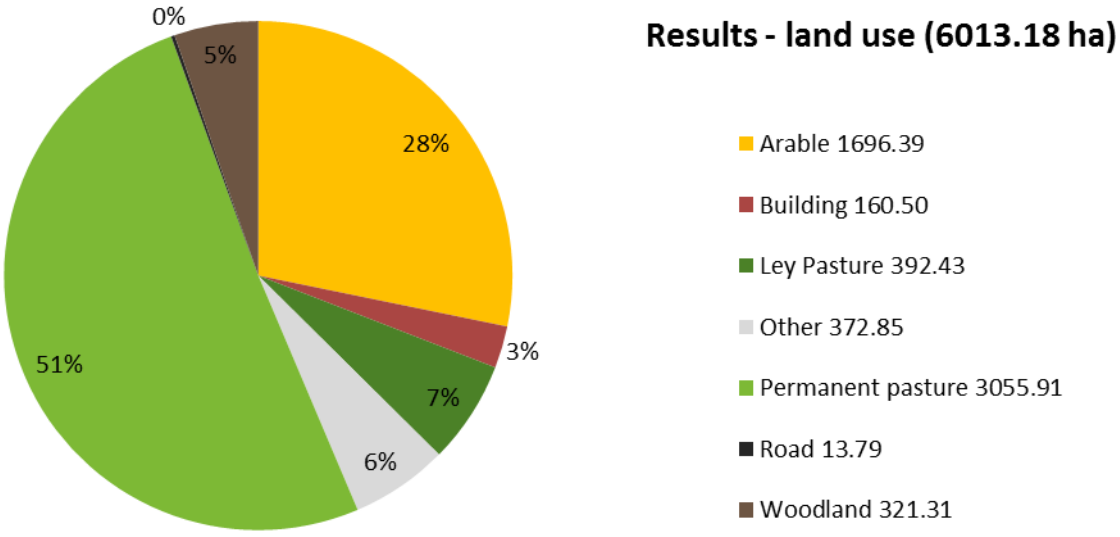

Figure 11: Breakdown of results by land use, all records

Land Use:

The largest area of land use on which ridge and furrow is recorded in the HER is permanent pasture (50.82% or 3055.91 ha); with arable land use the next largest area identified (covering 28.21% of the study area; 1696.39 ha).

Land used as permanent pasture is more evenly distributed across the study area whereas arable land is mainly located in the south-east of the county, which is also an area of market gardening (the Vale of Evesham).

Land Use	Area	Count	Percentage
Arable	1696.39	386	28.21
Building	160.50	108	2.67
Ley Pasture	392.43	133	6.53
Other	372.85	201	6.20
Permanent pasture	3055.91	1327	50.82
Road	13.79	21	0.23
Woodland	321.31	124	5.34
Totals	6013.18	2300	100.00

Notable land use changes observed during the last two decades include:

- Encroachment of development and infrastructure
- The conversion of permanent pasture to arable cultivation
- Expansion of existing extraction sites, mostly sand and gravel quarries
- Planting of new woodland both as part of grant schemes and private enterprise

Land use was not recorded as a matter of course in TTP2, only where earthworks were absent and then as the reason for their absence.

5.3 HER Enhancement

HER enhancement was not directly part of this condition assessment project; it is not a project to map all areas of ridge and furrow earthworks in Worcestershire. This would have been very difficult to quantify and estimate an amount of time to add to the condition assessment project. The starting point for the condition assessment project was existing records in the HER within the parishes in the study area.

The addition of the more than 600 records, not already on the HER, created from the volunteer earthwork survey project, was undertaken by HER staff as time in kind but scheduled in to the timescale as Task 6. Also, no existing records were updated with additional information from the volunteer earthwork survey as time was not available for this. These additions brought the number of monument records included in the condition assessment project to 1607.

The selection of these records was carried out from the GIS, rather than the database, due to a problem with HBSMR in Worcestershire. All monument records with a 'monument type' or 'RIDGE AND FURROW' were selected from the monuments shapefile.

More than one designation record was created for each monument record and in some cases, where the condition was assessed to be the same for a group of monument records (such as covered by a landfill site), one designation record was created to cover the area of many monument records.

If a record existed on the HER, then it is assumed that there was, at the time of creation, some surface evidence for this, except where the evidence was found by excavation or geophysical survey only. This does not mean that any record created from fieldwork were not included in the project because all fieldwork, when loaded on to the HER, will create the relevant monument records. There is no need to search separately for these records.

This report will be attached to the Event record (WSM70696) as a source, all monument records associated will be listed on any report run showing this event record, and it will be available on the Worcestershire Online Archaeology Library (http://www.worcestershire.gov.uk/archaeology/library) for download.

6 Discussion

6.1 Thematic Results

This section discusses the results broken down by land use, with maps and charts alongside notes discussing the results, to illustrate which are the most destructive of any remaining earthworks and which are the most beneficial to its preservation.

The following pages have been formatted to display together when viewed two pages together.

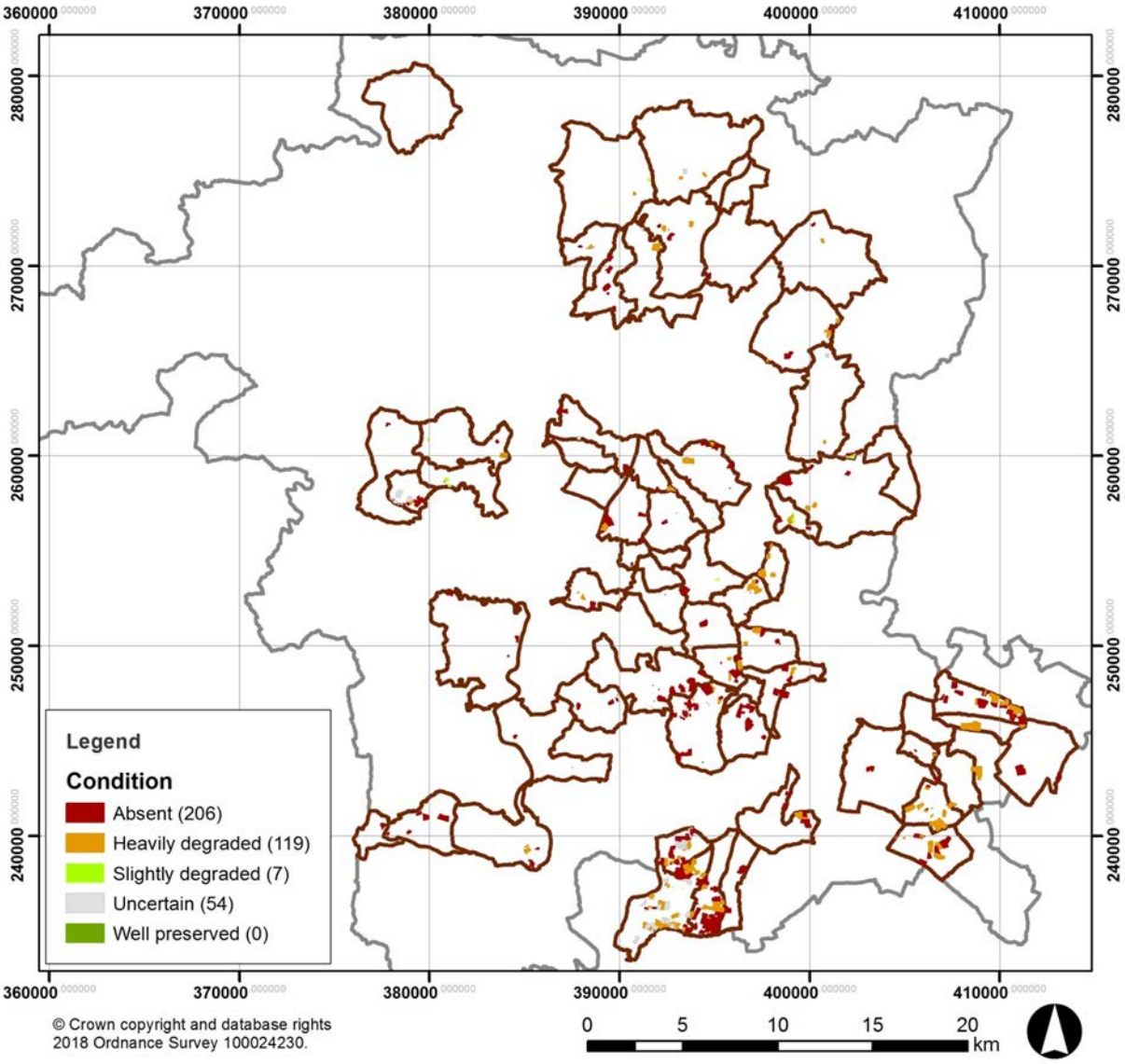

Figure 12: Results showing condition, for all arable land use

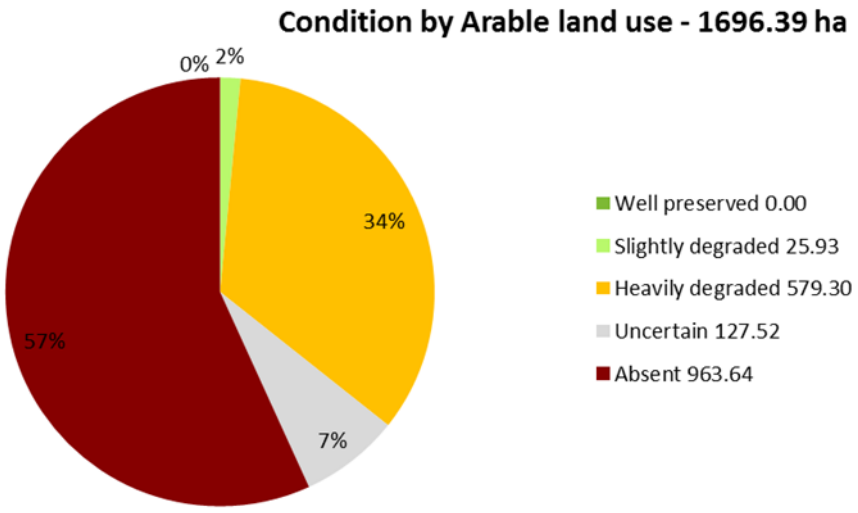

Figure 13: Breakdown of results by condition, by arable land use

Arable land use makes up 28% of the land use included in the study area; no well-preserved areas of ridge and furrow earthworks are recorded with this land use.

Using the criteria as applied in TTP2, the results show that 91% of arable land use is classified as either heavily degraded (which was where only the faintest of earthworks were visible on LiDAR coverage) or absent (where no trace was visible on either LiDAR or any aerial photographic coverage).

The small area classed as slightly degraded was, from aerial photographic evidence, was only converted to arable land use on the most recent aerial photographic coverage.

The records that existed on land subsequently used for arable mainly had sources of old Sites and Monument Record (SMR) records cards from when it was an index-card system, aerial photographs from the 1950s and 60s as well as later, earthwork plans drawn by researchers in the past, such as the Medieval Village Research Group, and landscape surveys undertaken by Mick Aston and James Bond. These would, it is assumed, have referred to earthworks rather than buried remains or cropmarks alone; therefore any record which shows no earthworks currently is included in the loss.

Turning the Plough 2 classified conditions of absent, heavily degraded and uncertain together which would mean that 98% of arable land, 1670.46ha in total, has seen a loss of ridge and furrow earthworks within this study area.

The main crop types seemed to be cereals and oilseed rape. Market gardening is a big land use in the Vale of Evesham and this is also a cause of loss, as can be seen in older aerial photographic coverage of the area around Childswickham (see Figure 4). It was not separated out as a land use type in this project although it could be in any future studies.

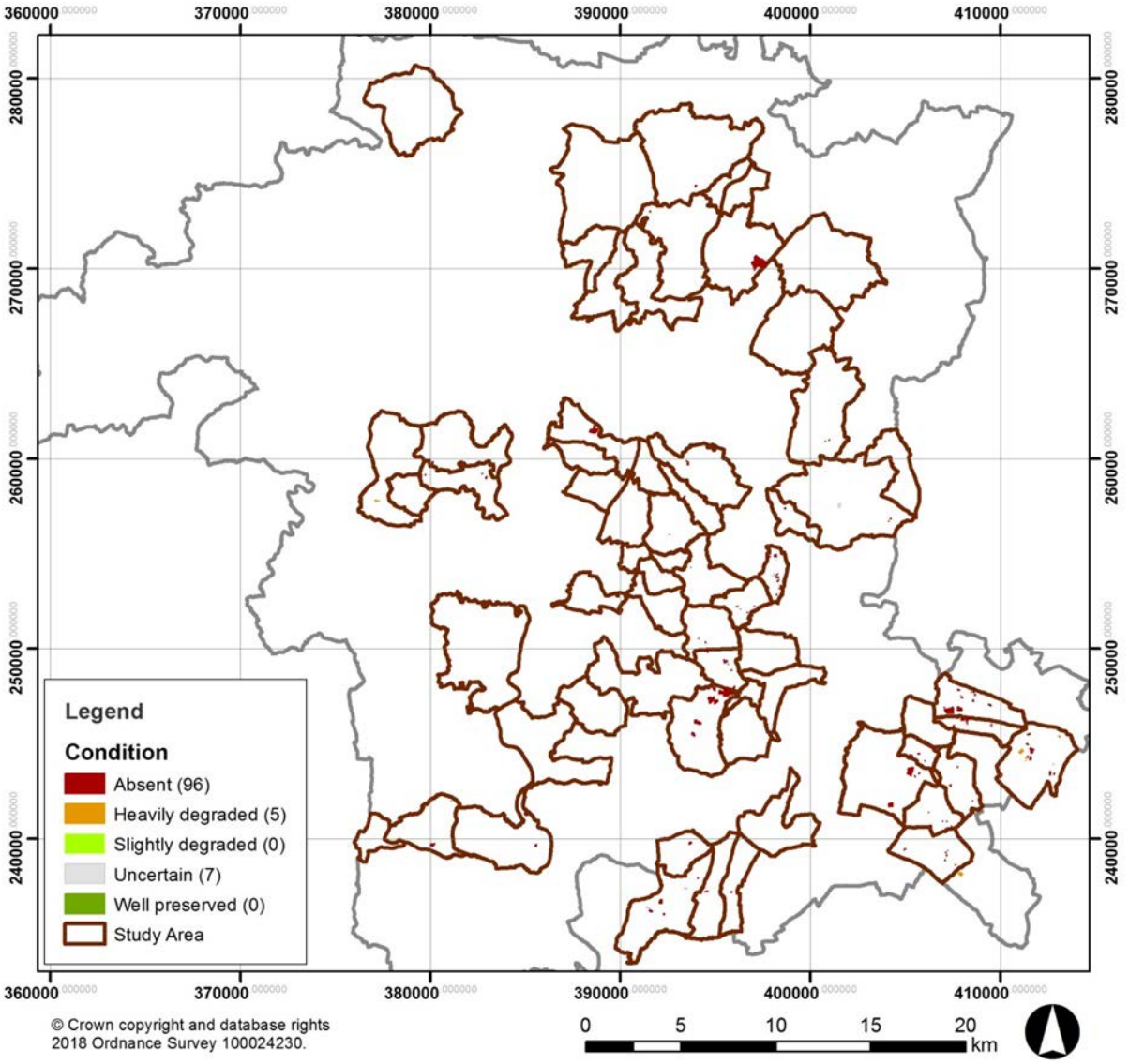

Figure 14: Results showing condition, for land use of building

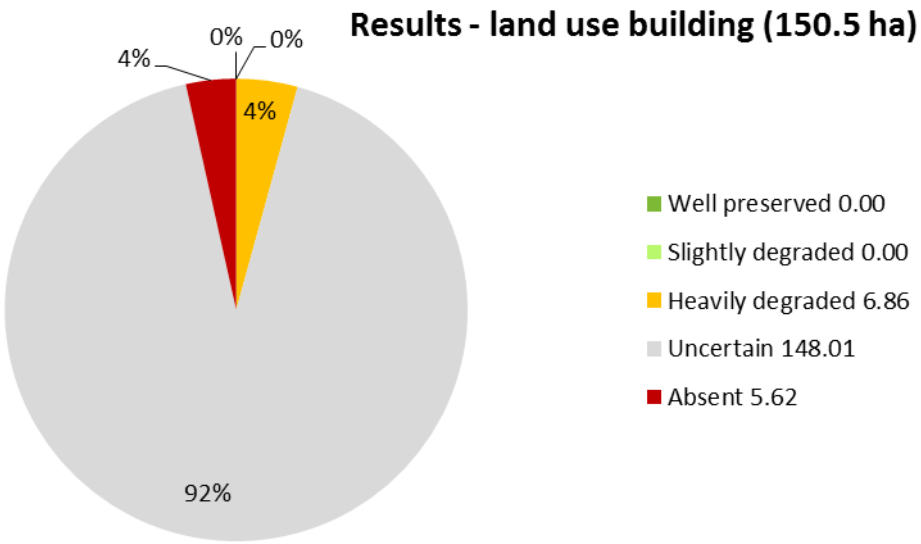

Figure 15: Breakdown of results by condition, by land use of 'building'

Land use of building was used to classify areas where either development of housing estates had occurred; it makes up just under 3% of the study area, which is mainly focussed away from settled areas. Many of these areas lie on the edge of existing settlements and so are under the most pressure from developers. This category also includes where new farm or other buildings, covering quite a large area, have been constructed, including new barns and what are probably indoor schools at equestrian establishments.

Very well preserved areas of ridge and furrow have been lost to this land use, for example in Honeybourne, which is on the edge of/within a settlement and in an area which contains some very well defined and very deep earthworks. Some developments have partially managed to avoid areas of earthworks; such as the new development called The Shire in Fernhill Heath (outside the study area – see Figure 16), where the ridge and furrow and associated hollow way have been partially preserved as part of open space in the development. How these survive in the future remains to be seen.

The extent to which enabling works and landscaping associated with development has affected survival of earthworks is unknown but is likely to have resulted in the total destruction/removal of ridge and furrow earthworks.

Using the same criteria as TTP2 100% of land affected by development has seen loss of ridge and furrow earthworks.

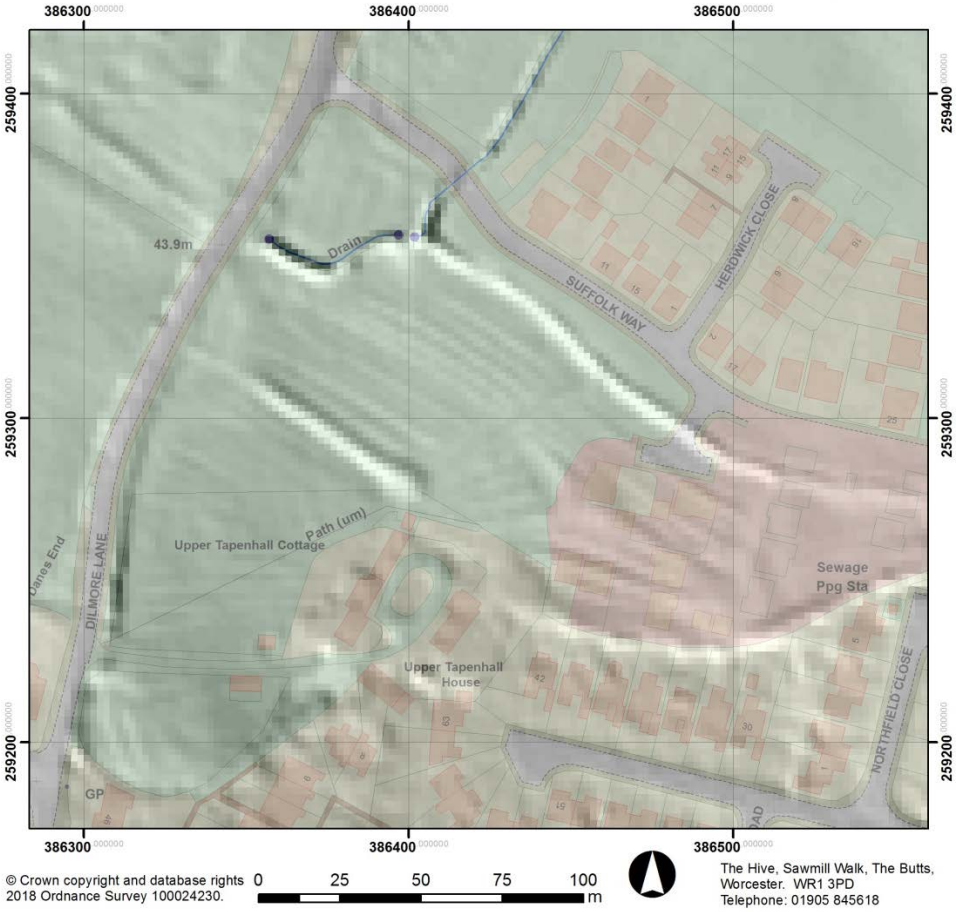

Figure 16: The Shire, Fernhill Heath, earthworks

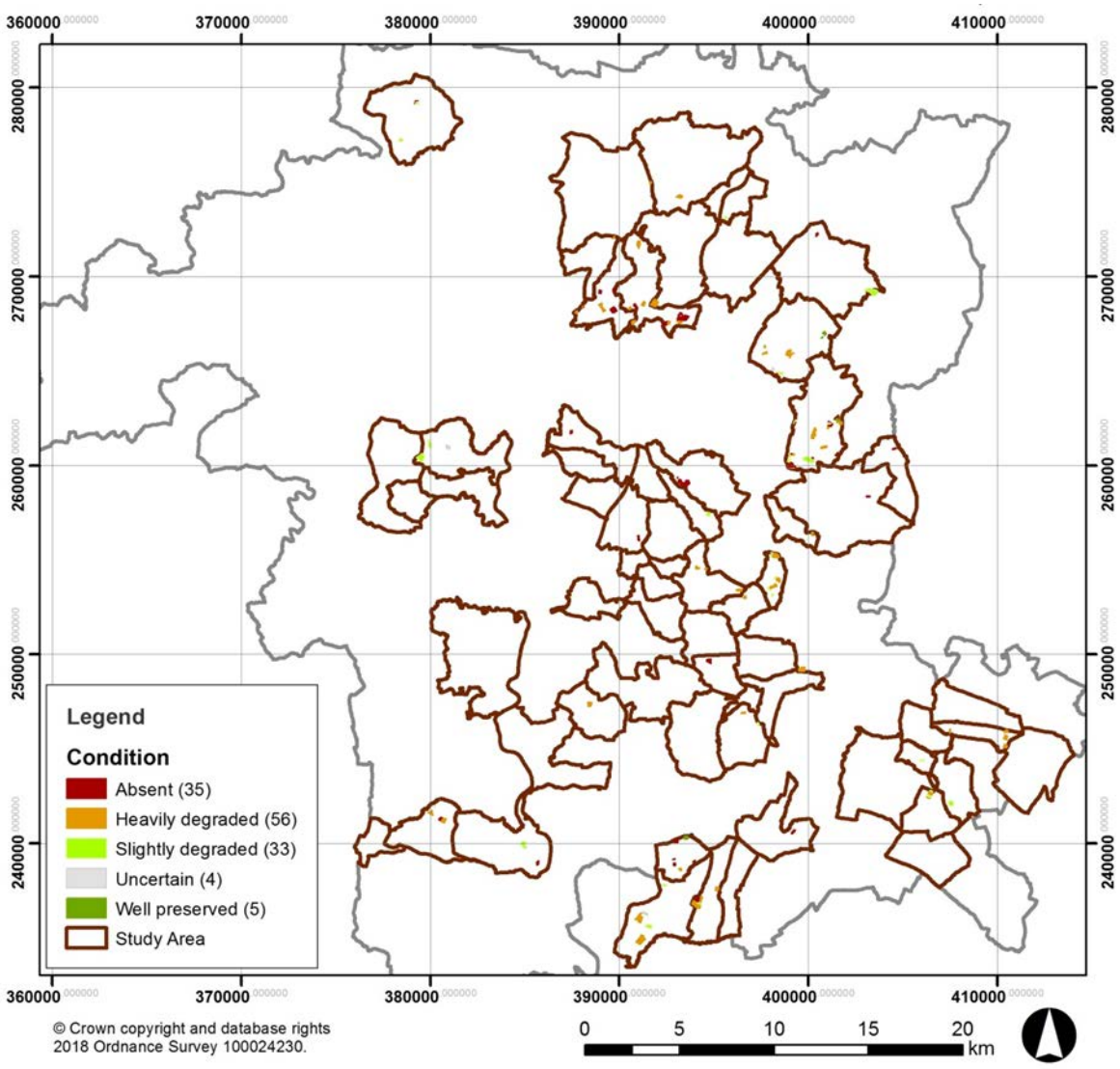

Figure 17: Results showing condition, for all ley pasture land use

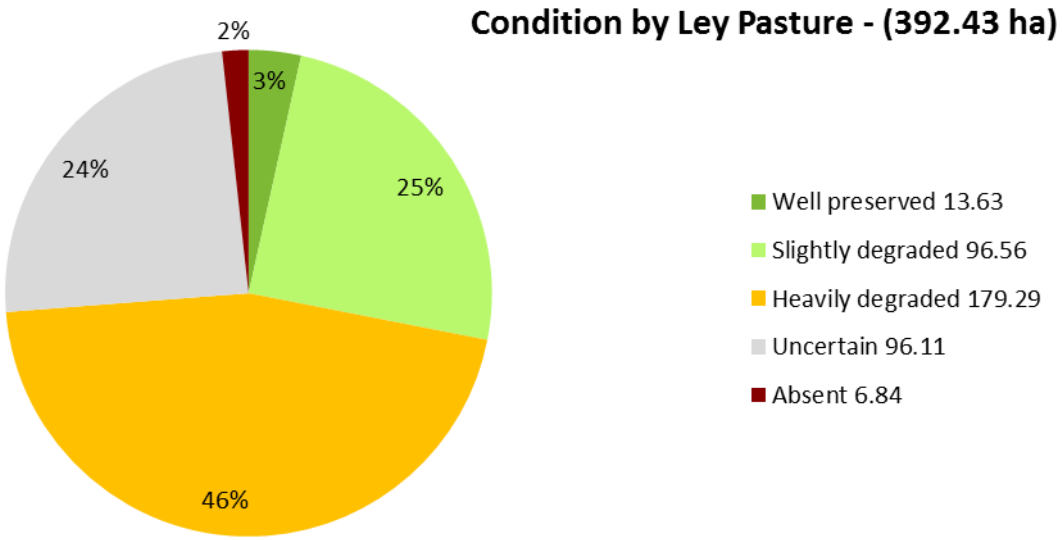

Figure 18: Breakdown of results by condition, by ley pasture land use

This category was applied to land which showed as pasture or grass but showed evidence it had been ploughed and re-seeded or planted with arable crops at some point previously. It accounted for under 7% of the total study area. This was picked by using the four different years of aerial photographic coverage because the resulting grass growth has a different texture and colour on aerial photographs.

The result is that 72% of land within the study area, with a land use of ley pasture, is classed as absent, heavily degraded or uncertain.

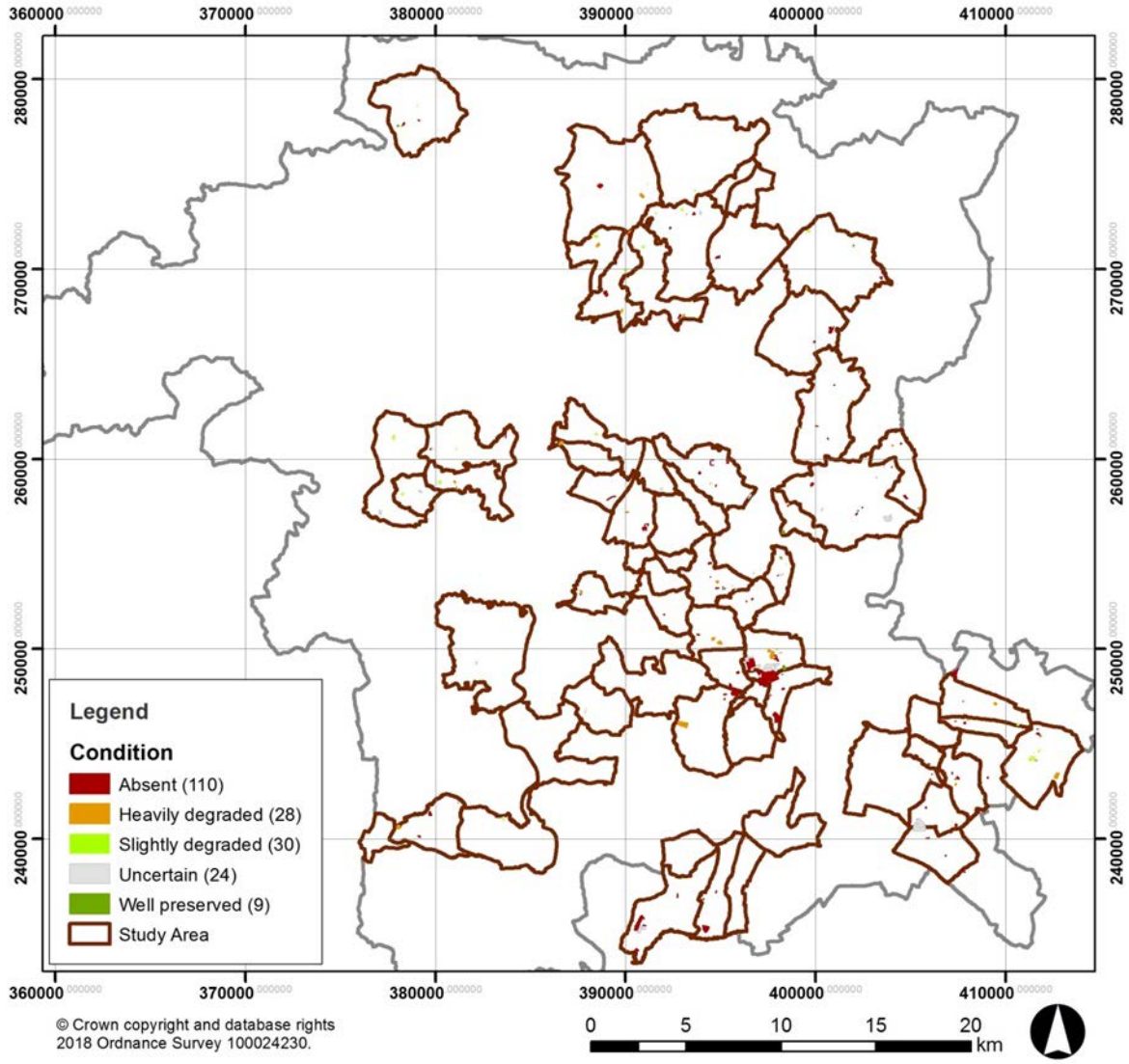

Figure 19: Results showing condition, for all 'other' land use

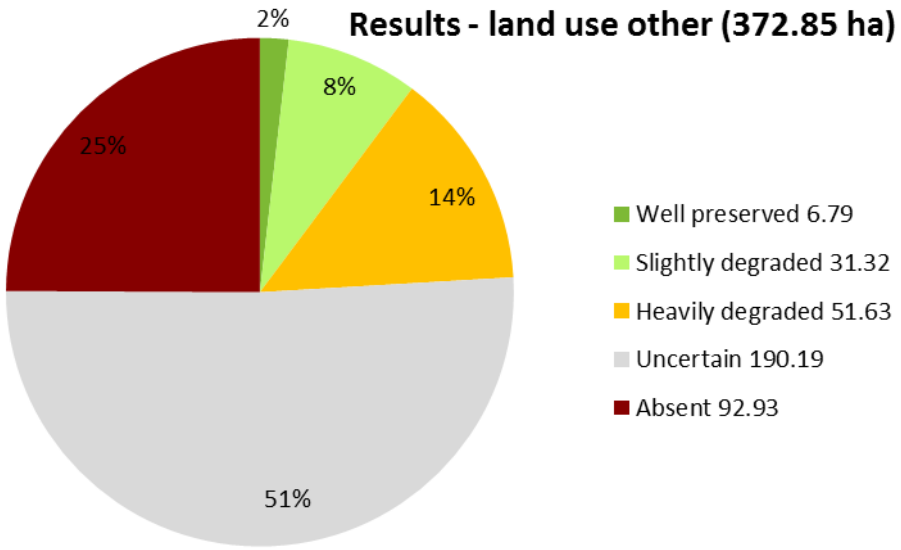

Figure 20: Breakdown of results by condition, by 'other' land use

This type of land use covers areas which fall in to gardens, park land, orchard, and also included caravan parks, solar farms, all weather racing gallops, all weather surfaces for equestrianism (manèges) and an amusement park. It accounts for just over 6% of the total study area. It also includes the main former landfill site in Worcestershire and an area that appeared to being used to dump spoil on an old airfield site which has infilled some earthworks that show very clearly on the LiDAR but are not at all visible on aerial photographic coverage.

Pipelines were recorded in this category and were visible crossing areas of ridge and furrow earthworks. They were usually visible because no reinstatement had taken place and the earthworks had been removed but in one case work had been undertaken to reinstate the earthworks. Unfortunately this was very visible because the wrong ridges had been joined together and a step was visible in the alignment of the earthworks.

Ninety percent of land in this category is classed as having earthworks which are absent, heavily degraded or uncertain.

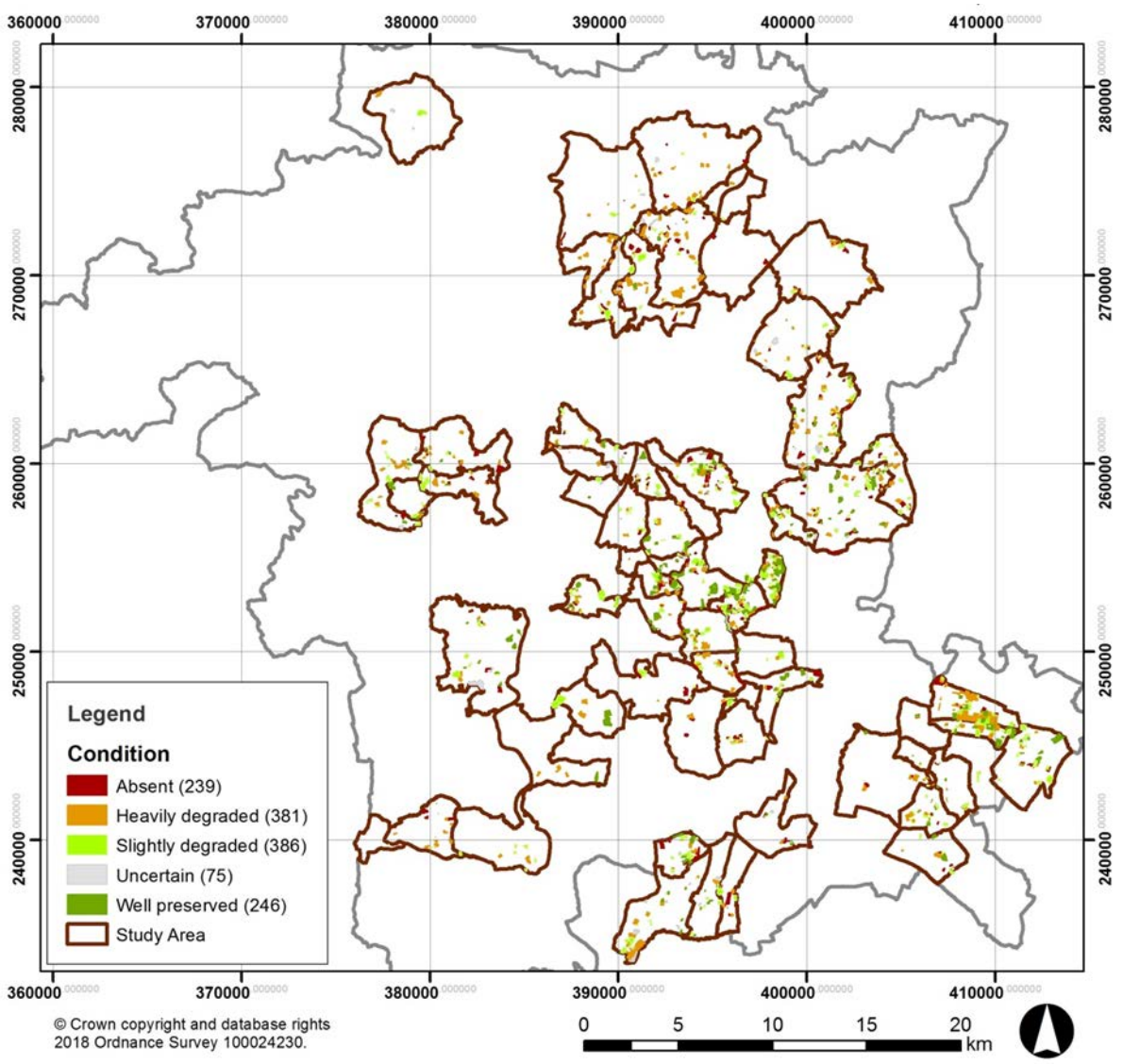

Figure 21: Results showing condition, for all permanent pasture land use

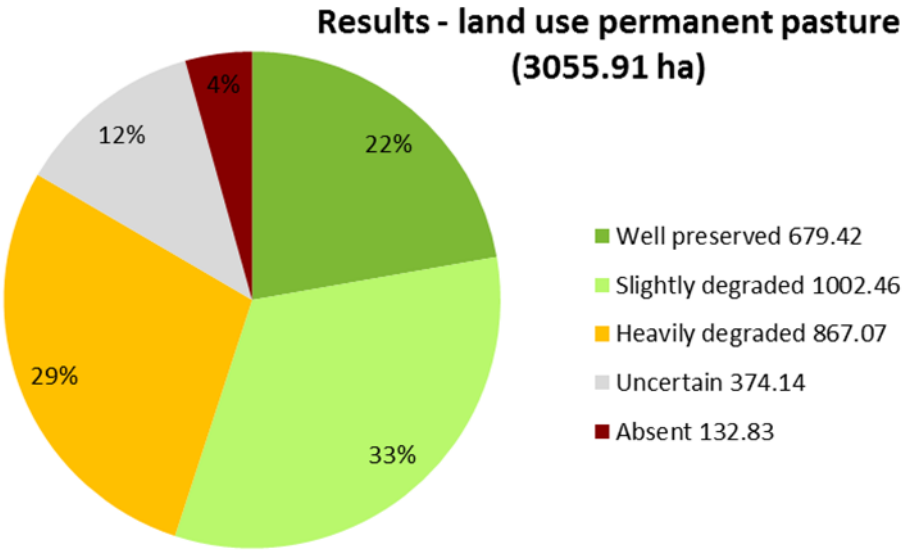

Figure 22: Breakdown of results by condition, by permanent pasture land use

This land use category covered the largest area in the study area, at 51%, and included areas for grazing sheep and cows as well as paddocks, which are quite prevalent in some areas of the county.

It is likely that the identification of some permanent pasture was inaccurate and it was recorded as ley pasture and vice-versa. This was questioned in the results because of the high proportion of permanent pasture with a condition of 'highly degraded'. Further investigation showed some mis-identification but also that the condition recorded was correct.

There is often further evidence in the monument record which was being assessed and this should have been checked. This could come from a site visit, fieldwork or a project such as the National Mapping Programme (Bishop 2009), has been undertaken (along the course of the Carrant Brook and overlapping with some of this study area for the condition assessment). The NMP project has added evidence to the HER, beyond what was available for this condition assessment project, due to the wider range of aerial sources consulted, to show that ploughing has taken place in the past and caused damage to earthworks.

There are also areas where landslip deposits have affected earthworks and diversification of activities on farms, such as quad biking tracks, are on areas of permanent grassland that may be grazed.

These are what have contributed to a higher than expected result in this land use category.

Where permanent pasture is in use for equestrian establishments different characteristics are visible. Subdivision in to paddocks was recorded in the general description field of each record, sometimes including the method of subdivision. If temporary/electric fences were used then damage was visibly reduced in aerial photographic coverage. This type of fencing seemed more prevalent at smaller establishments, where horses kept more as part of the family, than a business. Some equestrian establishments, such as racing stables and stud farms, have used permanent post and rail fences, which are very distinctive and look very tidy, while well maintained, but having permanent barriers can increase the damage. Stud farms are more likely to need well separated and strong (permanent) fences to turn out stallions. Horses will always walk along fence lines and congregate around access points to fields and this causes wear, especially if numbers are not carefully managed.

Figure 23: Permanent fences at an equestrian establishment

It would perhaps have been a good idea to classify paddocks as a separate land use being as they came to be so distinctive and have their own characteristics.

In the area that was no equestrian the recent wet and cold winters were also visible where feeding stations had been moved for sheep (usually long narrow feeders) or cattle (circular feeders). It is hard to avoid damage from poaching when the soil is wet and moving the feeding stations does help reduce deep erosion but also does spread the lessened damage across a wider area. Permanent pasture is the least destructive of all the land use categories in the study area, recording 45% that is classed as absent, heavily degraded or uncertain.

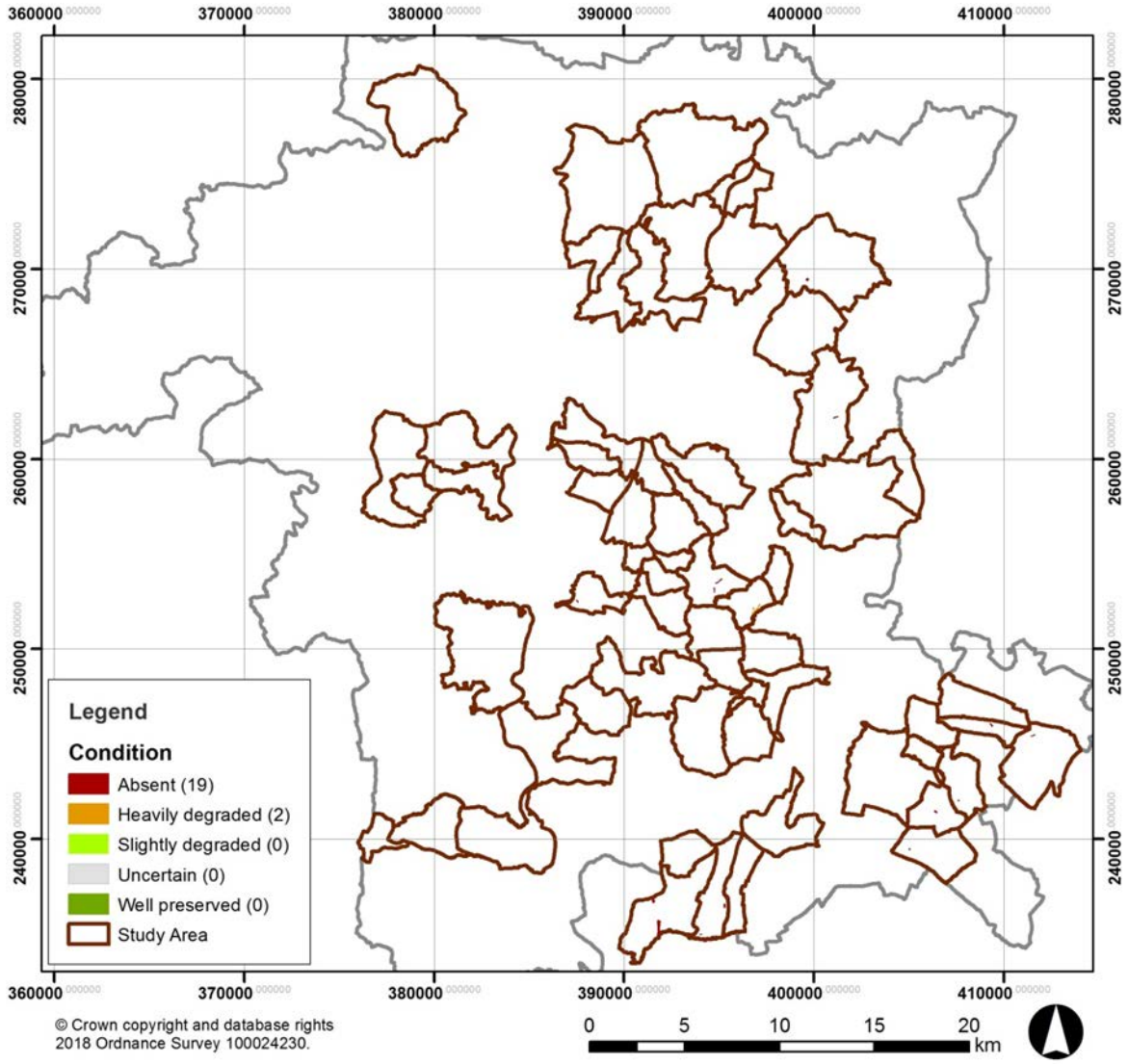

Figure 24: Results showing condition, for all land use of 'road'

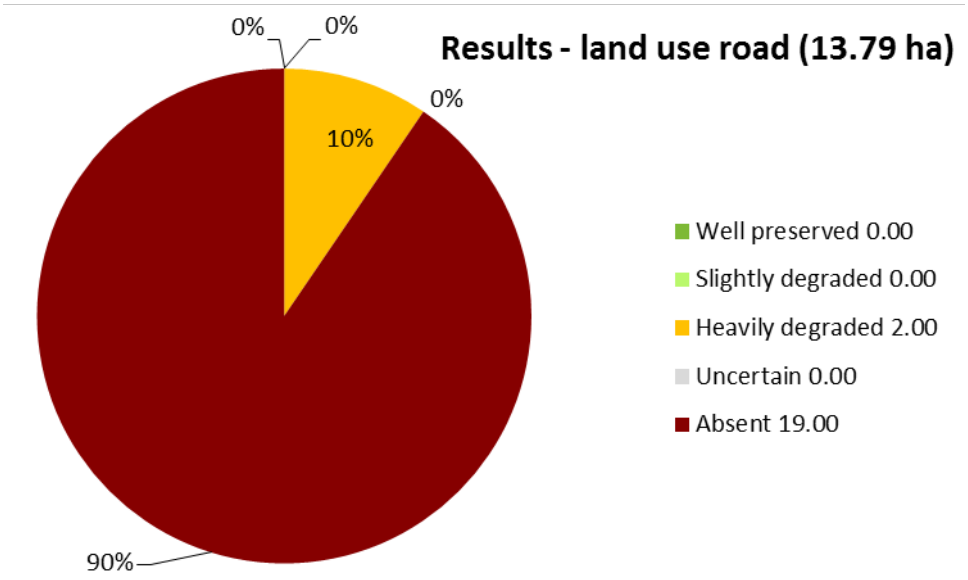

Figure 25: Breakdown of results by condition, by land use 'road'

This land use covered a very small area of the study area (0.2%) and is where road schemes, such as the M5, covered areas of former earthworks recorded before the roads were constructed. The area described as heavily degraded is likely to have been the verge of a road where some earthworks may be present, not surprisingly the rest of this area is classified as absent.

No earthworks remain on land classed as road.

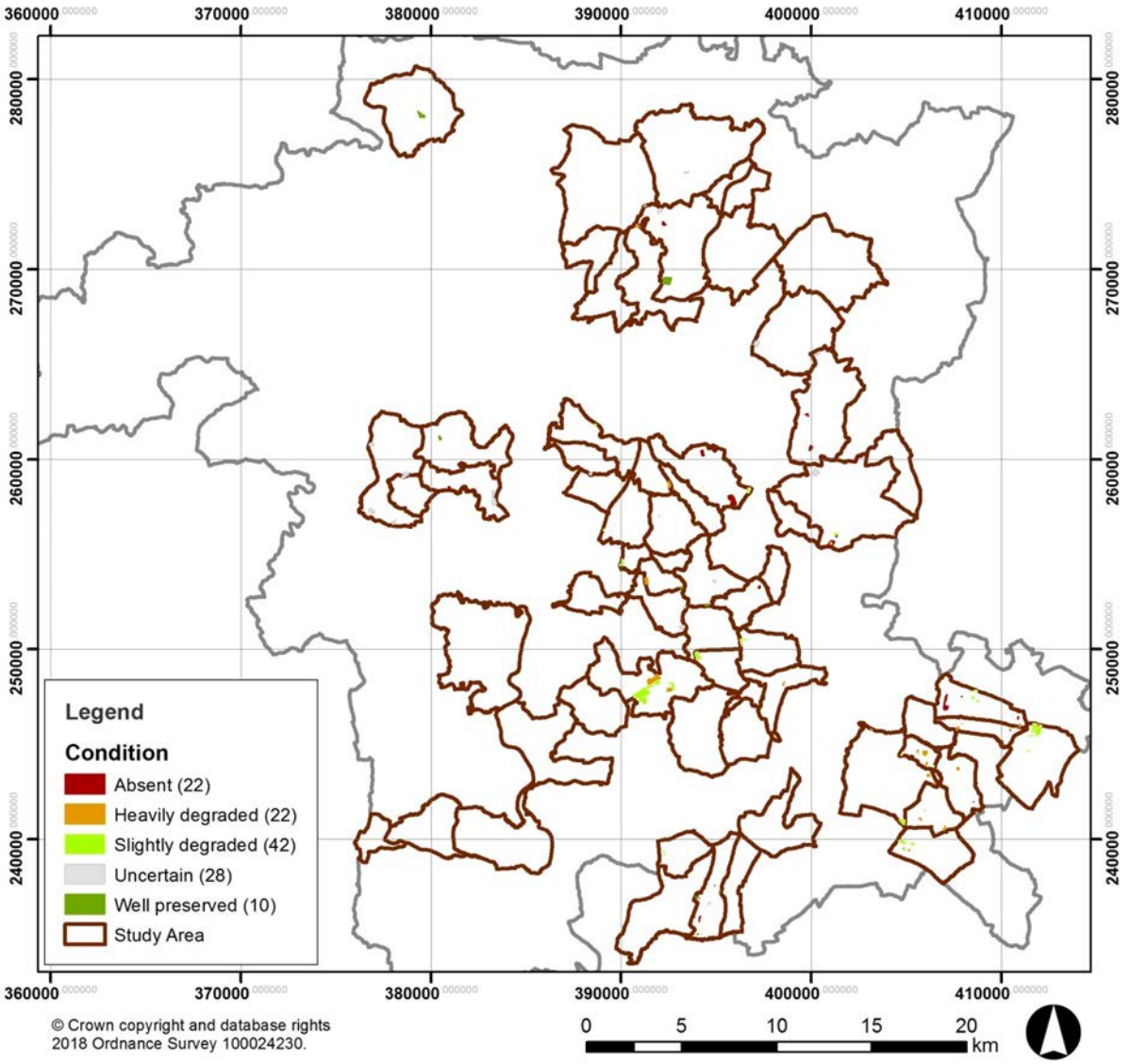

Figure 26: Results showing condition, for all woodland land use

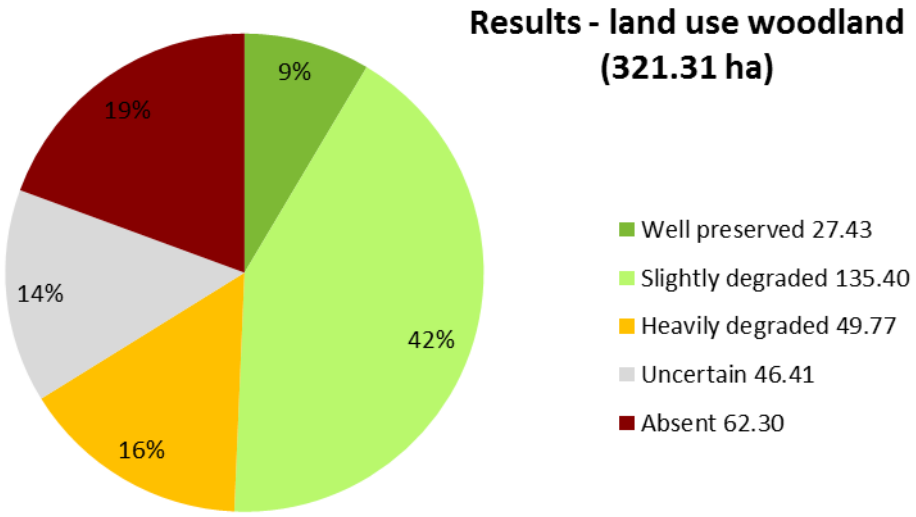

Figure 27: Breakdown of results by condition, by woodland land use

Woodland made up 5% of the land use classified within the study area and earthworks shown on LiDAR coverage were, in general, not as clearly defined as in pasture, due to undergrowth and/or fallen trees which will not be stripped out of the digital terrain model when the LiDAR tiles were processed. Contemporary boundary banks and ridge and furrow earthworks is fields around the woodland, as well as place names such as Thrift Wood in Crowle, give clues as to the likely age and origin of woodlands.

Fifty one percent of earthworks in woodland were classed as good or slightly degraded condition, making this the only other category of land use that has a higher than 50% preservation rate, the other being permanent pasture.

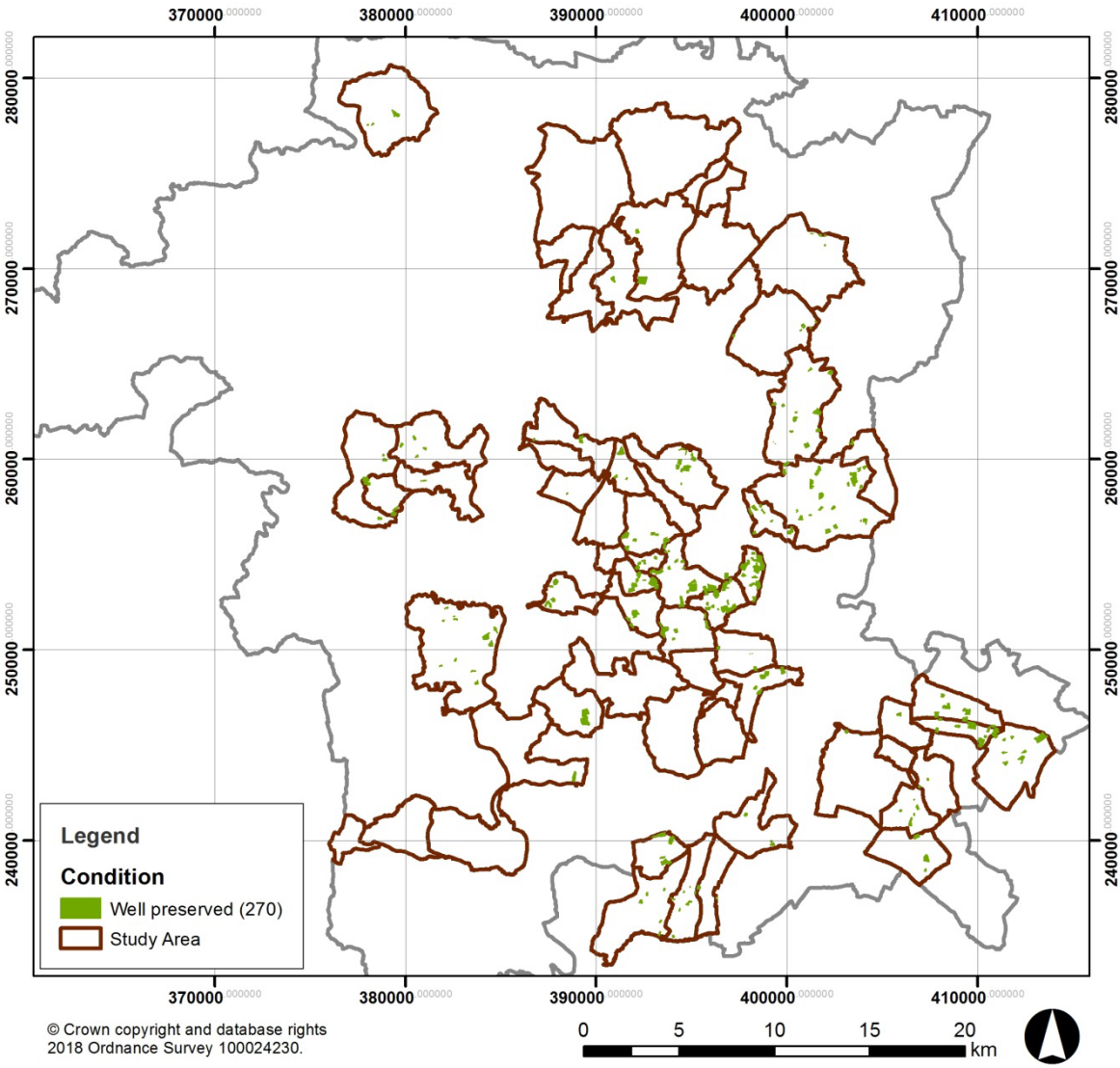

Figure 28: Well preserved ridge and furrow earthworks in Worcestershire

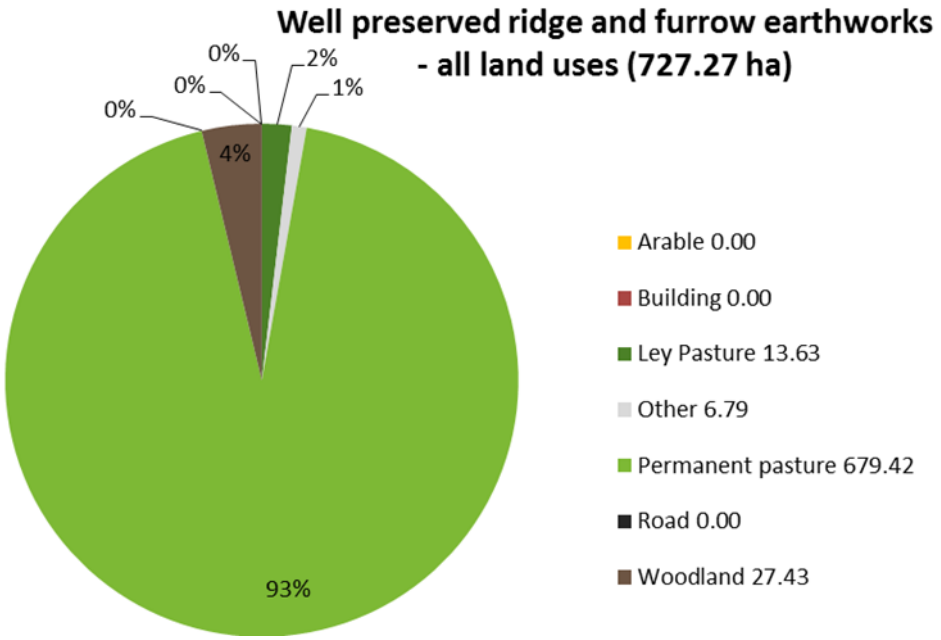

Figure 29: Breakdown of all well preserved earthworks by land use

Well preserved ridge and furrow earthworks, for all land uses are summarised in Figure 28 and Figure 29. These remain in 44 out of the 64 parishes in the study area and make up 12% of the results. Land uses of Arable, Building and Road contained no well preserved earthworks. More earthworks were found to be slightly degraded in Woodland than in Ley Pasture. Land use of other could have included green/open space in developments where earthworks may be very well preserved. Permanent pasture is shown to be the best land use for preserving earthworks.

6.2 Broad discussion of results

This desk based condition assessment is not a statement of all remaining ridge and furrow earthworks in these 64 parishes in Worcestershire and as explained in section 5.2 no new records were added to the HER and the project start point was existing records with a variety of creation dates and sources of information.

Volunteer Earthwork Survey
The volunteer earthwork survey project was intended to focus on whole parishes and record all earthworks present by visiting the site. In reviewing the records as they were input to the HER a lot were later found to be recording negative results or visibility only in crop marks/growing patterns or where visible under hedgerows.

There were also further areas within the parish, where earthworks are clearly visible on LiDAR and aerial photographic coverage, where nothing has been recorded. This is disappointing but there may be valid reasons, such as; access to the land being a problem, either through landowner permission or issues with livestock or horses, vegetation may have been too high, the earthworks may have been very subtle and walked along, rather than across, and so were not noticed; there are many valid reasons.

It was also expected to be a physical site visit and survey but as discussed earlier the results in North and Middle Littleton and South Littleton did not come from field observations.

HER Records – origin and difficulties
The HER holds records that have been imported from the old paper SMR overlay maps, probably by grid reference point, and some have not been cleaned since they were imported which can leave their sources vague and their origin unknown. This means some of the records were covered only by a 10mx10m polygon, converted from a point, which gives a distortion of the total area of ridge and furrow recorded. This affects 69 of the 1607 monument records in the study area. These have not been updated, and some of them may never be able to be updated, because the original source(s) are now lost or unavailable and the extent cannot be identified due to field boundary changes. These records were not cleaned or updated as part of this project.

HER Records – creation process
Other features of the monument records on the HER is the accuracy with which they were originally created. Often ridge and furrow earthworks have been mapped to modern field boundaries, rather than the parcels within the pattern of earthworks, which can give an inaccurate total coverage for the earlier field system.

HER Records – External sources – National Mapping Programme
The records from the NMP cover only the area of visible earthworks on the aerial photographs being consulted, which is not what is visible on other sources of information such as LiDAR. These records were uploaded en masse from CAD output, which was not straightforward, and the HER records were not cleaned or updated afterwards due to a lack of staff time and funding. This has given rise to areas of overlapping monument records which had to be catered for in this project to ensure the total area of monument and designation records would be the same, or as near as possible.

Understanding the constraints of HER records
Monument records that need attention can make interpreting the HER difficult for people carrying out research or receiving information in advance of planning or other applications (forestry or Countryside Stewardship) and was one of the justifications used for setting up SHINE. Finding the time for general or thematic HER enhancement outside of project work, where time is set aside or can be worked in as time in kind, is very difficult and gives a poorer record as a result. 'Big Data' projects which have used our HER data, such as EngLaID, where it is not automatically refreshed, will have the same weaknesses in their data.

Assumptions on data
If a record existed on the HER, then it is assumed that there was, at the time of creation, some surface evidence for this, except where the evidence was found by excavation or geophysical survey only. Using the same categorisation as in TTP2 the condition recorded as part of this project, where it is not well preserved or slightly degraded, can be taken as the loss of ridge and furrow earthworks in Worcestershire and occurring in the second half of the 20th century up until today.

Using the condition assessment project information
The Worcestershire HER now contains the information from this desk based condition assessment project because the input was done direct in to a layer in the designations module. This will make it visible and able to be consulted as part of HER searches, as well as being used to inform decisions in advance of development, forestry works, countryside stewardship, masterplanning, neighbourhood plans and strategic development within the county. This will help to promote better management of existing earthworks.

The volunteers who worked on this project are keen to add more ridge and furrow records to the HER, to cover those for earthworks which were visible but not recorded during this project. Not enhancing the HER and adding all visible earthworks as part of a project is a disadvantage because the record, although better, remains incomplete.

Threats to survival and visibility
The main threats to remaining ridge and furrow earthworks appear to be very much the same as those identified in TTP2; with ploughing associated with arable land use being the main threat, although market gardening could also be added in Worcestershire. Housing developments on the edge of existing settlements, as part of the development plans in Worcestershire are the next largest identifiable contributor (after 'other' land use).

Smaller scale threats such as those affecting a single small field and its use by the landowner, or agricultural activity resulting in the storage of equipment, old vehicles, and areas of muck heap were all notable on the aerial photographic coverage.
Diversification at farms has also had an effect on ridge and furrow earthworks in the form of activities such as quad biking, where sinuous tracks have been cut through remaining earthworks. Woodland does not seem to guarantee destruction but the preservation can be compromised by activities such as using heavy machinery to extract felled timber.
Quarrying for sand and gravel has removed large areas of earthworks, especially along the Severn, Avon and Carrant Brook, this is included in 'other' land use.

Natural threats such as alluviation along watercourses and landslides have both been identified in the study area. Geology maps were consulted where earthworks appeared not to be present along watercourses and alluvium was usually recorded, albeit at a scale of 1:50,000 from the BGS so the detail may not be entirely accurate on smaller watercourses.

Summary
This project will have different results from other aerial surveys, mapping projects and the TTP projects because they started with areas with existing earthworks whereas this condition assessment project started with existing records on the HER. No quality assurance was undertaken and this may be something to review when looking at repeating this sort of condition assessment elsewhere, but for this project understanding the state of earthworks remaining in an area, to help promote better management in the wider area in the future was the intent of the project. These results will prove useful in Worcestershire and should also be elsewhere. From a point of view of understanding the condition of a landscape in an area, this was a very worthwhile undertaking and has already been used to inform investigations in to ploughing of earthworks in breach of Environmental Impact Assessment (Agriculture) Regulations.

In summary the condition assessment has shown that arable land use, along with 'other' land uses (see results section), housing and road development are the main causes of loss of ridge and furrow earthworks in Worcestershire. Permanent pasture has preserved the largest amount but has only preserved 55% of the area it covers (3055.91 ha which is 58% of the total area included in the study area). Overall the total loss (including the conditions absent, heavily degraded and uncertain) in the study area is 66.42%.

6.3 Repeating this survey elsewhere

The method used in this project was successful in producing a record of the condition of ridge and furrow earthworks within a study area in Worcestershire. The processes described here worked well to provide a fast, desk based assessment of the condition of ridge and furrow recorded earthworks in Worcestershire based on limited sources of information.

Future investigations may want to focus on a more detailed approach that would use a wider evidence base in the form of more extensive LiDAR, making use of DSM, as well as DTM, layers, a wider range of aerial photographs, including oblique photographs held in both local HERs and in the Historic England Archive, as well as using site visits to investigate the landscape.

6.4 Conclusion

The aims and objectives of this project were met as follows:

- From the point of view of creating an understanding of the level of loss and degradation of ridge and furrow earthworks in Worcestershire this condition assessment project has been successful in providing that information. It is in a form that can be, and has been, used to help advise policy for agri-environment schemes, neighbourhood plans, EIA breaches, masterplanning and land management. It is

also available to include in research in to the landscape of Worcestershire. This condition assessment project has also provided empirical evidence which can be referred to in any of the above cases with further information about the drivers for change.

- The work undertaken as part of the volunteer earthwork survey is now incorporated in to the HER so it can be included in requests for information in advance of development and to help with research enquiries.

- Areas just outside the current study area have been identified for more detailed survey (see section 4.3.1) and these can also be added to the next parishes to be surveyed for earthworks by existing volunteers, within reason, or by new recruits if the areas become too far to travel to (no expenses have been paid for the surveying in this project).

- The condition assessment project used the methods of presentation used in TTP2, with the exceptions being due to the differences in the data used within the project and the difference this made to the final results.

- However the more detailed objectives, in regards to characterising the variety of landforms, identifying areas at greater risk, identifying measures to preserve and understand what remains and a more formal strategy to inform masterplanning and land management were expected to be addressed in the more detailed work undertaken as part of the further study and so have not been addressed here in full.

The project was still extremely valuable in Worcestershire because it assesses existing records, in an area outside of the TTP areas, and provided an assessment of the situation in Worcestershire.

7 Research questions/opportunities

The following is neither a complete nor comprehensive attempt at defining a research framework for ridge and furrow earthworks. It is rather a collection of questions that have arisen through the course of the project that we believe require investigation and development. They are therefore intended to inform discussion and work that will be carried out in stage three to develop more comprehensive outputs.

This project has a disadvantage in that it has no single 'start point' from which to base the loss of earthworks in the study area and the county is mostly outside the central province where ridge and furrow is more usually found.

The volunteers who have taken part in this study are keen to maintain the skills they have learned and use them to enhance the current record as well as to investigate other aspects in more detail.

- Investigate the form of the earthworks in more detail, most in this study are recorded as straight and only in one area were the very long sinuous field boundaries typical in other areas of the country observed.
- Is it possible that some earthworks were dug rather than ploughed?

- The earthwork survey area has, in most cases, recorded the width and height of all the earthworks recorded, can an analysis be undertaken from this data? Is it influenced by soil type and geology?
- Further identification of the characteristics of ridge and furrow compared to watermeadow earthworks. The HER has some records which could be either, that have been recorded as one or the other.
- Further research – look at historic land use (from documents and early historic mapping) in some areas to see whether this can be identified as arable/pasture or any further reference to creation and or land use.
- Consider how to input the ongoing work of the volunteer survey to maintain the condition information flow but maintain the records produced in this study.

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10 Appendices

Appendix I – Condition Assessment Project Study Area – list of parishes

Study area parishes, areas, districts and record numbers.

Table 3: List of parishes included in the study area, showing districts and area

Parish	District	Area (ha)
Aldington	Wychavon District	230.96
Badsey	Wychavon District	575.14
Belbroughton	Bromsgrove District	2148.67
Bentley Pauncefoot	Bromsgrove District	1375.51
Bournheath	Bromsgrove District	224.84
Bredicot	Wychavon District	160.67
Bredon	Wychavon District	1221.85
Bredon's Norton	Wychavon District	445.78
Bromsgrove	Bromsgrove District	1279.37
Broughton Hackett	Wychavon District	155.13
Catshill and North Marlbrook	Bromsgrove District	323.20
Chaddesley Corbett	Wyre Forest District	2284.21
Childswickham	Wychavon District	766.39
Churchill	Wychavon District	271.59
Cookhill	Wychavon District	614.43
Crowle	Wychavon District	702.90
Dodford with Grafton	Bromsgrove District	1468.20
Dormston	Wychavon District	332.14
Drakes Broughton and Wadborough	Wychavon District	1349.96
Elmbridge	Wychavon District	720.98
Elmley Castle	Wychavon District	833.01
Evesham	Wychavon District	1601.38
Feckenham	Redditch Borough	1512.39
Flyford Flavell	Wychavon District	279.28
Grimley	Malvern Hills District	998.73
Hallow	Malvern Hills District	643.24
Hill and Moor	Wychavon District	552.62
Himbleton	Wychavon District	960.95
Hindlip	Wychavon District	440.11
Honeybourne	Wychavon District	1164.16
Huddington	Wychavon District	397.53
Inkberrow	Wychavon District	2192.56
Kemerton	Wychavon District	673.43
Kenswick	Malvern Hills District	356.71
Kidderminster Foreign	Wyre Forest District	1429.42
Little Malvern	Malvern Hills District	290.00
Martin Hussingtree	Wychavon District	372.92
Naunton Beauchamp	Wychavon District	417.64

Parish	District	Area (ha)
North and Middle Littleton	Wychavon District	688.06
Oddingley	Wychavon District	350.11
Offenham	Wychavon District	451.80
Overbury	Wychavon District	514.51
Peopleton	Wychavon District	621.79
Pershore	Wychavon District	1142.26
Pinvin	Wychavon District	418.08
Pirton	Wychavon District	683.32
Powick	Malvern Hills District	2128.65
Rushock	Wyre Forest District	506.94
Salwarpe	Wychavon District	678.81
Severn Stoke	Malvern Hills District	1344.93
South Littleton	Wychavon District	329.92
Throckmorton	Wychavon District	616.01
Tibberton	Wychavon District	654.49
Tutnall and Cobley	Bromsgrove District	1731.50
Upton Snodsbury	Wychavon District	684.32
Upton Warren	Wychavon District	1002.39
Upton-upon-Severn	Malvern Hills District	1298.56
Welland	Malvern Hills District	764.26
White Ladies Aston	Wychavon District	498.94
Whittington	Wychavon District	419.37
Wichenford	Malvern Hills District	1211.28
Wick	Wychavon District	677.43
Wickhamford	Wychavon District	512.93
Wyre Piddle	Wychavon District	162.42

The total area of these parishes is which covers 30% of the county in area, see below:

Area	Hectares (ha)
Worcestershire	174051.60
Study area (64 parishes)	51861.02

Total area included in the study area, for each district, in Worcestershire:

District	Parishes	Area covered (ha)
Bromsgrove District	7	8551.27
Malvern Hills District	9	9036.35
Redditch Borough	1	1512.39
Wychavon District	44	28540.43
Wyre Forest District	3	4220.57
Total	64	51861.02

The study area did not include any area within the city of Worcester; it only covered areas where the volunteer earthwork survey had been undertaken.

Appendix II - Glossary

Abbreviation	Description
AONB	Area of Outstanding Natural Beauty
AP	Aerial photograph
BGS	British Geological Survey
CAD	Computer Aided Design software
CPD	Continuing Professional Development
CS	Countryside Stewardship
EIA	Environmental Impact Assessment
EngLaID	English Landscapes and Identities
ESRI	Software supplier for GIS software
GIS	Geographical Information System
Ha	Hectares
HBSMR	Software used for the HER database
HER	Historic Environment Record
HLC	Historic Landscape Character
LiDAR	Light Detection and Ranging
NMP	National Mapping Programme
SHINE	Selected Heritage Inventory for Natural England
SMR	Sites and Monument Record
TTP	Turning the Plough
TTP2	Turning the Plough 2 (update assessment)
WAAS	Worcestershire Archive and Archaeology Service

Appendix III - Training document for Volunteers

This guidance document was written to provide a guide for new people to the condition assessment project. It was used by both staff and volunteers while creating designation records to record the condition of any earthworks visible on LiDAR and/or aerial photographs.

It was written in advance of the project when some aspects were still only at the planning stage but has not been updated to reflect what actually happened as things changed while the project was in progress. It was found to be very useful although where HER records did vary slightly from 'standard' extra support was needed. It was impossible to cater for every eventuality in writing the document as it would have become far too large and complex to use.

The document gives background on using aerial photographs and LiDAR evidence in a GIS and links to further information about these. It described the process needed to log in to Worcestershire's HER and then described the process to follow to find the parishes allocated to each person (in the control shapefile), described the project layers in the GIS (outside the HER layers) as well as the HER layers to be used in the process. Using screen shots of the database and map screens the process is explained and the requirements for each record detailed.

The document also included the scope notes for the terms required in this project (the same as Table 2 in this report) and a glossary of terms, particular to using GIS and raster information, and to the HBSMR set up in Worcestershire.

Archive and Archaeology Service,
Worcestershire County Council

Archive and Archaeology Service,
Worcestershire County Council