



Lowland Cornwall: the Hidden Landscape

Volume Three

Historic Landscape Characterisation

Historic Environment Projects

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Historic Landscape Characterisation

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The views and recommendations expressed in this report are those of Historic Environment Projects and are presented in good faith on the basis of professional judgement and on information currently available.

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Abbreviations

BAP	Biological Action Plan
CC	Cornwall Council
CRO	Cornwall Record Office
EH	English Heritage
GIS	Geographic Information System
HEAP	Historic Environment Action Plans
HER	Historic Environment Record
HES	Historic Environment Service
HLC	Historic Landscape Characterisation
ICS	Institute of Cornish Studies
NMP	National Mapping Programme
OS	Ordnance Survey
SMR	Sites and Monuments Record

Summary

Cornwall's lowland areas probably have the highest archaeological potential in the county, but are poorly understood and increasingly subject to the impacts of major change in land use and development. The lowland Cornwall project attempts to address this issue by developing a method for predictive modelling of the lowland prehistoric and Romano-British landscape. The models produced by the project will better inform future management and land use decisions.

The project consisted of four stages: preparation of datasets and high level predictive models; deepening or refinement of Historic Landscape Characterisation (HLC); further analysis of the archaeological resource and the preparation of predictive models using the refined HLC; and the presentation of final results.

This report is the third of four volumes presenting the results of the Lowland Cornwall project. It presents the results of the production of 384 square kilometres of refined HLC mapping for lowland Cornwall in four study areas located in distinct parts of Cornwall: Probus, Penwith, Pelynt and Poundstock.

The report includes a general introduction to HLC, outlines the Lowland Cornwall method of HLC refinement, provides an analysis of the results for each study area, gives a critique of the Lowland Cornwall method, and makes recommendations for the future development of HLC in Cornwall.

The appendices include descriptive texts for each refined HLC Type and the metadata for the refined Lowland Cornwall HLC and accompanying 'Historic Settlement' dataset.

1 Introduction

1.1 Project background

Cornwall's lowland areas probably have the highest archaeological potential in the county, but are poorly understood and increasingly subject to the impacts of major change in land use and development. The Lowland Cornwall project attempts to address this issue by developing a method for predictive modelling of the lowland prehistoric and Romano-British landscape. Predictive models will better inform future management and land use decisions and increase confidence in responses to development proposals in areas where the Historic Environment Record (HER) currently shows no below-ground features. The method may also have the potential for application in other parts of the country.

The project comprises an appraisal of currently available data from a range of sources in order to develop models of past land-use, settlement patterns and landscape development. Whilst the primary aim is to indicate areas of high archaeological potential, at the same time it addresses key research agenda and contributes towards developing our understanding of historic landscape character.

The idea for the project was developed from a series of discussions with the County Archaeologist and other senior officers within Historic Environment, Cornwall Council (HE), and with the English Heritage South West regional and Characterisation teams. The project was commissioned by English Heritage (EH) following the submission of a project design in early 2009 (Young 2009).

1.2 Aims and objectives

1.2.1 Aims

1. To demonstrate the potential and significance of below-ground archaeology in lowland Cornwall, in particular to develop a better understanding of the extent and character of the prehistoric and Romano-British landscape. This improved understanding will better inform both development control and management and land use decisions in lowland Cornwall, the latter by highlighting those areas with high archaeological potential and thus higher priority in terms of most effective targeting of agri-environment schemes and other landscape-scale management initiatives. On a strategic level the better understanding and predictive modelling resulting from the project will provide a more meaningful context in which to specify the scope of future PPS 5 work and to assess the results of such work.
2. To define models for prehistoric settlement patterns and landscape development in lowland Cornwall and by exploring the relationship between these patterns and the early medieval and medieval patterns of settlement and land use, gain a better understanding both of the development of Cornwall's early society and economy and of the character and patterning of the county's buried archaeological remains.
3. To test and review interpretations of the development and potential of historic landscape character types.

1.2.2 Objectives

1. To review currently available HER, National Mapping Programme (NMP) and Events Record data. In particular to examine the range of settlement types, evidence for field systems and land use, and evidence for phasing and change.
2. To propose models for prehistoric settlement patterns and landscape development by linking the results of this review with Historic Landscape Characterisation (HLC) data to identify patterns in settlement distribution, in the spatial relationships between settlements and field systems, and in the relationships between areas of intense activity and areas which are apparently blank.

3. To review current interpretations of the development and potential of historic landscape character types by better defining the extent of Anciently Enclosed Land and Recently Enclosed Land HLC Types.

1.3 Report layout

The project comprised three distinct stages and generated an enormous amount of data. In order to present the results of the project in an accessible format, the final report is published as four separate volumes.

1.3.1 Volume 1

During stage one data for selected site types was extracted from the Cornwall HER and correlated with the existing HLC Types in order to identify recurring distribution patterns and to create high level predictive models. Volume 1 presents the outcome of this work, describing the methodology used to create the models, the results of the modelling and a discussion and set of conclusions drawn from this research. Volume 1 also outlines the background to, and scope of, the whole project.

1.3.2 Volume 2

Also during stage one an assessment was made of the extent to which non-archaeological factors, such as soils and geology, may influence known distribution patterns of below-ground archaeology. Further high level models were built based on correlations between site distribution and geology and soil types. The distribution of geology and soils was then joined with the pattern of aerial reconnaissance in Cornwall to produce a visibility map showing where below-ground archaeology is most likely to occur and where it is most likely to have been identified and recorded. More than half of the rounds and enclosures in lowland Cornwall are recorded as cropmarks and additional models were made based on the correlation of their distribution with that of soil and geology types for comparison with the models for cropmarks generally. Further research was carried out into rounds and enclosures by combining soil and geology types with HLC Types and correlating these combinations with the distribution of rounds and enclosures to create combined models. Volume 2 presents the results of this research.

1.3.3 Volume 3

Stage two involved refining or deepening HLC in four selected study areas, Probus, Penwith, Pelynt and Poundstock. The HLC refinement comprised a more detailed HLC analysis than that carried out for Cornwall in 1994. Specifically, some of the existing HLC Types prescribed in 1994 were further broken down into sub-types, characterisation carried out for a number of time slices and assessment undertaken at a larger scale. There were also further differences in the HLC methodology due to the specific requirements of the Lowland Cornwall project; i.e. to test the current ability of HLC to be used as a predictive model for buried prehistoric archaeology. The results of HLC refinement are presented in this volume. This report contains sections providing a general introduction to HLC (Section 2), the Lowland Cornwall method of HLC refinement (Section 3), the analysis of the results on a study area basis (Section 4), further discussion of the method, and recommendations for the future development of HLC in Cornwall (Section 5). Appendices include descriptive texts for each refined HLC Type and the metadata for the refined Lowland Cornwall HLC and accompanying 'Historic Settlement' dataset.

1.3.4 Volume 4

Stage three involved building predictive models based on correlations between site distribution and the refined HLC Types and sub-types, to see whether more accurate and precise models could be achieved using the refined HLC. A detailed analysis of the sites within each study area was also produced. Volume 4 presents the results of this work and contains the overall conclusions arising from the project.

1.4 General introduction to Historic Landscape Characterisation

1.4.1 Mapping

Historic Landscape Characterisation was developed to give a landscape-scale overview of the history of the present landscape and the general processes that have helped to form it. It is part of a larger European-wide movement to create a planning environment that understands change at a landscape level rather than that of site specific designations. It aspires to be simple and generalised in application and appreciation, though it has the flexibility in its method to contain more detailed information.

Every part of the project area is mapped without bias to certain localities. The use of Geographic Information Software (GIS) is now an integral part of HLC assessment. Across an entire area, and usually at a regional scale, broad patterns of similar landscape are grouped into parcels of similar 'character' or 'Type', defined by recurring historic attribute values (features) and shared 'time-depth'. Common, widely available sources (historic maps and aerial photographs for example) and further supporting evidence (county Historic Environment Records - HER) are normally used to inform the judgment process.

A guiding principle behind HLC is to focus on the historic components of the present landscape. However, HLC can also be used to produce 'snapshots' of activity in past periods or 'time-slices'. A primary objective of the HLC methodology is for the assessor to identify the dominant types of character or activity. Historic Landscape Characterisation is not focussed on plotting the exact extent of land use, especially at its higher (simpler) levels of characterisation (e.g. Broad Type), although it has some flexibility in its method to record more complex information (Clark *et al* 2004, 9).

Cornwall's was the first countywide HLC, carried out in 1994 (Cornwall County Council *et al* 1994; Herring 1998). The method used was 'prescriptive' or 'classification-led', whereby areas of land were assigned to a pre-defined character Type on the basis of attribute values (e.g. the line of field boundaries, the size and shape of fields, and the regularity of field patterns) shown on modern map data with other supporting evidence used to casually confirm definitions (settlement place-names for example). In the 1994 characterisation Cornwall's HER was not used as supporting evidence.

Since 1994 other countywide mapping has been undertaken but with differences in methodology. A 'descriptive' or 'attribute-led' approach was used in the Lancashire, Herefordshire and Somerset HLC projects (Aldred and Fairclough 2003; Clark *et al* 2004). In this method it is only after the mapping stage is completed across the entire project area that character Types are identified by data grouped from the statistical analysis of attribute values.

There are both advantages and disadvantages to the prescriptive and descriptive methods, and in 2002 the *HLC Method Review* concluded that a combined prescriptive/descriptive method was best for future practice. The review demonstrated that the descriptive attributes could be used to support the prescriptive classifications in terms of differences in the attribute values, and that some flexibility in the groups of values could be accepted to allow for the complexity of the landscape, the project aims and for further reassessment (see Aldred and Fairclough 2003 for full discussion)..

Past HLC revision projects have also varied in their approach due to differences in project objectives and the availability of data sources. In Cornwall, the small-scale Lynher Valley and Caradon Hill area HLC projects were designed to better understand landscape change to help inform future management proposals. To enable this, HLC mapping with a full range of attribute values was undertaken for past 'time-slices' using historic mapping, including First Edition 1:25-inch Ordnance Survey (OS) mapping and Tithe maps (Herring and Perry-Tapper 2002; Tapper and Herring 2005).

More recently, countywide HLC projects have also sought to better understand and map landscape change. However, unlike the method developed by Lowland Cornwall none on a regional basis have employed time-slices of mapping with full descriptive attributes for each period available (Peter Herring pers. comm.). Instead available historic maps and Sites and Monuments Record (SMR) data are checked and a 'time-line' created for each individual parcel of HLC Type mapped. For example, in the South Yorkshire HLC a time-line was created for each polygon with an interpretation given for certain dates e.g. cAD1400 and cAD1600.

A further development in the production and use of HLC in Cornwall since 1994 has been the introduction of GIS software. This has enabled the HLC mapping to be informed by a greater range of sources, and characterised with a greater range of supporting descriptive attributes which allow it to be queried in a greater range of ways.

1.4.2 HLC explanatory and descriptive texts

Aldred and Fairclough's 2003 *HLC Method Review* (2004) highlighted the need for simple explanatory texts or 'narratives' to accompany HLC mapping to help introduce users to each HLC Type, especially those not familiar with HLC, and to summarise overarching management recommendations and synthesis.

The 1994 Cornwall HLC method had piloted this with accompanying explanatory texts for each Type (Cornwall County Council *et al* 1994). The texts were general statements and were intended to be accessible, drawing out key attributes, an outline of the historical processes, interactions, summarising survival and value, potential forces for change and how these issues might be managed. In the absence of attribute detail the 1994 texts were written with no reference to statistics and no defined list of key attribute values. Herring's 1998 review of the original Cornwall method did not revise the 1994 explanatory texts.

In the past, HLC texts avoided ascribing absolute values to any HLC Type, so that one Type is not considered inherently more important than any other. However, in 2009 when Peter Herring undertook a partial revision of Cornwall's 1994 text an attempt was made to define value for each Type to help better guide future change. This was in part driven by his role as part of English Heritage's HLC team, and also to how the texts for each type could be changed to consider value in terms of 'Evidential', 'Historical', 'Aesthetic' and 'Communal' (for full principles, see English Heritage 2008).

1.4.3 Uses of HLC

Historic Landscape Characterisation is seen as a flexible method that can be put to many uses.

A key intended use was to help support planning archaeologists in their decision making and to provide a framework for the development of broader landscape management strategies.

It is envisaged that HLC can be used to help inform decisions on whether to support, request alteration to, or look for a refusal of a planning application; to support planning archaeologists placing conditions for archaeological mitigation to be carried out during a development; and to support the work of Historic Environment Countryside Advice officers in agri-environment scheme applications.

In Cornwall, the use of HLC in the planning process has been pushed further than elsewhere. It has been used as a way of trying to predict the potential for buried prehistoric archaeology where existing HER data is scarce (hence the need for Lowland Cornwall to statistically test this hypothesis). And in a further development of this hypothesis, HLC has been used more recently to inform pre-planning strategy documents to help guide developers of renewable energy developments (Tapper and Herring 2010a; 2010b).

It has also been used to inform broader landscape strategies. Cornwall was a pilot area for the development of Historic Environment Action Plans (HEAPs). These are the equivalent of a Biodiversity Action Plan (BAP) and can use HLC Types as the basis to outline broad management items and strategies for heritage assets. They were developed by Peter Herring, the original architect of HLC, whilst working for English Heritage's Characterisation Team. HEAPs have begun to be used by a number of Areas of Outstanding Natural Beauty (AONB). These use HLC as their primary framework but some also bring in further supporting evidence in terms of HER data (Peter Herring pers comm.). More recently a HEAP targeting the rough ground in west Cornwall was published with bullet point sections covering the key components of the rough ground, its development, statements of significance, forces for change, the effects of change and a final list of objectives and targets (Herring and Kirkham 2011).

Cornwall-wide HLC mapping is also used as a backdrop to Historic Environment Record (HER) and provides useful further context to help interpretation. In its broadest, most simple form (e.g. Broad and HLC Type), HLC mapping has been used to explain the wider context of the historic landscape to non-archaeologists, especially farmers, land owners, property managers and consultants in the environmental sector, so that they can hopefully help to better manage heritage assets.

Again in its most simple form Historic Landscape Characterisation forms a core component of the Historic Environment reports produced by Cornwall Council's Historic Environment Countryside Advice (HECA) archaeologists for farms, properties and blocks of common land that are entered for the Department of Environment, Food and Rural Affairs' (DEFRA) Higher Level Stewardship agri-environment schemes.

HLC mapping can also form one of several building blocks that contribute to the appreciation of an area's broader 'Historic Characterisation' and/or its 'Landscape Character'. These notions of character differ from HLC as they are specific and location-based. They try to understand a geographical locality, what features make it unique, what gives an area its own sense of place and what makes it different from other areas.

Planners and Local Plans make use of Landscape Character mapping to help guide development and support decisions made regarding change (planning applications). Their supporting texts and information are written to help inform planning decisions, to underpin planning policies, and to encourage positive change (in terms of existing Landscape Character) in the landscape (Swanick *et al* 2002).

2 Lowland Cornwall HLC methodology

The following section is an accessible summary of the project's HLC method: it explains the background to the 1994 method in Cornwall, the development of the Lowland Cornwall approach to HLC mapping, its HLC structure, the issues encountered during the HLC work stages, and explains the focus of the accompanying descriptive texts.

For a breakdown of the Lowland Cornwall HLC Types, HLC fields and attribute values, and the summary of the relevant metadata see Appendix 9 for details.

2.1 Aims: Modelling and the need for a refined HLC

Since the 1994 HLC was completed for Cornwall it has become generally accepted by archaeologists that Medieval Enclosed Land HLC Type, and where it survives, Prehistoric Enclosed Land HLC Type (together referred to as the zone, 'Anciently Enclosed Land'), correlate with the later prehistoric and Romano-British farming heartland (e.g. Johnson 1998). This inference was first stated by Peter Herring in his explanatory texts for Anciently Enclosed Land following the completion of the 1994 HLC (Cornwall County Council *et al* 1994, 140).

The Lowland Cornwall project aimed to test this assumption with high level inductive modelling. Usually, inductive predictive models seek to correlate archaeological data against elements of the physical landscape (e.g. elevation, geology, etc), however, Lowland Cornwall aimed to test the correlation between archaeological sites and HLC (Young 2009, 30-31).

In the first stage of the project, existing HLC Types from the mapping undertaken in 1994 were correlated against archaeological datasets, and high level predictive models produced.

For the second stage a refined HLC was produced for a total of 384 square kilometres spread throughout four study areas in different parts of Cornwall; Probus, Penwith, Pelynt and Poundstock.

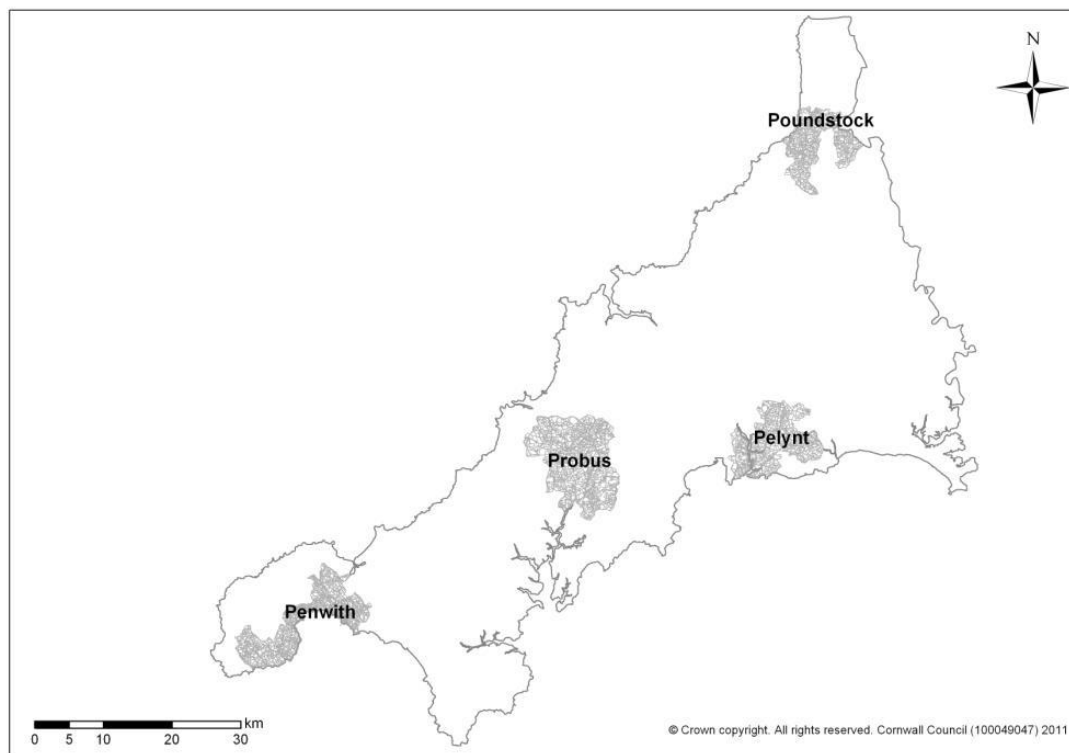


Fig 1 Lowland Cornwall study areas

The refined HLC was produced as a project focussed HLC to test the results of predictive modelling and differs from the 1994 HLC in its greater level of detail and accuracy of assessment produced using GIS. This was necessary because the 1994 HLC was undertaken rapidly on paper maps at 1:50,000 using a reduced version of the OS 1:25,000 map published at that time (Herring 1998, 16). The 1994 HLC was later transferred by the Cornwall HER team from paper maps to GIS as it was originally mapped i.e. in an unrevised state.

A greater definition of the landscape was also required to test if certain archaeological features occurred in greater or lesser numbers in certain types of Medieval and Prehistoric Enclosed Land; for example, to detect potential differences and similarities between areas of former medieval cropping units and former strip fields.

Due to the aims of the Lowland Cornwall its HLC is project focussed. No reference was made to supporting HER data as this would have invalidated the predictive modelling aspect of the work.

It was envisaged that the Lowland Cornwall HLC could help contribute towards the future methodology of countywide HLC mapping in Cornwall.

2.2 Structure

Historic Landscape Characterisation is hierarchical. At the top of the Lowland Cornwall HLC sits a 'Broad Type' with increasing levels of complexity beneath it. Broad Type is sub-divided to form a more specific 'HLC Type'; and within 'Enclosed Land' this can be further sub-divided to a detailed 'Sub-Type' level, defined by a complex set of attribute values. An example from the Lowland Cornwall project:

Broad Type:	Enclosed Land (simple set of attribute values)
HLC Type:	Medieval Enclosed Land (moderately complex set of attribute values)
Sub-Type:	MD derived from Cropping Units (complex set of attribute values)

The ways by which previous HLC projects have been undertaken have varied in different areas (see Section 2.1.1). This variability is partly due to differences in objectives, but is also the result of changes to HLC methodology as it has developed. At present there are no definitive guidelines to which an HLC project should adhere, although English Heritage is currently devising a more standardised format (Peter Herring pers. comm.).

2.3 Method

The Lowland Cornwall HLC method was outlined in the project design. Four work phases were identified (Young 2009, section 11.7):

- Phase 1: Refinement of methodology and sampling
- Phase 2: Characterisation: Mapping and Digitisation
- Phase 3: Review, analysis and interpretation
- Phase 4: Explanatory texts

HLC mapping was carried out on ArcView 9.2 GIS software with attributes entered into an accompanying Access database. This was undertaken on a parish by parish, study area by study area basis. With the completion of mapping in each parish, the GIS and Access datasets were joined, and the final dataset exported to GIS.

The following were created as part of the refinement process:

- HLC (including 2011, 1880 and 1840 time-slices with full attributes and where appropriate, two further Late Medieval and Late Prehistoric interpretative time-slices with no attributes)

- Historic Settlement data (place-name and history of settlement development).

2.3.1 Phase 1: Refinement of methodology and sampling

The methodology was based on best practice (Aldred and Fairclough 2003); a GIS based project with both prescriptive and descriptive elements, with a background table of HLC fields populated with attribute values for each polygon, a general restriction of 1ha on polygon size, and the production of explanatory or descriptive texts for each Type (see Sections 8 and 9 for further details).

The modern 1:10,000 digital map at the scale of 1:5000 was used to produce the 2011 HLC; though for accuracy, polygons were drawn at 1:2500 using the latest version of OS Master Map data.

2.3.2 Phase 1: Pilot parish

The parish of St Newlyn East (in the Probus study area) was chosen as the pilot to trial the HLC method. It was selected due to its sharply-defined divisions in topography and landscape, varied settlement and industrial history, and for model building purposes (because of the high number of late prehistoric sites recorded within it). The pilot was started in December 2009, with the revision of its methodology undertaken in January and February 2010.

The availability of the digital 1880 OS and 1840 Tithe maps in GIS enabled the full completion of HLC fields for these two time-slices. This, it was envisaged, would enable a clearer, statistic-based understanding of landscape change in the past 170 years. Where understood, two further 'interpretive time-slices' beyond the 1840 time-slice could also be added corresponding with the 'late medieval' and 'late prehistoric' periods. In this respect the Lowland Cornwall method differs from other HLC projects, which do not include time-slices with full HLC fields and attribute values. HLC mapping in the pilot parish confirmed the value of the 1880 and 1840 time-slices as they enabled a complex picture of landscape change to be drawn.

Widespread change to the St Newlyn East landscape, particularly changes to the field pattern, was recorded across the parish. Alteration was not evenly spread, varying from location to location, time-slice to time-slice, and with change not easily generalised on a parish-wide basis. Amalgamation, sub-division and re-arrangement of fields all occurred with great differences in scale and impact. In a majority of instances alteration was noted in the differences of attribute values for areas between time-slices; occasionally, however, wholesale change could result in the same/or similar number of fields and dominance of boundaries e.g. eight fields replaced by eight fields.

To record these changes in a simple way, in a prescriptive manner rather than based on attribute values alone, a series of Sub-Types for altered land were created:

- Amalgamated
- Sub-Divided
- Re-arranged

Therefore if the character of a group of fields classed as Medieval Enclosed Land had been altered by the later addition of sub-dividing boundaries, these fields would be interpreted as 'Medieval Altered field patterns (Sub-Divided)'. The final result is an HLC of the present as the Type records the dominant character and its attribute values. However, this is slightly different from previous HLC projects: for example, in existing 1994 HLC methodology, if Medieval Enclosed Land had been substantially altered it would be mapped as 'Post-medieval', or 'Modern' Enclosed Land instead (see Clark *et al* 1994, 6). This departure in the method was to need to further test the predictive modelling aspect of the project so that archaeological site types could be queried against the type of landscape change.

To accommodate the extra time required for the production of 1880 and 1840 time-slices it was decided that aerial photographs, 1:10560 OS paper maps (1950s and 60s) and 1808 OS map sources would not be consulted. Due to a delay in its publication, and the problems of locating field locations accurately, it was also decided that the Lanhydrock Atlas could not be used as part of the Lowland Cornwall HLC mapping (for original list of intended sources, see Young 2009, section 11.7.3.1).

The timing of the Lowland Cornwall project coincided with the Cornwall Record Office (CRO) digitising their archive of Tithe maps, and for most parishes the maps were available for use (see Phase 2 below).

Further context was provided by a separate supporting Historic Settlement dataset. This was mapped separately as a GIS-based layer of point data with attribute values. Its basis was the Historic Environment Service (HES) transcription of the Institute of Cornish Studies (ICS) Place-name Index (Historic Environment Service nd). The value of the dataset was to better identify potential continuity of land use, and change to settlement size and character (and therefore understand changes to the surrounding HLC). As with the revised HLC, time-slices were chosen on the availability of GIS-based maps i.e. 2011, 1880 and 1840.

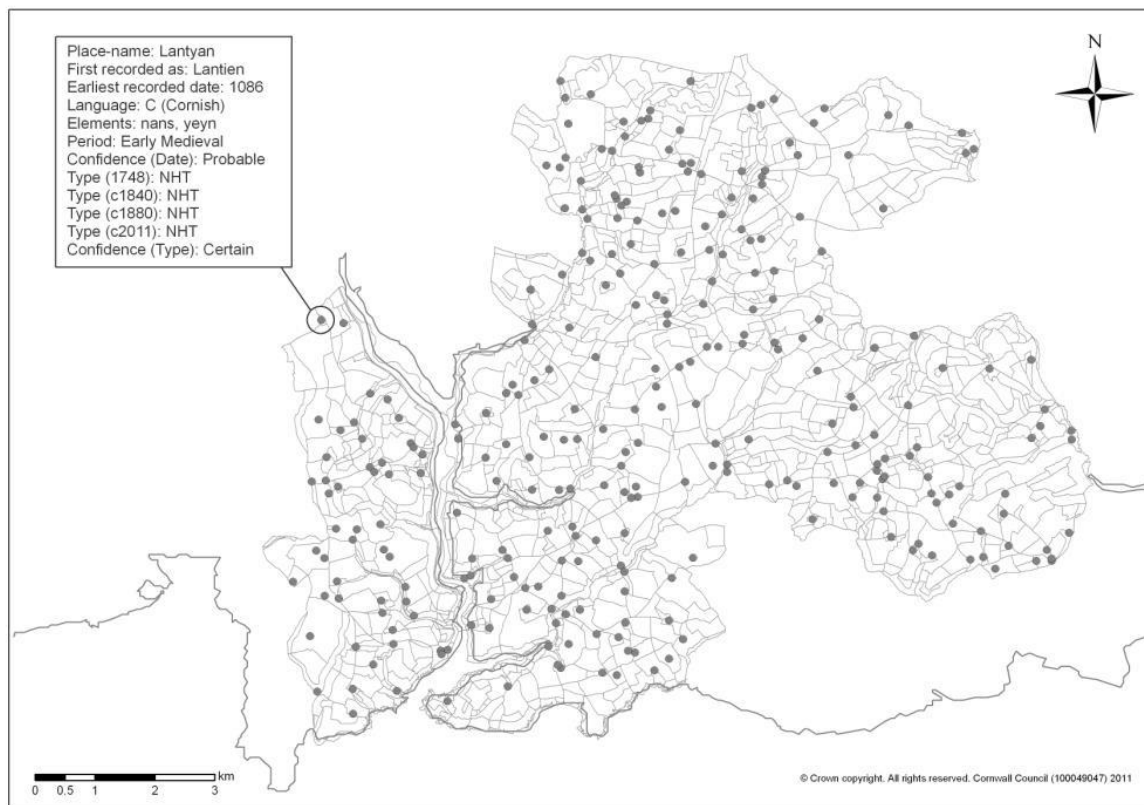


Fig 2 Historic Settlement dataset used as supporting evidence for the Lowland Cornwall HLC. The settlement of Lantyan, Fowey, is shown with the full set of fields used and the values recorded for this settlement. 'NHT' is an abbreviation of 'Nucleated Hamlet'.

A 1748 time-slice was also added to understand settlements prior to the Industrial Revolution. The source used was Martyn's 1748 Map of Cornwall. This used a set of conventions to distinguish mansion houses, single farms, mills, churches, hamlets, villages and towns. Martyn also mapped enclosed land separately from open or rough ground and the map is also useful in helping to validate the location of Early Modern and Modern Enclosed Land in respect of HLC.

As part of Phase 1 a Historic Settlement methodology statement was written to define the dating of place-name elements (both Cornish and English), and the notation

employed in the dataset (see Section 9.2.2). Additionally a document listing extra settlements added from modern and historic maps, further observations and interpretative detail, was created as the dataset was mapped (this is stored as part of the project archive).

The Historic Settlement supporting layer was the first dataset to be completed for the parish. This was useful as it provided a framework of background information which ensured the HLC was undertaken from a more informed understanding of the landscape. This work pattern, with Historic Settlement data mapped prior to the HLC stage, was repeated parish by parish throughout the project.

After dissemination of the initial results to the EH HLC team, it was agreed that the resulting Sub-Types, with a few minor amendments, fulfilled the requirements of the project, and a revised and finalised HLC structure was then developed. The main changes were made to ensure the HLC mapping budget would cover the whole project area, and involved the removal of the enclosing boundary detail, and more limited options to add secondary boundary information.

Following the pilot parish a 'Landuse' attribute was added to the HLC database. This attribute aimed to assess the potential continuity in settlement and land use history of all the terrestrial polygons in the HLC. The supporting evidence of the Historic Settlement data was crucial in the production of this dataset. Certain Cornish place-name elements, for example *tre-*, have been dated to the fifth to tenth centuries AD, and therefore could be interpreted as areas of continuous settlement since the end of the Romano-British period. Further Cornish and English place-name evidence was used to identify 'Core', 'Sub-core', 'Fluctuating/Tidal' and 'Marginal' areas of settlement land use. The Landuse attribute has several limiting factors but it was judged to have potential value in the predictive modelling stage of the project.

2.3.3 Phase 2: Characterisation: Mapping and Digitisation

For a summary of the ecclesiastical parishes mapped see section 9.1. Only the southern lowland parts of St Buryan, Lelant, Gulval and Madron ecclesiastical parishes were included in the study area.

The full metadata of the HLC and the Historic Settlement database is listed in section 9.2.

The HLC refinement was undertaken from March 2010 to February 2011. The four study areas had already been chosen on a basis of topography, to give a wide spread across Cornwall, and to target certain research areas e.g. the Culm measures in north Cornwall (Lowland Cornwall Volume 4).

Mapping was undertaken on a parish by parish, study area by study area basis.

The Probus study area was completed first, with the Penwith area started next. After completing the parishes of Perranuthnoe, Marazion and Ludgvan it was calculated that the HLC mapping rate in the Penwith area was too slow to meet the project timescale. In the interest of the overall project, mapping was switched to the Pelynt area, with the remaining Penwith parishes to be left until the end.

Digital Tithe map data for the parish of Gulval was unavailable so the details for 1840 were not entered. To enable analysis the attribute values were populated with the 1880 values instead.

2.3.4 Phase 3: Review, analysis and interpretation

As made clear in the original project design Phase Three was to run concurrently with Phase Two (Young 2009, section 11.7.4). A critical deviation from the original project design, however, was that the HLC Type and Sub-Type classifications were fixed during the mapping process, and in this respect the method that developed was more prescriptive than originally envisaged.

2.3.5 Phase 4: Descriptive texts

The texts accompanying the HLC Types are descriptive, with no explanatory synthesis of management recommendations as produced by Herring (Cornwall Council *et al* 1994: Herring 1998; 2009). The Lowland Cornwall texts focus instead on simply describing the Broad Types, HLC Types and where appropriate, its Sub-Types, and the key attribute values identifiable from the modern 1:10,000 OS map alone. The descriptive texts were written in March 2011 following the completion of Phases Two and Three.

3 Summary of refined HLC results

The following section summarises the results of the 2011 revised mapping for each study area, gives a comparison with the original 1994 HLC mapping and provides a further analysis of Medieval Enclosed Land Sub-Types.

3.1 Probus

The Probus study area is located in mid Cornwall, occupying an area of 135.495 sq km (see Figs 1 and 3). It comprises the ecclesiastical parishes of Probus, Ladock, Newlyn East, St Enoder and St Erme. Its southern edge is near the more sheltered south coast, its northern edge closer to the more windswept north coast.

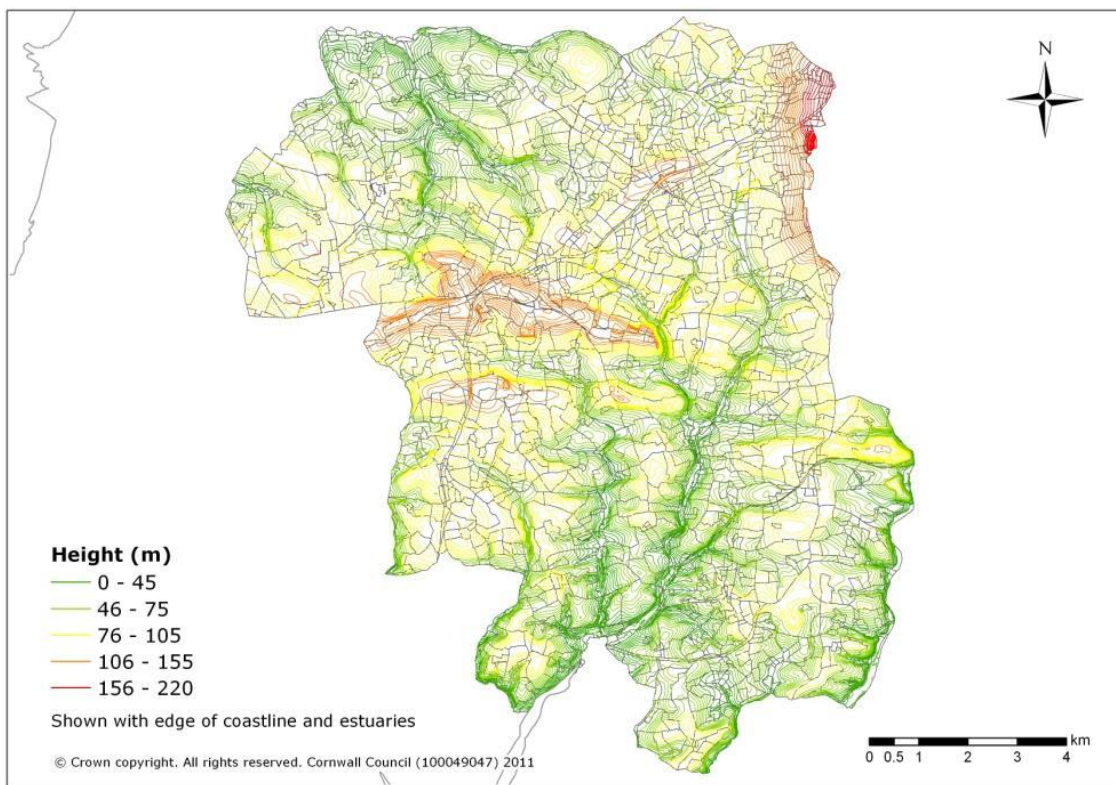


Fig 3 The Probus study area, shown with contours.

The area is characterised by dendritic stream valleys which lead inland from estuary systems (Gannel and Tresillian Rivers). These are flanked by ridges of higher ground leading to Newlyn Downs, a central east-west ridge of high ground standing at 110m to 145m OD between Carland Cross, St Newlyn East/St Erme and Tredeal, Ladock. In the parishes of Ladock and St Enoder, the upper reaches of the steeper-sided valleys open to form more shallow-sided open areas with poorer drainage. Near Fraddon, the northeast corner of the area rises to 220m OD, lying on the edge of the high ground of the Hensbarrow granite.

The river valleys are an important part of the physical and human landscape, forming significant landscape boundaries. Sections of these natural features have been used to demarcate the line of parishes: part of the northern parish boundary of St Newlyn East (and the northern boundary of the study area) is formed by the River Gannel running west-east. A section of the western parish boundary of St Erme (and part of the western boundary of the study area) is formed by the River Allen running south-north. The eastern parish boundary of Probus (and part of the eastern boundary of the study area) is formed by the River Fal running north – south. The Tresillian River runs north – south through the parishes of Probus and Ladock. For the 1994 HLC the percentage of the Probus area taken up by each HLC Type is shown in table 1: the percentage of the area taken up by the equivalent refined 2011 HLC Types is shown in table 2.

HLC Type (1994)	Area (sq km)	% Area
Communications	1.492	1.10
Farmland: Medieval	77.113	56.91
Farmland: Post-Medieval	33.412	24.66
Farmland: C20	4.648	3.43
Industrial: Disused	0.489	0.36
Industrial: Working	0.280	0.21
Intertidal and inshore water	0.012	0.01
Ornamental	1.614	1.19
Plantations and Scrub	1.557	1.15
Recreational	0.349	0.26
Settlement: C20	2.357	1.74
Settlement: older core (pre-1907)	0.968	0.71
Upland Rough Ground	5.363	3.96
Water	0.101	0.07
Woodland	5.740	4.24
Total	135.495	

Table 1 Probus study area: 1994 HLC Types

Refined HLC Type (2011)	Area (sq km)	% Area
Communications	1.492	1.10
Industrial	0.856	0.63
Medieval Enclosed Land	89.894	66.34
Post-Medieval Enclosed Land	8.560	6.32
Modern Enclosed Land (including Early Modern)	16.702	12.33
Mudflats and saltmarsh	0.012	0.01
Parkland	1.180	0.87
Plantation and shelterbelt	1.720	1.27
Recreational	0.651	0.48
Settlement	3.325	2.45
Upland and Valley Rough Ground	5.363	3.96
Woodland	5.740	4.24
Total	135.495	

Table 2 Probus study area: 2011 refined HLC

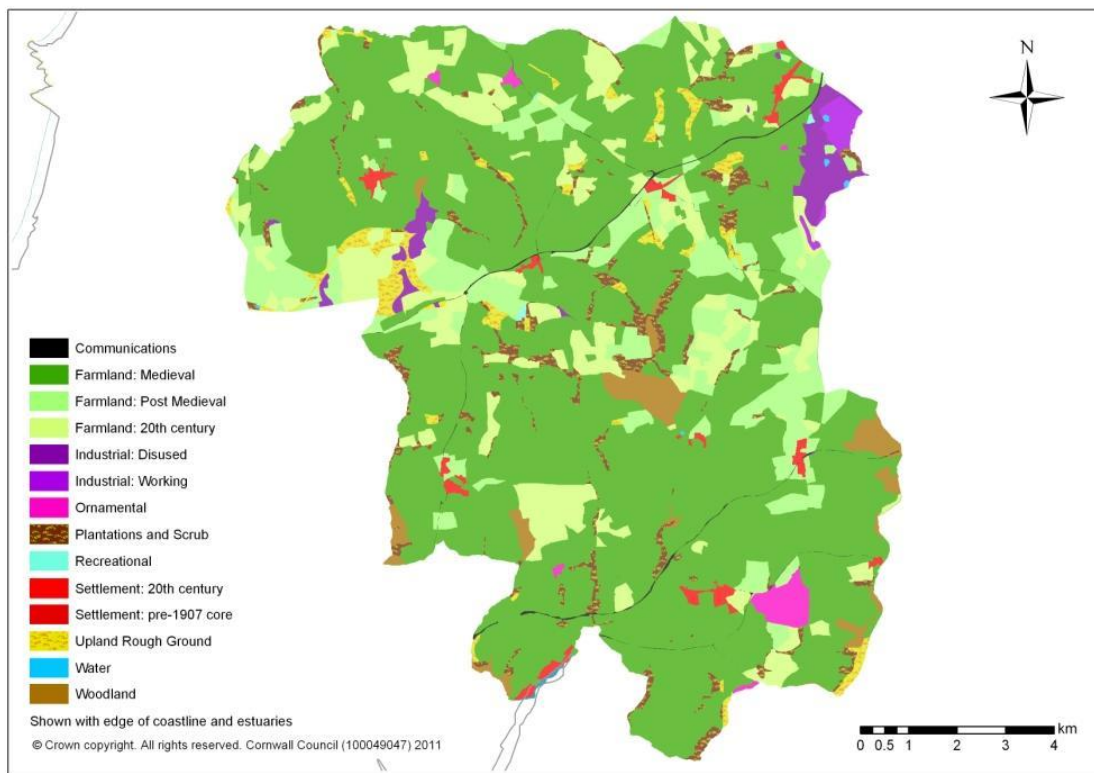


Fig 4 The Probus study area: 1994 HLC.

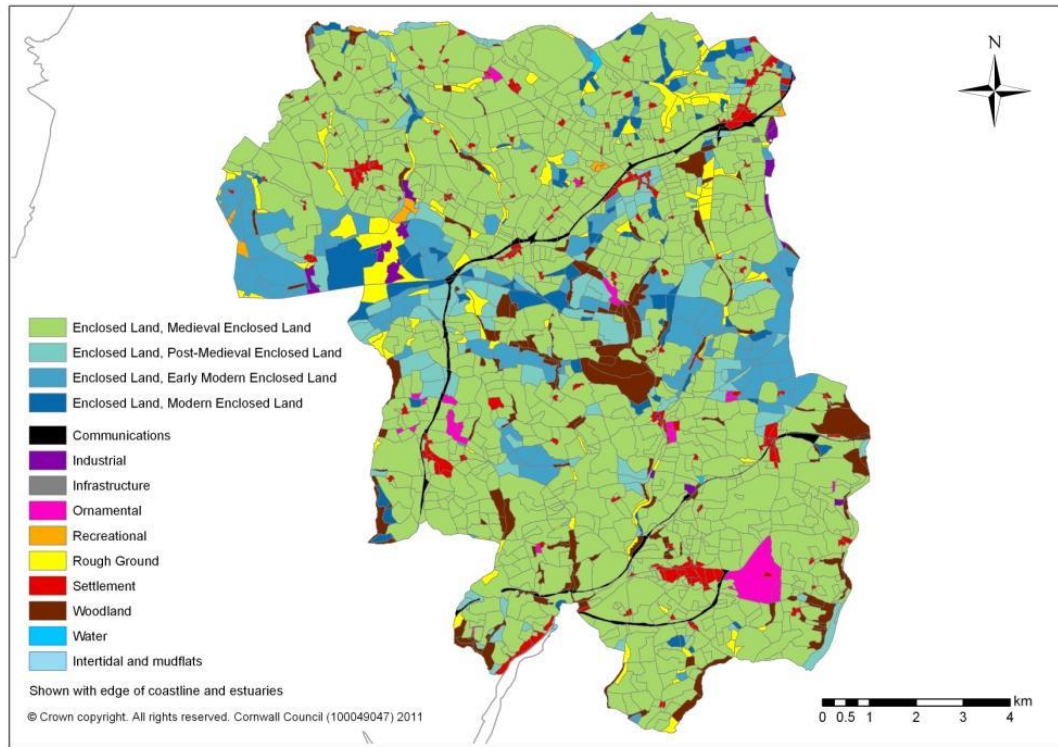


Fig 5 The Probus study area: 2011 refined HLC (showing Broad Types and HLC Types for Enclosed Land)

A more direct comparison of the area taken up by the 1994 and refined 2011 HLC Types is set out in table 3 below.

HLC Type	% Area (1994)	% Area (2011)
Communications	1.10	1.10
Industrial	0.57	0.63
Medieval Enclosed Land	56.91	66.34
Post-Medieval Enclosed Land	24.66	6.32
Modern Enclosed Land (including Early Modern)	3.37	12.33
Mudflats and saltmarsh	0.08	0.01
Parkland	1.17	0.87
Plantation and shelterbelt	1.14	1.27
Recreational	0.26	0.48
Settlement	2.45	2.45
Upland and valley rough ground	3.96	3.96
Woodland	4.24	4.24

Table 3 Probus study area: comparison between 1994 and 2011 HLC

The biggest difference is that in the refined HLC 18% less of the area is interpreted as Post-Medieval Enclosed Land. Roughly half of this has been re-interpreted as Modern or Early Modern in date and half as Medieval Enclosed Land.

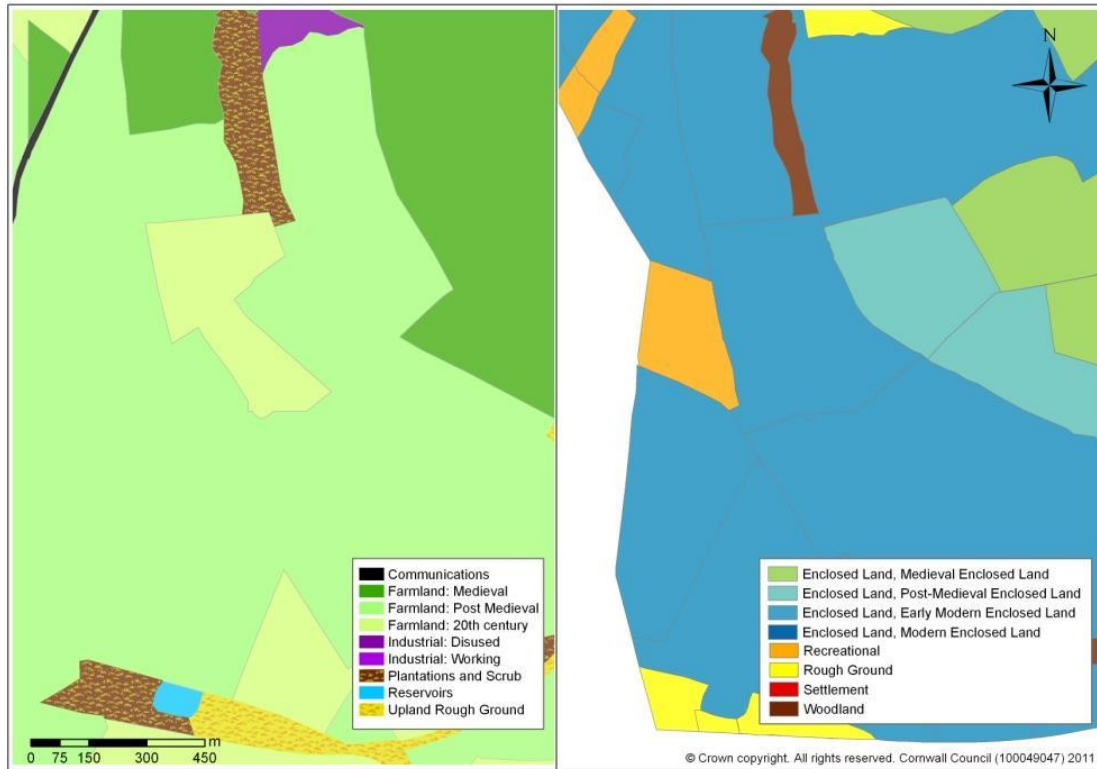


Fig 6 The Probus study area: Comparison of 1994 mapping (left) and 2011 refined HLC (right) for the edge of Newlyn Downs (St Newlyn East), showing the difference in the area of Post-Medieval Enclosed Land mapped.

The four time-slices in the revised HLC reveal how the area (sq km) of each of the main HLC Types has changed over time, reflecting changing land use patterns. This is shown below. The final column shows the difference in area between Late Medieval and 2011.

Refined HLC Sub-Type	2011	1880	1840	Late Medieval	Difference
Medieval Enclosed Land	89.894	93.223	93.971	95.974	-6.08
Post-Medieval Enclosed Land	8.560	9.630	10.247	0	8.560
Early Modern Enclosed Land	12.054	12.620	8.667	0	12.054
Modern Enclosed Land	4.648	0	0	0	4.648
Rough Ground	5.363	10.353	14.376	33.040	-27.677
Woodland	5.740	5.383	5.046	5.679	0.061

Table 4 Probus study area: comparison of time-slices (all figures shown in sq km)

Clearly the growth of Post-Medieval Enclosed Land and, more recently, Early Modern and Modern Enclosed Land has been primarily at the expense of Rough Ground.

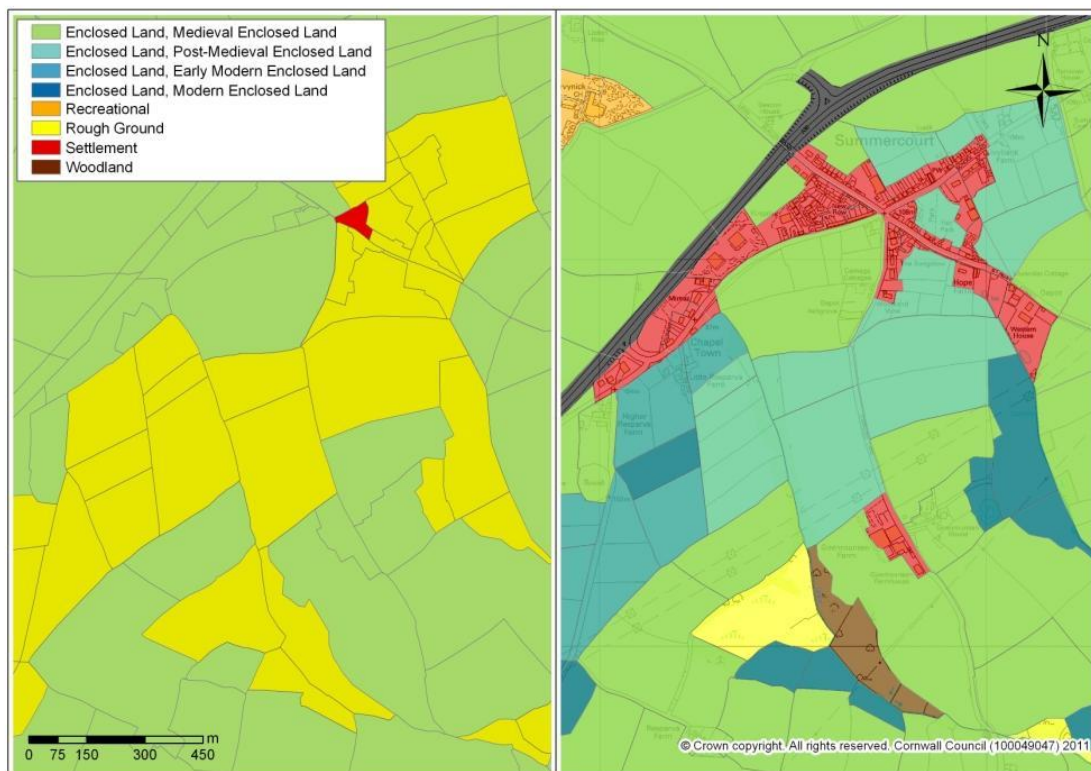


Fig 7 The Probus study area: extent of Rough Ground and Medieval Enclosed Land for the late medieval and 2011 time-slices. The area shown is located near to the settlement of Summercourt, St Enoder, which lies on the old route of the A30 and is famous for its summer fair. The late medieval time-slice is shown to the left and the 2011 time-slice to the right.

The time slices also show land use developments within the medieval enclosure types.

Refined HLC Sub-Types	2011	1880	1840	Late Medieval
MD Altered field patterns (Amalgamated)	44.293	13.988	1.266	0
MD Altered field patterns (Re-arranged)	12.367	8.122	8.060	0
MD Altered field patterns (Sub-Divided)	9.943	21.097	27.480	0
MD derived from Cropping Units	22.515	45.725	51.052	85.636
MD derived from Strip Fields (Enclosed)	0.391	3.491	3.970	6.967
MD peripheral fields	0.385	0.800	2.143	3.371
Total (sq km)	89.894	93.223	93.971	95.974

Table 5 Probus study area: area of Medieval Enclosed Land Sub-Types for each time-slice (all figures shown in sq km).

The striking change is the amount of alteration to fields derived from cropping units, which are interpreted as taking up 86 sq kms at the end of the medieval period, but which now only cover 22.5 sq kms. This 75% reduction results from episodes of extensive sub-division prior to 1840, continuing until the twentieth century when they seem to have tailed off. During the twentieth century there has been a dramatic alteration to fields derived from cropping units through widespread amalgamation of fields. Only small areas of fields derived from strip fields and peripheral fields were

identified and the present day extent of these has shrunk to less than a square kilometre.



Fig 8 The Probus study area: Medieval Enclosed Land in the late medieval and 2011 time-slices. In the late medieval period (left) Medieval Enclosed Land was dominated by cropping units but by 2011 (right), a large number of these areas had been altered (amalgamated, re-arranged or sub-divided).

3.2 Penwith

The Penwith study area is located in the far west of Cornwall. It comprises the ecclesiastical parishes of Paul, Penzance, Marazion, St Hilary and Perranuthnoe, most of the parishes of St Buryan and Ludgvan, and parts of Lelant, Gulval and Madron (see Figs 1 and 9). In total the study area covers 93.838 sq kms including approximately 23 km of coastline around Mounts Bay.

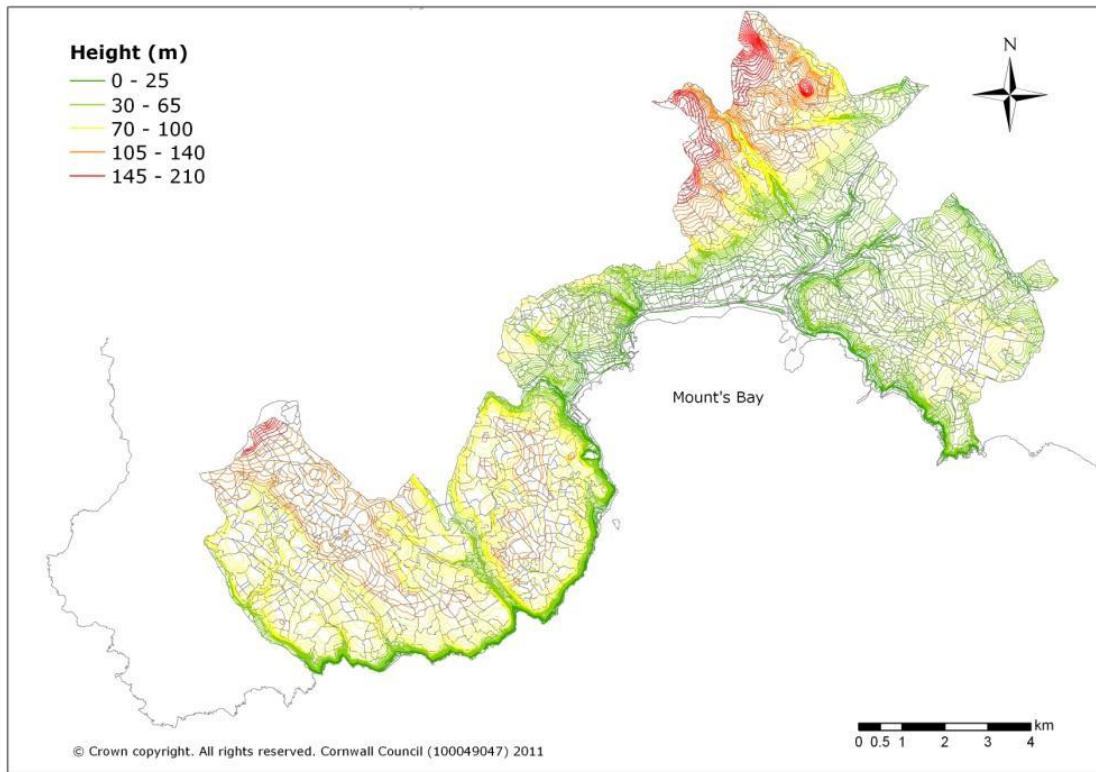


Fig 9 The Penwith study area, shown with contours.

Much of the land located on the eastern edge of the Mount's Bay, in the parishes of St Hilary, Perranuthnoe, Marazion and Penzance, is low lying (below the 65m contour). This includes the area of Marazion Marsh, a large open area of pools and rushes, which extends inland before narrowing into a river valley.

Where the area overlies the West Penwith granite the ground rises to a higher elevation as the slopes heighten to the ridge that forms the backbone of the peninsula. In the northern parts of Ludgvan and St Buryan, the area includes high ground, including Trencrom Hill (170m) and the shoulder of Carn Brea (175m), with the summit of Trink Hill, near Nancledra, Ludgvan, forming the highest point at 210m.

The granite area is characterised by a drainage pattern of stream valleys that run inland in a general northwest – southeast orientation e.g. Penberth, St Loy, Lamorna, Newlyn, Larrigan, Chyandour, Ponsandane, Rosmorran, Treassow, Red River and the valley at Trevethoe.

The eastern boundary of St Hilary parish, and the study area, is defined by the River Hayle, a prominent landscape feature in the area.

For the 1994 HLC the percentage of the Penwith area taken up by each HLC Type is shown in table 6 below.

HLC Type (1994)	Area (sq km)	% Area
Ancient woodland	0.056	0.06%
Communications	0.943	1.02%
Farmland: Prehistoric	37.448	40.62%
Farmland: Medieval	16.841	18.27%
Farmland: Post-medieval	11.990	13.00%
Farmland: C20	7.662	8.31%
Industrial: Disused	0.419	0.45%
Industrial: Working	0.223	0.24%
Ornamental	0.295	0.32%
Plantations and Scrub	2.742	2.97%
Recreational	0.186	0.20%
Settlement: C20	4.847	5.26%
Settlement: older core (pre-1907)	1.325	1.44%
Coastal Rough Ground	2.241	2.43%
Upland Rough Ground	4.714	5.11%
Water: Natural	0.233	0.25%
Water: Reservoirs	0.033	0.04%
Total	92.198	

Table 6 Penwith study area: 1994 HLC Types

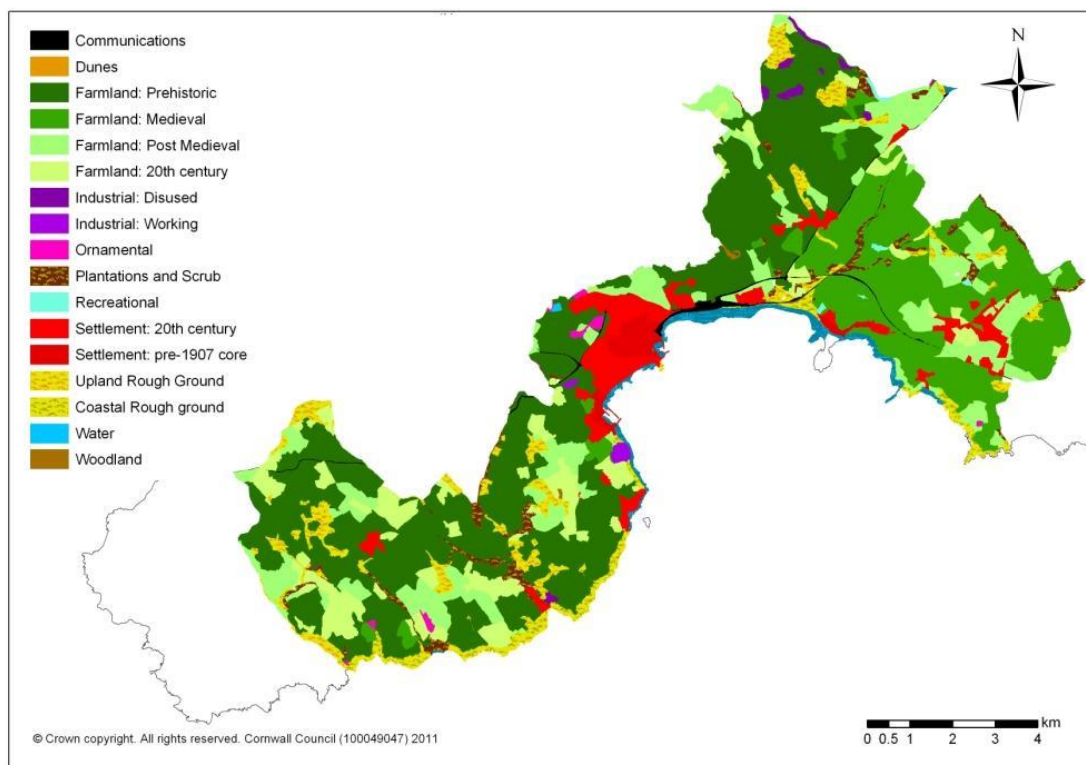


Fig 10 The Penwith study area: 1994 HLC.

There is a discrepancy in the size of the study areas of the 1994 and 2011 HLC mapping. The 2011 HLC is larger, extending further into the intertidal zone than that of 1994 (compare Tables 6 and 7).

The percentage of the area taken up by the equivalent refined 2011 HLC Types is as follows.

HLC Type (2011)	Area (sq km)	% Area
Communications	0.800	0.85%
Prehistoric Enclosed Land	7.064	7.53%
Medieval Enclosed Land	48.497	51.68%
Post-Medieval Enclosed Land	5.994	6.39%
Modern Enclosed Land (incl. Early Modern)	11.244	11.98%
Industrial	0.498	0.53%
Intertidal and inshore water	1.867	1.99%
Ornamental	0.642	0.68%
Plantation	0.401	0.43%
Recreational	0.229	0.24%
Settlement	7.955	8.48%
Coastal Rough Ground	1.765	1.88%
Upland and Valley Rough Ground	5.362	5.71%
Water	0.059	0.06%
Woodland	1.460	1.56%
Total	93.838	

Table 7 Penwith study area: 2011 HLC Types

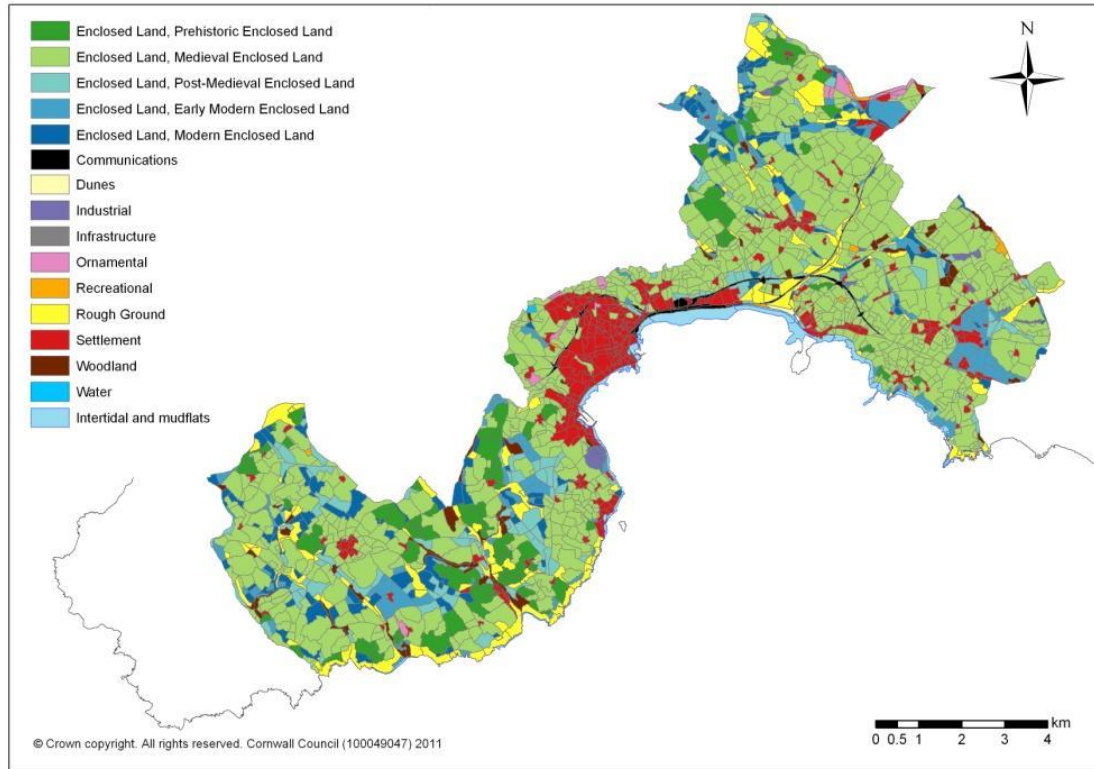


Fig 11 The Penwith study area: 2011 refined HLC (showing Broad Type and HLC Types for Enclosed land).

A more direct comparison is set out in the table below.

HLC Type	% Area (1994)	% Area (2011)
Communications	1.02%	0.85%
Prehistoric Enclosed Land	40.62%	7.53%
Medieval Enclosed Land	18.27%	51.68%
Post-Medieval Enclosed Land	13.00%	6.39%
Modern Enclosed Land (incl. Early Modern)	8.31%	11.98%
Industrial	0.69%	0.53%
Intertidal and inshore water	0.22%	1.99%
Ornamental	0.32%	0.68%
Plantations and Scrub	2.97%	0.43%
Recreational	0.20%	0.24%
Settlement	6.70%	8.48%
Coastal Rough Ground	2.43%	1.88%
Upland and Valley Rough Ground	5.11%	5.71%
Water	0.07%	0.06%
Woodland	0.06%	1.56%

Table 8 Penwith study area: comparison between 1994 and 2011 HLC

The biggest difference is that much of the land classed as Prehistoric Enclosed Land in the 1994 HLC has been re-interpreted as Medieval Enclosed Land in 2011. Roughly half the area classed as Post-Medieval Enclosed in 1994 has been re-interpreted as Modern Enclosed Land (including Early Modern Enclosed Land) or as Medieval Enclosed Land.



Fig 12 Trevedran Cliff, St Buryan. Aerial photograph looking north to the settlement of Trevedran. The area in the foreground has been interpreted in the 2011 Revised HLC as altered Prehistoric Enclosed Land with a majority of the fields in the middle ground interpreted as altered Medieval Enclosed Land. Most of the area had been recorded in the 1994 HLC as Prehistoric Enclosed Land (see Fig 13 below). ©Historic Environment, Cornwall Council, 2007; F84-168.

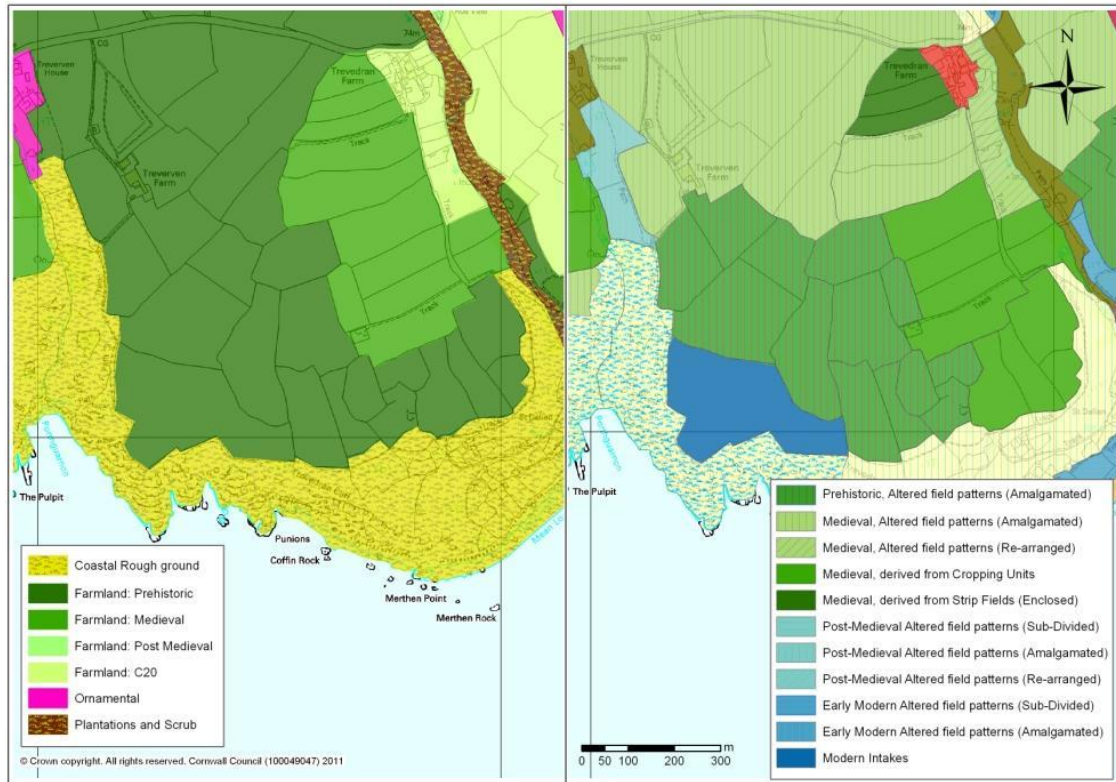


Fig 13 Trevedran, St Buryan. Comparison of 1994 HLC mapping (left) and 2011 revised mapping (right). The 2011 revised mapping is shown to the level of HLC Sub-Type (note, due to space the legend only presents Enclosed Land Types).

The four time-slices in the revised HLC reveal how the area of each of the main HLC Types has changed over time, reflecting changing land use patterns. This is shown (in sq kms) below. The final column shows the difference in area between the Late Medieval and 2011 time-slices.

Refined HLC Type	2011	1880	1840	Late Medieval	Difference
Prehistoric Enclosed Land	7.064	6.987	7.196	7.058	0.006
Medieval Enclosed Land	48.497	51.381	52.716	55.271	-6.774
Post-Medieval Enclosed Land	5.994	6.796	6.966	0	5.994
Early Modern Enclosed Land	5.630	6.551	5.225	0	5.630
Modern Enclosed Land	5.614	0	0	0	5.614
Rough Ground	7.061	14.277	15.819	28.268	-21.207
Woodland	1.460	0.125	0.000	0.299	1.161

Table 9 Penwith study area: comparison of time-slices (all figures shown in sq km)

The area of Prehistoric Enclosed Land has remained fairly consistent throughout the time slices, probably because it is often found in marginal locations, though it has often undergone phases of alteration. Clearly the growth of Post-Medieval Enclosed and, more recently, Early Modern and Modern Enclosed Land has been primarily at the expense of Rough Ground.

The time slices also show land use developments within the Medieval Enclosure Land HLC and its Sub-Types.

Refined HLC Types	2011	1880	1840	Late Medieval
MD Altered field patterns (Amalgamated)	26.534	16.848	0.063	0
MD Altered field patterns (Re-arranged)	10.575	8.053	10.581	0
MD Altered field patterns (Sub-Divided)	8.013	16.431	26.644	0
MD derived from Cropping Units	3.045	8.575	13.069	46.151
MD derived from Strip Fields (Enclosed)	0.195	1.212	1.764	6.910
MD peripheral fields	0.136	0.262	0.537	2.152
MD strips (Unenclosed)	0	0	0.057	0.057
Total (sq km)	48.497	51.381	52.716	55.271

Table 10 Penwith study area: area of Medieval Enclosed Land Sub-Types for each time-slice (all figures shown in sq km)



Fig 14 Penwith study area: 1840 and 2011 time-slices to the north east of the settlement of St Buryan. A number of areas are recorded as being sub-divided or altered in 1840 (left) but by 2011 (right) many of these areas had either been re-arranged or amalgamated.

Ninety three percent of land classed as cropping units in the Late Medieval time-slice and 97% of strip fields (whether enclosed or unenclosed) have been altered. The alteration process was characterised by sub-division until the late nineteenth century and since then by amalgamation.

3.3 Pelynt

The Pelynt study area is located on the south coast of Cornwall, on and around the Fowey estuary. It comprises the ecclesiastical parishes of Boconnoc, Fowey, Golant, Lanreath, Lanteglos by Fowey, Pelynt and St Veep, in total covering an area of 89.155 sq km (see Figs 1 and 15).

It includes a six km stretch of coastline characterised by moderately high cliffs and steep cliff slopes, stretching between Lansallos in the east and almost as far as Gribbin Head in the west.

The River Fowey estuary cuts inland from the coast leading to a series of tributaries, most notably the River Lerryn and Trebant Water. These rivers extend inland to form a dendritic drainage pattern and a predominantly undulating landscape of ridges incised by steep-sided valleys. The valleys often form the boundaries of parishes; the east the study area for example, bounded by the West Looe River, which forms the eastern edge of the parish of Pelynt.

Close to the rivers, much of the western part of the area is relatively low-lying, generally situated below the 100m contour. However, ridges of higher ground extend from the eastern edge of the Fowey estuary, leading eastward to a large ridge of higher ground that runs roughly south-north, reaching its highest point in the north eastern part of the study area at Bury Down (205m). The northernmost section of the study area lies upon the flank of the high ground of Braddock Down.

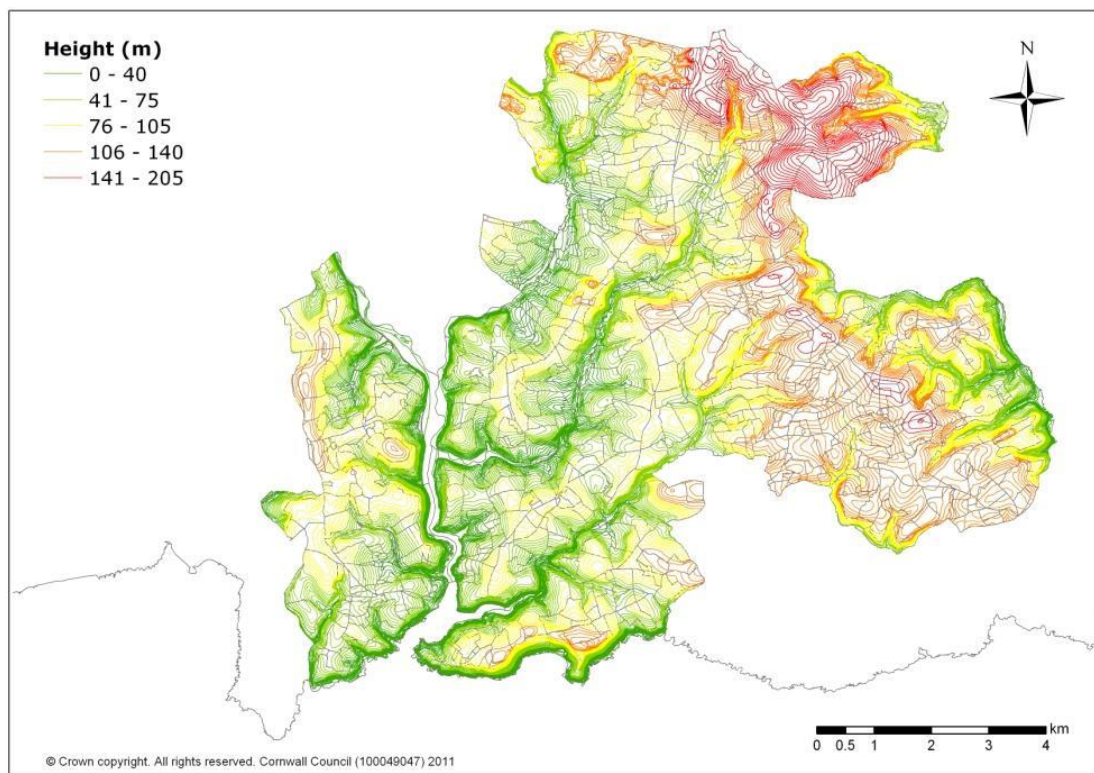


Fig 15 Pelynt study area, shown with contours.

For the 1994 HLC the percentage of the Pelynt area taken up by each HLC Type is as follows.

HLC Type (1994)	Area (sq km)	% Area
Coastal Rough Ground	0.512	0.57%
Communications	0.170	0.19%
Farmland: Medieval	47.263	53.01%
Farmland: Post-medieval	23.690	26.57%
Farmland: C20	1.131	1.27%
Industrial: Disused	0.029	0.03%
Industrial: Working	0.090	0.10%
Intertidal and inshore water	1.994	2.24%
Ornamental	2.753	3.09%
Plantations and Scrub	0.246	0.28%
Recreational	0.348	0.39%
Settlement: C20	1.902	2.13%
Settlement: older core (pre-1907)	0.468	0.53%
Upland Rough Ground	1.307	1.47%
Woodland	7.250	8.13%
Total	89.155	

Table 11 Pelynt study area: 1994 HLC Types

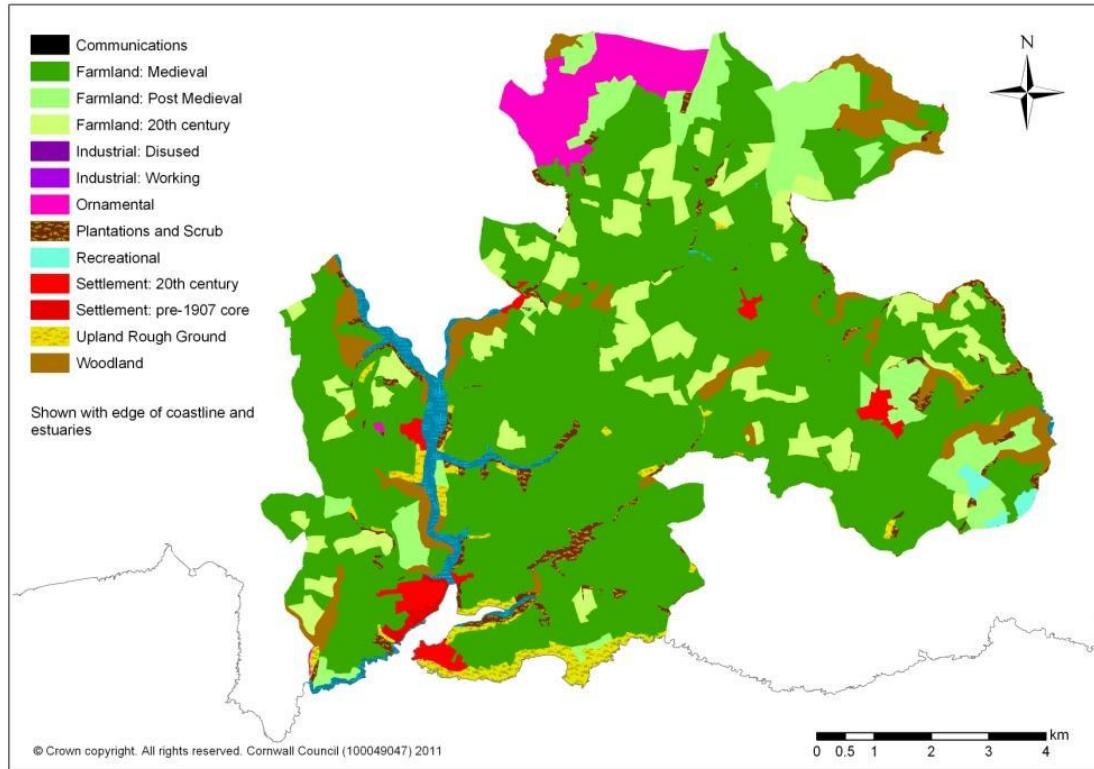


Fig 16 Pelynt study area: 1994 HLC.

The percentage of the area taken up by the equivalent refined 2011 HLC Types is as follows.

HLC Type (2011)	Area (sq km)	% Area
Communications	0.170	0.19%
Industrial	0.131	0.15%
Medieval Enclosed Land	60.487	67.84%
Post-Medieval Enclosed Land	6.380	7.16%
Modern Enclosed Land (inc. Early Modern)	5.231	5.87%
Mudflats and inshore water	1.785	2.00%
Parkland	1.231	1.38%
Plantation	1.675	1.88%
Recreational	0.429	0.48%
Settlement	2.309	2.59%
Upland and Valley Rough Ground	1.336	1.50%
Coastal Rough Ground*	0.790	0.89%
Woodland	7.201	8.08%
Total	89.155	

*Coastal Rough Ground includes the 2011 HLC Types bare cliffs, beach and rocky foreshore.

Table 12 Pelynt study area: 2011 refined HLC

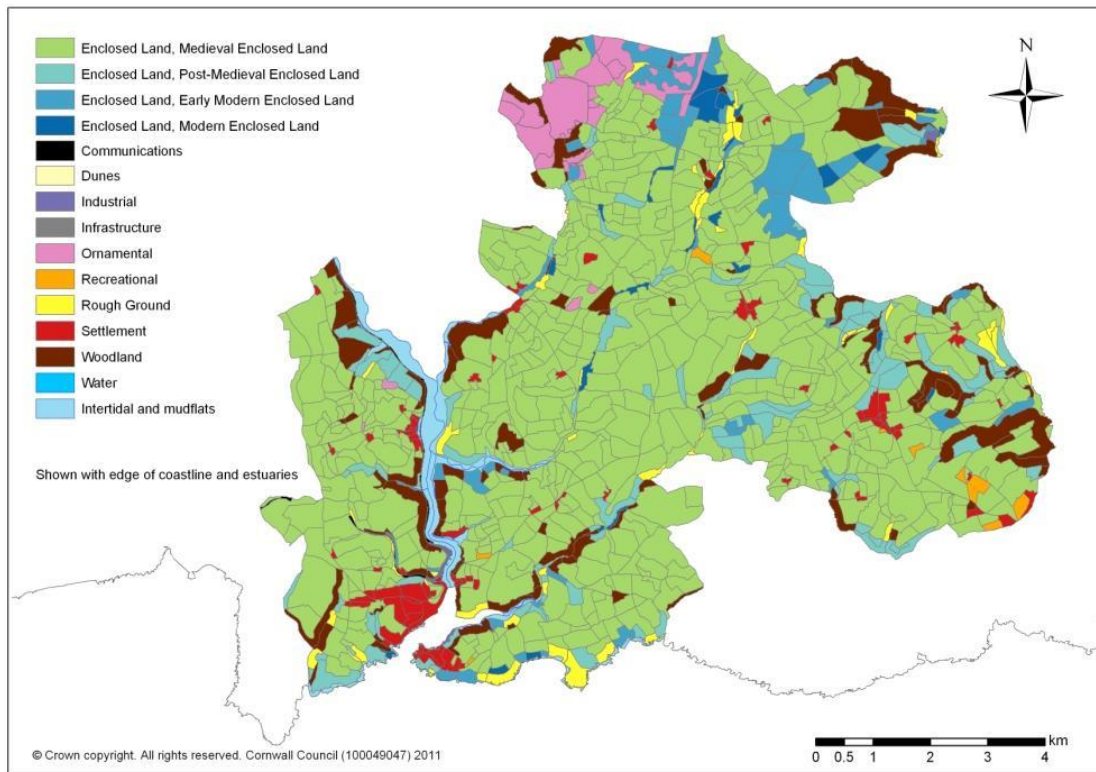


Fig 17 Pelynt study area: 2011 refined HLC

A more direct comparison is set out in the table below.

HLC Type	% Area (1994)	% Area(2011)
Coastal Rough Ground	0.57%	0.89%
Communications	0.19%	0.19%
Industrial	0.13%	0.15%
Medieval Enclosed Land	53.01%	67.84%
Post-Medieval Enclosed Land	26.57%	7.16%
Modern Enclosed land	1.27%	5.87%
Mudflats and inshore water	2.24%	2.00%
Parkland	3.09%	1.38%
Plantation	0.28%	1.88%
Recreational	0.39%	0.48%
Settlement	2.66%	2.59%
Upland and Valley Rough Ground	1.47%	1.50%
Woodland	8.13%	8.08%

Table 13 Pelynt study area: comparison between 1994 and 2011 HLC

The significant difference is in the interpretation of Post-Medieval Enclosed Land. In the 1994 HLC 23.69 sq km is classed as Post-Medieval whereas in the 2011 HLC the figure is only 6.38 sq km. The difference is 17.31 sq km, of which 4.1 sq km was re-interpreted as Modern or Early Modern Enclosed Land and 13.2 sq km as Medieval Enclosed Land in the 2011 HLC. There is also an interesting change in the amount of

Coastal Rough Ground which increased from 0.57% in 1994 to 0.89% in 2011. This is probably due to the difference in the scale of the polygon mapping.

The four time-slices in the revised HLC reveal how the area of each of the main HLC Types has changed over time, reflecting changing land use patterns. This is shown below. The final column shows the difference in area between the late medieval and 2011 time slices.

Refined HLC Type	2011	1880	1840	Late Medieval	Difference
Medieval Enclosed Land	60.487	62.653	62.897	64.629	-4.143
Post-Medieval Enclosed Land	6.380	7.202	7.513	0	6.380
Early Modern Enclosed Land	4.100	4.682	1.847	0	4.100
Modern Enclosed Land	1.131	0	0	0	1.131
Rough Ground	1.336	2.379	4.015	8.176	-6.839
Woodland	7.201	5.573	6.150	12.586	-5.385

Table 14 Pelynt study area: comparison of time-slices (all figures in sq km)

This shows that the extent of Rough Ground, Woodland and Medieval Enclosed Land has diminished through time.

The time slices also show land use developments within the medieval enclosure types.

Refined HLC Sub-Type	2011	1880	1840	Late Medieval
MD Altered field patterns (Amalgamated)	33.21	19.81	1.02	0.00
MD Altered field patterns (Re-arranged)	15.78	9.32	11.85	0.00
MD Altered field patterns (Sub-Divided)	7.67	20.89	32.84	0.00
MD derived from Cropping Units	3.43	10.97	14.34	54.42
MD derived from Strip Fields (Enclosed)	0.07	0.56	1.19	6.65
MD peripheral fields	0.33	1.10	1.65	3.55
Total (sq km)	60.49	62.65	62.90	64.63

Table 15 Pelynt study area: area of Medieval Enclosed Land Sub-Types for each time-slice (all figures shown in sq km)



Fig 18 Polean, Pelynt: Aerial photograph looking northwest beyond Polean across an area of Medieval Enclosed Land. The large field in the foreground has been altered through the amalgamation of fields in the modern period. Note the predominantly erratic – angular boundaries.



Fig 19 Lankelly, Pelynt: Aerial photograph of an area of Medieval Enclosed Land that has been heavily altered in the modern period. The area has been interpreted as 'derived from Cropping Units' up to and including the 1880 time-slice. By 2011 there had been a period of amalgamation with a 90% loss of field boundaries, the only visible traces of these surviving as earthworks and the remnants of hedges. ©Historic Environment, Cornwall Council, 2007; F80-040.

3.4 Poundstock

The Poundstock study area is located in the north-eastern corner of Cornwall. It comprises the ecclesiastical parishes of Jacobstow, Marhamchurch, Poundstock and Whitstone (Figs 1 and 20). Originally it was planned to include Week St Mary parish in this study area but not digitised Tithe map data was available so this parish was omitted. As a result the study area encompasses a less contiguous block of landscape than the other three and is the smallest, covering an area of 65.574 sq km.

The eastern parish boundaries of both Marhamchurch and Whitstone form part of the boundary with Devon which is defined by the River Tamar. The western boundary of Jacobstow follows the River Ottery as it runs southeast – northwest. The parish of Marhamchurch is dissected by the River Neet, which also forms part of the eastern parish boundary of Poundstock. Poundstock is also cut by the Wanson Water and Millook Water as they flow from higher ground to the coast

The study area includes approximately five kms of coastline around Widemouth Bay. Much of this coast is relatively low-lying (below the 50m contour), apart from in the south around Millook, where the land quickly rises to the 120m contour.

Although the Neet valley is steep-sided, much of Marhamchurch is relatively low-lying. Only in the far east of the parish does the landfall rise above the 70m contour. The northernmost portion of Poundstock parish is similarly low-lying but in the south the land rises and continues to do so into Jacobstow parish, most of which lies above the 70m contour. The southern part of Jacobstow is characterised by a long and prominent ridge running northwest – southeast to Langdon Hill on the 145m contour. Whitstone is also hilly, being formed by an undulating plateau which drops away steeply to the valleys of the Tamar in the east and a tributary of the Neet in the west. The western part of the plateau is characterised by a north-south line of rounded hills which reach the 160m contour at Whitstone itself.

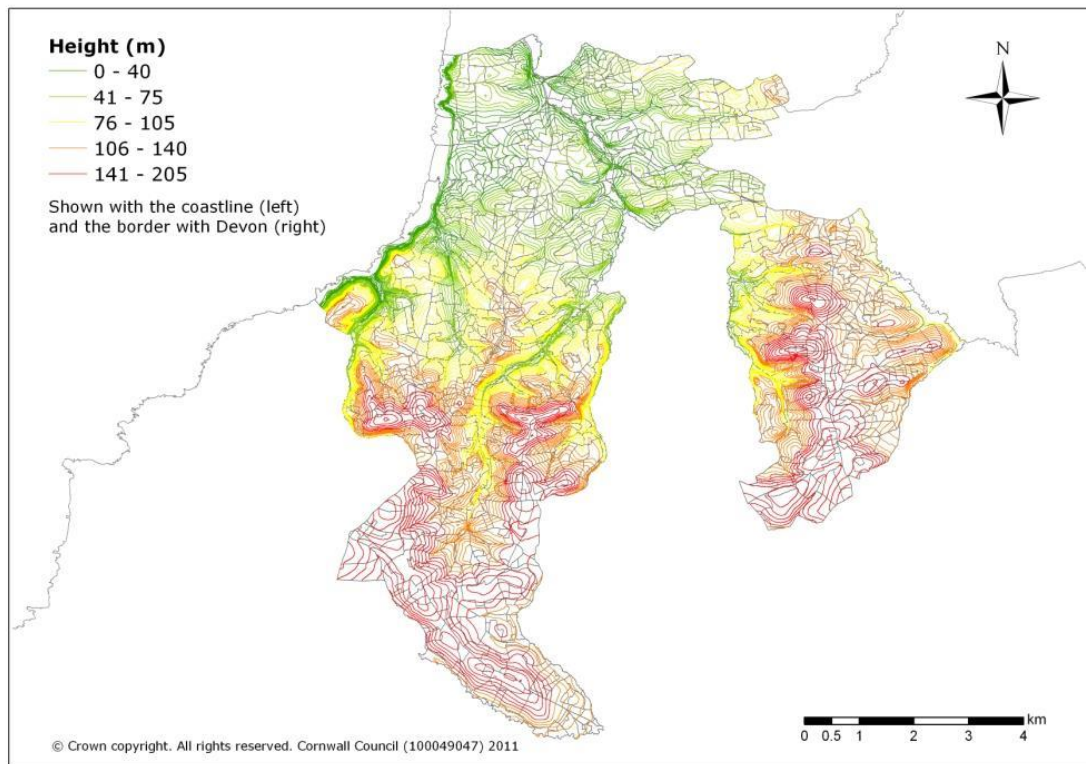


Fig 20 Poundstock study area: shown with contours

For the 1994 HLC the percentage of the Poundstock area taken up by each HLC Type is as follows.

HLC Type (1994)	Area (sq km)	% Area
Coastal Rough Ground	0.982	1.50%
Communications	0.204	0.31%
Farmland: Medieval	34.562	52.71%
Farmland: Post-medieval	13.366	20.38%
Farmland: C20	9.259	14.12%
Industrial: Working	0.01	0.02%
Intertidal and inshore water	1.193	1.82%
Military	0.08	0.12%
Plantations and Scrub	0.486	0.74%
Recreational	0.363	0.55%
Settlement: C20	1.359	2.07%
Settlement: older core (pre-1907)	0.198	0.30%
Upland Rough Ground	0.79	1.20%
Woodland	2.722	4.15%
Total	65.574	

Table 16 Poundstock study area: 1994 HLC Types

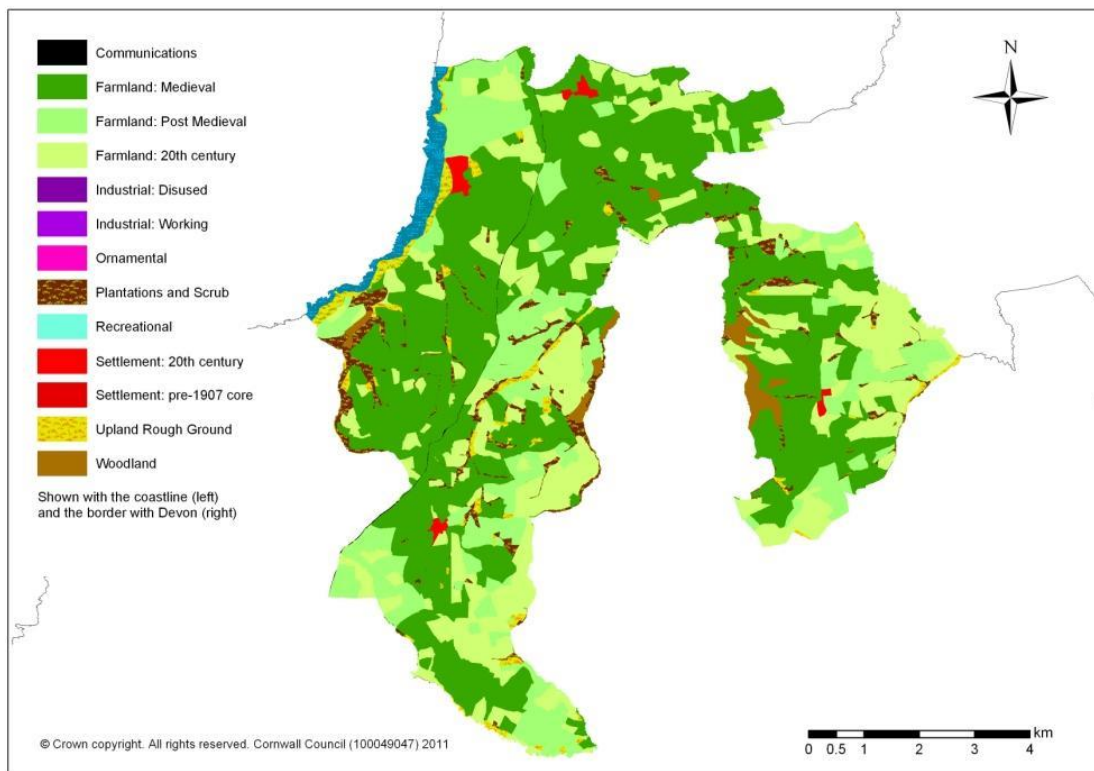


Fig 21 Poundstock study area: 1994 HLC

The percentage of the area taken up by the equivalent refined 2011 HLC Types is as follows.

HLC Type (2011)	Area (sq km)	% Area
Coastal Rough Ground	0.571	0.87%
Communications	0.202	0.31%
Industrial	0.010	0.02%
Intertidal and inshore water	1.594	2.43%
Military	0.080	0.12%
Medieval Enclosed Land	39.583	60.36%
Post-Medieval Enclosed Land	6.039	9.21%
Modern Enclosed Land (incl. Early Modern)	11.572	17.65%
Plantation	0.486	0.74%
Recreational	0.364	0.55%
Settlement	1.556	2.37%
Upland and Valley Rough Ground	0.791	1.21%
Woodland	2.726	4.16%
Total	65.574	

Table 17 Poundstock study area: 2011 refined HLC

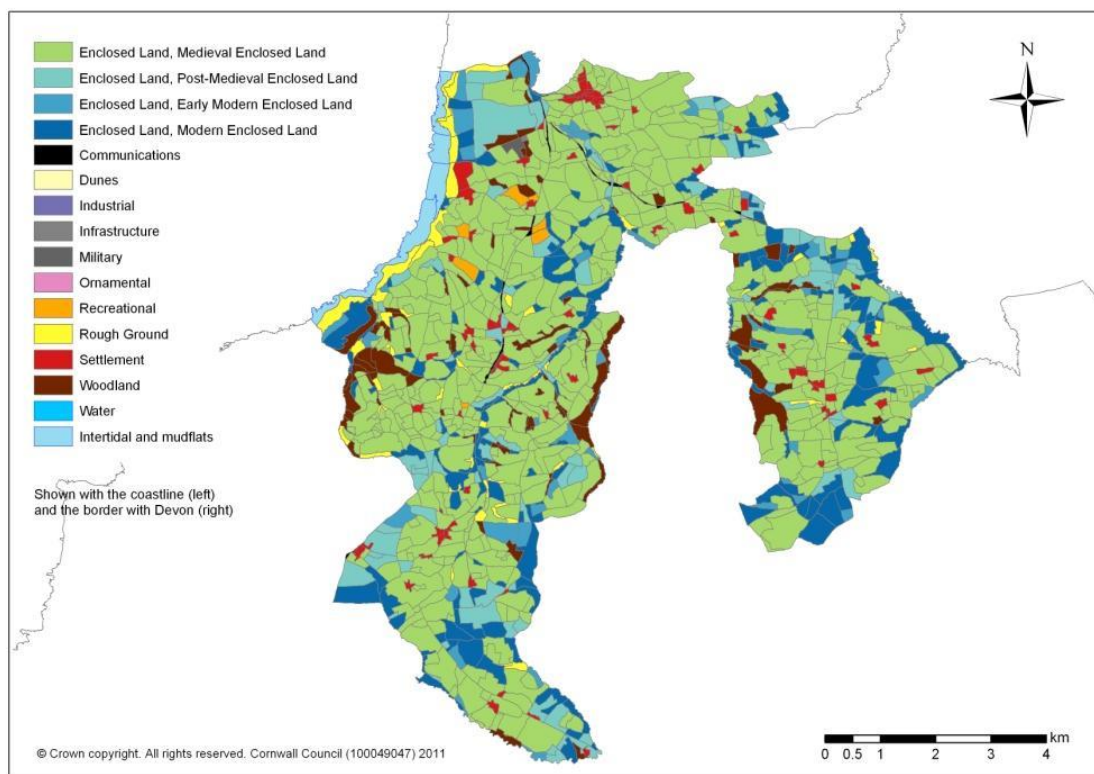


Fig 22 Poundstock study area: 2011 HLC

A more direct comparison is set out in the table below.

Refined HLC Type	% Area 1994	% Area 2011
Coastal Rough Ground	1.50%	0.87%
Communications	0.31%	0.31%
Medieval Enclosed Land	52.71%	60.36%
Post-Medieval Enclosed Land	20.38%	9.21%
Modern Enclosed Land (incl. Early Modern)	14.12%	17.65%
Industrial	0.02%	0.02%
Intertidal and inshore water	1.82%	2.43%
Military	0.12%	0.12%
Plantations and Scrub	0.74%	0.74%
Recreational	0.55%	0.55%
Settlement	2.37%	2.37%
Upland and Valley Rough Ground	1.20%	1.21%
Woodland	4.15%	4.16%

Table 18 Poundstock study area: comparison between 1994 and 2011 HLC

The biggest difference is that 11% less of the area is interpreted as Post-Medieval Enclosed Land. Roughly 3.5% has been re-interpreted as Modern or Early Modern Enclosed and 7.5% as Medieval Enclosed Land.



Fig 23 Aerial photograph of Millook Common, Poundstock. This was an open area of Coastal Rough Ground in 1840. It had been sub-divided but not improved by the 1880 time-slice (based on OS mapping), and has been converted to improved fields in the modern period; the 2011 revised HLC mapping recording a majority of the area as Modern Intakes. The 1994 HLC mapping had recorded the majority of the area as Post-Medieval Enclosed Land, enclosed in the 17th, 18th or 19th centuries. ©Historic Environment, Cornwall Council, 2007; F84-134.

The four time-slices in the revised HLC reveal how the area of each of the main HLC Types has changed over time, reflecting changing land use patterns. This is shown below. The final column shows the difference in area between medieval and present.

Refined HLC Type	2011	1880	1840	Late Medieval	Difference
Medieval Enclosed Land	39.583	39.983	41.542	42.302	-2.719
Post-Medieval Enclosed Land	6.039	6.368	6.739	0	6.039
Early Modern Enclosed Land	2.385	2.469	0.435	0	2.385
Modern Enclosed Land	9.187	0	0	0	9.187
Rough Ground	1.362	13.076	13.542	18.920	-17.558
Woodland mixed	2.726	1.746	1.406	2.640	0.086

Table 19 Poundstock study area: comparison of time-slices (all figures shown in sq km)

Clearly the growth of Post-Medieval Enclosed and, more recently, Early Modern and Modern Enclosed has been primarily at the expense of Rough Ground.

The time slices also show land use developments within the medieval enclosure types.

Refined Sub-Type	2011	1880	1840	Late Medieval
MD Altered field patterns (Amalgamated)	24.205	13.416	0.875	0
MD Altered field patterns (Re-arranged)	9.883	10.006	12.789	0
MD Altered field patterns (Sub-Divided)	3.373	9.942	16.792	0
MD derived from Cropping Units	1.902	5.363	8.334	29.057
MD derived from Strip Fields (Enclosed)	0.082	0.491	1.414	10.266
MD peripheral fields	0.138	0.766	1.338	2.978
Total (sq km)	39.583	39.983	41.542	42.302

Table 20 Poundstock study area: area of Medieval Enclosed Land Sub-Types for each time-slice (all figures shown in sq km)

Seventy two percent of land classed as cropping units in the Late Medieval time slice and 90% of enclosed strip fields had been sub-divided or re-arranged by the 1840 time slice. Since 1840 the process of alteration has been one of amalgamation. Now there are hardly any strip fields left and less than two sq km of 'derived from Cropping Units'.

4 Assessment of the Lowland Cornwall HLC method

4.1 Introduction

The HLC methodology employed within Lowland Cornwall was tailored to the specific needs of the project in that the identification of HLC was based on Tithe and Ordnance Survey mapping alone; no supporting evidence from historic environment datasets other than the Historic Settlement dataset was used. No reference to the HER was made as this would have compromised the model building stage because HLC mapping would be influenced by the very data with which it was to be correlated.

The simplicity of only using a small number of historic maps and the supporting Historic Settlement dataset in the HLC mapping process meant, in terms of the limited range of supporting data, that the Lowland Cornwall HLC was nearer to the 1994 method for Cornwall, rather than more recent HLC projects elsewhere, for example South Yorkshire. One benefit of not consulting HER data was the speeding up of the mapping process.

Lowland Cornwall's HLC is unusual in that it has a larger amount of attribute information than other HLC projects. It contains a full set of HLC fields populated with attribute values for three time-slices; 2011, 1880 and 1840. The speeding up of the mapping process through not consulting HER data enabled the 'attribute heavy' requirements of the three time-slices of the Lowland Cornwall method to be completed within the project timescale.

Whilst it is common practise amongst many HLC practitioners not to see HLC attribute values as a 'dataset' their potential ability across three time-slices to be queried, quantified and statistically analysed in GIS is a great asset, as it is hoped the following sections will demonstrate.

A difference from other HLC projects is that Lowland Cornwall assessed the character of Enclosed Land to Sub-Type level, and in relation to alterations to the HLC Type, so that present character at Sub-Type level can be understood in terms of continuity or alteration. Usually with HLC a large-scale change in field boundaries would result in an area of Enclosed Land being identified as a new HLC Type (for example an area of Medieval Enclosed Land would be reclassified as Modern Enclosed Land if it had undergone substantial modification during the twentieth century). The Lowland Cornwall method, by contrast, assesses the type of change to the enclosed land (in the example above, the fields would be reclassified as Medieval Altered field patterns). This is a result of Lowland Cornwall's use of full attributes for the three time-slices, the added complexity of the HLC Sub-Types, and the project aim to better understand the nuances of archaeological data. While mapping the pilot parish it became clear that a majority of the Enclosed Land in the 1840 and 1880 time-slices had undergone substantial change which could be defined as either 're-arranged', 'sub-divided' or 'amalgamated' Sub-Types (see Section 3.3.2).

Whilst the Lowland Cornwall HLC is a project specific methodology a thorough interrogation of both its prescriptive and descriptive elements is critical. This is especially important in light of the results of the predictive modelling and secondly, because archaeologists working in Cornwall have consistently tried to push the use of HLC in innovative ways within the planning process (see Section 1.4.3). As the area where HLC was first piloted and produced on paper maps without attribute values, the discussion of the pros and cons of the prescriptive and descriptive methods at a national level were not discussed in detail in relation to Cornwall's landscape, so this report is an important opportunity to do so.

Furthermore it is widely acknowledged by landscape archaeologists that much of Cornwall's enclosed land has a more complex landscape history than many other places. Cornwall is also unusual in its use of HSC Types for Enclosed Land that include a period pre-fix, e.g. Prehistoric Enclosed Land. This is because in many parts of Cornwall it is possible to demonstrate the continuity of enclosed land (field boundaries and land

use) from at least the late medieval period. This is especially the case in areas like West Penwith where the time-depth, and potentially continuity of use, can be postulated back to the later prehistoric period, resulting in the interaction between prehistoric and medieval enclosed land sometimes being difficult to disentangle. The very presence of areas of HLC definable as Prehistoric Enclosed Land in the present is also unusual, with very few other counties and areas able to demonstrate this (exceptions include Devon and for parts of the Weald, south east England; Peter Herring, pers comm).

The following section expands the discussion of the Lowland Cornwall HLC in relation to other HLC projects, makes recommendations for future study of its HLC attributes, and a number of potential areas to consider in advance of the development of a methodology for future HLC mapping in Cornwall.

4.2 Discussion

4.2.1 The use of Historic Settlement data

As outlined above the only historic environment dataset used as supporting evidence for the HLC refinement was the Historic Settlement dataset. Place-name mapping was used to provide further context to the interpretation of the landscape. The dataset was produced for each parish before HLC mapping was undertaken. The potential for dating certain Cornish and English place-name elements enabled a greater degree of confidence in the interpretation of an area's HLC. It also included the form and type of the settlement named, and a mid-18th century time-slice based on Martyn's 1748 'Map of Cornwall'. Consultation of Martyn's map also provided a further source to support the HLC assessment, increasing confidence in the differentiation of 'Post-Medieval' from 'Early Modern' Enclosed Land as the map accurately records the extent of larger areas of unenclosed rough ground in 1748. For clarity, the year 1750 was used as the cut-off between post medieval and early modern periods. It also broadly corresponds with the beginnings of the Industrial Revolution, and a dramatic increase in the enclosure of small holdings (Dudley 2011a).

Interpretation of the place-name mapping was also used in an attempt to indicate the continuity of settlement and land use of each area. For example, the enclosed land surrounding a *tre*- settlement would be identified as 'core'. The identification of attribute values as either 'Core', 'Sub-core', 'Fluctuating/Tidal' and 'Marginal' aimed to indicate the potential depth of continuous land use in an area.

The purpose of these attributes was to add value to the predictive models: to see if the archaeological resource in areas of potential continuous settlement since the late prehistoric period (core) differed from that in more peripheral areas. Decision making for 'Landuse' was based on the interpretation and dating of Cornish and, to a lesser extent, English place-name elements contained in the Historic Settlement dataset. These were used to give a potential indication of a settlement's earliest date, and the landscape history of the area.

This is easiest to postulate for the Cornish place-name elements *tre*, *bod*, *hendre*, *lann*, *ker* and *lys* which probably date in usage to between the fifth and tenth centuries AD (Padel 1985). It is suggested that these *could* be interpreted as 'core' areas: those most likely to have been continuously settled since the Romano-British period. The polygons surrounding these settlements were classified as 'Core'.

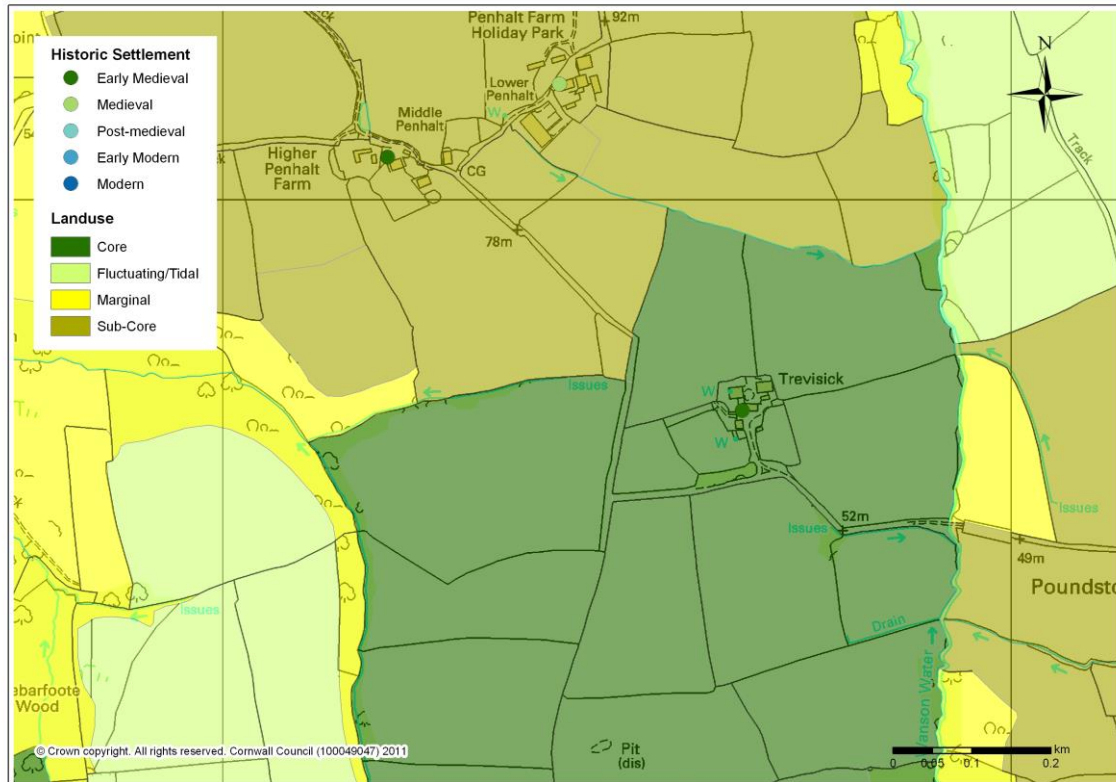


Fig 24 Poundstock study area: Identification of 'Landuse' in areas surrounding settlements of early medieval date. Trevisick was dated on its Cornish tre- place-name element but Penhalt was recorded as early medieval due to its documentation by the Domesday Book in 1085 as an important estate. The accurate identification of potential continuity of fields has many complications but the project attempted to explore its potential as part of predictive modelling.

Other attribute values for Landuse included 'Sub-Core' (possible areas of continuous settlement) and 'Fluctuating/Tidal' (areas which may have seen an extension of settlement in the late prehistoric/early historic period, then a retraction of settlement, followed by colonisation again, sometimes in slightly different locations and potentially under different circumstances, in the later medieval period). 'Marginal' Landuse was identified on the basis of rough ground, altitude, severity of slope and aspect; typically corresponding with Rough Ground or Woodland, or previous areas of Rough Ground (Post-Medieval, Early Modern and Modern Enclosed Land) and Woodland.

Accurately establishing the extent to which a group of fields were associated with a given settlement was difficult. Extent was usually established by subjective judgment influenced by topography (altitude, severity of slope, and aspect) and the way in which the landscape was divided (dominant boundaries). A small number of the 1840 Tithe maps recorded tenement boundaries (for example Paul) and where so, these were used to delineate the areas of enclosed land surrounding a particular settlement.

However, this aspect of the mapping had several limiting factors and the results suggested little correlation with differences in the visibility and types of archaeological features (see Lowland Cornwall Volume 4).

4.2.2 The use of time-slices in HLC

The Lowland Cornwall project assessed HLC in terms of a three-tier level of Type and to better demonstrate the amount and type of landscape change in three time-slices. This was undertaken to see if changes to an area of Enclosed Land, for example subdivision, amalgamation or re-arrangement, resulted in differences in the recording and visibility of archaeological features.

In Lowland Cornwall's method HLC in an area can be reassessed at Broad and HLC Type if it is interrupted for a time-slice(s). For example, certain areas of Prehistoric Enclosed Land were identified as probably first enclosed in the Late Bronze Age. These areas are now usually found in marginal upland locations and it is likely that many reverted to rough ground in the Iron Age, and were recorded as 'Upland Rough Ground' in the late medieval interpretative time-slice. Since then many of these areas have been brought back into cultivation and improved from the post medieval period onwards as crofts. Here the Lowland Cornwall method would have recorded the areas (once improved) as 'PX Altered field patterns' for the later time-slices rather than Post-Medieval, Early Modern or Modern Intakes (depending on the relevant date).

In most cases differences in terms of the attribute values will show the areas where elements of prehistoric character have been largely unaltered, and the areas where they have been heavily altered. In conventional HLC methodology the latter areas would be reclassified. This need not be a problem as the flexibility of the attribute values should allow the Lowland Cornwall HLC to be reassessed if needs be. This has previously been applied in Cornwall with the 1994 HLC in relation to areas where revision HLC projects have been undertaken. The process for merging HLCs with differing methodologies brought to the fore the importance in the interpretation of boundary values and percentages to confidently assess Enclosed Land (see Dudley 2011b).

The nature by which the Lowland Cornwall HLC records past change leads to further differences in its HLC. There are several areas of Medieval Enclosed Land that have been characterised as Industrial HLC in their 1840 or 1880 time-slices, or both, and then reverted back to Medieval Enclosed Land, albeit 'Altered'. In the 2011 time-slice Lowland Cornwall has recorded these areas as 'MD Altered field patterns (Re-arranged)'. What is noticeable is that when these areas were 'Industrial', elements of their former character as Enclosed Land were still evident but not dominant (Fig 25). Upon the removal of the industrial remains by the 2011 time-slice Lowland Cornwall recorded their reversion to Enclosed Land, the change in HLC being simply an alteration. Further analysis of the attribute fields and a visual inspection of these areas show that for some, they are now dominated by straight boundaries but retain their medieval outer enclosing boundary (see below for further discussion).

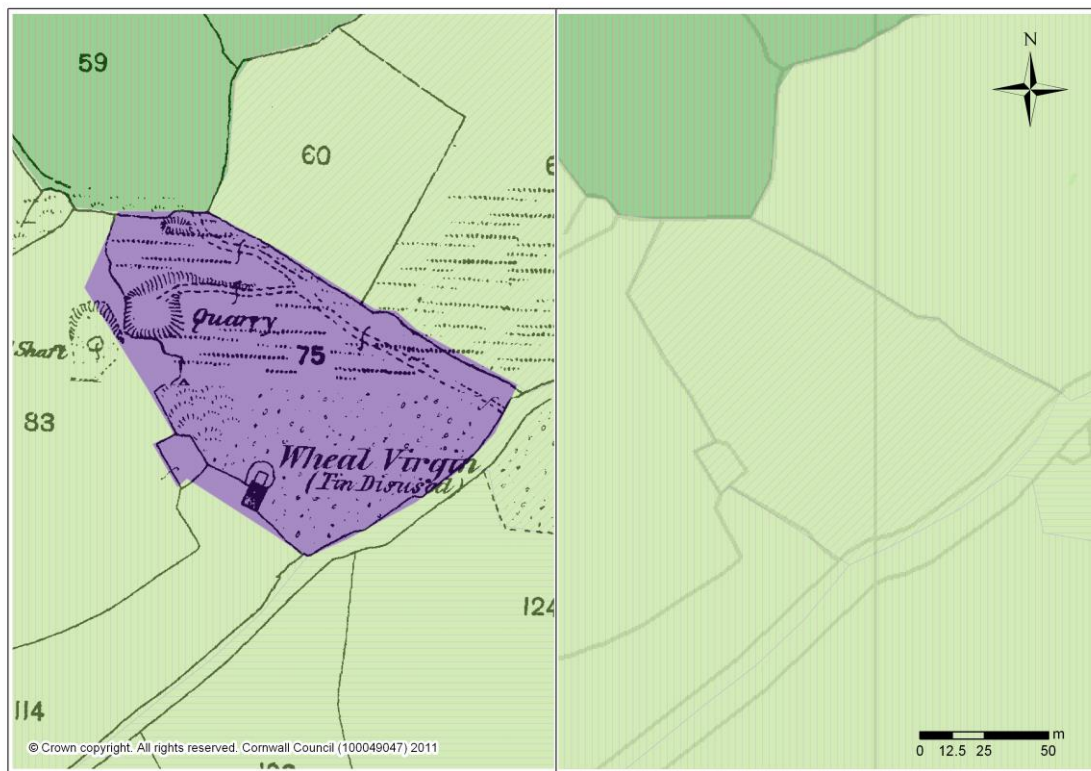


Fig 25 Marazion, Penwith: the area of Wheal Virgin. In 1880 (left) and in 2011 (right) when it was recorded by the Lowland Cornwall HLC method as altered Medieval Enclosed Land following re-arrangement and its return to Enclosed Land.

4.2.3 Differentiation between Prehistoric and Medieval Enclosed Land

Due to time constraints the 1994 HLC for Cornwall had drawn a rough line from the A30 between Hayle and Varfell, Marazion and assumed that west of this line (i.e. West Penwith) a majority of enclosed land was prehistoric in date.

In the Lowland Cornwall method Prehistoric Enclosed Land was distinguished by a predominance of erratic and/or curvilinear field boundaries and small field size (though the simplicity of this assessment is open to some debate; see below for further discussion). The HLC Type was only identified in parts of the Penwith study area. However, the 2011 time-slice contains no areas of Prehistoric Enclosed Land that have not been altered in some way. For many areas these alterations have been significant in scale.

The differentiation of Prehistoric and Medieval Enclosed Land requires further discussion to try and better understand the effect of not using HER data during the mapping process, the role of the prescriptive method, and the limited range of attribute values used in the Lowland Cornwall HLC mapping.

A data query shows that 36 areas of Medieval Enclosed Land in the 2011 time-slice have dominant curvilinear or erratic boundary types. However, only four of these areas have not been 'Altered' in some way. Of these four, two areas contained extant prehistoric enclosures. To further test the interaction with the HER a location query on these 36 areas, for all prehistoric HER features, resulted in ten areas selected. Developing the query further by selecting only where prehistoric HER features are 'Extant', only seven of the 36 areas were selected. Of the seven areas, three were in Penwith study area, two in Probus, with single entries in both Pelynt and Poundstock. A majority of the sites are rounds and hillforts except for the three sites in Penwith where two were standing stones and the last was a potential barrow.



Fig 26 Medieval Enclosed Land where the dominant boundary is curvilinear or erratic and there is correlation with an extant prehistoric monument recorded in the HER. To the left, the round at Bake Rings, Pelynt, makes a contribution to the boundary character of the area due to its scale and the fossilisation of part of the rampart in the present field boundary. However, to the right the standing stone at Treverven House, St Buryan, makes no contribution to the area's boundary character.

There are also 40 areas of Medieval Enclosed Land where curvilinear and erratic field boundaries form the secondary boundary character. Using HER data where features are recorded as either 'Extant' or as an 'Earthwork', a location query identified that only ten of these 40 areas contained these types of prehistoric features. Further inspection showed that only in a single instance this might have changed the HLC mapping from 'Medieval Enclosed Land' to 'Prehistoric'. For most of the areas, the erratic field boundaries were the result of haphazard amalgamation of medieval fields, and the curvilinear boundaries were only partially curvilinear and not dominant landscape features.

At Cargoll, Newlyn East for example, the curvilinear elements in the boundaries were mapped as only a minor part of the landscape, the area being dominated by sinuous boundaries (70-89%). The HER point records the remains of a prehistoric enclosure, partially fossilised in the field boundary and partially surviving as an earthwork (PRN 25050). The area also contains another enclosure recorded as a banked feature (PRN 55558). The curvilinear nature of this feature appears to be partially mirrored in the nearby field boundary. Its identification as Medieval Enclosed Land and not Prehistoric is because the prehistoric features are not a dominant part of the landscape, with only limited elements fossilised in all three time-slices.

The limited features can only suggest that prehistoric activity occurred in the area, not that the area is entirely or predominantly fossilised prehistoric enclosed land.

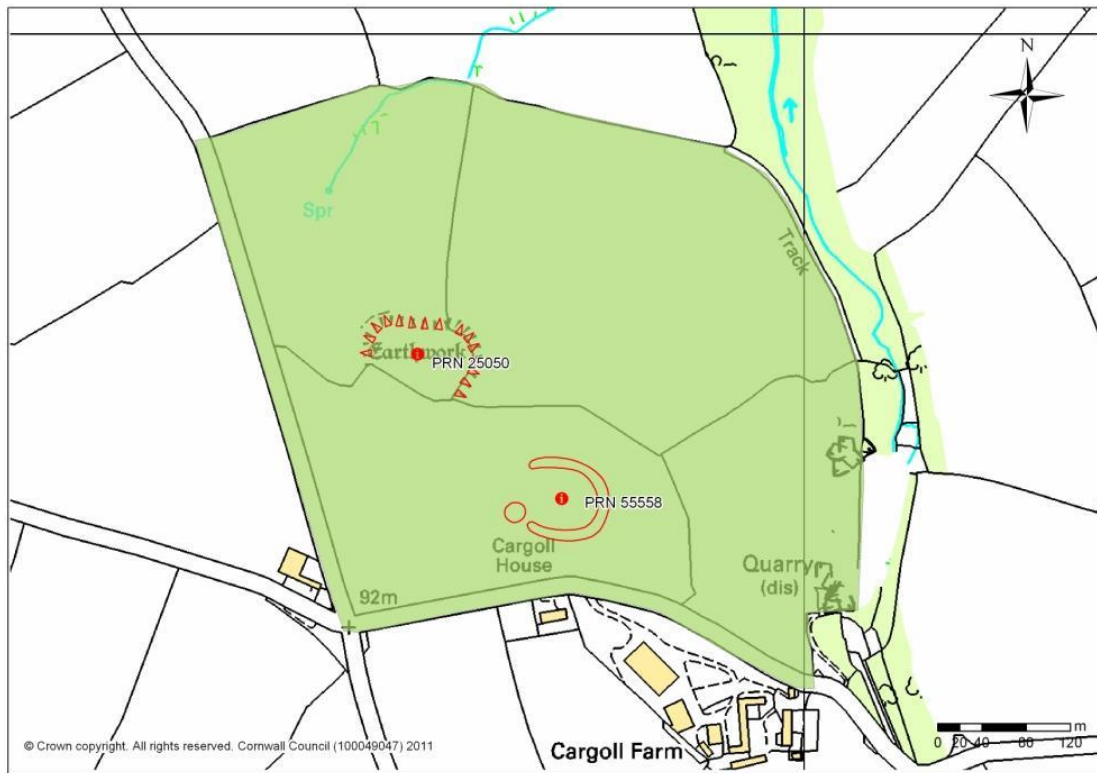


Fig 27 Probus study area: Cargoll, St Newlyn East, Medieval Enclosed Land with limited prehistoric features fossilised in field boundaries. Shown with NMP data from aerial photographs (red lines) and 'extant' and 'cropmark' prehistoric period HER points (with reference numbers).

It is of no surprise that the interaction and distinction between Prehistoric and Medieval Enclosed Land is difficult to disentangle in Penwith. In HLC an area is identified on its individual attributes alone, and not influenced by the character of the broader landscape. Nor was the mapping attempting to directly establish the former extent of prehistoric field systems, but where prehistoric character is visible in 1840, 1880 or 2011.

The 2011 refined HLC for the Penwith area contains concentrations of Prehistoric Enclosed Land, often forming islands of prehistoric character surrounded by medieval character.

Due to the survival of Prehistoric Enclosed Land Penwith can be seen as different from the other study areas. However, as with the other study areas, most of Penwith has been characterised as Medieval Enclosed Land (51.68% of the area). This is quite different to the 1994 HLC mapping when only 18.27% of the Penwith study area was characterised as Medieval Enclosed Land (see Table 8). The difference is marked, and deserves further analysis to better understand the reasons why.

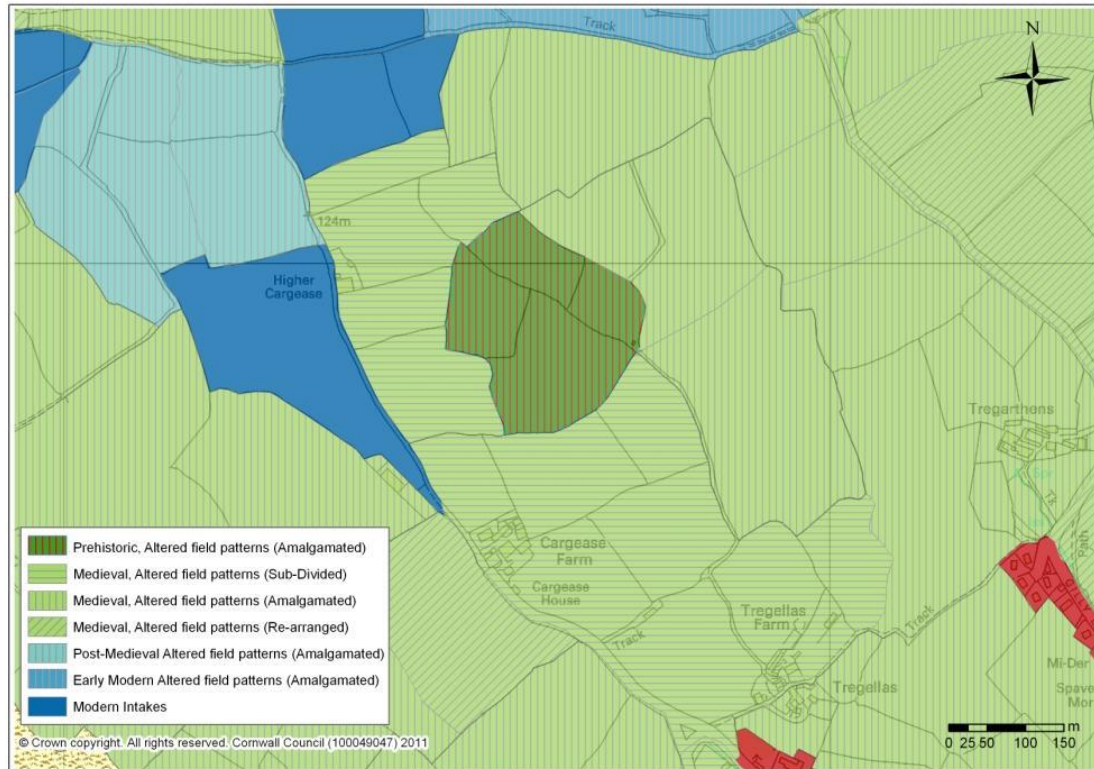


Fig 28 Penwith study area: An island of Prehistoric Enclosed Land (Altered) surrounded by altered Medieval Enclosed Land at Cargease, Ludgvan.

The first obvious reason is a difference in the person undertaking the HLC mapping, and the subjective role involved in HLC assessment. It is clear that the present author's initial approach to mapping differed from that of the team in 1994 who had limited project budget and no GIS-based resources to complete the mapping for the whole of Cornwall. In the Lowland Cornwall HLC it was decided by the assessor that the Prehistoric Enclosed Land could only be identified were it was *substantially* visually different in terms of boundary form from Medieval Enclosed Land. While it was clear that as mapping progressed that the character of Medieval Enclosed Land in Penwith 'felt' different from the other study areas, especially in its more marginal locations, it was decided that in many instances it was nearer to a medieval character rather than the surviving prehistoric character found elsewhere. Here, it has to be acknowledged that the present HLC mapper felt that there were not enough descriptive elements in the present method to differentiate the Enclosed Land Types. Therefore further analysis of the descriptive method is required. This includes the use of HLC field and attribute fields and further analysis of field size produced via a GIS based query.

4.2.4 Differences in the HLC of the four study areas

An analysis of Medieval Enclosed Land in relation to dominant and secondary boundary types suggested only limited differences between study areas. Overall 'Very Irregular' field patterns are more frequent in the Penwith and Pelynt study areas; with 34% and 42% respectively located in each area. Dog-leg shaped boundaries are more likely in Probus, Pelynt and Poundstock and erratic boundaries most likely in Penwith, both as dominant and secondary characteristics. However, erratic boundary types are not exclusive to Penwith, with erratic boundaries also a result of the amalgamation of medieval field boundaries across all study areas and not solely a fossilisation of prehistoric elements.

A noticeable feature of Penwith is the large number of polygons in the study area. It covers 24% of the project area but contains 34% of the total polygons mapped by the

project. The mapping rate for Penwith was noticeably slower than the other study areas, suggesting a more complex and varied landscape. The higher number of polygons is also due to the smaller size of fields in Penwith, and mean field size is a marked difference which sets Penwith apart from the other study areas.

The average field size for Enclosed Land of all dates is noticeably smaller in Penwith, and over half the size of that found in the Probus study area, where field size is largest. Fields in the Poundstock area are also noticeably smaller.

Enclosed Land (All HSC Types)	
Study Area	Mean hectarage of a field
Probus	2.95
Pelynt	2.64
Poundstock	2.16
Penwith	1.36

Table 21: Mean hectarage of fields in Enclosed Land for the four study areas

Further analysis of the Prehistoric Enclosed Land identified in Penwith shows a mean value of 1.35ha per field, increasing to 1.44ha where 'altered' or 're-arranged' and an extremely small 0.68ha where 'sub-divided'. When only Medieval Enclosed Land is analysed across all the study areas, Penwith is again noteworthy for its difference in mean field size.

Medieval Enclosed Land (2011)	
Study Area	Mean hectarage of a field
Probus	2.95
Pelynt	2.63
Poundstock	2.16
Penwith	1.41

Table 22: Mean hectarage of fields in Medieval Enclosed Land for the four study areas

This suggests that the fields making up Medieval Enclosed Land in Penwith are quite different in form than those in the other study areas. The mean figure of 1.44ha field size for altered Prehistoric Enclosed Land is very close to the mean figure of 1.41ha field size for Medieval Enclosed Land in Penwith. It is unclear if this is a difference which dates back as far as the prehistoric period, and that Penwith has always been enclosed (and farmed) differently, or if this is simply a difference in the date and mechanism of later changes, or a combination of the two. This point cannot be expanded upon in this report but is perhaps something for future projects to consider.

It is likely however that the difference in the Penwith landscape in the 19th century was, in part, due to differences in the arrangement of its settlements and land holdings. The smaller size of fields in the Poundstock area could be due to the poor soils, and/or a difference in the way the area is, and has been, farmed. Probus is also markedly different from the other study areas. An observation during the mapping phase was that the agricultural landscape appeared to be organised on a larger scale from an earlier date than elsewhere. This was particularly true in the parish of Probus and the southern portions of Ladock and St Erme. Here, the Historic Settlement data can be of some use.

4.2.5 Settlement types and HLC

In 1748 20 of the 84 Mansion Houses recorded in the project area were located around Probus, Ladock and Trispen (in an area approximately 58 sq km in size); this approximates to 23% of the mansion houses in 15% of the Lowland Cornwall area. Probus was also known as the 'garden parish' of Cornwall renowned for its fertility and favourable climate. By 1840 the same area contained 27% of the mansion houses and by 1880, 25%. The wealth of the area may have also been affected by its close proximity to Truro, a centre for merchants and business. However, it seems that holdings in the Probus area were amalgamated at an early date, perhaps as early as the late medieval period in some instances.

In 1748 Penwith contained 36% of the nucleated hamlets in 24% of the Lowland Cornwall area. This had increased to 40% of nucleated settlements by 1840 and 42% by 1880. Conversely, in 1748 Penwith contained only 7% of the single farmsteads in the Lowland Cornwall project area, of which it covers 24%. In Pelynt, 39% of single farmsteads were located in 23% of the Lowland Cornwall area, perhaps suggesting a high number of small individual farms from an early date.

The Poundstock area differed from the others in 1748 by not having any towns or villages. This may simply be due to the parishes mapped, as the settlement of Stratton which lies just outside the study area would have been important settlement. Further analysis of the Historic Settlement dataset against the Lowland Cornwall HLC could potentially reveal other differences and relationships, but this will require further interpretation.

While Martyn's 1748 map is an invaluable source for understanding historic settlement at an early date, its mapping conventions for settlements are limited in their differentiation of hamlets. In all instances these are recorded as nucleated hamlets. There are further limitations to the interpretation of the 1840 time-slice as the Tithe Maps vary in quality and detail, with large buildings not differentiated as 'Mansion Houses', and only with certain maps can dwellings and buildings be distinguished, limiting the accuracy of differentiating settlements as hamlets or single farmsteads.

In order to best meet the aims of the project the mapping focused on the better understanding of Enclosed Land HLC. The project attempted to break down the Settlement Broad Type by focussing on its number of dwellings and the date of its development and changes to it rather than its built character. Before a new HLC method is employed across Cornwall further work should establish what HLC fields and attribute values are needed for Settlement HLC to be an effective management tool.

4.2.6 Inter-relation of Medieval Enclosed Land with later enclosure

Whilst the Lowland Cornwall project aims to better understand the interaction of prehistoric and medieval enclosed land, the HLC mapping also provides hints at an interesting interaction between Post-Medieval and Early Modern Enclosed Land and earlier medieval features. A query of attribute values for Post-Medieval Enclosed Land where the dominant boundary is sinuous results in 58 records. In the 2011 time-slice a majority of these areas have been altered. But by looking at the 1840 time-slice it is clear that a majority of this land was identified as the Sub-Type, 'Post-Medieval Intakes' (51 areas; 88%). In 24 of these 51 areas sinuous boundaries were dominant in 1840. These areas are often located on the edge of existing medieval field systems, in more marginal locations; such as valley bottoms, near to the edges of cliffs and valley sides. Interpretation suggests that the sinuous boundaries are remnants of earlier, medieval use but in a temporary or less intensive arrangement: the boundaries on steep sided valleys probably the remnants of wood banks or pasture boundaries (that follow breaks in the slope or natural features); those in valley bottoms perhaps the remnants of leats, or pasture boundaries again making use of natural features; and on cliff edges and hill slopes possible re-using areas of former temporary outfield cultivation or pasture boundaries. The classification of these areas as 'Post-Medieval' rather than 'Medieval' is due to their marginal location, their probable temporary

enclosure, and their location away from the permanently enclosed land surrounding the medieval settlements.

4.2.7 Boundary loss and gain

Time constraints were a governing factor in the Lowland Cornwall method due to the implications of having to populate full HLC fields and their attribute values for three time-slices. However, there are potential benefits of having this amount of information.

Establishing the number of fields for three time-slices enables a general understanding of boundary loss and gain. Overall, for the areas presently identified as Enclosed Land, there has been an approximate 42% loss in field boundaries between 1840 and 2011. The overall rate is about the same in the Pelynt study area, slightly less in Penwith and Probus and slightly higher in Poundstock. However, the highest single loss of field boundaries was recorded in an area at Higher Treave, St Buryan, where there was a 96% reduction (Fig 29). Penwith was also the location for the greatest increase in field boundaries, where an area of rough ground was enclosed and sub-divided into market garden plots; an increase from two boundaries in 1840 to 44 in 2011 (Fig 29).

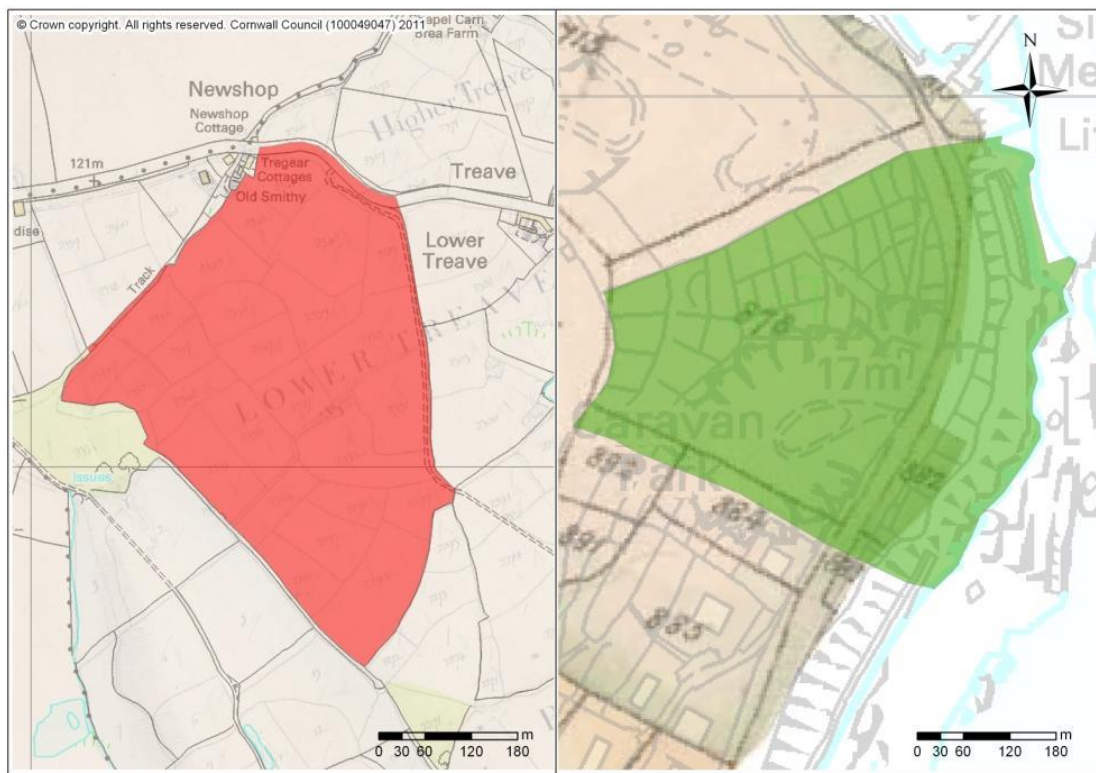


Fig 29 Areas with the greatest loss and gain of fields. The greatest loss of fields was recorded at Treave, St Buryan (left) and the largest gain of fields at Penlee Point, Paul (right) between the 1840 and 2011 time-slices. Both areas are shown with the 1840 Tithe Map and modern OS 1:10,000 mapping.

Analysis of boundary loss/gain could help increase the understanding of landscape change upon HLC. It is possible that there are noticeable differences between time-slices and areas. Further assessment of the results could establish the usefulness of the attributes to guide future landscape strategy in Cornwall, and further develop our understanding of where change has occurred and is likely to happen in future.

The analysis of Lowland Cornwall's HLC suggests that there has been a mean 50% loss in the numbers of field boundaries since 1840 in Medieval Enclosed Land, and an 80% loss in the Altered Sub-Types.

There are limitations to the understanding of loss/gain. For example, an area of enclosed land recorded with eight fields in 1840 may have been re-arranged by 2011 into eight fields with fences not Cornish hedges, banks or walls. In the current Lowland Cornwall method, this would appear as no change in terms of boundary detail (but should have been picked up at Sub-Type level and period). The use of aerial photographs would have increased the accuracy of the boundary form interpretation, as a boundary could be differentiated further e.g. 'fence line', though in future this would have to be added to the values for the boundary attribute values.

4.2.8 Boundary type and dominance

Lowland Cornwall's method of establishing the dominance of a boundary type was based on its numerical count, not boundary length or its visual dominance on mapping. This is a more statistical way of looking at the attribute values but it has its uses and raises some interesting points. The *HLC Revisions in Cornwall* project (Dudley 2011b) used the Lowland Cornwall attribute fields to convert the areas to a more simplified HLC structure (based upon a development of the 1994 HLC mapping). The data query process for HLC Revision in Cornwall established that Medieval Enclosed Land could be substantially altered before its medieval character was visibly lost.

For example, if there were six straight boundaries and four sinuous boundaries in an area this would be recorded as '51-69%', dominant boundary 'straight' and secondary 'sinuous'. But it is possible, and is often the case, that the four sinuous boundaries are greater in length and more substantial than the straight boundaries. On a simple data query many areas of Medieval Enclosed Land where straight boundaries were numerically dominant would have been revised to Post-Medieval Enclosed Land. It was only where straight boundaries were dominant above 90% that visually, based on map data, medieval character appeared to be lost at HSC Type level.

This suggests that surviving sinuous boundaries are often fossilised in the present field pattern as dominant landscape boundaries, perhaps too large and therefore too costly to remove, and/or useful landscape divisions. It also suggests the visual dominance of boundary sinuosity on the HLC mapping process.

There are limitations to both the prescriptive and descriptive elements of the Lowland Cornwall method that will need to be addressed by future HLC work, and limitations of certain principal sources that need consideration during the mapping process, and the eventual evaluation of HLC.

An obvious way of enhancing the ability of HLC to better distinguish differences in medieval character, including surviving traces where alteration has taken place, would be to reintroduce an 'external boundary' attribute field. This was originally intended to be included in the Lowland Cornwall HLC method but was not, due to the limitations of time. Re-introduction of this attribute field could help to further distinguish earlier and later enclosures from one and another, in that Post-Medieval, Early Modern and Modern enclosures are more likely (but not always) to be defined by a straight outer boundary. It could also add further complexity to the understanding of alteration, and the potential effects of it on the HLC of an area. Potential for further distinctions in Medieval Enclosed Land could also be established, if the ability to record detail such as 'ring-fences' were added. The future development of Tithe Apportionment details in a digital GIS format would also enhance HLC interpretation, especially in consideration of land use to distinguish between Rough Ground and Enclosed Land.

It was found during the mapping stage that the 1840 Tithe Surveys varied in the accuracy of their depiction of field boundaries. For several parishes cross-reference with the 1880 OS map was necessary to better inform the potential description of a boundary and in some instances may have led to a misrepresentation of the attribute values in an area. It is unclear whether this is due to inconsistencies on the part of the surveyors who undertook the mapping or if any of the parishes were second-class Tithe Surveys (see Kain and Prince 2000).

An area for the potential improvement of the Lowland Cornwall method is the need for guidelines for the descriptive part of the HLC mapping. While the subjective part of HLC is acknowledged it seems sensible to try to encourage consistency in terms of interpretation of field pattern and boundary form. Analysis suggests that 'Very Irregular' field patterns are more likely in Penwith; however, there is potential scope for a mapper's interpretation to be skewed in different study areas. To ensure more consistent interpretation visual guidelines could be produced for degrees of regularity/irregularity.

This equally applies to the form of boundary. For example, at what point does a sinuous boundary become erratic? And is there any way of differentiating erratic boundaries produced by different processes: are prehistoric boundaries more likely to be 'erratic – sinuous' whereas those derived from the amalgamation of medieval boundaries are more likely to be 'erratic – angular'?

The completion of full HLC fields and attribute values for three time-slices makes the attribute values behind the Lowland Cornwall an extremely powerful tool, but the full analysis of its benefits requires extra analysis and study. The addition of further information to the attribute fields would require extra time and slow the mapping rate down. However, the complexity of the attributes results in a set of attributes that can be reassessed further, either by simplification or the addition of complexity (sub-divided).

4.2.9 Landscape change over time

A potential advantage of Lowland Cornwall's three time-slices is that they give a clearer indication of the extent of landscape change that has occurred. It is interesting to note that certain areas of Medieval Enclosed Land could be assessed as more 'medieval' in character than they were in 1840. Many of the fields surrounding St Newlyn East had been sub-divided in 1840, probably due to the rise in population from the success of the mines in the area. By 1880 many of the fields were still sub-divided, notable for the small fields and straight boundaries dividing former medieval cropping units. By 2011 many of these smaller, later sub-divisions had been removed resulting in a return to enclosures derived from cropping units. Because of the nature of the Lowland Cornwall HLC these areas were recorded in the present 2011 HLC as 'MD Altered field patterns (Amalgamated)' (see Fig 30).



Fig 30 Probos study area: the area to the north of the settlement of St Newlyn East, shown in the late medieval, 1840, 1880 and 2011 time-slices. Many of the fields were sub-divided by 1840 and 1880, but these sub-divisions have been removed by 2011.

In fact one of the important results from the deepening of HLC is the recognition that this pattern of change appears to be county-wide. In all four study areas many of the former cropping units had been sub-divided by 1840 but during the twentieth century most of the sub-dividing boundaries were removed during phases of amalgamation. In the Pelynt study area, for instance, at the end of the medieval period as much as 83% of Medieval Enclosed Land was derived from cropping units. By 1840 almost half of these fields had been sub-divided. Since 1840 the extent of fields derived from cropping units has shrunk dramatically as a result of amalgamation and a large portion of the sub-divided fields have also undergone amalgamation. Today 70% of the fields originally derived from cropping units in Pelynt have been altered (Fig 31).

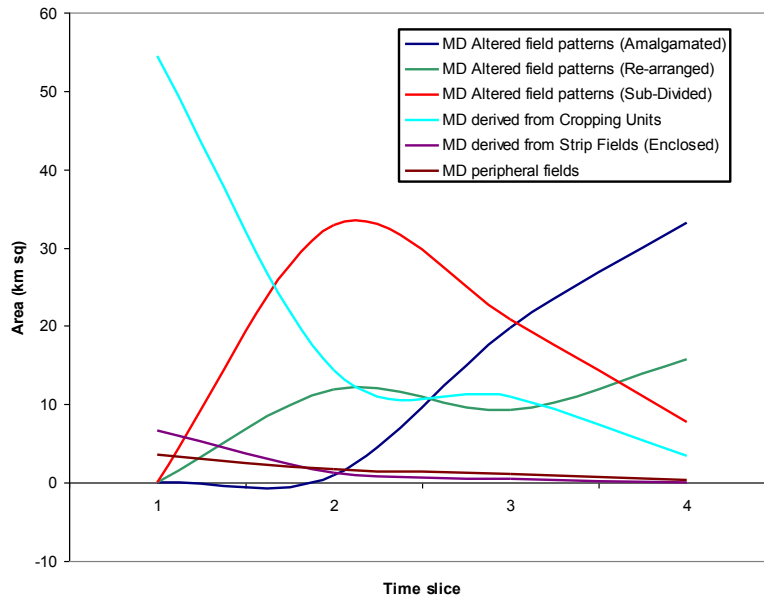


Fig 31 Graph showing changes to Medieval Enclosed Land over the four time slices.

As with other HLC methodologies, Lowland Cornwall does not result in a definitive location in the 'present' of the extent of all medieval and prehistoric field systems. The potential benefit of the Lowland Cornwall method is that it can show the degree and types of alteration to the landscape, and in particular enclosed land, enabling a more statistically based analysis of landscape change, and how this can interact with the perception of character. It is interesting to note that in many instances medieval character is still dominant in the 2011 time-slice but has often been altered in some way, often by several phases of alteration (Fig 32).

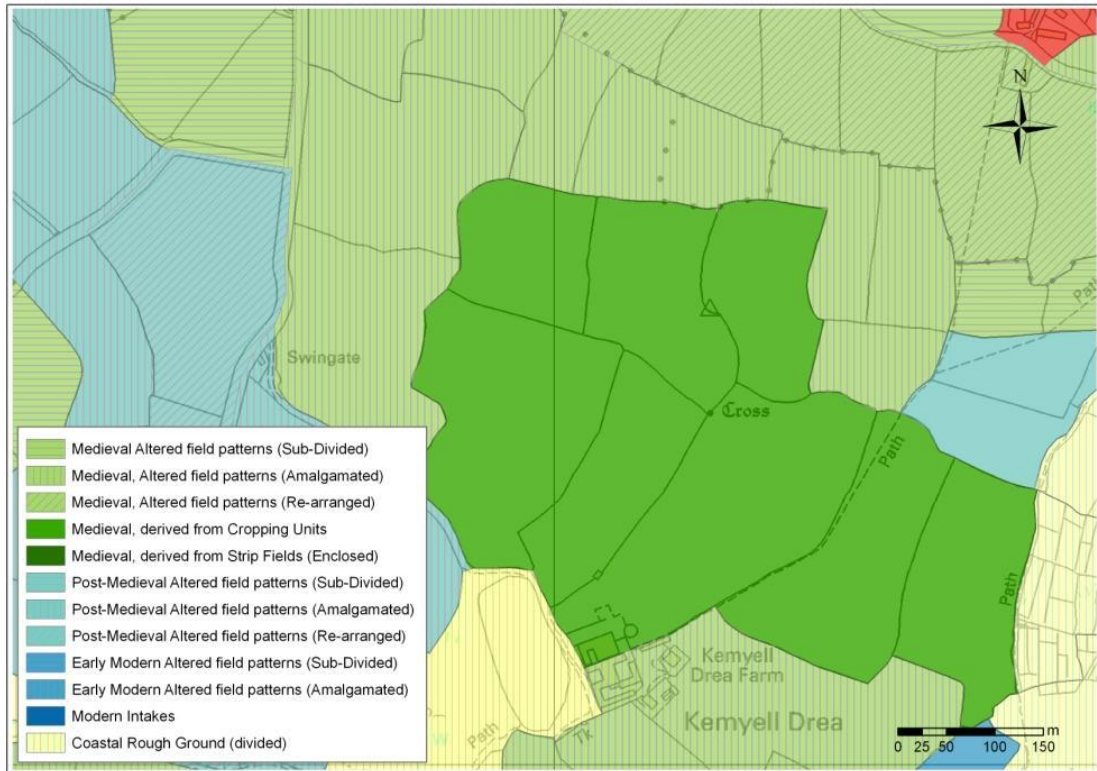


Fig 32 Penwith study area: Kemyell Drea, Paul. Remnant area of Medieval 'derived from Cropping Units' in the 2011 time-slice. The surrounding areas of Medieval Enclosed Land, if interpreted solely on their visual appearance in 2011 could have been interpreted as 'derived from Cropping Units'. Due to alteration in the 1840 and 1880 time-slices these are recorded as Altered Medieval Enclosed Land.

5 Conclusion

It must be highlighted that the Lowland Cornwall HLC method is project specific and should not be rolled out across Cornwall without a period of further assessment and analysis. The methodology differs from previous HLC methods due in part to the predictive modelling requirements of the Lowland Cornwall project, and its attempt to better understand landscape change for three time-slices. For clarity, a summary of the strengths and weaknesses of the method are outlined in the following sections, closing with recommendations for future HLC projects in Cornwall.

5.1 Strengths of the Lowland Cornwall method

The scale at which the 2011 Lowland Cornwall HLC mapping was undertaken has many benefits when compared to the 1994 HLC for Cornwall.

The Lowland Cornwall method involved mapping polygons of HLC to dominant landscape boundaries including roads, streams, and tenement and parish boundaries. This added an extra level of granularity and landscape context aiding the visual interpretation of HLC.

The use of GIS enabled polygons to be created at a larger scale than the 1994 mapping. Lowland Cornwall HLC was identified at the scale of 1:5000 (using the 1:10,000 OS map) and drawn against the OS Master Map landline. This is a considerable improvement as the 1994 mapping was undertaken rapidly at 1:25,000 on OS paper maps, then reduced in scale to 1:10,000 and at a later date, transferred to GIS. The larger scale at which the Lowland Cornwall HLC mapping was carried out has resulted in a more sensitive interpretation of the landscape, with a sharper granularity to mapping and interpretation.

A further strength of the method was the use of Historic Settlement data and historic maps as supporting evidence (and the basis for the 1840 and 1880 time-slices).

The supporting Historic Settlement dataset was of considerable benefit as it added an extra level of confidence to the interpretation of HLC, especially the distinction between Medieval and Post-Medieval Enclosed Land. Martyn's map of 1748 which was consulted as part of the compilation of the Historic Settlement dataset also provided further confidence in distinguishing Post-Medieval Enclosed Land from that of Early Modern date.

The 1840 Tithe maps and 1880 OS 1:25 inch mapping added further context and confidence to the interpretation of HLC overall. Additionally, their availability in a digital (Raster) geo-referenced format via GIS made consultation efficient in terms of time.

Using the 1840 and 1880 mapping enabled the production of three time-slices of HLC mapping with full attribute values.

Lowland Cornwall HLC raises interesting questions about the level of change and at which point medieval character is separated from prehistoric, lost, gained or, in part, 'regained'. It also highlights several important points regarding the way in which HLC is currently mapped.

Firstly, the Lowland Cornwall method enables landscape change to be quantified in terms of boundary loss between the various time-slices. This provides further descriptive detail which, potentially, could support the interpretation of HLC or highlight discrepancies in its assessment. It can also provide a more statistically-based understanding of change in terms of field boundaries; one of the principal attribute fields by which Enclosed Land HLC types are interpreted. As the Enclosed Land HLC Broad Type covers much of Cornwall, this is of particular importance to predictive mapping and managing landscape change in future.

The mapping of the boundary types and numbers of fields across the time-slices has shown that landscape change has not only been more varied and complex in the past, but that it has also been more widespread in Cornwall than perhaps previously

acknowledged. It also shows that character can be 'regained'. For example, in certain areas of Medieval Enclosed Land the recent removal of straight, post-medieval and early modern subdividing boundaries could be perceived as an area altering to something nearer to its former character. This is perhaps a moot point as the existing national HLC method would simply see this as an alteration and as valuable as its former character, but the point to be considered is that 'medieval' character can be robust in terms of landscape change (if certain boundaries are maintained).

Analysis of the Lowland Cornwall HLC method also shows the difference between the numerical and visual dominance of boundaries. In many areas of Altered Medieval Enclosed Land it is often the case that sinuous boundaries are the more visually dominant boundaries in the landscape, and therefore are more likely to influence an appreciation of character. However, they may not always be dominant numerically (as recorded in the percentage of dominant and secondary boundary types).

One positive is that the issues in distinguishing Prehistoric Enclosed Land from Medieval Enclosed Land have also come under further focus. Using the current range of attribute values for boundary types, the ability for descriptive analysis to support and/or assist a prescriptive assessment is very limited. This leads to the present interpretation of Prehistoric Enclosed Land as being prescriptive, and therefore completely subjective without any effective means to demonstrate a difference in character through analysis of attribute values (see Sections 5.3.2 and 5.3.3 for further discussion). There is plenty of scope for this to be improved upon with further targeted archaeological work.

However, the scale and breadth of Lowland Cornwall's attribute information is a potential advantage of the method. The wealth of information contained within it is open to further evaluation and analysis, including the simplification of the HLC mapping if required. This is also enhanced by the data held in the Historic Settlement dataset, which is valuable in its own right.

At present, historic settlement data from the ICS place-name transcriptions has only been partially incorporated into Cornwall's HER. This has often focussed on place-names recorded in the early medieval and medieval periods, and has not been expanded upon since digital historic mapping has become more widely available. Lowland Cornwall's Historic Settlement dataset is also of great value as it contains information about the type of settlement for the four time-slices. This enables further interpretation of the changes in population and the character of settlements in relation to the changes recorded in HLC. However, this is an area which would benefit from further work and analysis.

5.2 Weaknesses of the Lowland Cornwall method

The attribute data behind the Lowland Cornwall HLC is a potentially powerful tool but further evaluation is needed to better judge the benefit of populating full attributes for three time-slices. With so much detail the method proved time consuming. The mapping rate was around 5sq kms a day, but due to the complexity of Penwith's landscape, it slowed to 4sq kms a day in this study area.

The Lowland Cornwall method also makes further demands on time as it requires the completion of the supporting Historic Settlement dataset. On average this took approximately one day per parish.

By trying to understand change in terms of changing attribute information for field boundaries the method is reliant on the accuracy of the maps used. In this respect the modern and 1880 OS mapping is reliable and consistent whereas the quality of the 1840 Tithe maps not only varies with each parish, but with each surveyor who undertook the original mapping. For several of the parishes, or in particular locations, it was difficult to interpret boundary types with certainty (e.g. the degree of sinuosity) and in these instances reference to the 1880 OS mapping was necessary. It is likely that the Tithe surveyor may not have always had the time to record boundaries at an

adequate level of detail for the degree of interpretation the Lowland Cornwall method requires.

Furthermore, for the parish of Gulval (Penwith study area), and for several other parishes in Cornwall, digital 1840 Tithe maps are not currently available, and are unlikely to be until copies from the British Library are made (Cornish Records Office pers. comm.).

Lowland Cornwall's assessment of present character in enclosed land highlights the type and degree of alteration from the 1840 and 1880 time-slices. For example, an area of Medieval Enclosed Land that was 'derived from Cropping Units' in 1840, then altered by subdivision in 1880, and then by the removal of the 19th century subdividing boundaries by the 2011 time-slice, would be recorded as HLC Sub-Type 'MD Altered (Amalgamated)' rather than 'derived from Medieval Cropping Units'.

Following the Lowland Cornwall method, if an area of Medieval Enclosed Land has recently had all its sinuous boundaries removed and replaced by straight boundaries it would still be recorded as Medieval Enclosed Land albeit as 'Altered'. In conventional HLC, this would change from Medieval Enclosed Land to Modern Enclosed Land. However, the description (attribute values) for both the Lowland Cornwall and conventional HLC methods would be the same.

While these differences in the Lowland Cornwall method are not necessarily a weakness, this is dependent on the intended use of HLC.

The complexity of the Lowland Cornwall HLC presents difficulties in terms of visual presentation at its most complex level, the Sub-Type. The large number of Sub-Types makes the allocation of a colour scheme difficult and potentially confusing, especially to the layman. The complexity of Sub-Types does not lend itself to the limited colour palette of ArcView software. In an attempt to resolve this issue 'Colorbrewer [sic] 2.0' website was used to produce a more harmonious but distinctive colour scheme. Even with Colorbrewer's numerous colour options the complexity of the Lowland Cornwall HLC made this difficult. As yet, there is no preferred choice of colour schemes suggested by EH, and the Lowland Cornwall options for the different periods of enclosed land largely builds upon that used by the 1994 mapping.

The critique of Lowland Cornwall has highlighted the current weaknesses in the consistency of data entry as part of the descriptive element of the method. At present there is no guidance for the interpretation of different boundary types and the regularity/irregularity of field systems. The lack of an external boundary attribute field is also a limitation. Developing this idea further, one weakness was the lack of attribute values available to distinguish Prehistoric and Medieval Enclosed Land from one and another. Average field size has proved to be of some use but, currently, interpretation of Prehistoric Enclosed Land is too reliant on both the prescriptive method and the subjective interpretation of the HLC mapper. Erratic boundaries and very irregular field patterns are not exclusive to areas of Prehistoric Enclosed Land, and can be found in areas of Altered Medieval Enclosed Land. However, casual observation during the mapping stage suggested that there are differences in erratic boundary types which can be drawn out if further attribute values are developed (see Section 5.2 for further discussion).

Analysis of field systems recorded in the HER and Events record also show that a majority of prehistoric field systems are of rectilinear and mixed form (Lowland Cornwall Volume 4). However, most of the Prehistoric Enclosed Land HLC Type was recorded where field systems are very irregular in form and where there is a dominance of erratic field boundaries. This suggests there is either a discrepancy in what the HLC assessment is picking up, and/or that there is a substantial difference in the character of prehistoric fields that are fossilised in the landscape and those which survive as buried archaeology.

5.3 Recommendations

Both the prescriptive and descriptive elements of the Lowland Cornwall method would benefit from further discussion and development. Descriptive interpretation could be enhanced by visual guidance to aid consistent interpretation of boundary form and degree of 'regularity/irregularity'. This guidance will need to be basic, easily accessible and not onerous in terms of adding complexity and timescale for HLC mapping.

A greater range of descriptive elements to describe boundary types, and in particular to distinguish differences in erratic boundaries and to distinguish fence lines, and the addition of an external boundary type would enable a better range of queries and more confidence in interpretation, especially in regards to the interpretation of Prehistoric Enclosed Land.

Further work is required to investigate the character of Prehistoric Enclosed Land in Cornwall to help improve the confidence in its interpretation, and to tease out differences in it, especially in areas where no field survey work has formerly been carried out. This in turn could make the methodology of future HLC interpretation more robust and potentially less open to a full range of subjectivity and potentially, could help to highlight the uniqueness and value of areas of Prehistoric Enclosed Land.

Further evaluation is required to investigate the potential for the Lowland Cornwall method to produce the most appropriate forms of information to guide future landscape strategies, especially if it is to be used as the source to guide future pre-panning strategy for developers. Tapper and Herring's guidance for renewable energy installations (Tapper and Herring 2010a; 2010b) make clear that the 1994 mapping needs improvement due to its lack of sophistication in terms of the scale of mapping and its classification.

While this report has attempted to highlight the benefit and shortcomings of the Lowland Cornwall method, the question remains; is the method capable of delivering the requirements for the future use of HLC in the planning process?

6 References

6.1 Primary Sources

- Ordnance Survey, 2011. 1:10,000 map (digital)
- Ordnance Survey, 2011. Master map digital data
- Ordnance Survey, c1880. *1:25 Inch 1st Edition map* (surveyed between 18xx and 18xx) Ordnance Survey and Landmark Information Group (digital copy)
- Martyn, Thomas, 1748. *Map of Cornwall at One Inch Scale* (facsimile copy at HES)
- Tithe Map, c1840. *Parish of Boconnoc* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of Fowey* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of Jacobstowe* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of Ladock* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of Lanreath* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of Lanteglos by Fowey* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of Ludgvan* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of Madron* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of Marazion* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of Marhamchurch* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of Paul* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of Pelynt* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of Penzance* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of Perranuthnoe* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of Poundstock* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of Probus* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of St Buryan* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of St Enoder* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of St Erme* (digital copy provided by Cornwall Records Office, Truro)

- Tithe Map, c1840. *Parish of St Hilary* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of St Sampson in Golant* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of St Newlyn East* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of St Veep* (digital copy provided by Cornwall Records Office, Truro)
- Tithe Map, c1840. *Parish of Whitstone* (digital copy provided by Cornwall Records Office, Truro)

6.2 Publications

- Aldred, O, and Fairclough, G, 2003. *HLC: Historic Landscape Characterisation: Taking stock of the Method - The National HLC Method Review*, English Heritage and Somerset County Council.
- Clark, J, Darlington, J, Fairclough, G, 2004. *Using Historic Landscape Characterisation*, English Heritage and Lancashire County Council.
- Cornwall County Council and Countryside Commission, 1994. *Cornwall Landscape Assessment*. Cornwall County Council.
- Dudley, P. 2011a. *Goon, Hal, Cliff and Croft; west Cornwall's rough ground*, Cornwall Council and English Heritage.
- Dudley, P. 2011b. *Historic Landscape Characterisation Revisions Project*, Cornwall, Cornwall Council, HE report 2011R074.
- English Heritage, 2008. *Conservation Principles for the Sustainable Management of the Historic Environment*, English Heritage.
- Herring, P, 1998. *Cornwall's Historic Landscape: presenting a method of historic landscape character assessment*, Cornwall County Council and English Heritage.
- Herring, P. 2009. *Historic Landscape Character Texts for Cornwall*. English Heritage (held as a digital copy by Cornwall Council Historic Environment Record).
- Herring, P and Perry-Tapper, B. 2002. *The Lynher Valley, Cornwall Historical and archaeological appraisal*, Cornwall Archaeological Unit, Cornwall County Council.
- Herring, P and Kirkham, G. 2011. Integrated management for the wider historic environment in Kirkham, G, 2011, *Managing the historic environment on west Cornwall's rough ground*, English Heritage and Cornwall Council.
- Historic Environment Service, nd [198x]. *Transcription of Institute of Cornish Studies Place-name Index* (Paper copy stored as part of the Historic Environment Record, Cornwall Council).
- Johnson, N, 1998. Cornish farms in prehistoric farmyards, *British Archaeology*, **31**, 12-13.
- Kain, RJP, and Prince, HC, 2000. *Tithe Surveys for Historians*. Phillimore.
- Padel, OJ, 1985. Cornish Place-name elements, *English Place-name Society* **LV/II**.
- Padel, OJ, 1999. Place-names in R Kain and W Ravenhill (eds), *Historical Atlas of the South-West England*, University of Exeter Press.
- Swanick, C, and Land Use Consultants, 2002. *Landscape Character Assessment for England and Scotland*. The Countryside Agency and Scottish Natural Heritage.

- Tapper, B and Herring, P, 2005. *Caradon Hill Area Heritage Project, Cornwall; Historic Landscape Characterisation*, Historic Environment Service (Projects), Cornwall County Council.
- Tapper, B and Herring, P, 2010a. *Historic Landscape Characterisation and Sensitivity Mapping for Photo-Voltaic (Solar Farms) installations in Cornwall*, Historic Environment Advice and Information, Cornwall Council.
- Tapper, B and Herring, P, 2010b. *Historic Landscape Characterisation and Sensitivity Mapping for Wind Farm installations in Cornwall*, Historic Environment Advice and Information, Cornwall Council.
- Turner, S, 2005. *Devon Historic Landscape Characterisation*, Devon County Council and English Heritage (available as a downloadable pdf).
- Young, A, 2009. *Lowland Cornwall: The Hidden Landscape [Project Design]*, Historic Environment Service, Cornwall County Council. Historic Environment Service (Projects), Cornwall Council.

6.3 Websites

Colorbrewer 2.0 (<http://colorbrewer2.org/>)

South Yorkshire HLC (<http://www.sytimescapes.org.uk/sources>)

7 Project archive

The HES project number is **2009028**

The project's documentary and digital archive is housed at the offices of Historic Environment, Cornwall Council, Kennall Building, Old County Hall, Station Road, Truro, TR1 3AY. The contents of this archive are as listed below:

1. A project file containing site records and notes, project correspondence and administration.
2. GIS shapefiles and accompanying metadata held in the directory: L:\Historic Environment (Data)\HE_Projects\Sites_L\Lowland_Cornwall_2009028\HLC

This report text is held in digital form as: G:\TWE\Waste & Env\Strat Waste & Land\Historic Environment\Projects\Sites_L\ Lowland_Cornwall\Final report

8 Appendix 1: Descriptive texts

8.1 Introduction

Every parcel of Britain's landscape has, or has been, altered over time by the activity of people. It is an historic landscape of accumulated human action, with nowhere found in its purely natural state (Herring 2009).

The interaction of past and present is complex. It is constantly evolving as land use changes, but successive phases of past activity can create time-depth in a landscape. Time-depth includes fossilised (still in use) and relict (abandoned) features. These often form an important part of our present landscape, significantly influencing the physical and visual character of an area, and our perception of it. These features are identifiable by commonly occurring attributes, such as the shape of field boundaries. Key attributes will group where the landscape has undergone shared landscape history, created over time by similar processes and similar periods of human activity.

Historic Landscape Characterisation (HLC) has been developed to give a broad, landscape-scale overview of landscape history and the processes that have helped to form it. The visual presentation of information is an important part of the method. It does this by grouping similar blocks of landscape into coherent units, or polygons. Each polygon is ascribed to a certain HLC Type, a predetermined classification which encapsulates the main landscape history and processes that have affected the landscape.

HLC data is presented as an overlay to map data, with each HLC Type and further subdivision(s) also presented. Each has its own symbology (colour and conventions) to make interpretation easier.

Underlying the Lowland Cornwall HLC is a two to three-tier hierarchical system that increases in complexity with each tier. At the top, and most general, is the Broad Type; e.g. Rough Ground or Enclosed Land. Beneath, at the second-tier level, the complexity of attributes increases to further divide the Broad Type into HLC Type; e.g. Upland Rough Ground (undivided) or Medieval Enclosed Land. The third-tier has the most complex arrangement of attributes that can be identified from map-based evidence alone. In the Lowland Cornwall project third-tier HLC was sub-divided into different Sub-Types for Enclosed Land; for example:

Broad Type:	Enclosed Land
HLC Type:	Medieval Enclosed Land
HLC Sub-Type:	MD derived from Strip Fields (enclosed).

The following texts are descriptive and outline the details by which each HLC Type was identified and mapped in the 2011 time-slice. The texts are succinct, concise and targeted at a general audience. They make no reference to the value of each Type or its typical archaeological and historical components. The texts focus instead on simply describing the Broad Types, HLC Types and, where appropriate, Sub-Types, and their key attributes identifiable from the modern 1:10,000 OS map. In this respect they are substantially different from the explanatory texts for the 1994 mapping (Cornwall Council 1994), and the 1998 and 2009 revisions of those texts (Herring).

8.2 Rough Ground

Summary

Rough Ground is defined by its rough vegetation and is predominantly found in agriculturally marginal locations (areas open to wind exposure, with poor soil fertility and drainage). Formed and maintained by human interference Rough Ground is 'semi-natural' and often demonstrates the longest continuous history of human utilisation. In part Rough Ground is the product of early prehistoric farming, and has been maintained through time by continued use for the seasonal grazing of livestock from late prehistory to the mid-nineteenth century. Once a crucial part of the agricultural economy, many areas of Rough Ground are now neglected, with vegetation levels at their highest since prehistory. The different HLC Types of Rough Ground are distinguished by their location and the level of enclosure or sub-division.

Broad Type: Introduction

Rough Ground is defined by rough vegetation (typically variations of heath, coarse grassland, furze/gorse, and osiers/willow) and is predominantly found in agriculturally marginal locations (areas open to wind exposure, with poor soil fertility and drainage). It can include areas where exposed rock surfaces and rock debris also dominates.

It is sub-divided into the following HLC Types based on differences in location and land division; the differences also reflected in historic land use and ownership:

1. Upland Rough Ground (undivided)
2. Upland Rough Ground (divided)
3. Valley Rough Ground (undivided)
4. Valley Rough Ground (divided)
5. Coastal Rough Ground (undivided)
6. Coastal Rough Ground (divided)
7. Bare cliffs

Principal historical processes

Rough Ground is regularly regarded as largely 'natural' or 'wild' when it is in fact often 'semi-natural' in origin, largely formed and maintained by human interference. Areas of rough ground often demonstrate the longest continuous history of human utilisation; in part the product of early prehistoric settlement and farming, but maintained by continued use from late prehistory to the mid-nineteenth century through the grazing of livestock. Grazing has interrupted the normal natural succession or development of vegetation communities through to woodland (Herring, 2009).

Environmental analysis suggests that woodland cover in many parts of Cornwall was removed by early farmers in the Neolithic and Early Bronze Age (c4000-1500 BC). By c1500BC this farming activity, together with natural climatic deterioration, had led to a widespread reduction in soil fertility.

Place-name evidence suggests that by the early medieval period (AD410 – 800) rough ground was an integral part of the agricultural economy through transhumance, or the movement of livestock to seasonal grazing grounds. In the medieval period, areas of rough ground were organised into large open areas of common land shared by several local farming settlements. It seems likely, however, that the shared use of rough ground for the seasonal grazing of livestock has its origins in late prehistory, and perhaps as far back as c1500BC. Reminders of these commons are often found in the Upland Rough Ground (undivided), Valley Rough Ground (undivided), and Coastal Rough Ground (undivided) HLC Types.

From the fourteenth century onwards changes in land ownership and rights enabled individual farms and farmers to divide off smaller parcels of rough ground from the commons. Additionally, from the seventeenth century onwards areas of rough ground were often sub-divided by boundaries into 'crofts' or smaller enclosures of rough ground. Where both these type of enclosures survive as rough ground they are classed as Upland Rough Ground (divided), Valley Rough Ground (divided), and Coastal Rough Ground (divided) HLC Types.

Until the Agricultural Revolution in the late eighteenth century rough ground was an integral part of a mixed farming economy, covering approximately 40% of Cornwall. Most areas of rough ground were principally used for grazing but rights also allowed the collection of domestic fuel (furze/gorse and turf/peat). Additionally, when permitted by the owner, rough ground was where stone was quarried, the majority of ore was mined, and areas were streamed for tin. Bare cliffs were often the focus for quarrying and mining activity due to the accessibility of their rock faces and associated debris. Each Type of Rough Ground typically demonstrates a variation in past and present activity within it due to differences in location e.g. maritime-based activity in Coastal Rough Ground HLC Types.

By 1800, however, a rapidly rising population led to large areas of rough ground being enclosed as new farms and small-holdings. More people ensured growing markets for farmers' produce so existing farms could afford to intake and improve blocks of rough ground, the process aided by advances in machinery and agricultural thinking. By the late nineteenth century the area of Cornwall's rough ground had shrunk further. It had also become a marginal part of the farming economy as farmers specialised, for example, in dairy production.

Throughout the twentieth century the process continued, with further improvements in mechanisation, the wide availability of artificial fertiliser and government grants for improvement. Bodmin Moor is the last remaining area in Cornwall where rough grazing continued to be practised on a large scale. Other, smaller areas of rough ground became unmanaged; with the level of human intervention and management reduced to practically nil.

The larger, more accessible areas of rough ground are now often used for recreation by the urban-based population. They are often highly valued for their beauty, ecological value and the wide range of archaeological features that survive within them. In more recent years, largely through environmental initiatives, rough grazing has started to be reintroduced, principally on the Lizard Peninsula and coastal areas to help improve ecological value, and to keep archaeological features visible and free from encroaching scrub.

Further reading

Dudley, P, *et al*, 2011a. *Goon, hal, cliff and croft: west Cornwall's Rough Ground*, Cornwall Council and English Heritage.

Dudley, P, 2008. *The Archaeology of west Cornwall's moors, downs and heaths*, Cornwall Council (available as a downloadable pdf).

Herring, P, and Rose, P, 2001. *Bodmin Moor's Archaeological Heritage*, Cornwall Council.

HLC Types: Typical mapped attributes

(Based on recurring features found on modern OS 1:10,000 map data)

- **Common to all Rough Ground Types:** rough vegetation mapped using standardised OS conventions.
- **Upland Rough Ground (undivided):** hilltop and upland plateau location, open and not sub-divided.

- **Upland Rough Ground (divided):** hilltop and upland plateau location, sub-divided by boundaries into smaller parcels of land.
- **Valley Rough Ground (undivided):** valley bottom and valley side location, open and not sub-divided.
- **Valley Rough Ground (divided):** valley bottom and valley side location, sub-divided by boundaries into smaller parcels of land.
- **Coastal Rough Ground (undivided):** coastal location, open and not sub-divided.
- **Coastal Rough Ground (divided):** coastal location, sub-divided by boundaries into smaller parcels of land
- **Bare cliffs:** coastal location, large areas of exposed rock faces and rock debris, occasionally with areas of rough ground vegetation.

8.3 Enclosed Land

Summary

Enclosed Land is divided into field enclosures and sub-divided by field boundaries and is improved and maintained by farmers as productive farmland. It has an extremely complex landscape history, with great differences in time-depth, often with periods of continuous use (and change) over hundreds, sometimes thousands, of years, and in this respect Cornwall's Enclosed Land is unusual. It has been sub-divided on the basis of date, with supporting evidence provided by the Historic Settlement dataset. Due to its complexity it is classified to Sub-Type level, based on differences in field shape, field patterns, field boundaries, probable tenure and enclosure process, and subsequent alteration.

Broad Type: Introduction

Enclosed Land is divided into field enclosures and sub-divided by field boundaries. It has been improved and maintained by farmers as productive farmland, dominated by a changing mixture of grassland (pasture) and cultivated crops (arable, root and green crops).

Map sources typically show Enclosed Land as 'clean-land' without the conventions for rough ground vegetation although small areas of coarser vegetation and rock outcrops are depicted within some fields.

The character of Enclosed Land varies enormously with great differences in time-depth. It has an extremely complex landscape history, often with periods of continuous use (and change) over hundreds, and sometimes thousands, of years, and in this respect the time-depth of Cornwall's Enclosed Land is unusual.

To reflect this time-depth the Broad Types have been sub-divided into the following HLC Types distinguished by differences in field pattern, field shape, and the line of internal field boundaries. Further supporting interpretative evidence was provided by the dating analysis of historic settlements.

1. Prehistoric Enclosed Land
2. Medieval Enclosed Land
3. Post-Medieval Enclosed Land
4. Early Modern Enclosed Land
5. Modern Enclosed Land

Each HLC Type has been further sub-divided on the basis of tenure, land use and change identifiable in the attribute sets. Historic maps (1840 Tithe and 1880 OS) were used to aid interpretation and to help quantify landscape change in the past 170 years.

Principal historical processes

Prehistoric Enclosed Land (c1500BC – AD409)

Land enclosed and farmed since late prehistory (probably Middle Bronze Age onwards, c1500 BC -). It often survives in marginal locations where surface rock is a problem, so that later improvement was too laborious and uneconomic. There are differences in attributes which probably reflect differences in date and later prehistoric reuse.

Areas of small field size, with very irregular and irregular field patterns, dominated by curvilinear and erratic boundaries probably originally date to the mid to Late Bronze Age (c1500- c700 BC). They are often associated with Bronze Age and Iron Age round houses (sometimes shown on OS maps), located on the edge of upland and coastal areas, in more windswept and exposed locations.

On more sheltered, less marginal ground (but probably still within areas of poorer than average fertility) there are blocks of small to medium sized, square and rectangular fields, arranged in regular field patterns, and dominated by gently curvilinear and sinuous, and occasionally erratic boundaries. These areas are probably the wholesale re-arrangement of Late Bronze Age enclosures, associated with later prehistoric farming hamlets, where field patterns and holdings had to be arranged in a more formal manner. The areas often have dominant linear boundaries, which are often parallel to the main orientation of local topography.

In many areas, especially parts of West Penwith, the Lizard plateau, the Carnmenellis granite and the upland fringes of Bodmin Moor, it can be readily seen that Prehistoric Enclosed Land was altered by the amalgamation of fields in the medieval period. The character in these areas, however, is still prehistoric. It is only where there has been substantial re-arrangement in the medieval period that earlier character has been completely lost (see below).

Medieval Enclosed Land (AD 410 – 1539)

The agricultural heartland of Cornwall, it is associated with historic settlements documented before the sixteenth century, when the majority of the population still farmed the land. For the most part it is generally located on the best land, on the gentler slopes and in the most sheltered areas (Herring 2009).

In some areas of Cornwall, particularly West Penwith, parts of the Lizard, the Carnmenellis granite and the upland fringes of Bodmin Moor, it is plausible to suggest that much of the Medieval Enclosed Land, although largely medieval in character, probably derives from heavily altered prehistoric land (see above), with the main land divisions and defining boundaries essentially late prehistoric in pattern. However, this is difficult to distinguish from map evidence alone.

Elsewhere the results of archaeological excavation suggest that underlying much of the Medieval Enclosed Land are former field patterns originally enclosed in the prehistoric period. In these areas there was wholesale re-arrangement, probably in the early medieval and medieval periods, though the exact date is often unknown, with variation likely from area to area.

New enclosure would also have been undertaken in the medieval period. This is often hard to distinguish in HLC terms (based on map evidence alone), except in areas where ring-fences survive in the landscape, and a relative chronology can be established.

Originally, the majority of Medieval Enclosed Land was organised as open 'strip' field systems. The strips were groups of parallel, often sinuous, narrow, long, rectangular fields, open to each other, and divided from the next only by a low bank. Several similar-sized strips were arranged in a group or bundle, termed a 'cropping unit' by landscape historians in Cornwall. Several cropping units were open to one and another but grouped within a large 'open' field enclosed by a substantial stock-proof boundary. The systems were associated with farming hamlets where several tenant families lived, each tenant holding a certain amount of land, intermixed with other tenants within the

system. There was a degree of communalism as the land was shared out equally amongst the tenants and the open fields grazed in common in the ley period.

The extent of fields derived from cropping units has diminished drastically over time (see Fig 33 below). These fields made up 84% of all Medieval Enclosed Land in the late medieval time-slice and only 5% in the 2011 time-slice. The loss up to 1840 was due mainly to sub-division (and to a lesser extent, re-arrangement) and since then to amalgamation, especially in the twentieth century. Peripheral fields and fields derived from strip fields are now very rare.

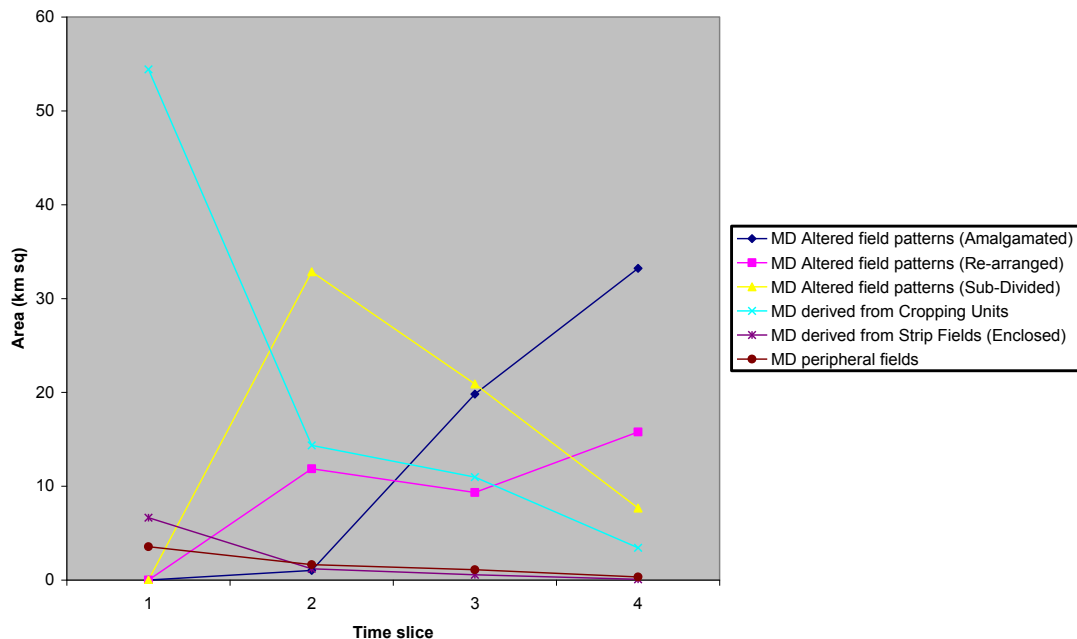


Fig 33 Graph showing the changing area of Medieval Enclosed Land Sub-Types across all the Lowland Cornwall study areas. The x axis of the graph shows the time-slices with '1' representing the late medieval time-slice; '2', 1840; '3', 1880 and finally '4' representing the 2011 time-slice.

Medieval Strips (Unenclosed)

Open strip field systems are now rare; and the Sub-Type MD Strips (Unenclosed) correspondingly so. Cornwall is fortunate to have one of the last survivals at Forrabury, Boscastle.

Medieval derived from Strip Fields (Enclosed)

Evidence in Cornwall suggests that open strip fields were enclosed from the fourteenth to seventeenth centuries. This was linked to broad changes in land tenure and economy whereby a tenant's land holdings were grouped together. The open strip systems appear to have been enclosed in two main ways, depending on the settlement history of a particular location.

Where hamlets of farming families continued the open strip systems could be enclosed as strips, more often as a small group of strips amalgamated together, and farmed by a single tenant. Instead of a low bank dividing these, a stock-proof boundary would be built; usually an earthen bank or Cornish hedge, with the boundary fossilising the earlier low bank that once divided the strips. This process resulted in the HLC Sub-Type, MD derived from Strip Fields (Enclosed).

Medieval derived from Cropping Units

Where farming settlements had changed from several families to a smaller group, or even individual families, strip systems would be enclosed on a larger scale, usually on a cropping unit by cropping unit basis. Each cropping unit would be enclosed to form an

individual field, enclosed by a boundary such as an earthen bank or Cornish hedge, and farmed by a single tenant. Groups of enclosed cropping units arranged close to one another could then be farmed as a single holding rather than in an intermixed manner. This process resulted in the HLC Sub-Type, MD derived from Cropping Units.

Medieval peripheral fields

In the damper, heavier soils of the valley bottoms MD peripheral fields were often used as hay meadows, to produce valuable winter feed for livestock. Once the hay was cut in late summer, livestock would graze the remaining grass into the autumn. Due to their location, peripheral fields might also contain areas of coarser vegetation, for example, patches of rushes.

Due to a combination of its long history and its coverage of the best agricultural ground, Medieval Enclosed Land has undergone many successive phases of alteration due to changes in agriculture, economy and settlement. This is recorded in the Sub-Types MD Altered field patterns (Sub-Divided, Amalgamated or Re-arranged). The scale, speed and date of changes varied from parish by parish, and often a farm by farm basis.

Medieval Altered field patterns (Sub-Divided)

Sub-division often occurs near to settlements that have grown substantially; from single farms (including small-holdings) to hamlets and in particular, surrounding villages that grew rapidly in the nineteenth century, for example, St Newlyn East. Changes in land use will also affect the level of subdivision; where market gardening has developed and more in recent times, where horse paddocks have been established.

Medieval Altered field patterns (Amalgamated)

Amalgamation of field enclosures is not purely a modern phenomenon. Barton farms or head manorial farms were an early focus, due to differences in tenure, land use, and capital available to invest in labour and technology. In the parish of Probus, the Amalgamation of cropping units into larger fields appears to date to the late medieval period onwards. Elsewhere, Amalgamation is later in date, probably dating to the eighteenth and nineteenth centuries, but primarily focussed again on larger holdings and more wealthy land owners. Modern farming methods have resulted in large-scale, widespread Amalgamation. Typically, the smaller, later boundaries that sub-divided the fields were removed first but in certain areas, for example, parts of Penwith, large areas of many small fields have been amalgamated into single large enclosures.

Medieval Altered field patterns (Re-arranged)

Re-arrangement is where there has been the comprehensive, wholesale realignment of field boundaries, or where there has been both considerable amalgamation of field enclosures and the realignment of certain field boundaries. This can occur where a large estate has been split up into several holdings, for example, the small farms created from the Trerice Estate, St Enoder, following the First World War.

Post-Medieval Enclosed Land (1540 – 1749)

Land enclosed from the late sixteenth century through to the mid-eighteenth, typically from Rough Ground. The fields are generally medium to small in size, enclosed and divided by straight boundaries, the land enclosed principally in three ways.

Post-Medieval Intakes

Intakes were often extensions to blocks of Medieval Enclosed Land enclosing more marginal land (rough ground) in the valley bottoms and the upland areas. They are generally medium sized fields, mostly regular in field pattern, though occasionally irregular where fitted into the topography. Early maps often show small patches of coarse vegetation within them, the full improvement process sometimes taking generations of work to complete. On occasion they can contain a sinuous boundary,

perhaps the remnant of a later medieval outfield (a temporary field enclosed and cultivated on marginal ground for a short time when economic conditions allowed).

In this period new farms and new small-holdings were enclosed on a piecemeal basis, the two distinguished from each other in terms of field size and settlement patterns. Further supporting evidence provided by Historic Settlement data helps to distinguish post medieval settlements from those founded in the early modern period.

Post-Medieval New Farms

New farms have been defined as holdings over 5ha in size. They are often located in upland areas, on former Upland Rough Ground, typically shown on historic maps with a single dwelling and surrounding group of small farm buildings. Most often they have English place-names but in west Cornwall earlier examples continued to have Cornish place-names. Field size tends to be medium in area, but noticeably larger than small holdings, as they were enclosed by full time farmers.

Post-Medieval New Smallholdings

New small holdings were single cottage dwellings, with few or no small farm buildings. They are located in upland areas, on former Upland Rough Ground, and also on the edges of valley bottoms, on areas of Valley Rough Ground, and more occasionally, Woodland. Worked by a single family, on a part-time, subsistence basis, the fields are small in size, square or rectangular in shape, and often regular or very regular in pattern.

Post-Medieval Altered fields

Due to successive changes in technology, economy and settlement pattern, a majority of Post-Medieval Enclosed Land has undergone extensive phases of alteration, recorded in the Sub-Types as PM Altered field patterns (Sub-Divided, Amalgamated or Re-arranged). Alteration to Post-Medieval Enclosed Land has occurred due to similar processes to those highlighted in Medieval Enclosed Land above.

Early Modern Enclosed Land (1750 – 1899)

Land enclosed in the late eighteenth and nineteenth centuries, usually from Rough Ground or Valley Rough Ground. The character is similar to Post-Medieval Enclosed Land; dominated by straight boundaries, regular or very regular field patterns, and dispersed settlement of single dwellings and holdings. However, the process was undertaken more rapidly, on a larger, more organised scale, due to the massive increase in population following the Agricultural and Industrial Revolutions.

Early Modern New Farms and Smallholdings

Both new farms and new small holdings are similar in character to those in the post medieval period, though field size on New Farms might tend to be larger due to changes in farming technology (for example the use of draught horses). Sinuous field boundary elements could still be included where medieval outfield boundaries, or former pasture boundaries, were incorporated into the field patterns.

Early Modern Intakes

Intakes varied in size but could be larger in field size than those in the preceding period. This is due to advances in farming machinery, changes in agricultural thinking and practice, and the continued growth in markets for produce. They were often extensions from existing medieval and post-medieval farms.

Early Modern Altered fields

Due to modern changes in technology, economy and settlement pattern, most Early Modern Enclosed Land has undergone extensive phases of alteration, recorded in the Sub-Types as EMod Altered field patterns (Sub-Divided, Amalgamated or Re-arranged). In many areas, especially coastal and those surrounding large towns and villages, parcels of Early Modern Enclosed Land have now been built on, and recorded under the

Settlement Broad Type. Alteration to Early Modern Enclosed Land has occurred due to the similar processes to those highlighted in Medieval Enclosed Land above.

Modern Enclosed Land (1900 - present)

Land enclosed in the twentieth century, usually from Upland Rough Ground or more occasionally, Valley Rough Ground. The character is similar to Post-Medieval Enclosed Land and Early Modern Enclosed Land; dominated by straight boundaries, regular or very regular field patterns, and dispersed settlement of single dwellings and holdings, often with large farm sheds and buildings.

Modern Intakes

A majority of Modern Enclosed Land is classified as Intakes, often at some distance from the farming settlement, enclosed from large tracts of former Upland Rough Ground. Field size is very large, and occasionally a large field barn or shed is built to store livestock, silage or haylage. Due to the widespread use of modern vehicle based machinery the fields are interconnected by straight trackways.

Modern New Farms and Smallholdings

Modern smallholdings and new farms are fewer in number and area than in the preceding post medieval and early modern periods

Further reading

Dudley, P, 2008. *The Archaeology of west Cornwall's moors, downs and heaths*, Cornwall Council (available as a downloadable pdf).

Herring, P, and Giles, C, 2008. *Agriculture in Herring, P, Sharpe, A, Smith, JR, and Giles, C, Bodmin Moor: An Archaeological Survey: Volume 2; The Industrial and Post-Medieval Landscapes*, English Heritage.

Herring, P, and Rose, P, 2001. *Bodmin Moor's Archaeological Heritage*, Cornwall Council.

Website: *Flying Past* - <http://www.historic-cornwall.org.uk/flyingpast/farms>

HLC Types: Typical mapped attributes

(Based on recurring features found on modern OS 1:10,000 map data)

- **Common to all Enclosed Land HLC Types:** enclosed and sub-divided by field boundaries.
- **Prehistoric Enclosed Land:** generally irregular or very irregular field patterns, in some instances regular field patterns; erratic, curvilinear and sinuous internal boundaries; often small fields, except where altered; typically located in more marginal locations in areas where there is an abundance of rock, e.g. granitic uplands and coastal locations.
- **Medieval Enclosed Land:** generally regular or irregular field patterns; dominated by sinuous internal boundaries, but sometimes dog-leg and J-shaped, erratic where amalgamation has taken place, and occasionally S-shaped and curvilinear boundaries; fields can vary in size and shape, especially where there has been large scale alteration; typically located on the best agricultural land, on valley sides and sheltered locations, although can extend on to valley bottoms and the edge of high ground; associated with older settlements, often former farming hamlets with Cornish place-names (less so in east Cornwall); settlements connected by networks of irregular lanes and roads.
- **Post-Medieval Enclosed Land:** generally regular field patterns; dominated by straight internal boundaries; rectangular or square fields, medium to small in size; typically located in upland areas and valley bottoms; associated with more recent settlements, often individual farms and small cottages with English place-names, occasionally Cornish; or next to important and large existing farms;

settlements often connected with fields by straight tracks and roads. Occasional sinuous boundary suggesting former medieval land use but as a marginal part of the landscape.

- **Early Modern Enclosed Land:** generally regular field patterns; dominated by straight internal boundaries; rectangular or square fields, large to small in size; typically located in upland areas and valley bottoms; associated with more recent settlements, often individual farms and small cottages with English place-names; settlements often connected with fields by straight tracks and roads. Occasional sinuous boundary suggesting former medieval land use but as a marginal part of the landscape.
- **Modern Enclosed Land:** generally regular field patterns; dominated by straight internal boundaries; rectangular or square fields, large or very large in size; typically located in upland areas; associated with more recent settlements, often individual farms with a mixture of Cornish and English place-names; fields connected by straight tracks and roads.

Broad Type	Enclosed Land		
HLC Type	Prehistoric Enclosed Land		
	2011	1880	1840
PX field patterns	0.028 sq km	0.191	0.579
PX Altered field patterns (Amalgamated)	4.954	5.328	4.539
PX Altered field patterns (Re-arranged)	1.146	0.776	0.669
PX Altered field patterns (Sub-Divided)	0.937	0.693	1.409
HLC Type	Medieval Enclosed Land		
	2011	1880	1840
MD Strips (Unenclosed)	Nil	Nil	0.057
MD derived from Strip Fields (Enclosed)	0.736 sq km	5.751	8.342
MD derived from Cropping Units	30.894	70.634	86.797
MD peripheral fields	0.986 sq km	2.929	5.668
MD Altered field patterns (Amalgamated)	128.238	64.066	3.224
MD Altered field patterns (Re-arranged)	46.608	35.503	43.278
MD Altered field patterns (Sub-Divided)	28.999	68.357	103.760
HLC Type	Post-medieval Enclosed Land		
	2011	1880	1840
PM Intakes	6.005 sq km	15.534	27.879
PM New Farms (>5ha)	0.067	0.560	1.320
PM New Smallholdings (<5ha)	0.210	1.102	2.143
PM Barton field patterns	Nil	Nil	Nil
PM Orchard	Nil	0.085	0.085

Broad Type	Enclosed Land		
PM Altered field patterns (Amalgamated)	14.579	8.684	Nil
PM Altered field patterns (Re-arranged)	3.035	1.112	Nil
PM Altered field patterns (Sub-Divided)	2.983	2.822	0.037
HLC Type	Early Modern Enclosed Land		
	2011	1880	1840
Emod Intakes	4.851 sq km	14.366	9.243
Emod New Farms (>5ha)	0.642	1.833	2.924
Emod New Smallholdings (<5ha)	0.652	2.847	4.007
Emod Barton field patterns	Nil	Nil	Nil
Emod Orchard	Nil	0.037	Nil
Emod Altered field patterns (Amalgamated)	12.488	2.451	Nil
Emod Altered field patterns (Re-arranged)	2.183	0.797	Nil
Emod Altered field patterns (Sub-Divided)	3.353	3.990	Nil
HLC Type	Modern Enclosed Land		
	2011	1880	1840
Mod Intakes	20.048 sq km	Nil	Nil
Mod New Farms (>5ha)	0.291	Nil	Nil
Mod New Smallholdings (<5ha)	0.241	Nil	Nil

Table 23 Breakdown of area of Enclosed Land Sub-Types in the 2011, 1880 and 1840 time-slices. The table shows the changing area (in square kilometres) in the three full time-slices for each Sub-Type

8.4 Woodland

Summary

Woodland is dominated by deciduous or coniferous trees, or a variation of the two. Following the end of the last glacial period deciduous trees once covered most parts of Cornwall. However, by the medieval period woodland cover had been reduced to the marginal steep-sided valleys. Traditionally woodland was managed to maximise economic return. Non-native coniferous trees were introduced on a large scale from the late eighteenth century onwards, not only to improve profitability, but also for ornamental purposes, especially in the estates surrounding large houses. Further deciduous species were also introduced and by the nineteenth century Cornwall's woodlands were more varied in character than ever before. Woodland products were once economically important but many areas of Woodland now receive negligible management, although tree cover is at its greatest since the medieval period. The different HLC Types of Woodland are distinguished by tree species, land use and possible time-depth.

Broad Type: Introduction

Woodland is where deciduous or coniferous tree cover dominates, or a combination of the two.

The character of the Type can be sub-divided into the following HLC Types distinguished by differences in species, time-depth, location, and the size and shape of the areas under tree cover.

1. Shelterbelt
2. Timber plantation
3. Woodland mixed
4. Deciduous Woodland
5. Ancient Semi-Natural Woodland

Historic maps (1840 Tithe and 1880 OS) are used as further source material to better establish the original date of the woodland cover.

Principal historical processes

From c8000BC to c4000BC woodland covered most of Cornwall's land surface except the most exposed and waterlogged parts of the uplands and coastal margins. The species and density of tree cover varied with location, exposure and drainage; the most sheltered areas dominated by oak with an understory of hazel and holly while in damper areas willow and alder prevailed.

Small scale clearances within the woodland cover had been made by the late Neolithic period (c2500BC). Grazing, cultivation and population pressure all continued through later prehistory, so that by the early medieval period woodland distribution was probably restricted to the steeper valleys of Cornwall. Woodland was further encroached upon, with the least marginal areas (south-facing and less steep slopes) cleared first.

Despite the ever continuing reduction in area, woodland was carefully managed to maximise its resources. In the medieval period it was exploited as pasture grounds (underwood), sources of fuel, coppice wood (including barking of oak for the tanning industry) and timber. In Cornwall the needs of the mining industry added further pressure on woodland management, with trees needed for timber (for structures and props) and charcoal (for smelting).

The Domesday Book of 1086, however, recorded that Cornwall had little woodland area proportionally. With the reduction in the grazing of the Rough Ground, in particular Valley Rough Ground, many areas are, through natural succession, returning to Deciduous Woodland. Figures suggest that Cornwall has more woodland cover in 2011 than for the past 1000 years at least.

Many of the areas of Deciduous Woodland could have their origin in the medieval period, but it is likely that they have gone through several phases of clearance, replanting and/or natural succession. From the late eighteenth century onwards, as part of the changes in land management methods associated with the Agricultural Revolution, new species of tree were introduced, including sycamore, beech and chestnut, their original introduction often associated with large estates.

Timber Plantations of coniferous trees also began to be planted at a similar time, often infilling the gaps between areas of deciduous woodland, or entirely replacing them. Commonly, they have names ending in 'plantation' or 'copse'. Early plantations were often planted by landowners of large estates keen to maximise economic gain from marginal land. They also provided the additional benefits of providing wind breaks, closing off estate land from general view and adding ground cover for hunting.

Twentieth century Timber Plantations are generally on a much larger scale, often covering several hundred hectares or more, and are found away from steep sided valleys and estates, with a focus on former areas of Upland Rough Ground.

Mixed Woodland does not naturally occur, being a mixture of deciduous and non-native coniferous species. It can occur where Timber Plantations have merged with blocks of deciduous woodland. In several instances Timber Plantations have rapidly become unmanaged and neglected, and with time a new flush of deciduous woodland has grown within the plantation. In other areas, Mixed Woodland is the deliberate result of purposeful landscape design, usually associated with the creation of a picturesque view from particular parts of a large estate. It can often survive as a remnant when the surrounding ornamental landscape has been removed or altered.

Shelterbelts are typically quite small in area, and are usually linear belts of trees running parallel to existing field boundaries, within large blocks of Enclosed Land. They can be planted by individual farmers or sometimes as part of a programme of improvement on estates and tenanted farms. Intended to reduce the damaging effects of the wind to crops and settlements they tend to be planted in upland areas where wind exposure is a problem.

Further reading

There is currently no general historical synthesis of Cornwall's woodland.

Herring, P, 2008. Other uses and activities in Herring, P, Sharpe, A, Smith, JR, and Giles, C, *Bodmin Moor: An Archaeological Survey: Volume 2; The Industrial and Post-Medieval Landscapes*. English Heritage.

Rackham, O, 1986. *The History of the Countryside*. J M Dent, London.

HLC Types: Typical mapped attributes

(Based on recurring features found on modern OS 1:10,000 map data)

- **Shelterbelt:** narrow, linear alignment of trees; usually dominated by conifers; located in exposed areas to protect certain fields or settlements from the wind - within areas of Enclosed Land; predominantly Post-Medieval, Early Modern and Modern, due to their exposed location.
- **Timber plantation:** dominated by conifers; if older then generally medium in size favouring valley sides and bottoms; if modern, often very large in size, dissected by tracks, the largest found in upland locations.
- **Woodland Mixed:** medium to large areas of woodland; mixed coniferous and deciduous, with varied history often incorporating smaller plantations that have been abandoned; found on valley sides or bottoms.
- **Deciduous Woodland:** small to large areas of woodland, varied history, often incorporating recent regeneration of woodland on areas of former Rough Ground, especially Valley Rough Ground.

8.5 Industrial

Summary

Industrial HLC is where industrial land is extensive and dominant in character. Its defining attributes vary but can include a huge range of built and cut features which, when taken as a whole, are often significant in scale, both physically and visually. Cornwall has a notable industrial legacy. Its origin stretches back into late prehistory, reaching a heyday in the late nineteenth century when a rapid decline led to many industrial complexes being abandoned. The Type also records active industry and in certain areas this has continued on a significant scale; for example, the china clay industry on the Hensbarrow granite. Located anywhere where resources and

infrastructure allows it is sub-divided into HLC Types by differences in the resource exploited, and the methods employed to do so.

Broad Type: Introduction

Only extensive areas of industrialised land are mapped under the Industrial Type.

Where a relict industrial landscape has reverted to Woodland or Rough Ground, or in urban areas, incorporated within larger blocks of Settlement, the HLC will use the dominant Broad Type. This significantly reduces the extent of Industrial HLC in the 2011 time-slice. Modern, light industrial units are included in the Settlement Broad Type.

It can be distinguished into those areas that are still in active use, and those that are disused. It is sub-divided into HLC Types on the basis of the dominant industrial processes that were undertaken in the area, though in many areas there have been successive phases of metalliferous, non-metalliferous and processing industries creating a complex set of landscape features.

1. Extractive, metalliferous
2. Extractive, non-metalliferous
3. Processing

Historic maps (1840 Tithe and 1880 OS) are used as further source material to better establish the former extent of industrial areas.

Principal historical processes

Industrial activity has been an important part of Cornwall's economy since late prehistory. Greenstone, for hand axes, was quarried in the Neolithic period and it is probable that both tin and copper were first streamed and mined (respectively) from the Bronze Age onwards. As yet, the archaeological evidence for early mining and extractive industry is indirect, largely because later workings have tended to obliterate earlier examples (Herring 2009).

As time progressed, industry became larger in scale, more complex, and linked to more extensive transport networks. The height of Cornwall's metalliferous and extractive industries (together with its associated processing) was the late nineteenth century; hence the majority of Industrial Type is classed as 'non-active'. However, in the twentieth century certain industries continued, expanding in importance and scale; for example, china clay production on the Hensbarrow granite.

Cornwall is famous for its metalliferous mining industry, principally for tin, copper and arsenic.

Tin was originally exploited by streamworking and this developed into a major industry in Cornwall in the later medieval period. As the surface deposits of tin became exhausted, the tanners began, mainly from the fifteenth and sixteenth centuries, to turn more of their attention to the seams, or lodes, themselves and venture further under ground.

Early mining was shallow, taking the form of short shafts interconnected with areas of underground excavation, limited in scale and depth. But as rock-breaking and pumping technologies improved, engine houses became commonplace, allowing the mines to become deeper and more extensive than before. Copper mining continued to develop alongside the expansion of the tin industry, but both industries suffered from the boom and bust fluctuations of ore prices.

While mining developed further underground, processing complexes on the surface increased in complexity, size and extent. Different ores required different stages of processing resulting in various types of buildings and features, e.g. calciners for arsenic. A majority of these structures were temporary in nature, built of timber and

from the later nineteenth century onwards, corrugated iron, although some were more permanent and of stone construction.

Ancillary processing industries developed alongside mining, including smelting works, gunpowder works, fuse and rock-drill factories. Consecutive complexes of tailings works were constructed along the major river valleys to try and recover tin ore suspended in the water pumped out of mine workings.

Cheaper foreign imports and the gradual exhaustion of the more easily worked lodes led to a rapid decline in both industries by the end of the nineteenth century. Tin mining struggled through the twentieth century but no mines are now currently in active use.

Cornwall is also famous for its non-metalliferous extractive industry based on the exploitation of its varied rock types.

Until the early nineteenth century granite quarrying was largely confined to the exploitation of surface rock. By the eighteenth century increasingly large quarries were developed. This development was associated with the increase in civic and infrastructure construction, the opening of new national and international markets, and the development of new drilling and cutting technology. The production of precision-dressed granite flourished, particularly on Bodmin Moor and the Carnmenellis granite. Few of these quarries now remain in active use.

Other quarries, located usually on outcrops of granite, gabbro and elvan were opened to produce roadstone/ballast.

Slate was an important export from north Cornwall from the later medieval period, especially in the area around Delabole - famous for its blue grey slate used for roofing, flagstones and grave stones.

China clay (kaolin), a form of decayed granite, has been worked since the mid eighteenth century, principally on the Hensbarrow granite (the China Clay Area), but also in the western half of Bodmin Moor, and on the Tregonning and West Penwith granite. It is in these outlying areas that early remains best survive. The industry continues to work on a massive scale on the Hensbarrow granite with associated docks and processing works at Fowey.

Further reading

Bryan, E, 1994. *Cornish Mining: The Techniques of Metal Mining in the West of England, Past and Present*. Cornish Hillside Publications, St Austell.

Buckley, A, 2007. *The Story of Mining in Cornwall*. Cornwall Editions Limited, Fowey.

Gerrard, S, 2000. *The Early British Tin Industry*. Tempus.

Herring, P, Sharpe, A, Smith, JR, and Giles, C, 2008. *Bodmin Moor: An Archaeological Survey: Volume 2; The Industrial and Post-Medieval Landscapes*. English Heritage.

Smith, JR, 1992. *Cornwall's China Clay Heritage*. Twelveheads Press, Truro.

Stanier, P. 1999. *South West granite: a history of the granite industry in Cornwall and Devon*. Cornish Hillside Publications, St Austell.

Website: Cornish Mining World Heritage Site - <http://www.cornish-mining.org.uk/delving-deeper>.

HLC Types: Typical mapped attributes

(Based on recurring features found on modern OS 1:10,000 map data)

Active

- **Extractive, metalliferous:** none (2011).
- **Extractive, non-metalliferous:** non-shaft based; large scale, open extraction; quarried rock faces; bare and scrubby over waste heaps, with variable amounts of large stone waste; access roads; reservoirs and settling ponds; small ancillary buildings.
- **Processing:** often large buildings; chimneys; small to medium sized ancillary buildings; settling ponds, leats and sluices; railways; docks, quays, wharves, storage bins, cranes.

Non-active

- **Extractive, metalliferous:** shafts; shaft safety walls; bare and scrubbed over waste heaps; platforms; revetment walls; reservoirs; engine houses (often unroofed); headframe; storage bins; chimneys; flues; calciners; buddles; settling ponds; ancillary buildings, stamps, leats; OS maps sometimes preserve old mine names, typically 'Wheal', and more occasionally 'Consols' or 'Mine'.
- **Extractive, non-metalliferous:** large scale, open extraction pits and quarries; rock faces; roofless buildings/ruins; bare and grassed over waste heaps; scrubby vegetation; former roads and paths; cuttings and embankments of disused rail and tramways; empty settling ponds; OS maps sometimes preserve old mine names, typically 'Quarry', and more occasionally 'Pit', especially in the china clay areas.
- **Processing:** abandoned buildings and ruins often on the edge of settlements; chimneys; ruined, roofless ancillary buildings and offices; empty settling ponds; railway and tramway embankments, cuttings and bridges; abandoned docks, quays, wharves, and storage bins; OS maps sometimes preserve old names, typically 'Harbour' and 'Dock(s)'.

8.6 Military

Summary

Military complexes built or maintained in the twentieth century that are large in area. Those mapped as HLC are mostly still in active use, with only a few sites decommissioned. Individual sites can show considerable time-depth, used as defensive sites over successive periods, especially near important harbours. Cornwall's strategic location at the edge of the Atlantic has resulted in a wealth of military sites since the sixteenth century, with a marked peak in the Second World War. The vast majority of military complexes are now abandoned, and are not mapped as Military in the 2011 HLC; their principal impact is to add local time-depth in specific locations to other HLC Broad Types. Military activity can vary and the HLC is sub-divided on the basis of the type of built features, scale and location.

Broad Type: Introduction

The Broad Type covers military complexes used in the twentieth century that are extensive in area. Individual sites can show considerable time-depth, used as defensive sites over successive periods, especially near important harbours.

Many complexes are too limited in area to be mapped in this Broad Type; others have been considered to be secondary to more dominant HLC Broad Types, especially where they have been significantly altered following abandonment.

The Military HLC Broad Type has been sub-divided into HLC Types based on differences in military activity, built features and scale:

1. Military airfields
2. Barracks
3. Artillery complexes
4. Military communications

Principal historical processes

In Cornwall, the majority of Military HLC is located on or near the coast, with a notable concentration in the south east corner of Cornwall, surrounding the naval centre of Plymouth.

Earlier defensive sites, such as prehistoric hillforts, medieval castles, later blockhouses, and Civil War forts have merged into their immediate landscape. It is only where military use has continued into the twentieth century that a significant impact is made in HLC terms.

Traditionally, military sites focussed on prominent locations in the landscape, concentrating to defend important harbours, settlements and resources. From the sixteenth century onwards, as the early British state developed, Cornwall became important strategically. This was due to its far-flung location, jutting out into the Atlantic, and therefore a staging post to protect maritime and international interests but also a place susceptible to enemy attack, and occasionally internal unrest.

By the mid-twentieth century military infrastructure had increased dramatically in its variety and scale; fuelled principally by the demands of two World Wars and significant leaps in technology.

Airfields were first developed in the First World War to protect shipping in the Western Approaches, but many more were established during the Second World War. They required a coastal location to aid a quick response and large areas of level ground, and so were often situated on the level coastal plateau and in former areas of Rough Ground.

The demands of Second World War also required many military communication sites to be developed. These were constructed to help defend airfields, and due to Cornwall's location, to communicate with shipping and to listen for and identify enemy activity in the Atlantic. These sites were often developed on areas of Coastal and Upland Rough Ground, usually in prominent locations to send and intercept radio signals.

Artillery bases also protected strategic features, both military and economic. These were often smaller sites, less prominent in scale, and once abandoned were generally lost to other Broad Types in terms of HLC. In some instances the artillery complexes are situated within larger military bases.

As D-Day approached Cornwall's strategic position again came to the fore, resulting in a large number of military barracks developed as part of the war effort. Many of these, however, were temporary in nature, and as with artillery complexes left little long-term HLC impact.

A majority of the First and Second World War military sites have been altered to Enclosed Land or reverted back to Rough Ground. RNAS Culdrose and RAF Predannack airfields are still in active military use, and RAF Cleave has been altered to GCHQ early listening post. RAF St Mawgan airfield has recently been decommissioned and is now used as a civil airfield.

Further reading

Ashworth, C, 1990. *Action Stations: 5. Military airfields of the South-West*. Patrick Stephens Limited.

Herring, P, 2008. Other uses and activities in Herring, P, Sharpe, A, Smith, JR, and Giles, C, *Bodmin Moor: An Archaeological Survey: Volume 2; The Industrial and Post-Medieval Landscapes*. English Heritage.

Pye, A, and Woodward, F, 1996. *Historic Defences of Plymouth*. Cornwall County Council.

Website: Flying Past - <http://www.historic-cornwall.org.uk/flyingpast>.

HLC Types: Typical mapped attributes

(Based on recurring features found on modern OS 1:10,000 map data)

- **Military airfields:** large, open area; if active, enclosed by a significant perimeter boundary; runways; dispersals/pens; observation towers; hangars; sheds; ancillary buildings; radar stations.
- **Barracks:** large, open area; if active, enclosed by a significant perimeter boundary; buildings, often arranged in formal rows; parade ground.
- **Artillery complexes:** small to medium sized open area, if active enclosed by a significant perimeter boundary; gun emplacements; small buildings.
- **Military communications:** small to medium sized open area; if active, enclosed by a significant perimeter boundary; radar beacons; masts; buildings; often in coastal and upland locations.

8.7 Ornamental

Summary

Ornamental HLC is land that has been carefully designed, manipulated, and managed to create an idealised landscape, associated with mansion houses and accompanying estates. A majority of Ornamental HLC in Cornwall was established in the eighteenth, nineteenth and very early twentieth centuries, often by individuals made wealthy by profits from copper and tin mines. Vestiges of medieval designed landscapes survive in the form of deer parks, but most only survive as components of time-depth within areas of other HLC. In the later twentieth century many areas of Ornamental HLC were converted back to Enclosed Land as the estates on which they were founded collapsed.

Broad Type: Introduction

Ornamental HLC has been carefully designed, manipulated, and managed to create an idealised landscape, associated with mansion houses and accompanying estates.

They were (and occasionally can still be) private landscapes of recreation for the landowners who commissioned them, but away from the house and garden the deer parks, parkland and plantations often had (have) an economic role within the estate.

The Ornamental Broad Type can be sub-divided into HLC Types based on differences in location, size and shape, planting, tree cover, and the type of built features found within them:

1. Pleasure garden
2. Parkland
3. Plantation
4. Deer Park

Principal historical processes

Ornamental gardens surrounding larger houses have been part of Cornwall's landscape since the medieval period at least. Large areas of tenanted Enclosed Land, and sometimes Rough Ground were converted into private ground for pleasure and recreation.

Early gardens were limited in scale; their size and grandeur, as today, dependent on the wealth of the families who commissioned them. The more important later medieval Cornish estates developed deer parks - large open areas with scattered trees where deer were kept within a park pale to be hunted by the Lord to provide sport, and game for the table.

A majority of deer parks were disparked or had decayed by the mid-sixteenth century when most were reorganised as Enclosed Land. The estate at Boconnoc has a remnant medieval deer park, the area recorded under the Deer Park HLC.

The majority of Ornamental HLC was created in the eighteenth, nineteenth and very early twentieth centuries, often by individuals made wealthy by profits from copper and tin mines.

In the mid to late eighteenth century large landscape-scale Parkland became fashionable, the ethos was to enhance the 'natural' aspects of the landscape, a movement in landscape design for which Britain is famous. Parkland HLC has carefully positioned clumps of trees, with open vistas uninterrupted by hedges, framed by the sinuous lines of plantations. Larger scale Plantations framed the parkland, controlling the views into/from the mansion house and points within the estate.

With the nineteenth century expansion in exploratory travel, and growth in botanical science, the emphasis shifted towards laying out gardens with specimen trees and shrubs, camellias, rhododendrons and more delicate exotic plants, many of which could not survive far from the benign influence of the Gulf Stream.

These later gardens are often in valleys, making the most of natural topography to aid shelter and growing conditions. They were smaller, darker and more intricately planned, being enclosed by planted shelter belts to enhance the micro-climate (Herring 2009).

Many gardens declined in the mid-twentieth century as the maintenance of large teams of gardeners became increasingly difficult. Much ornamental landscape has disappeared or been reduced in impact and importance. However, several important landscapes do survive, and these are mapped in the 2011 time-slice. Following abandonment Ornamental HLC often reverted to Enclosed Land, but close to the major towns it is often incorporated into Settlement in later HLC time-slices.

Further reading

Pett, DE, 1998. *The Parks and Gardens of Cornwall: A Companion Guide*. Alison Hodge, Penzance.

HLC Types: Typical mapped attributes

(Based on recurring features found on modern OS 1:10,000 map data)

- **Pleasure garden:** small to medium sized in area; enclosed and often sub-divided; situated close to a mansion house; shrubs and trees; beds, terraces and walkways; ponds; lawns; summerhouses; glasshouses; pavilions.
- **Parkland:** large in area; often open but can be sub-divided into large fields; framed by plantations and occasionally ponds; sinuous and curving boundaries, occasionally straight; tree clumps and copses; drives and carriageways; seats; isolated buildings.
- **Plantation:** small to large in area; often surrounding a mansion house and/or to frame parkland, or control views into/from parkland; planted mixed coniferous and deciduous species; often recorded as 'Plantation' on OS maps.
- **Deer Park:** large in area; open; scattered isolated trees; framed by plantations; sinuous and curving boundaries, occasionally straight; tree clumps and copses; drives and carriageways; isolated buildings; recorded as Deer Park on OS map.

8.8 Recreational

Summary

Recreational HLC covers large areas of land given over to recreation, predominantly in the late twentieth century. It is found in greatest concentration close to the main tourist resorts on the coast, but can be found inland also. Subdivision is based on differences in activity, and often distinguished on map evidence by symbology alone.

Broad Type: Introduction

This Broad Type covers large areas of land given over to recreation, predominantly in the late twentieth century, and therefore only recorded in the 2011 HLC time-slice. Golf courses, however, were the earliest to be developed, with a handful founded at the close of the nineteenth century.

Groups of early twentieth century summer houses were established close to many of the larger beaches, especially on the north coast, but most are now permanent settlements, and recorded as Settlement HLC. Other, smaller areas of recreational facilities are absorbed into other Broad Types, again often as Settlement.

Recreational HLC is predominantly found in close proximity to the coast, and in particular, close to settlements where the tourist industry forms a major part of the economy. Access by car now forms an important part of recreation.

Subdivision is based upon differences in the density of buildings and the areas of Recreational HLC are often distinguished on OS maps by map symbology alone.

1. Golf course
2. Campsite, chalet park, etc
3. Theme Park

Principal historical processes

Cornwall's nascent tourism industry started to develop in the early nineteenth century. At first, only the wealthy travelled to Cornwall to visit dramatic natural locations, for example, Land's End and the Logan rock at Treen.

It was not until 1859 and the connection of Cornwall to the main rail network that tourism become an industry. Visitor numbers dramatically increased as Cornwall was marketed as a summer destination for families living in the urban centres. Tourism had a largely seaside bias focussing on, and greatly expanding, many existing fishing villages and towns. On the north coast, several settlements expanded from a few houses to small towns bustling with summer visitors staying in purpose-built guest houses and hotels. Wooden chalets for summer visits were also built in the Dunes and Coastal Rough Ground, creating small temporary settlements (many of which are now permanent).

The Campsite, chalet, etc HLC Type developed in the late twentieth century with the increase in car transport, hence they both have networks of tarmac and concrete drives. The car has also enabled campsites to be located inland from the beaches. They are often located in areas of Enclosed Land concentrating around the major resorts; the result of farmers and small holders diversifying their income.

With changes to employment law to allow for a shorter working week, and the increase in people's wealth, recreation itself became a growing industry with a growth in sport as a leisure pursuit. Golf courses were established predominantly in coastal locations, or near to major settlements, often altering areas of Enclosed Land or further utilising the natural undulations of dunes.

Theme Parks were developed as visitors wanted a more than a traditional 'bucket and spade' experience, the car allowing them to drive to venues where they could be entertained.

Due to the modern relationship between the car and recreation all Recreational HLC Types have extensive car parks and networks of roads.

Further reading

There is currently no general historical synthesis of Cornwall's recreational landscapes.

HLC Types: Typical mapped attributes

(Based on recurring features found on modern OS 1:10,000 map data)

- **Golf course:** large, open area; small to medium sized buildings close to a car park; driving range; often found in coastal locations or the edge of major towns; mapped on OS maps with a symbol.
- **Campsite, chalet park, etc:** high density of small rectangular buildings; complex network of small roads; medium sized ancillary buildings; sub-divided with straight boundaries; often in valley and coastal locations.
- **Theme Park:** irregular scatter of small to large sized buildings; large car park(s); mapped on OS map with name.

8.9 Settlement

Summary

Settlement HLC is where buildings dominate, the areas in Cornwall varying in size from a single farmstead through to a large town or small city. The buildings found within them are mostly permanent dwellings, but generally as a settlement increases in size and importance, so does the number of buildings associated with economic, industrial and recreational activity. Many of Cornwall's settlements were established in the early medieval and medieval periods but others have a more recent history, especially in the mining districts. Due to the massive rise in population and successive changes to the economy many show considerable time-depth. Differences in settlement size and layout are the basis by which Settlement HLC has been sub-divided.

Broad Type: Introduction

Settlement HLC is defined as areas dominated by buildings. Predominantly these are permanent dwellings, but as the size of a settlement increases, the range and number of non-dwellings rises as well. Thus there is a corresponding rise in complexity with larger settlements offering a range of economic, industrial and recreational functions that smaller settlements cannot sustain.

Difference in settlement size is the main basis by which Settlement HLC has been sub-divided.

The HLC-Types Highway settlement, Terrace and Row differ slightly in their identification process. These were mapped to further demonstrate the complexity of rural settlement; to enable Lowland Cornwall to better understand landscape change. Their classification is based on layout; Highway settlement on location and Terrace and Row upon the differing arrangement of buildings. However, these were only recorded when settlement size was comparatively small (usually the 1840 and 1880 time-slices), many are now part of larger settlements where the Village or Town HLC Type can be used instead.

The following HLC Types were used;

1. Farmstead
2. Hamlet
3. Village
4. Town
5. Highway settlement

6. Terrace

7. Row

Principal historical processes

Most settlements in Cornwall started as rural farming communities in the early medieval or medieval period. Usually located in the most favourable locations (based upon shelter, access to water and soil fertility), in many instances these are found close to, or probably overlies, later prehistoric ones. Certain settlements would have been larger and/or more important than others, also being centres for administrative and ceremonial activity.

In the medieval period most settlements were farming hamlets of several dwellings nucleated in a group. Individual, isolated dwellings also occurred, reflecting differences in agricultural potential and/or land tenure and status.

Following the Norman Conquest, planned towns were created systematically with markets held on specified days to control economic activity. Towns were evenly spaced (10-15 miles apart) to ensure a sufficient agricultural hinterland to supply the market, and were the focus for industrial, financial and administrative activity. Medieval towns were small in size compared to the settlements of today and typically contained three or four main streets, usually with one of these either widened or splayed to form a market place. Most have a larger than average medieval church, often placed at one end of the market place, and some have surviving medieval castles (most famously Launceston), or the known sites of them (Truro, Liskeard, Tregony, Week St Mary). Most in Cornwall have now developed into major towns, though some never expanded, and are only villages (Herring 2009).

In the later medieval period, following the Black Death, certain hamlets were subdivided into separate individual farms, while others stayed as farming hamlets. The rural population steadily rose in the seventeenth and early eighteenth centuries and new farming settlements were established, often as single farms and smallholdings. New towns were also founded, often to exploit new services and needs, for example, Falmouth as a victualling centre for ships. The old towns continued to grow slowly until the mid-eighteenth century, often as a result of people leaving the countryside.

With the Agricultural and Industrial Revolutions in the late eighteenth and early nineteenth centuries leading to a massive rise in population, settlements exponentially increased in size and number over a short period of time.

Existing medieval towns located close to mining, quarrying and other industrial activity expanded in size and commercial activity. Medieval hamlets in the mining districts did the same, sometimes becoming bustling villages and towns (Camborne for example). Again, near to the mining districts new farms and small holdings were enclosed in areas of former Rough Ground as the population rocketed in size.

Several new towns were developed to serve industry, often as ports to handle the export and import trade primarily for industry. Hayle was developed by the Cornish Copper Company, exporting Cornish copper to South Wales for smelting and the import of Welsh coal.

The pattern of rural settlement also changed, especially where large commercial centres were distant. A particular feature of eastern Cornwall was the number of small settlements developed along highways or at river crossings, serving travellers and acting as local service centres (having smithies, carpenters' shops etc). Near to industrial areas, often close to the more remote quarries and mines, on former areas of Rough Ground, rows and terraces were developed by landlords keen to increase revenue.

In the twentieth century the population living in larger settlements increased dramatically. Virtually all the villages and towns in the 2011 time-slice include a high

proportion of later twentieth century housing and light industry; their original cores now dwarfed by modern development.

The services and function of almost all the larger settlements have also changed. Most are largely residential, their original industrial, harbour and commercial functions having declined. Others are now dominated by the provision of residential and recreational facilities for tourists. Similarly, while many of the smaller rural hamlets have changed little in their number of dwellings, a majority have also become residential settlements with little or no farming activity.

Further reading

Website: Cornwall Industrial Settlements Initiative – <http://www.historic-cornwall.org.uk/cisi>

Website: Cornwall and Scilly Urban Survey – <http://www.historic-cornwall.org.uk/csus>

HLC Types: Typical mapped attributes

(Based on recurring features found on modern OS 1:10,000 map data)

- **Farmstead:** single dwelling; farm yard; surrounding farm buildings; nucleated settlement.
- **Hamlet:** multiple dwellings (15 or under); townplace; scatter of farm buildings; occasional church and/or chapel; nucleated, linear, or dispersed settlement.
- **Village:** multiple dwellings (15 – 250 approx); occasional farm included on settlement edge; service buildings e.g. church and chapels, school, library, village hall, sports club, pub; small car park; occasional small industrial estate; nucleated, linear, or dispersed settlement.
- **Town:** multiple dwellings (approx 250 and over); multiple service buildings and zones e.g. churches and chapels, schools and colleges, leisure centres, sports clubs, pubs, commercial streets, fire stations; car parks; industrial estates.
- **Highway settlement:** linear or dispersed arrangement of dwellings along road; small in size (hamlet or village level); often located close to prominent cross roads on A and B roads.
- **Terrace:** linear arrangement of conjoined dwellings; shared alignment of frontage; only recorded when in isolation.
- **Row:** linear arrangement of conjoined dwellings; staggered alignment of frontage; only recorded when in isolation.

8.10 Horticulture

Summary

Horticulture HLC is dominated by the crops of flowers, fruit, nuts, vegetables, and ornamental garden plants grown on a commercial basis as a cash crop. These are areas of intensive land use, where infrastructure has also been built to maximise yield. Cornwall benefits from an early growing season due to the influence of the Gulf Stream. Commercial scale horticulture is largely a recent phenomenon, except in the Tamar Valley where the industry was already important by the late eighteenth century. The development of the railway network in the late nineteenth century allowed horticulture to further develop in parts of Cornwall, especially close to the main line. Since the end of the Second World War, however, foreign imports have ensured its relative decline.

Broad Type: Introduction

Areas identified as Horticulture HLC are where the landscape is dominated by the crops of flowers, fruit, nuts, vegetables, and ornamental garden plants grown on a commercial basis as a cash crop. These are often areas of intensive land use, where

infrastructure has also been built to maximise yield i.e. glasshouses and buildings where crops are started and buildings where the crops are processed.

Vegetable crops of swede/turnip (Swedish turnip) and potatoes are also grown by many farmers, particularly in west Cornwall but the crops can be grown within Enclosed Land without the permanent infrastructure of glasshouses and nursery beds.

Horticulture Broad Type is located in areas of Enclosed Land, often Medieval Enclosed Land, close to the temperate influence of the ocean or large tidal rivers, on south and east facing slopes sheltered from the southwest and northwest winds. The land is usually sub-divided to aid the management of crops.

The Broad Type can be sub-divided on the basis of the dominant cash crops grown, and the corresponding differences in infrastructure to do so.

1. Orchard
2. Market Garden

In the past market garden crops were not recorded by Tithe surveyors and the OS using a map convention. A majority of this land would have been classified by HLC as Enclosed Land, most probably the Sub-Type, MD Altered (Sub-Divided). This is because Medieval Enclosed Land was often the most fertile ground and because market gardening often results in the intense subdivision of pre-existing fields. The HLC Type can be recorded in the 2011 time-slice because of the accompanying infrastructure of glasshouses and buildings (these being a late twentieth century development).

Principal historical processes

Horticulture has been undertaken since the medieval period at least. Its scale depended on the wealth of the household, the plants grown to provide extra foodstuffs for the immediate household.

Small garden plots would be cultivated to provide vegetables and fruit. Most farming settlements and probably all larger houses had orchards situated close to dwelling houses, mainly for cider production but also to provide food, both grown for domestic consumption rather than on a commercial basis. Orchards for domestic use continued to be a feature of Enclosed Land until the early to mid twentieth century, when most apple trees were grubbed out and the enclosures amalgamated into larger fields for cultivation or pasture.

Commercial-scale horticulture did not start until the eighteenth century with the growth of towns and an urban-based population. New crops were also introduced and by the late eighteenth century west Cornwall was already exporting potatoes by ship for sale in London.

Markets close by also developed. Southeast Cornwall benefitted from the growth of Plymouth as an important naval town, with market gardening and orchards a prominent feature of the Tamar Valley by the close of the eighteenth century. Here, the industry was so important to the economy that paper mills were built to supply the demand for wrapping produce.

As the railway networks grew in reach so did the market for fruit, vegetables and flowers. Cornwall was in a prime location; the benign influence of the Gulf Stream ensured an early growing season, giving Cornish producers a guaranteed market for their produce. As the wealth of the general population increased the market in flowers also developed and again Cornwall was an important producer due to its temperate climate.

In the late nineteenth century market gardening was growing in importance, especially around the edge of the south coast close to Penzance. Here, people enclosed parcels of Coastal Rough Ground with tiny enclosures divided by drystone walls and terraced revetments. Hedges of tamarisk and privet were grown as wind breaks, the fields

interconnected by meandering footpaths and networks of trackways. None are now in cultivation, and almost all have reverted to the coarse vegetation of Rough Ground.

The importance of commercial fruit growing in Cornwall has declined since the Second World War as it has become cheaper to import from abroad. Commercially run orchards are limited to the few businesses specialising in cider production but market gardening is still carried out in the Tamar valley, particularly around the settlement of Bohetherick.

Further reading

There is currently no general synthesis of Cornwall's horticultural past.

HLC Types: Typical mapped components

(Based on recurring features found on modern OS 1:10,000 map data)

- **Orchard:** regular arrangement of trees (there is an OS map convention for an orchard); small to medium sized, square or rectangular fields often created by the subdivision of existing Enclosed Land; predominantly straight boundaries for subdivision; small buildings to edge of fields; located in sheltered locations away from high ground; often close to a dwelling; occasional shelter belts of woodland.
- **Market Garden:** small to medium sized, square or rectangular fields often created by the subdivision of existing Enclosed Land; predominantly straight boundaries for subdivision; glasshouses and/or polytunnels; small buildings to edge of fields; often located in sheltered locations away from high ground; occasional large buildings for processing; occasional shelter belts of woodland.

8.11 Communications

Summary

Mass transportation links that are significant enough in scale to impact on HLC. The history and archaeology of the type is varied, but communications infrastructure, both large in scale and significant in visual and physical impact, developed largely in the twentieth century. Certain roads, however, date to the late medieval period at least, while airfields are the most recent development. Disused routes and areas which continue to have a significant impact on the landscape are also included. Due to its association with the movement of people and resources Communications HLC is found across all the study areas but in total forms a very small part of Cornwall.

Broad Type: Introduction

Mass transportation links that are significant in scale to impact on HLC. This Broad Type has been divided into the following HLC types:

1. Major roads
2. Railways
3. Airfields (non-military: commercial and private)
4. Canals

Principal historical processes

The communication infrastructure of Cornwall is largely needs driven, determined by a complex of factors including topography, settlement, industry, agriculture, economics, government policy, community pressure, the entrepreneurial action of landowners, individuals and businesses, and the need to reduce journey time and cost (Herring 2009).

In terms of HLC, mass transportation, large in scale and significant both in visual and physical impact, is largely a recent phenomenon, starting to a lesser degree in the eighteenth and nineteenth centuries, but increasing substantially in the late twentieth.

Roads have developed over centuries, with most of the main thoroughfares of Cornwall established by the late medieval period (the spinal A30, the A38 and A39). It is only since the 1950s that existing roads have undergone extensive enlargement and alteration, with the addition of by-passes and upgrading around most major towns and congestion-spots.

Numerous local railways were developed in the early nineteenth century to serve the needs of industry. It was not until 1859 and the opening of Brunel's Royal Albert Bridge over the Tamar that Cornwall was connected to the wider rail network. This linked large urban markets to Cornish industry and agriculture, changing the farming economy and greatly expanding the tourist industry. Further lines continued to be developed into the early twentieth century but since the mid-twentieth century many have been closed.

Canals in Cornwall were developed from the mid-eighteenth century onwards to expand the distribution of resources for agricultural improvement. When compared to roads and railways they were often shorter in length and more limited in scale. By the mid-nineteenth century canals had been superseded by the rail transportation.

Small civilian airfields were first established in Cornwall prior to the Second World War (e.g. St Just and St Merryn in 1937). Many military airfields were created during or immediately after the War and one of these, RAF St Mawgan developed into a significant joint military and civil airport, the latter now known as Newquay Airport (Herring 2009). Other civilian fields are simple landing strips, often grass. Airfields are often found on upland and coastal plateau where a level gradient over a large area can accommodate the need for a runway. Some airfields originally developed for the military in the Second World War are now civilian. These favour coastal locations, and often incorporate large areas of former rough ground (e.g. Perranporth).

Further reading

Stengelhofen, JP, 1988. *Cornwall's Railway Heritage*. Twelveheads Press, Truro.

HLC Types: Typical mapped attributes

(Based on recurring features found on modern OS 1:10,000 map data)

- **Major roads:** roadway; cuttings; embankments; roundabouts; fly-overs; underpasses; tunnels; slip roads; lay-bys; services.
- **Railways:** railway track; stations; large, medium and small buildings; cuttings; embankments; bridges, viaducts, tunnels; sidings; goods yards.
- **Airfields:** runway; taxi strips; hangars; large car parks; observation towers; terminal and ancillary buildings.
- **Canals:** channels; embankments; cuttings; inclines; tow paths.

8.12 Dunes

Summary

Dunes consist of successive ridges of blown sand and shell deposits with differing levels of vegetation cover. Near to their seaward side the dunes are often dominated by marram grass but further inland the dune systems change, giving way to mixed plant communities of grassland and trees. There is a long history of human interference, with successive phases of land use and abandonment. The date and history of dune development varies; available evidence suggests that the dune systems on the south Cornish coast are more recent than those on the north coast, although even these continued to develop well into post medieval times.

Broad Type: Introduction

Dunes consist of successive ridges of blown sand and shell deposits. The HLC Broad Type covers large parts of the Cornish coast, and can extend inland a considerable way. Vegetation is an important component of the HLC: marram grass, a specially adapted coarse grass, thrives on the seaward sides of dune complexes where other plants cannot. Further inland the dune systems change, giving way to mixed plant communities of permanent grassland and trees, and it is here the ground was once exploited as pasture for the grazing of livestock and occasionally rabbits. There is a long history of human interference, and in many areas, the relief and vegetation has been affected by past activity.

Principal historical processes

(Adapted from Herring 2009)

There is still uncertainty concerning their date and rate of development but it is known that not all the dunes in Cornwall were created at the same time. Available evidence suggests that the dune systems on the south coast are more recent than many of the major systems on the north coast, although even these continued to develop well into post medieval times. For example, the medieval church of St Piran, Perranporth, was swamped by encroaching sand in the nineteenth century.

An important historical feature of dune development is the succession of sand movement and stabilisation; a stabilised land surface may be used for pasture, cultivation and settlement before being sealed by a further sand blow, the surface of which may in due course become stabilised and again used. At Gwithian, archaeological excavation revealed successive buried land surfaces and human activity dating from the Early Bronze Age through to the medieval period.

In the medieval period many of dune systems were used as seasonal pasture grounds. In west Cornwall dunes are often called by their Cornish name, towans, prefixed with the settlement to which common rights were originally attached e.g. Gwithian towans. In the later periods, many were also used as rabbit warrens, the vegetation communities upon which they fed greatly affected by human activity and regarded as 'semi-natural'. Marram grass itself has been deliberately planted to aid stability in places, particularly where sand movement threatened property.

Many areas defined as Dunes Broad Type show further time-depth of human interference. Some contain ruined mines (especially on the vast Perran Sands) and others now abandoned industrial complexes, the most dramatic and extensive being the explosive works at Upton Towans, near Hayle. These have altered the natural landforms by providing stable and more permanent relief in an inherently mobile landscape.

In the twentieth century recreational caravan and chalet parks and golf courses have also spread on to the Dunes, considerably altering their character but not always dominating it (as at Hayle and Bude). At Penhale, Perranporth, the dunes are used by the military and are out-of-bounds to the public.

Further reading

There is currently no general historical synthesis of Cornwall's dunes.

HLC Types: Typical mapped components

(Based on recurring features found on modern OS 1:10,000 map data)

- **Dunes:** large, open areas dominated by areas of bare sand and rough grassland; located on coastal margins.

8.13 Infrastructure

Summary

Twentieth century large-scale 'sub-urban' infrastructure located separately from settlements. It is associated with the management, dispersal and collection of power, waste and transportation at a large scale, the result of the increased size, needs and demands of the modern population. It is sub-divided on the basis of land use, the differences often identified by annotation on modern 1:10,000 OS maps. The scale of each area can vary, and more recently, landscaping to reduce the visual impact of a development has become increasingly important.

Broad Type: Introduction

This Broad Type was developed for the Lowland Cornwall project with the aim to better understand more recent landscape change; in particular the development of twentieth century large-scale 'sub-urban' infrastructure located separately from settlements. It is associated with the management, dispersal and collection of power, waste and transportation at a large-scale, the result of the size, needs and demands of the modern population.

Reservoirs are mapped in the Water Broad Type and have earlier origins, with a few developed in the late nineteenth century.

The Infrastructure Broad Type is sub-divided on the basis of land use, the differences identified by annotation on modern 1:10,000 OS maps. The scale of each area can vary, and in more recent development landscaping to reduce the visual impact has become increasingly important.

It has been sub-divided into the following HLC Types;

1. Car Park (out of town schemes)
2. Water/Sewage works
3. Electricity sub-station
4. Recycling station
5. Refuse tip (public and commercial)

Principal historical processes

From the late twentieth century large-scale infrastructure has become a common feature of the landscape. The rise in its landscape prominence is linked to the increased use of technology, the rise in consumerism, and the continued trend in population growth (and pressure), all of which have required the better management of resources.

Refuse tips have the earliest history with many small scale tips operated in the past by individual town authorities. As the twentieth century progressed the amount of waste produced by people increased dramatically, due to the considerable rise in population, increase in consumption and product packaging. The management of rubbish has become centralised with large tips servicing whole districts, covering several large towns and a substantial population.

The same changes, linked with advances in technology, and combined with the need for centralised points of collection and redistribution, have created large scale water/sewage works and electricity sub-stations. Water/sewage works tend to have a more restricted location, most often positioned on, or on the edge of, valley bottoms near to streams and rivers.

Recycling stations and car parks (out-of-town car parks) are a very recent landscape phenomenon in Cornwall. These have developed in the past twenty years with an increase in the awareness of environmental impact. Purpose built out-of-town car parks (park and ride schemes) focus on the main shopping centres and currently Truro has

the only large scheme in Cornwall, though a new one is planned on the edge of the city, and others likely elsewhere.

Recycling centres, once rare, are now being built across Cornwall and with the reduction in land-fill capacity, are increasing in size and so can be mapped as part of 2011 HLC.

Further reading

No general synthesis is currently available.

HLC Types: Typical mapped attributes

(Based on recurring features found on modern OS 1:10,000 map data)

- **Car Park:** large open area; network of access roads; embankments and terraces; located on the edge of major towns near to A roads (as park and ride).
- **Water/Sewage works:** series of large circular and rectangular tanks; small ancillary buildings; trackways; occasional enclosing bank as part of landscaping works; enclosed by a single boundary, often straight; modern OS 1:10,000 map notes 'sewage works'.
- **Electricity sub-station:** square or rectangular in area; enclosed by a single boundary, often straight; modern OS 1:10,000 map notes 'El Sub Sta' and the line of several pylons converging on site.
- **Recycling Station:** open area; access and exit points; modern OS 1:10,000 map notes 'Recycling Centre'.
- **Refuse tip (both public and commercial):** large unenclosed area; trackways; access road; landscaping – embankments, shelter belts of woodland.

8.14 Water

Summary

Water HLC is where bodies of inland fresh water dominate in scale. In Cornwall, most are man-made features dating to the later twentieth century, with the HLC Types distinguished by their history and intended use. Those naturally formed also occur. These are most commonly located close to the coast, where bars have cut off former intertidal creeks from the sea. Dozmary Pool is the only large naturally-formed inland water body in Cornwall.

Broad Type: Introduction

Water HLC is where bodies of inland fresh water dominate in scale. In Cornwall, most are man-made features dating to the later twentieth century, but those that were naturally formed also occur and are distinguished as a separate HLC Type. The date of the natural features varies; some were formed after the glacial period, but a majority of natural lakes next to the coast were formed by the separation from the sea in later periods, but at various times. The man-made are sub-divided based on size and use.

1. Reservoirs
2. Fish farm
3. Artificial Lake
4. Natural Lake

Principal historical processes

Most water-bodies in Cornwall large enough to be recorded as Water HLC are man-made and date to the mid to late twentieth century.

Naturally formed features do occur but their date of origin varies. This is because most occur next to the coast, where a bar of shingle and sand has blocked a former creek

from the sea; often after a storm event. The largest and only inland natural body of water is Dozmary Pool, the origin of which is thought to date to the early post-glacial period.

Large scale reservoirs were first developed in the early twentieth century as the urban population grew (College reservoir, Penryn) but a majority of the larger ones were developed in the late twentieth century, the most recent being Colliford on Bodmin Moor.

Fish farms and Artificial Lakes are far smaller in size with less of a visual impact on HLC than the reservoirs. They have a recent history, often developed by individual farmers or landowners either as part of business diversification (coarse fishing) or through agri-environment schemes, which financially support the creation of small lakes to benefit wildlife.

Many of the larger Artificial Lakes are flooded extractive pits, abandoned from the late nineteenth century onwards. Several lakes near to large china clay pits that are still active in use are used temporary reservoirs to store water, which is pumped to processing works when required.

Further reading

No general synthesis has been undertaken.

HLC Types: Typical mapped attributes

(Based on recurring features found on modern OS 1:10,000 map data)

- **Reservoirs:** large, open areas of water (not closed reservoirs); dam; small ancillary buildings; often in upland locations.
- **Fish farm:** series of small ponds; ponds vary in size but usually regular in shape; valley bottom location.
- **Artificial Lake:** small to large in size; often irregular in shape; most frequently in valley bottom location; larger lakes associated with abandoned extraction pits.
- **Natural Lake:** medium to large in size, variable in shape; named on modern and historic maps, predominantly coastal locations.

8.15 Intertidal and mudflats

Summary

Intertidal and mudflats cover the area between Mean Low Water and Mean High Water, but can extend above and beyond them for a limited distance. Differences in water cover, vegetation, sediment type and the exposure of bedrock is the basis upon which the Broad Type can be sub-divided. It is created by the natural processes of marine inundation, erosion and deposition with a varied history dependent on location. Rates of erosion and deposition, however, have been altered by man's activities, leading to large areas of intertidal mudflats and salt marshes that have a more recent history. The HLC Types have been utilised for communication, extraction of raw materials (e.g. sand) and food production; a role in which some areas continue today.

Broad Type: Introduction

The Intertidal and mudflats Broad Type covers the area between Mean Low Water and Mean High Water, and extends into those areas slightly above and beneath them.

This includes areas frequently inundated with seawater above mean high water due to the action of spring tides and/or exposure to swell, and the creeks of water (permanently below mean low water) that extend inland.

Differences in water cover, vegetation, sediment type and the exposure of bedrock form the basis upon which the following HLC Types are determined;

1. Intertidal mudflats
2. Salt marsh
3. Inshore water
4. Beach
5. Rocky foreshore

Principal historical processes

The Intertidal and mudflats Broad Type has been created by the natural processes of marine inundation, erosion and deposition. Rates of erosion and deposition, however, have been increased and altered by man's activities, leading to large areas of intertidal mudflats and salt marshes that are recent in formation.

In the post-glacial period a rise in sea levels flooded the unglaciated steep valleys to form rias or inland coastal inlets of creeks and estuaries; for example, the Camel, Fal, Fowey and Tamar.

Further periods of sea-level change have occurred, with many areas of low-lying land inundated further, probably in the Bronze Age and Iron Age periods. Areas of 'submerged forest' or former woodland and peat deposits survive in the intertidal zone in several areas of the Cornish coast, for example at Marazion and Long Rock.

Many of the beaches, and possibly many of the present sea-cliffs in areas of softer rock, perhaps date to the last major phase of sea level rise. In areas of hard rock, the cliffs could be older. In these areas the sea has cut large wave-cut platforms to leave areas of rocky foreshore and sections of foreshore dominated by looser rock debris/boulders (this has been mapped as part of Rocky foreshore HLC).

Beaches are formed where erosion and deposition has combined to deposit large volumes of small particles of sand, silt and small pebbles. The character of beaches can vary dramatically. Many in Cornwall are rich in the fragments of calcareous shells and have been used for hundreds of years to improve soil fertility. At Carlyon Bay, St Austell, however, the beach was artificially formed using quartz waste from china clay production.

There were once many more creeks, especially along the southern coast where several have now silted up completely, as at Seaton, Pentewan and Porthluney. The Cober was trapped as Loe Pool when the Bar was thrown up by storms in the medieval period (see Water HLC Broad Type).

The networks of creeks and inlets (Inshore water) offer naturally-sheltered harbours and transport networks that extended far inland. They were often the main thoroughfares for trade and movement of people from prehistory up until the late nineteenth century. The strategic importance of estuaries continues and many are still key harbours and ports; in the Second World War some formed main points of departure for the D-Day landings.

Inshore water once extended further inland, and settlements that were once important medieval, and probably late prehistoric, ports were left stranded by the silting up of the shallower creek heads. The River Fowey at Lostwithiel had silted up by the fourteenth century limiting trade considerably, the result of sediment washed down from tin-streaming activity on Bodmin Moor.

More limited areas of deposition have also occurred on the edges and heads of the creeks. Above mean high water these have often become covered by salt tolerant vegetation. Known as saltings, these salt marshes were important for sheep grazing from medieval to post-medieval times. Where intertidal mudflats were stable they were often used for harvesting shellfish, in particular oysters on the Rivers Fal and Helford.

Further reading

Parkes, C, 2000. *Fowey Estuary Historic Audit*. Cornwall County Council.

Ratcliffe, J, 1997. *Fal Estuary Historic Audit*. Cornwall County Council.

Reynolds, A, 2000. *Helford Estuary Historic Audit*. Cornwall County Council.

HLC Types: Typical mapped attributes

(Based on recurring features found on modern OS 1:10,000 map data)

- **Intertidal mudflats:** exposed between Mean High Water and Mean Low Water; dissected by sinuous channels at Mean Low Water; mud convention on modern OS 1:10,000 maps (but can include small areas of sand and rock).
- **Saltmarsh:** above the line of Mean High Water; vegetated, saltmarsh conventions on modern OS 1:10,000 maps.
- **Inshore water:** permanent water (creeks); below Mean Low Water.
- **Beach:** above the line of Mean High Water; sand and shingle conventions on modern OS 1:10,000 maps.
- **Rocky foreshore:** above the line of Mean High Water; rock debris and exposed bedrock conventions on modern OS 1:10,000 maps.

9 Appendix 2: HLC methodology

The appendix outlines the list of ecclesiastical parishes mapped by the Lowland Cornwall HLC, and the metadata for the Lowland Cornwall HLC mapping and supporting Historic Settlement dataset.

9.1 Study areas (with ecclesiastical parishes)

Table 24 shows the four study areas listed from west to east with an accompanying list of the ecclesiastical parishes inspected as part of the HLC stage. The ecclesiastical parishes relate directly with the 1840 Tithe maps used to map the 1840 HLC time-slice. A majority of the maps have been scanned and rectified into a digital format by the Cornwall Records Office, but additional rectification was undertaken as part of the Lowland Cornwall project for six of the parishes (shown in italics). Four of the parishes in the Penwith study area are underlined as they were only partially covered by the Lowland Cornwall study area.

Study Area	Parishes (ecclesiastical)
Penwith	<i>St Buryan</i> , Paul, <u>Madron</u> , Penzance (urban parish), <u>Gulval</u> (no 1840 Tithe Map available as digital data), <u>Ludgvan</u> , <u>Lelant</u> , <i>St Hilary</i> , Marazion, Perranuthnoe.
Probus	St Newlyn East (pilot), St Enoder, St Erme, <i>Ladock</i> , Probus.
Pelynt	Fowey, St Sampson in Golant, Lanteglos by Fowey, St Veep, <i>Boconnoc</i> , Pelynt, Lanreath.
Poundstock	<i>Jacobstowe</i> , <i>Poundstock</i> , Marhamchurch, Whitstone

Table 24 List of study areas with relevant ecclesiastical parishes

9.2 Metadata: Lowland Cornwall datasets

The following section outlines the components and attributes of the Lowland Cornwall HLC method and Historic Settlement data collection process in detail (for a general introduction and summary see Section 3).

Each is divided in a similar manner and to act a GIS metadata statement.

9.2.1 Lowland Cornwall HLC

Software: ESRI ArcView 9.2 GIS and Microsoft Access 2000.

Date: December 2009 to February 2011.

Mapper: Peter Dudley

Scale: HLC identification at 1:5,000 with polygons drawn at 1:2500 using the latest version of OS Master Map data. Minimum size of 1ha applied to polygons.

Time-slices (with full attributes):

1. 2011 HLC
2. 1880 HLC
3. 1840 HLC

Further interpretative time-slices (only mapped for polygons where interpretation was possible and with limited attributes):

4. Late Medieval
5. Late Prehistoric

HLC Sources (all available as digital data):

1. 2011 time-slice – modern 1:10,000 OS map
2. 1880 time-slice - 1880 1:2500 OS map (1st Edition)

3. 1840 time-slice – 1840 Tithe maps (rectified)

Further supporting evidence:

1. Historic Settlement data.

Process:

1. Data collection on a parish by parish, study area by study area basis.
2. Historic Settlement data mapped for full parish.
3. HLC mapping undertaken as a GIS shapefile with full suite of attributes entered into an accompanying Access database; the two linked by a Polygon ID number unique to each polygon in that parish.
4. Once the parish was completed, the shapefile and Access database were joined in GIS, and exported out as a final GIS shapefile.
5. The final shapefile was presented with an accompanying symbology file as a visual check to the data. This was carried out for each time-slice.
6. Further fields were added to the final parish shapefiles.
 - Average field size (2011)
 - Percentage (%) change in number of fields between 1840 and 1880.
7. Once all parishes completed, the separate parish final shapefiles were merged.

HLC fields and attribute values:

Field	Attribute values
Polygon ID	Unique value for each polygon
Landuse [only in 2011 time-slice]	Core
	Sub-core
	Fluctuating/Tidal
	Marginal
Broad Type	See Table 26 for full breakdown
HLC Type	See Table 26 for full breakdown
Sub-Type	See Table 26 for full breakdown
Period	Modern (1900-present)
	Early Modern (1750-1899)
	Post-medieval (1540-1749)
	Medieval (1066-1539)
	Early Medieval (AD410-1065)
	Romano-British (AD43-409)
	Iron Age (801BC-AD42)
	Bronze Age (2500-800BC)
	Mesolithic (10000-4000BC)
	Prehistoric (4000BC-AD409)
Confidence	Certain
	Probable

Field	Attribute values
	Possible
Active [only used for Industrial Broad Type]	No
	Yes
	N/A
Overall/Pattern shape	Very Irregular
	Irregular
	Regular
	Very Regular
No of fields in polygon	Free text
Dominant internal boundary type	None
	Erratic
	Curvilinear
	Sinuuous
	S-shaped
	J-shaped
	Dog-leg
	Straight
Secondary boundary [internal]	None
	Erratic
	Curvilinear
	Sinuuous
	S-shaped
	J-shaped
	Dog-leg
	Straight
% Dominant	51-69%
	70-89%
	(> 90%)
Map Source	1:10,000 OS
	1880 OS 1:2500
	1840 Tithe Map
	Interpretation

Table 25 List of Lowland Cornwall HLC fields and attribute values

HLC Types:

Those not mapped in the 2011 HLC time-slice have a tick (✓) next to them, and those Types not mapped as HLC in the study areas have an (X) next to them.

Broad Type	HLC Type	Sub-Type
Communications	Major Roads	
	Railways	
	Airfields	
	Canals	
Industrial	Extractive, metalliferous	
	Extractive, non-metalliferous	
	Processing	
Intertidal and mudflats	Intertidal mudflats	
	Saltmarsh	
	Inshore water	
	Beach	
	Rocky foreshore	
Military	Military airfields (X)	
	Barracks (X)	
	Artillery complexes (X)	
	Military communications	
Ornamental	Pleasure garden	
	Parkland	
	Plantation	
	Deer Park	
Recreational	Golf course	
	Campsite, chalet park etc	
	Theme park (X)	
Settlement	Highway settlement	
	Farmstead	
	Hamlet	
	Village	
	Town	
	Terrace (✓)	
	Row	
Rough Ground	Coastal Rough Ground (undivided)	
	Coastal Rough Ground (divided)	
	Bare cliffs	
	Valley Rough Ground (undivided)	

Broad Type	HLC Type	Sub-Type
	Valley Rough Ground (divided)	
	Upland Rough Ground (undivided)	
	Upland Rough Ground (divided)	
Woodland	Shelterbelt	
	Timber plantation	
	Woodland mixed	
	Deciduous Woodland	
	Ancient Semi-Natural woodland (X)	
Enclosed Land	Prehistoric Enclosed Land	PX field patterns
		PX Altered field patterns (Sub-Divided)
		PX Altered field patterns (Amalgamated)
		PX Altered field patterns (Re-arranged)
Enclosed Land	Medieval Enclosed Land	MD Strips (Unenclosed) (X)
		MD derived from Strip Fields (Enclosed)
		MD derived from Cropping Units
		MD Barton field patterns (X)
		MD Orchard (not commercial horticulture) (X)
		MD Peripheral fields
		MD Altered field patterns (Sub-Divided)
		MD Altered field patterns (Amalgamated)
		MD Altered field patterns (Re-arranged)
		Enclosed Land
PM New Smallholdings (<5ha)		
PM Barton field patterns (X)		
PM Orchard (✓)		
PM Intakes		
PM Altered field patterns (Sub-Divided)		
PM Altered field patterns (Re-arranged)		
PM Altered field patterns (Amalgamated)		
Enclosed Land	Early Modern Enclosed Land	Emod New Farms (>5ha)

Broad Type	HLC Type	Sub-Type
		Emod New Smallholdings (<5ha)
		Emod Barton field patterns (X)
		Emod Orchard (✓)
		Emod Intakes
		Emod Altered field patterns (Sub-Divided)
		Emod Altered field patterns (Re-arranged)
		Emod Altered field patterns (Amalgamated)
Enclosed Land	Modern Enclosed Land	Mod New Farms (>5ha)
		Mod New Smallholdings (<5ha)
		Mod Intakes
Horticulture	Orchard	
	Market Garden (X)	
Infrastructure	Car Park (X)	
	Water/Sewage works	
	Electricity sub-station	
	Recycling station (X)	
	Refuse tip (public) (X)	
	Refuse tip (commercial) (X)	
Water	Reservoir	
	Fish farm	
	Artificial Lake	
	Natural Lake	
Dunes	Dunes and Towans	

Table 26 List of HLC Types (and subdivisions)

Further background:

Table 25 lists the full attribute values available for the three HLC time-slices mapped, i.e. 2011, 1880 and 1840. The two further interpretative time-slices were only mapped where interpretation was possible, with a limited number of fields populated due to the lack of historic source material, i.e. Broad Type, HLC Type, Sub-Type, Period, Confidence and Source.

The full suite of HLC Types developed by the Lowland Cornwall method is listed in Table 26. Lowland Cornwall's HLC structure differs from other HLC projects as HLC Type has been further sub-divided to a Sub-Type level. The Sub-Type classification focused on Enclosed Land.

'Landuse' was the only field to be recorded in a single entry per polygon (irrespective of time-slice). The identification of attribute values as either 'Core', 'Sub-core', 'Fluctuating/Tidal' and 'Marginal' aimed to indicate the potential depth of continuous land use in an area.

Decision making in this respect was based on evidence from the Historic Settlement dataset. The interpretation and dating of Cornish, and to a lesser extent, English place-name elements was used to give a potential indication of a settlement's earliest date, and the landscape history of the area.

This is easiest to postulate for the Cornish place-name elements *tre*, *bod*, *hendre*, *lann*, *ker* and *lys* which probably date in usage to between the fifth and tenth centuries AD (Padel 1985). It is suggested that these could be interpreted as 'core' areas: those most likely to have been continuously settled since the Romano-British period. The polygons surrounding these settlements were classified as 'Core'.

Other attribute values for landuse included 'Sub-Core' (possible areas of continuous settlement) and 'Fluctuating/Tidal' (areas which may have seen an extension of settlement in the late prehistoric/early historic period, then a retraction of settlement, followed by colonisation again, sometimes in slightly different locations and potentially under different circumstances, in the later medieval period). 'Marginal' landuse was identified on the basis of rough ground, altitude, severity of slope and aspect, typically corresponding with Rough Ground or Woodland, or previous areas of Rough Ground (Post-Medieval, Early Modern and Modern Enclosed Land) and Woodland.

Establishing the extent to which an area extended beyond a settlement was difficult with an understandable limitation to its accuracy. Extent was usually established by subjective judgment influenced by topography (altitude, severity of slope, and aspect) and the way in which the landscape was divided (dominant boundaries). A small number of the 1840 Tithe maps recorded tenement boundaries (for example Paul) and where so, these were used to delineate the areas of enclosed land surrounding a particular settlement.

Table 27 below lists the key place-name elements and dates by which Landuse was classified.

Place-name elements	Landuse	Date
<i>Tre-</i> , <i>bod-</i> , <i>ker-</i> , <i>lann</i> , <i>-lys</i> , <i>hendre</i> (all Cornish language)	Core	5th – 10th centuries
Later Cornish element and English <i>tun</i>	Sub-core	9th – 11th centuries
English element and <i>tun</i>	Sub-core	9th – 11th centuries
Cornish <i>pen</i> , <i>pol</i> , etc and English <i>cote</i> and <i>wordig</i> recorded in 1086	Sub-core	9th – 11th centuries
Other Cornish and English place-name elements recorded since 1086	Fluctuating/Tidal	11th century onwards

Table 27 Interpretation of Cornish and English place-name elements and the earliest recorded date of settlements in relation to 'Landuse'

Location:

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9.2.2 Historic Settlement

Software: ESRI ArcView 9.2 GIS.

Date: December 2009 to February 2011.

Mapper: Peter Dudley

Scale: Mapped at 1:5,000 as a single layer (point data).

Time-slices:

1. 2011
2. 1880
3. 1840
4. 1748 map

Sources (available as digital data except where noted):

1. 2011 time-slice – modern 1:10,000 OS map
2. 1880 time-slice - 1880 1:2500 OS map (1st Edition)
3. 1840 time-slice – 1840 Tithe maps for selected parishes (rectified)
4. 1748 time-slice – 1748 Martyn’s Map of Cornwall (paper copy)
5. HES transcription of ICS place-name index (paper copy held as part of CC HER)

Process:

1. Creation of methodology statement, and tested in trial parish.
2. Data collection on a parish by parish, study area by study area basis.
3. Historic Settlement data mapped for full parish.
4. Historic Settlement data used to classify attribute values in ‘Landuse’ field in HLC layer.
5. The final shapefile presented with an accompanying symbology as a visual check.

HLC fields and attribute values:

Field	Attribute Values
ID	To be populated
Place-name	Free text
First recorded as	Free text – earliest reference
Earliest date	Free text
Language	‘C’ – Cornish
	‘E’ – English
	‘CE’ – Cornish/English mix
	‘CL’ – Cornish/Latin mix
	‘U’ - Unknown
Elements	Free text
Settlement type 1748	T – Town (e.g. over 250 dwellings – over approx 100ha in area)
	NV – Nucleated Village (e.g. over 15 dwellings in a concentrated, constrained area)
	DV – Dispersed Village (e.g. over 15 dwellings dispersed over a wide but coherent area)
	LV - Linear Village (e.g. over 15 dwellings

Field	Attribute Values
	in a line along a road or valley)
	NHT – Nucleated Hamlet (e.g. under 15 dwellings – under in size)
	DHT - Dispersed Hamlet (e.g. under 15 dwellings dispersed over a wide but coherent area)
	LHT - Linear Hamlet (e.g. under 15 dwellings in a line along a road or valley)
	TE - Terrace (e.g. line of houses built similar in plan, more formally arranged than row)
	R - Row (e.g. line of houses built in different phases and therefore each house differs in size, and/or steps forwards/backwards from the next).
	SHT – Shrunken Hamlet (hamlet reduced in size/dwellings from former time slice)
	SF – Single Farm (e.g. larger dwelling with several outbuildings)
	C – Cottage (e.g. single isolated dwelling with a small number of small outbuildings)
	H - House (e.g. villa with no outbuildings)
	MH - Mansion House (large grand house with outbuildings)
	M - Mill.
	IN - Industrial e.g. Huel Rose. These are likely to be transitory names.
	N - Not established.
	D - Deserted. Recorded on an earlier map but no longer recorded as a place-name on map.
	NA - Not applicable (as topographical/landscape name)
	U - Unknown (not visible due to error/damage to map or if extant would not have been recorded as within larger settlement)
	NS - Not shown but possibly extant
	FB - Farm buildings
	LT – Linear Town
	CH – Church
	SCH – School
	CHA – Chapel
	INN – Inn
	LDGE – Lodge
	FC – Fish cellars

Field	Attribute Values
Settlement type 1840	For full list, see 1748 above
Settlement type 1880	For full list, see 1748 above
Settlement type modern [2011]	For full list, see 1748 above
Period	Early Medieval (410 – 1065)
	Medieval (1066 – 1539)
	Post-medieval (1540 – 1749)
	Early Modern (1750 – 1899)
	Modern (1900 – present)
Date Confidence	Certain
	Probable
	Possible
	Unknown
Type Confidence	Certain
	Probable
	Possible
	Unknown
Notes	Free text

Table 28 List of Historic Settlement HLC fields and attribute values

Further background:

The method by which the date or ‘period’ of a settlement was established is complex.

The earliest documentary date for each settlement was taken from the HES transcription of the ICS place-name index held as part of the Cornwall HER. In the absence of such data a date was established (where possible) using the historic map data: Martyn’s 1748 Map of Cornwall, 1840 Tithe, 1880 OS and modern 1:10,000 OS maps. Due to the date range of the historic maps these were only useful for the identification of more recent settlements; from the post medieval period onwards.

To give an idea of the original date of the settlement a date period was given. This followed the existing Cornwall HER classifications and mirrored the HLC;

Early Medieval (410 – 1065)

Medieval (1066 – 1539)

Post-medieval (1540 – 1749)

Early Modern (1750 – 1899)

Modern (1900 – present)

In some instances it is possible to suggest that a settlement was established in an earlier period before it was first recorded in documentary material. This is easiest to postulate for the Cornish place-name elements *tre*, *bod*, *hendre*, *lann*, *ker* and *lys* which probably date in usage to between the fifth and tenth centuries AD (Padel 1985).

In parts of east and north Cornwall there are almost as many English place-names as Cornish ones. In the Poundstock study area for example, the parishes of Whitstone and Marhamchurch have predominantly English place-names.

It is harder to date the English language elements. All names will post-date the early 9th century when the English first settled in Cornwall and many may have simply replaced the British names of existing settlements, and therefore seriously limit the way in which the project was trying to use the dataset.

It is likely that the English element *tun*, 'farmstead, estate', pre-dated the Norman Conquest and so sits in the later range of the Early medieval period. In mid and west Cornwall important Cornish estates had *tun* added to their names, representing an English administrative take-over, for example Helston (*henlys - tun*) and date to a similar period. However, in the same area the compound Newton seems to be Medieval in date, in use probably between the 12th to 15th centuries (Padel in Ravenhill 1999, 91-2).

The usage of the English elements *cot* and *wordig* (worthy) is different to that of *tun*: they are found mainly in north and east Cornwall and probably date to the medieval period.

Padel suggests that *wordig*, 'farm, enclosure' settlements were found on less attractive land than *tun* settlements, and that many were likely to date mainly to the expansion of farming in the eleventh to thirteenth centuries. In Cornwall, a majority of worthy settlements are found to the north of the River Ottery (*ibid* 93-94).

Cot was likely to be a low status site (perhaps like the Cornish *bod*?). In Devon a majority of *cot* settlements are found in the north of the county with a complete absence in the south. In Cornwall, as with *wordig*, there is a general absence south of the River Ottery but there is a small cluster around Callington. The dating of the element, in the absence of a 1086 Domesday reference, could be contemporary with *wordig*, though the situation is not clear. The appearance of *cot* in western Cornwall is predominantly in the compound of *ceald-cot*, 'cold cottage' is later when *cot* had stopped being used to form other place-names (Padel in Ravenhill 1999, 94).

Padel (*ibid*) comments that habitative terms have been concentrated upon in place-name studies but topographical terms were just as likely to have been used to describe settlements. An issue in respect to 'Landuse' is that their dating is more problematic: the elements used over a broad date range, and potentially borrowed from long-standing names of natural features.

Where *pol-*, *pen-*, *wood*, etc elements were recorded in 1086 (in relation to a settlement) a (late) early medieval date is likely.

Location:

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