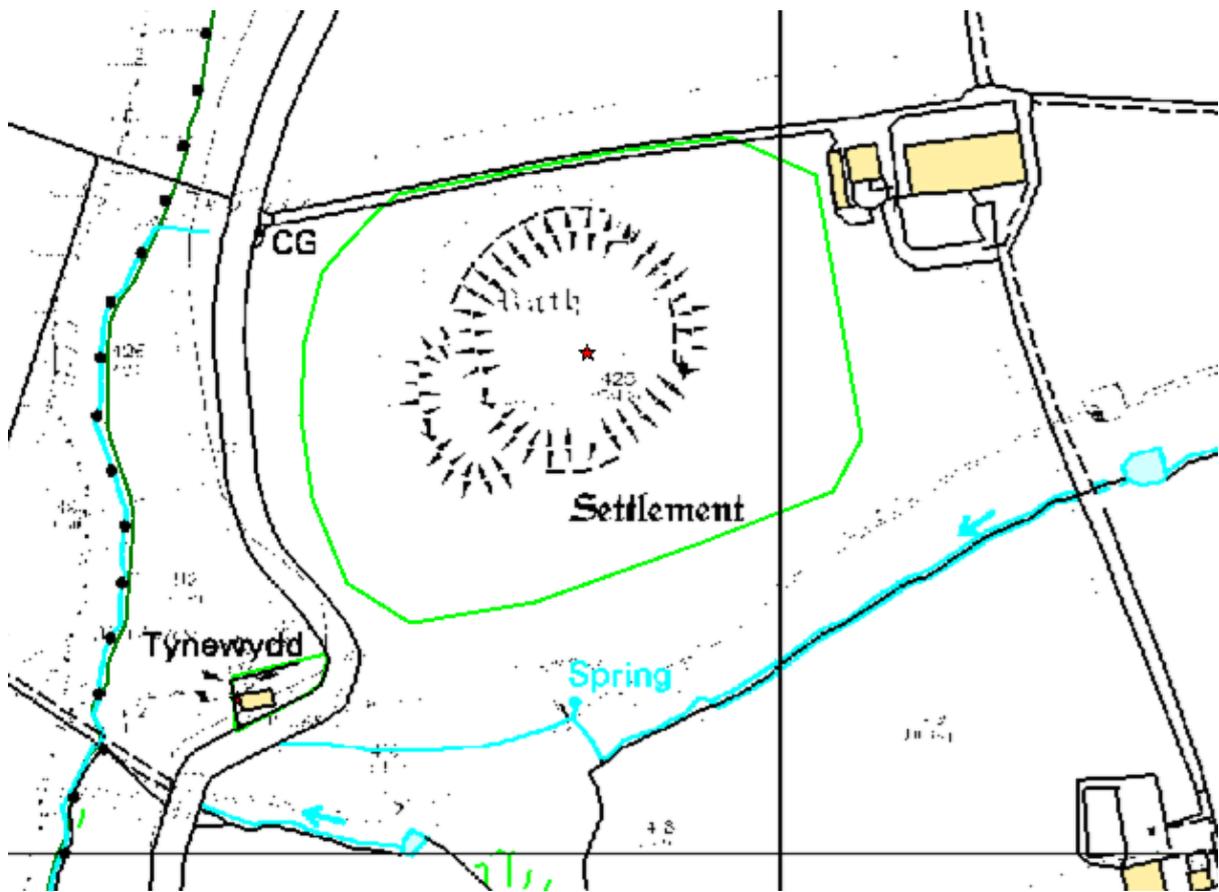


CREATION OF POLYGONAL DATA FOR THE HISTORIC ENVIRONMENT RECORD: PILOT STUDY



Prepared by:
Dyfed Archaeological Trust
For:
Cadw and Leader Pembrokeshire



ymddiriedolaeth archaeolegol
DYFED
archaeological trust

DYFED ARCHAEOLOGICAL TRUST

DAT Event Record No. 121725

Report No. 2020/20

Cadw Project No. DAT 11G

March 2020

CREATION OF POLYGONAL DATA FOR THE HISTORIC ENVIRONMENT RECORD: PILOT STUDY

By

F Sage

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**CREATION OF POLYGONAL DATA FOR THE HISTORIC
ENVIRONMENT RECORD:
PILOT STUDY**

Client	Cadw and Leader Pembrokeshire
Event Record No	121725
Report No	2020/20
Project Code	DAT 11G
Report Prepared By	Felicity Sage
Report Approved By	Ken Murphy 31.03.2020

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Cyllidwyd y prosiect hwn drwy Cymunedau Gwledig Llywodraeth Cymru - Rhaglen Datblygu Gwledig Cymru 2014-2020, a ariennir gan Lywodraeth Cymru a'r Gronfa Amaethyddol Ewrop ar gyfer Datblygu Gwledig

**CREATION OF POLYGONAL DATA FOR THE HISTORIC ENVIRONMENT RECORD:
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CRYNODEB GWEITHREDOL

Sefydlodd y prosiect peilot hwn y fethodoleg a'r gweithdrefnau ar gyfer creu polygonau digidol o safleoedd a henebion a gofnodwyd ar Gofnod Amgylchedd Hanesyddol Dyfed, gan dynnu ar practis gorau a ddatblygwyd mewn rhannau eraill o'r DU. Ar ôl sefydlu'r fethodoleg a'r gweithdrefnau, crëwyd 1025 o bolygonau ar gyfer safleoedd a henebion mewn 14 o ardaloedd cynghorau cymunedol yn sir benfro. Y bwriad yw parhau i greu polygonau ar gyfer yr holl safleoedd a henebion a gofnodir ar y cofnod amgylchedd hanesyddol.

EXECUTIVE SUMMARY

This pilot project established the methodology and procedures for creating digital polygons of sites and monuments recorded on the Dyfed Historic Environment Record, drawing on best practice developed elsewhere in the UK. Following establishment of the methodology and procedures, 1025 polygons were created for sites and monuments in 14 community council areas in Pembrokeshire. It is planned to continue creating polygons for all site and monuments recorded on the Historic Environment Record.

1 INTRODUCTION

- 1.1.1 Dyfed Archaeological Trust maintains and enhances the regional Historic Environment Record (HER), which is used for a variety of purposes including: as a basis for providing historic environment advice to a wide range of organisations and individuals; as a source of information on the historic environment for community groups, local history/archaeological societies, students, academics and anyone else with an interest in archaeology and history. Information is mostly held in digital format, with the core data made publicly available through the Archwilio website – www.archwilio.org.uk. This is a map-based database/website. However, a common criticism from users of the HER is that it is difficult to understand the geographic data, as it is 'point' data and not polygonal data. This means that a large monument, such as a hillfort, is represented by just a single dot on the map, and, due to the vagaries of grid referencing, this dot is not always over the monument. Ideally the full geographic extent of the monument would be shown as a polygon.
- 1.1.2 The Trust applied to Cadw and to Pembrokeshire Leader (administered by PLANED) for funding for a pilot project to assess the feasibility of volunteers with little or no experience of working on the HER creating polygonal data. These applications were successful. The application for the pilot was to create HER polygons for just three local council communities in Pembrokeshire.
- 1.1.3 This pilot project established the methodology and procedures for creating digital polygons of sites and monuments recorded on the Dyfed HER, drawing on best practice developed elsewhere in the UK. As part of the project, following establishment of the methodology and procedures, polygons were created for sites and monuments in 14 community council areas in Pembrokeshire.
- 1.1.4 Some polygonal data already existed, including that created for providing advice to the Glastir agri-environment scheme. Polygons created for Glastir are for management purposes, and although some were suitable for incorporation into the HER, many encompass multiple HER records and so were not suitable for inclusion. Other polygonal data includes those created for the current historic farmsteads project, which is expected when completed to generate over 10,000 polygonal records in the region.

2 METHODOLOGY

- 2.1.1 It was decided that Mapinfo Pro would be the best Geographical Information System software to use for this project as it allows for more intricate work than the GIS on the online Historic Environment Record. Many digital datasets can be accessed from within Mapinfo Pro, and this was the basis for the creation of our methodology.
- 2.1.2 A workspace was created on Mapinfo with the boundaries of all the communities in Pembrokeshire, the Historic Environment Records in point data, modern and historic mapping, and datasets of existing polygons such as Cadw scheduled monuments and polygons created as part of the agri-environment scheme Glastir.
- 2.1.3 The method in its simplest form was as follows:
- 2.1.4 A volunteer was given a community to work within and then systematically went through every HER point within that community boundary, creating polygons

where they could, using existing polygonal data and digital and physical historic maps.

- 2.1.5 The online HER was available to view on an additional screen so volunteers could access summaries and descriptions of sites, more modern mapping, and other helpful sources.
- 2.1.6 Polygons created were taken globally into online Historic Environment Record, each polygon replacing a point.
- 2.1.7 Emma Jones of the Trust started the testing of this methodology and identifying pitfalls and problems. She then produced a set of instructions for volunteers - having worked a way around the significant problem of attaching the metadata accurately to the polygon from the point, eliminating a large margin for human error. Using these instructions the method was tested by Ken Murphy, also of the Trust, who identified further problems with the process. A new set of instructions were then produced for volunteers to use.
- 2.1.8 In spring 2019, the Trust advertised all volunteer projects on their website and on social media. In addition, the advert was circulated among everyone on the DAT contacts database.
- 2.1.9 Fifteen people contacted us expressing an interest in the project; each was invited into the Trust's offices for an introductory meeting with the project officer. A total of nine volunteers were engaged, and after an introduction were trained in polygon creation and use of digital and physical sources including the online HER. Each was assigned a community to work within.
- 2.1.10 Between them the volunteers completed over 100 hours of work over 24 days.
- 2.1.11 The newly created digital polygons were globally updated to the online HER in March 2020.

3 RESULTS

- 3.1.1 Project volunteers created a total of 1025 polygons in 14 communities in Pembrokeshire. In addition Trust staff created polygons for Llawhaden and Wiston communities; these are not included in the overall figures.

Community	HER points	Polygons created	No polygons created
Ambleston	72	39	33
Puncheston	257	179	78
New Moat	124	51	73
Maenclochog	232	171	61
Llandewi Velfrey	228	118	110
Llandissilio West	76	40	36
Llanrhian	317	91	226
Spittal	55	25	30
Letterston	78	53	25

Scleddau	138	17	121
Wolfscastle	183	54	129
Clynderwen	244	25	219
Mathry	178	112	66
Mynachlog Ddu	232	50	182

Table 1: Communities worked on with number of polygons created.

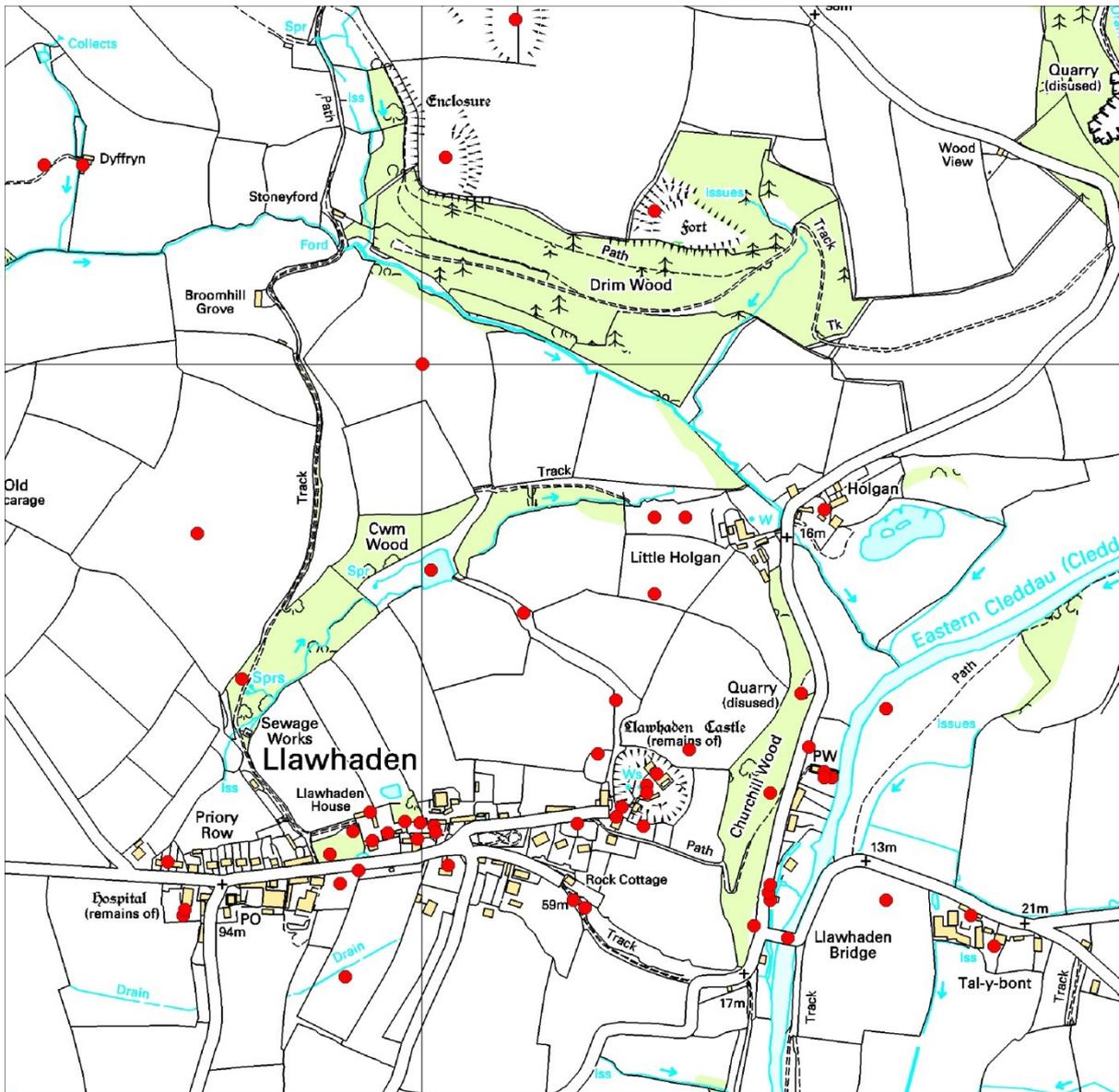


Figure 1: Part of Llawhaden Community showing HER points prior to the creation of polygons.

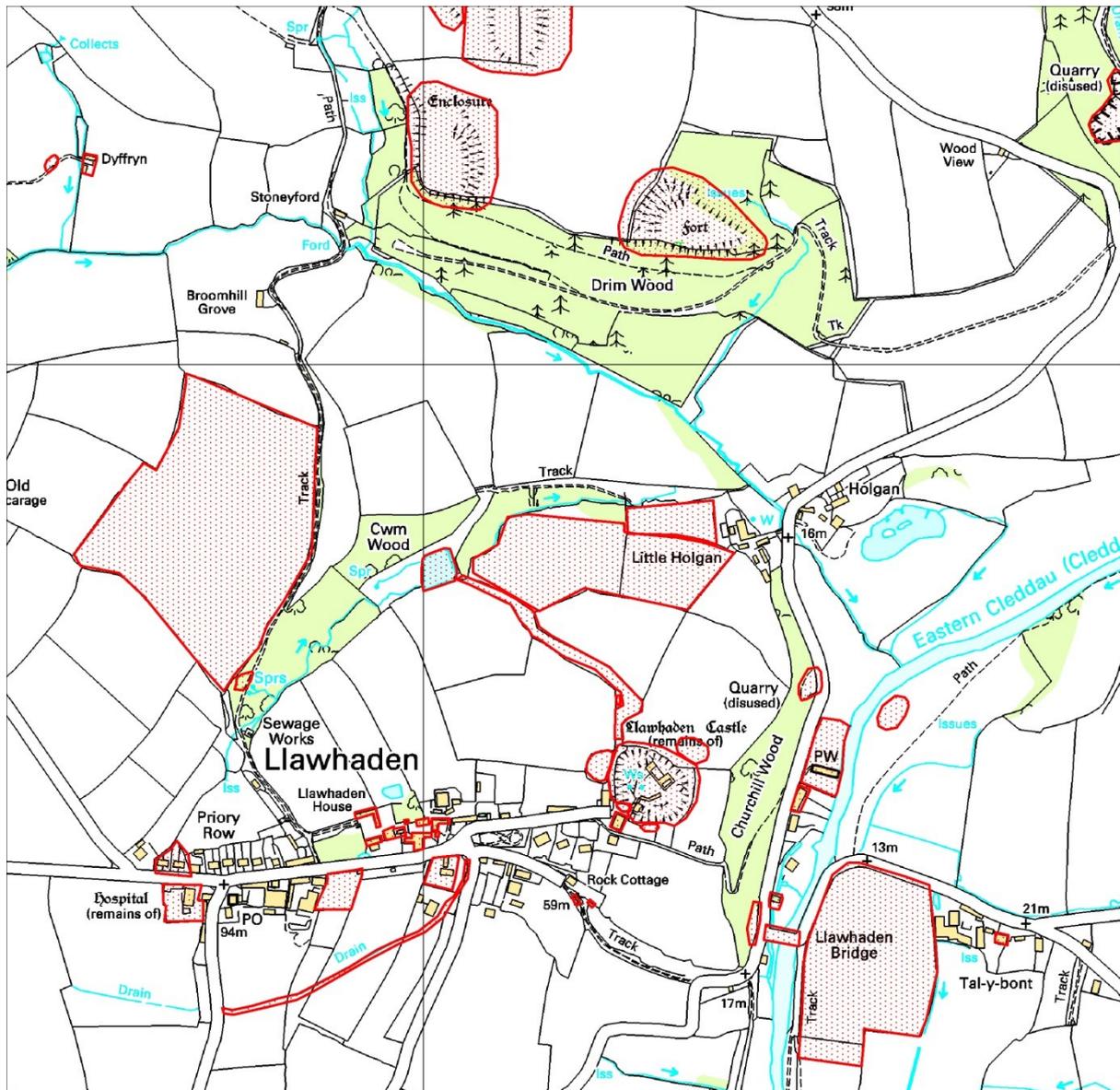


Figure 2: Part of Llawhaden Community showing HER polygons created. Note: it was not possible to create polygons for all sites.

4 PROBLEMS AND CHALLENGES

4.1.1 During the project both Trust staff members and volunteers found that for some types of site producing polygons was fairly straightforward but some types of site presented difficulties or were unsuitable for polygonization. For difficult sites judgements on an individual basis is often required, using the worker's experience and knowledge.

4.2 Site types with few issues

4.2.1 Sites shown on historic Ordnance Survey maps or modern maps, such as old quarries present few problems.

4.2.2 Scheduled monuments have legally defined boundaries. These are very useful, but for HER purposes the actual site limits may be wider than the legal boundary.

4.2.3 Extant buildings are fairly simple to define, but on occasions it may be necessary to decide whether it is just the building that is being defined or everything within its curtilage.

4.2.4 Polygons have been created for Glastir agri-environment schemes. These polygons often encompass more than one HER site and monument and so are of limited use. Care must also be exercised when using Glastir polygons as they were produced very quickly.

4.3 Sites types with one or multiple issues

4.3.1 Some HER records are based on documentary sources that cannot be assigned a precise geographical location. Primary research may provide precision, but generally it will not be possible to create polygons for this type of site.

4.3.2 Sites may have multiple HER records. For instance a church may have a record for the extant building, one for an early medieval dedication and one for an early medieval monument within the church.

4.3.3 Drawing polygons for sites with small physical presences can be problematic and in this pilot polygons were not drawn for them.

4.3.4 Place-names throw up multiple issues. Where, for instance, a tithe map records a field name of historic significance, such as 'Maen hir' then drawing a polygon around the field is an easy solution. However, it is not possible to draw a polygon for a place-name that refers to a large but ill-defined geographic area.

4.3.5 Descriptions on some HER records can be poor or absent and thus defining the extent of the site without further research is not always possible.

4.3.6 Grid references on HER records are not always accurate or are only of four or six figures. In many instances these can be easily rectified, but for some records research is required before a polygon can be created.

4.3.7 Some sites have duplicate records. If this is the case a polygon can be created for the primary site in consultation with HER officers.

4.3.8 Linear features such as railways canals, turnpike roads are problematic. In theory creating a polygon for such a feature should be straightforward, but it can be technically difficult to achieve.

Communities	Sites too small to draw polygons (Standing Stones, Wells, Findspots etc)	Sites with inaccurate locations	Placename / uncertain evidence for site	Other
Ambleston	7	5	5	16
Puncheston	43		3	32
New Moat	1	2	9	61
Maenclochog	28		1	32
Llandewi Velfrey	11		78	21
Llandilssilio West	7	6	10	13

Llanrhian	3	6	21	196
Spittal	4	1	14	11
Letterston	13		2	10
Scleddau	8	2	3	108
Wolfscastle	54	38	33	4
Clynderwen	3	1	1	214
Mathry	36	1	3	26
Mynachlog Du	28		7	147

Table 2: Site types for which no polygons were drawn by community. 'Other' comprises all the other difficulties encountered.

- 4.3.9 Initially, volunteers needed quite a lot of supervision, but after becoming familiar with the process they were able to work independently.
- 4.3.10 Due to the systematic nature of working through every site in a community volunteers were able to easily spot sites that had incorrect details recorded, and the HER officers were able to enhance those records with the correct information.

5 EVALUATION

- 5.1.1 This project was well received by most of the volunteers. They were happy to be involved and trained in the data management side of archaeology and were able to create over 1000 HER polygons.
- 5.1.2 The pilot study was originally designed for the creation of polygons in three communities in Pembrokeshire. The volunteers created polygons within 14. The methodology developed was shown to be successful, resulting in no loss of data.
- 5.1.3 It is clear that not all sites are suitable for polygonization. However, the vast majority of sites are. The resulting polygonal data is far more useful for site management and public dissemination than point data.
- 5.1.4 The Trust is planning to continue with this project. The cohort of volunteers who worked on the pilot are keen to return and complete the polygonization of the remaining sites in the 14 communities worked on to date, developing solutions to the problems identified. In addition, it is planned to start the lengthy task of polygonising all sites recorded on the HER, where it is possible to do so, uploading them to the online HER on a quarterly basis. Training needs to be provided to DAT staff to create polygons as part of their working practice.

6 ACKNOWLEDGEMENTS

- 6.1.1 The methodology was developed by Emma Jones. The testing was carried out by Ken Murphy. Steve Smith uploaded the final results onto the online historic environment record. Thanks are due to all the volunteers on this project for their enthusiastic participation.

7 SOURCES

7.1 Database

Dyfed Archaeological Trust Historic Environment Record housed with the Dyfed Archaeological Trust

RCAHMW Coflein Database: -<http://www.coflein.gov.uk>

Cof Cymru - National Historic Assets of Wales:

<http://cadw.gov.wales/historicenvironment/recordsv1/cof-cymru/?lang=en>

7.2 Cartographic

Ordnance Survey Mastermap

Pembrokeshire 1st edition 1:2500 Ordnance Survey map

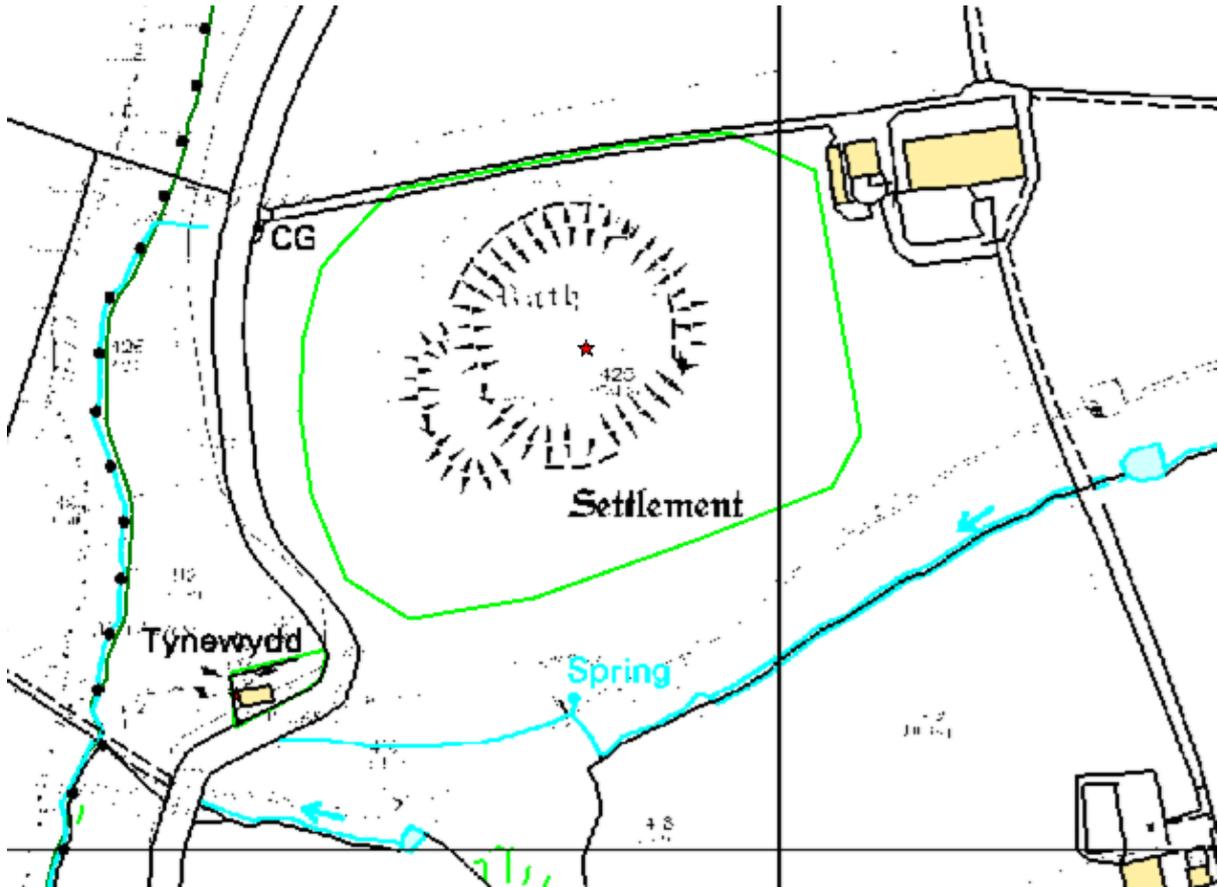
Pembrokeshire 2nd edition 1:2500 Ordnance Survey map

Pembrokeshire 1st edition 1: 6 inch Ordnance Survey map 1889

Pembrokeshire 2nd edition 1: 6 inch Ordnance Survey map 1906

APPENDIX A CREATION OF HISTORIC ENVIRONMENT RECORD POLYGONAL DATA – A GUIDE

A CADW AND LEADER PEMBROKESHIRE FUNDED PILOT STUDY



GLOSSARY

DAT	Dyfed Archaeological Trust
GIS	Geographical Information Systems
HER	Historic Environment Record
NGR	National Grid Reference
NMR	National Monuments Record
METADATA	Supporting information for the spatial/visual data
RASTER	Raster data is usually a static image made up of a set of pixels. When you zoom in or out too far the image can become unreadable.
SAM	Scheduled Ancient Monuments
VECTOR	Vector data is a database of points, lines or polygons that can be overlaid over a raster map. The features of these layers can be manipulated using a GIS, such as Mapinfo.

CREATION OF HISTORIC ENVIRONMENT RECORD POLYGONAL DATA

PROJECT DESCRIPTION

Dyfed Archaeological Trust (DAT) maintains and enhances the historic environment record (the HER) for the counties of Ceredigion, Carmarthenshire and Pembrokeshire. This is used by individuals and organisations to inform commercial archaeological work, and by history groups, academics and members of the public as an educational tool. Much of the data is stored as points within digital mapping software (known as GIS- Geographic Information Systems). This is sufficient for some small archaeological sites, but does not adequately portray the extent (and shape) of a site.

This project aims to establish a methodology for the creation of polygonal data for sites and monuments recorded on the HER, and then to create polygons on GIS for incorporation into the HER database for sites in three communities in Pembrokeshire, so we can see the extent and shape of the sites in question. A report will be produced describing the pitfalls and achievements of the project, and if deemed successful this methodology will be applied to the rest of our monument data.

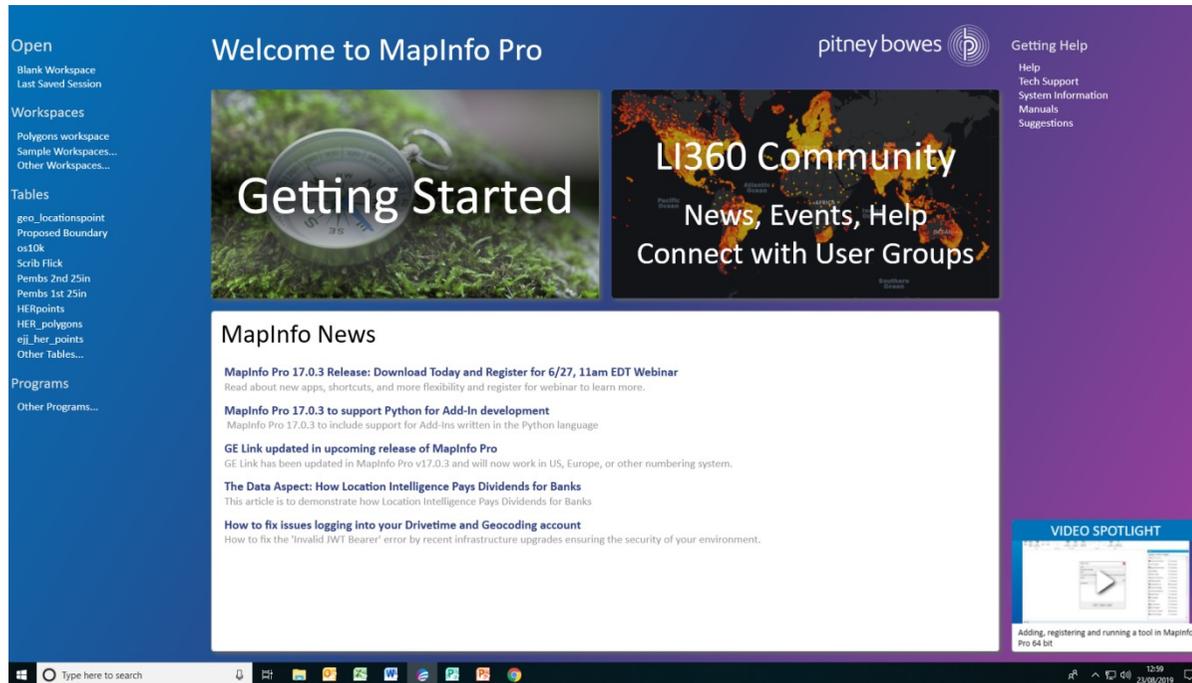
We will be creating the polygonal data in a geographical information system software package called Mapinfo Pro. In order to create the polygons we will need to consult sources in order to ascertain the extent and shape of said polygons.

For this we will be using a number of sources including:

- The online DAT Historic Environment Record
- Historic and current ordnance survey maps
- Tithe maps
- Record maps
- The National Monuments Record (NMR)
- Aerial photographs
- Grey literature reports
- Existing polygonal datasets

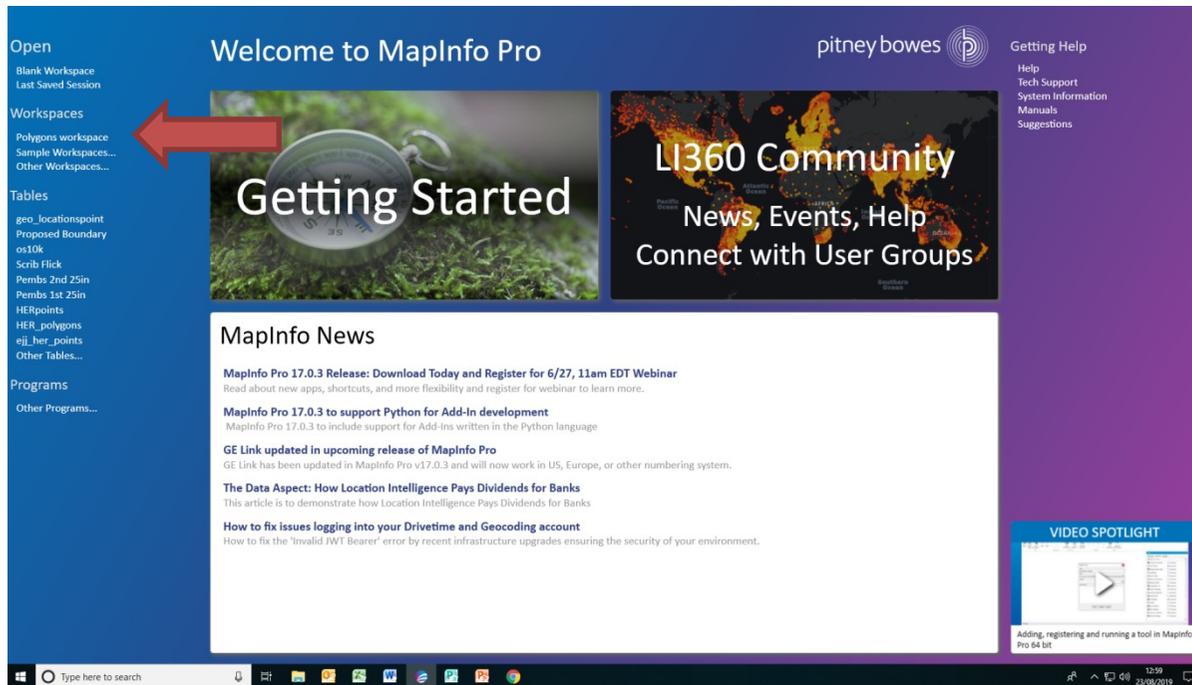
These datasets are varied, and used for different purposes. You will be trained in how to use each of them to help you decide the extent of your polygon.

We will be creating our polygons in a GIS software program called Mapinfo Pro (pictured below). This program allows us to view, analyse and manipulate datasets.



A workspace has been created with all required datasets for this project stored in the volunteer folder on the network. The data comes in two forms known as RASTER and VECTOR. A raster map is a static image made up of a set of pixels. When you zoom in or out too far the image can become unreadable. Vector data is a database of points, lines or polygons that can be overlaid over a raster map. The features of these layers can be manipulated using a GIS, such as Mapinfo. They are also zoomable.

To open your workspace open MapInfo Pro (pinned to your taskbar at the bottom of your screen) and click on blank workspace.



This will open a window to the volunteer project folder. Click on Polygonisation project, and then your workspace.

This will open several layers, both raster and vector.

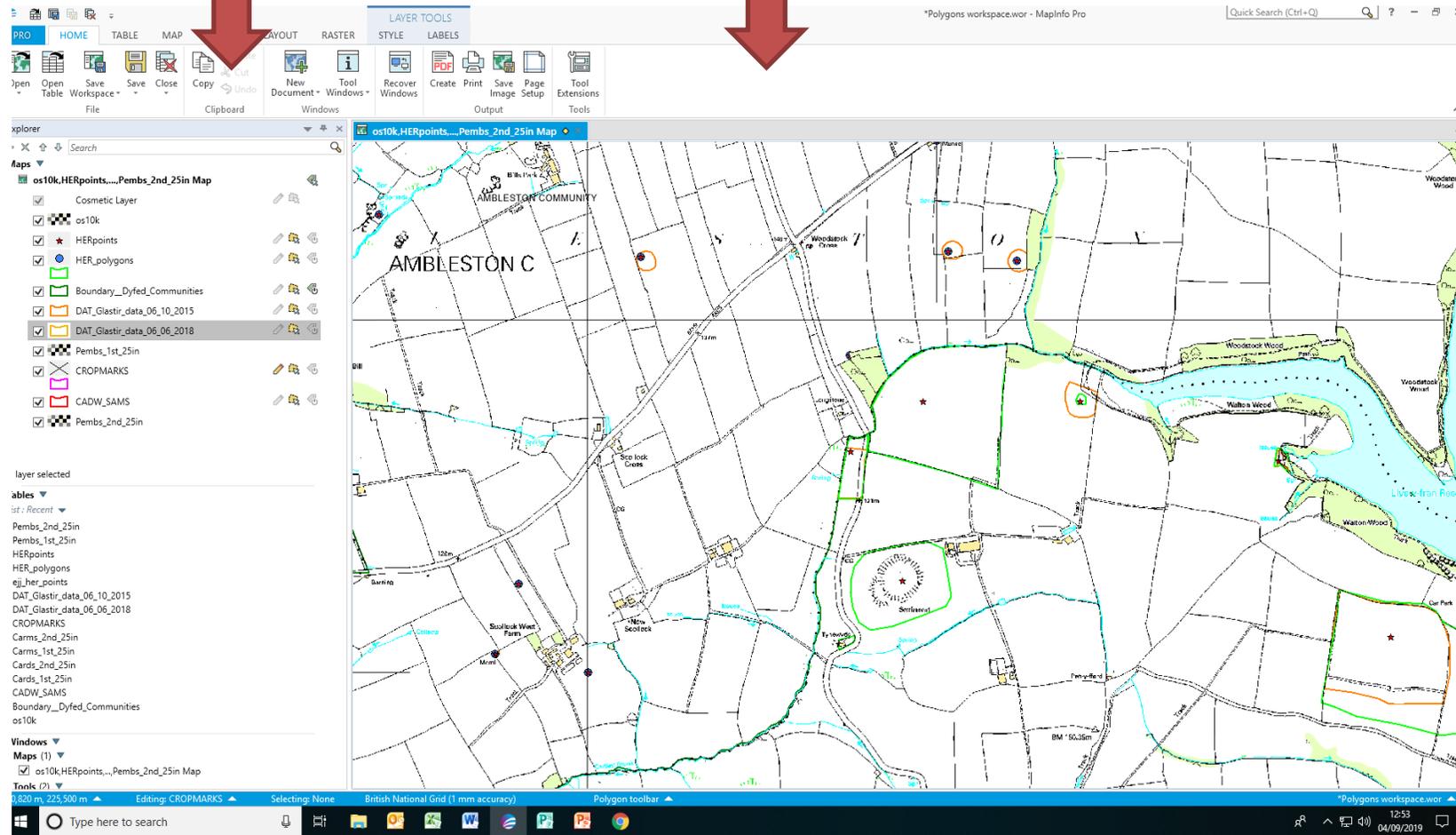
The workspace will consist of a number of layers. They are as follows:

HERpoints	This is a layer consisting of point data and supporting metadata
HER_polygons	This is the layer in which we will be creating polygons
DAT_Glastir_data_06_10_2015	This layer comprises management areas featuring one or more historic environment feature. We will only be using this layer if the metadata includes a PRN.
DAT_Glastir_data_06_06_2018	As above
CROPMARKS	This layer features cropmarks of probable Iron Age date derived from aerial photography
Cadw_SAMS	Boundaries of the scheduled monuments dataset maintained by Cadw
Boundary_Dyfed_Communities	Boundaries of communities in the counties of Carmarthenshire, Ceredigion and Pembrokeshire
Pembs_1st_25in	This is a seamless map of the 1 st edition Ordnance survey map of Pembrokeshire at a 1:2500 scale, published in 1889
Pembs_2nd_25in	This is a seamless map of the 2 nd edition Ordnance survey map of Pembrokeshire at a 1:2500 scale, published in 1907
OS10k	The modern ordnance survey 1:10000 seamless map. This is a raster layer.

You can view these layers by clicking on the **explorer** tool either on the taskbar at the top, or by right clicking on an HERpoint, opening your toolbox and clicking on your explorer tool.

Explorer Panel
Your layers will be shown here

Map Panel
Your map and spatial data will be shown here



Next to each of your layers are the following three icons.



This icon allows you to edit polygonal and line data. You will need to select this to make the **polygons** layer editable in order to draw your polygons.

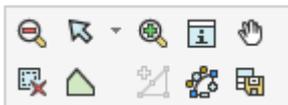


This icon allows you to select polygonal, point or line (vector) data.



This icon allows you to label point, polygonal or line data with PRN, Name, or any other field title that can be used to identify a site.

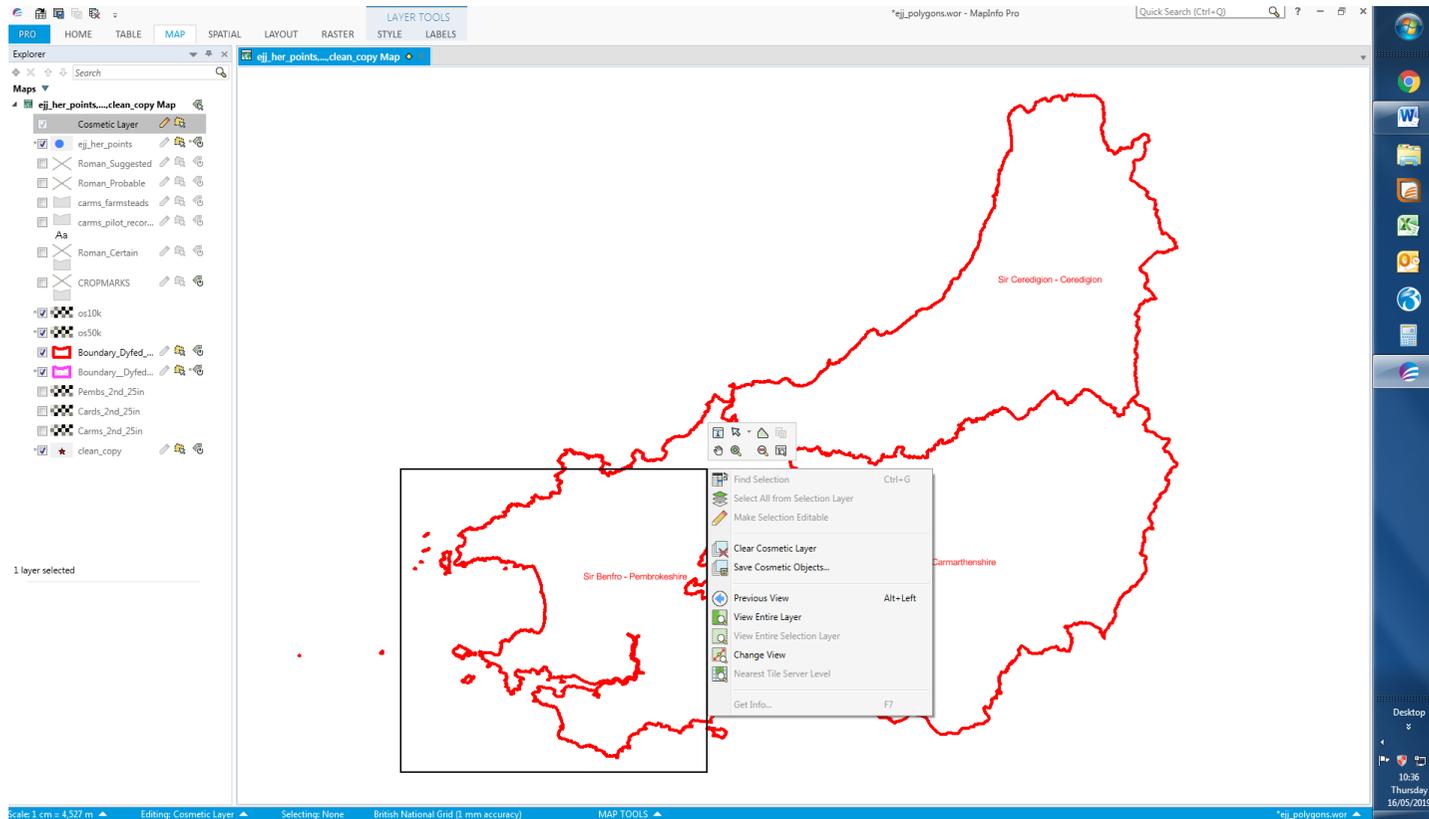
You will also be given a toolbox containing the following icons. You can access this by right clicking anywhere on the map.



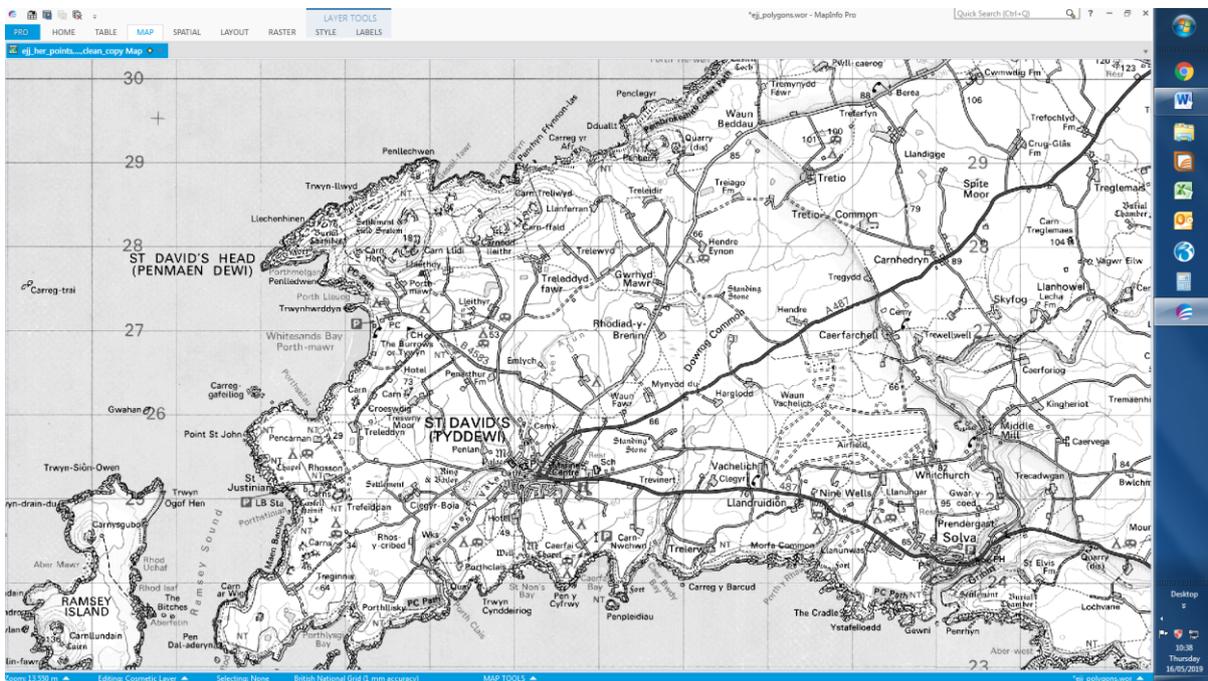
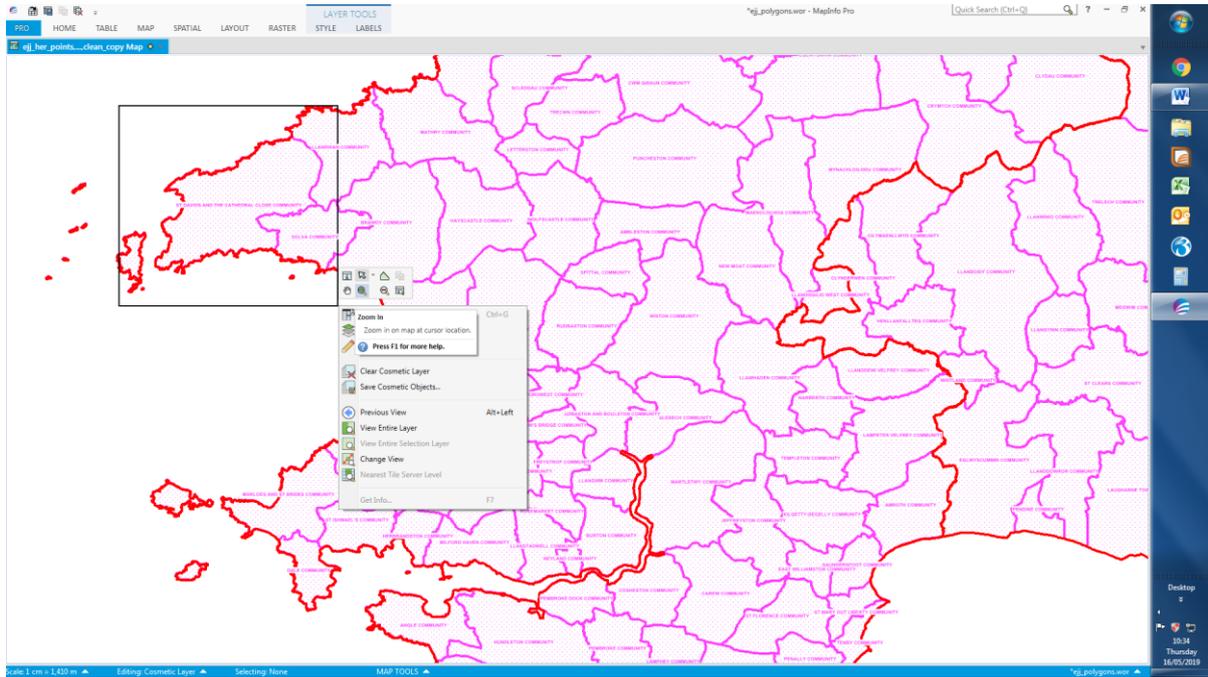
We will be creating polygons for archaeological sites in the following communities: **New Moat, Ambleston and Spittal.**

There are different ways of getting to the area or place on which we have decided to focus:

Using the mouse and **zoom in** icon. You will use your mouse to click and then drag a box area to zoom, or use a simple mouse click. You will find either of these methods useful at different times but it doesn't matter which you use.



Creation of polygonal data for the Historic Environment Record



- Typing in a national grid reference using the **Change View**  box.
- Using the **Find Address**  (this doesn't need to be a postal address!) box

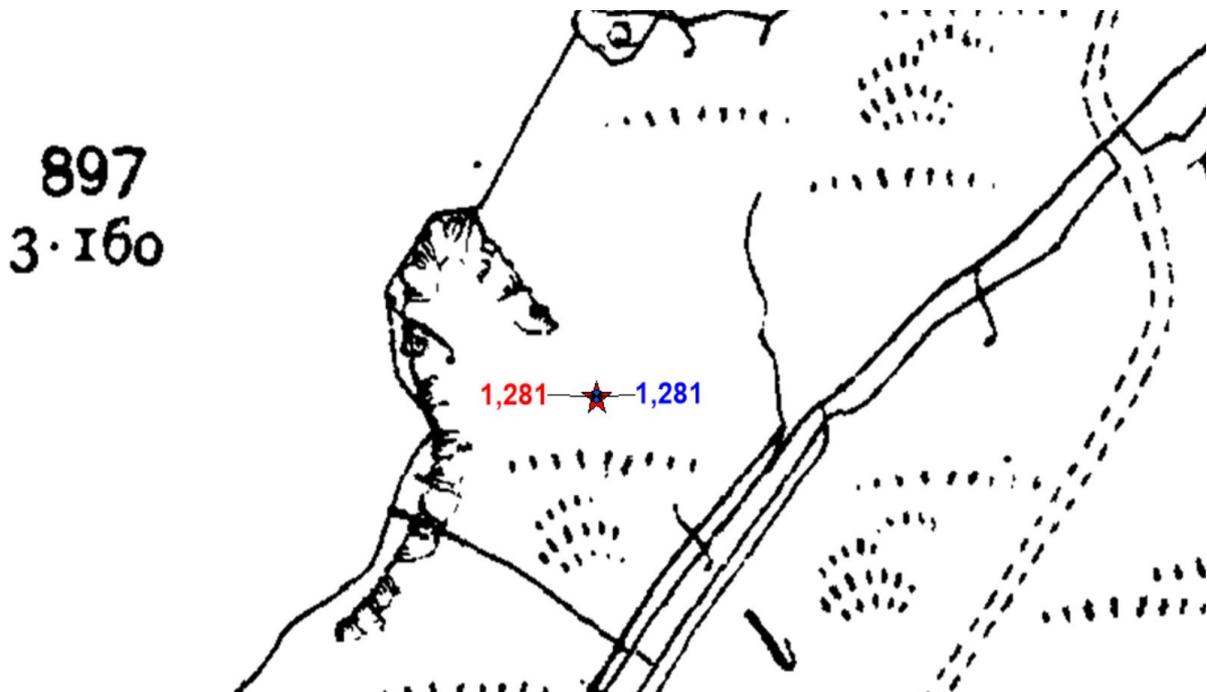
The project manager will instruct you in how to use the **change view** tool to

find your community. Alternatively you can use the **pan** tool  to move the map around.

The layer in which we will be creating polygons is the one called HER_polygons.

To do this you will need both HERpoints and HER_polygons visible and

HER_polygons will need to be editable  and have the labels showing the PRNs of both points. These labels should be identical.

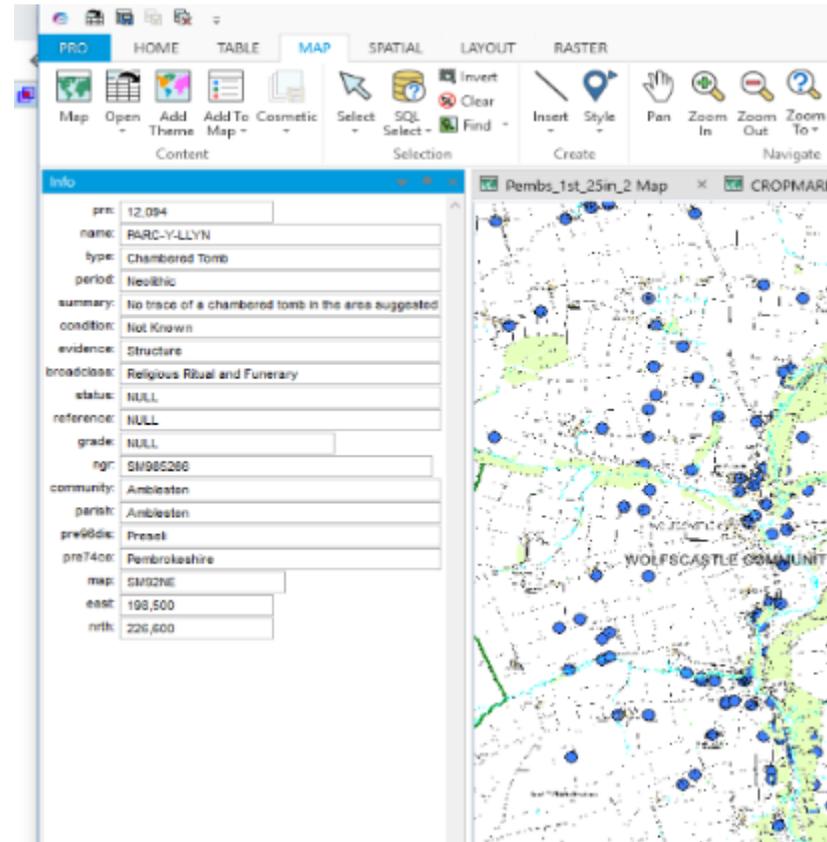


To draw your polygon...

IT IS ESSENTIAL THAT THESE NEXT STEPS ARE UNDERTAKEN IN ORDER

- Right click on the point in the HER_polygons layer (shown with the blue dot ) you want to draw a polygon for.
- Select the point.
- Bring up your toolbox and select **clear map objects**. 
- The blue dot should disappear. Select the polygon drawing icon  from your toolbox and start drawing your polygon, making sure you click in every corner.
- Right click to bring up your toolbox and select the information tool 
- Click away from your polygon area, then inside it. The record information should reappear in your information panel on the left hand side of the screen.

The record information should reappear in your information panel on the left hand side of the screen.



Check that it matches the record information for the HERpoint.  Right click inside the polygon you have just created and select save table  .

