Heritage, natural capital and ecosystem services: case studies

Project No: 7740

The Blackdown Hills Area of Outstanding Natural Beauty Case Study: An integrated approach to valuing environmental capital and services (boundaries and linear landscape features)

Final report and Case study

Blackdown Hills
Area of Outstanding Natural Beauty

Devon
County Council

Project name:	**Heritage, natural capital and ecosystem services: case studies (Blackdown Hills)**
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Blackdown Hills AONB field boundaries: project 7740

Executive summary

This is one of a number of initiatives through which Historic England aim to support the heritage sector in engaging with natural capital and ecosystem services methodologies in order to protect the historic environment within future environmental policy.

This case study, focussing on the field boundaries and linear features in the Blackdown Hills Area of Outstanding Natural Beauty (AONB) will primarily address how the historic environment might be better included, but will also inform the development of the guidance for the heritage sector on how to engage with natural capital and ecosystem services approaches.

The hypotheses for the project are:

1. When comparing and contrasting discrete landscapes (with networks of field boundaries and linear landscape features), some are richer in natural capital than others and provide a wider range and more benefit to society (ecosystem services)
2. The natural capital value of some landscapes (with networks of field boundaries and linear landscape features) is currently undervalued, once all aspects of heritage (including designated and undesignated sites) are integrated and accounted for

Methodology

A relatively detailed methodology was devised to choose four representative study squares, each two by two kilometres in size.

A 4 part methodology was then devised that looked to test and quantify (via scoring):

1. Extent of total stock
2. Synergy and added value
3. Function/ economics of the boundaries
4. Natural capital stock to ecosystem service flow

A further two sections of the methodology then looked to:

5. Draw the threads together
6. Testing/ verifying and applying the results

Analysis was undertaken per Historic Landscape Character (HLC) type within each study square. HLC types can occur in more than one study square.

General results:

- The study areas have extensive field boundary networks (predominantly banks with hedges) that are well connected, many intact and with variable numbers of hedgerow trees.
- There is a trend for intact hedges and hedgerow trees in the Blackdown Hills and the thicker and sinuous nature of hedges in landscapes retaining characteristics of medieval origin.
- There is considerable historic environment interest in the four study squares. The majority of hedges in the study squares are considered ‘important’ hedges.
- For all study areas, there is significant association between field boundaries and heritage assets recorded on the HERs.
- The methodology was largely found to be fit for purpose, but scoring some areas was difficult due to lack of data or the degree of subjectivity.
- Study area 1 (Hemyock) scored 18.36 overall and study area 2 (Wrangway/ Sampford) scored 16.25 overall (both out of a possible 25). The main reasons for this are the greater density of field boundaries in study area 2 (Hemyock square) that were generally in good condition and had a strong co-incidence across biological/ historic/ cultural heritage.

- It appears that a premium associated with the historic environment (including association between field boundaries and HER's) has been identified in some cases and more generally, we have evidence that the historic environment has influenced delivery of the final benefits.
- This all translates through to natural capital stock and ecosystem service flow; the natural capital stock is considered to be high when taking into account the full suite of heritage assets.

Natural capital stock and ecosystem service flow results

1. There is significant field boundary stock in the study areas. In study area 1, the length of field boundaries is 78 kilometres (71 kilometres of this being hedged boundaries). In study area 2, the length of field boundaries is 52 kilometres (49 kilometres of this being hedged boundaries).
2. We have gathered information on the condition of field boundary stock and have made assumptions and then tested what this means, in terms of the extent of services that flow from the stock.
3. In terms of testing these assumptions and monetising the service values, the following assessments were made of field boundaries (within two of the study squares): carbon stock, flood alleviation and access/ recreation benefits
4. Carbon stock in biomass:
    - Study area 1 (Hemyock)= 1758 tonnes, carbon stock value £341,972, Annual carbon flux value= 387 tonnes of carbon/year, Annual flux value[1]= £75,370/ year
    - Study area 2 (Wrangway/ Sampford)= 1235 tonnes, carbon stock value= £240,411, Annual carbon flux value= 263 tonnes/ carbon/ year, annual flux value £51,306/ year
5. Flood alleviation benefits: the value of this water storage service is calculated as follows:
    - Hemyock square: £174,323
    - Sampford square: £120,111
6. Access/ recreation benefits: in study area 2, since there are very few Public Rights of Way that are in this area of analysis, the values are not readily available to calculate. As an approximation, the ORVal tool (https://www.leep.exeter.ac.uk/orval/) was traced across the bridleway that is next to a boundary feature Scheduled Monument 0380 (Sampford study square). The tool estimates approximately1622 visits per year and a welfare value of £4406
7. An analysis of HER assets and the National Ecosystem Assessment derived value was inconclusive insofar as there was no way to differentiate the ecosystem service values from land whether HER or HLC, because there was no data that could put in a differential between the two. This means that an ecosystem service 'uplift' from including HER's cannot be demonstrated to stakeholders nor that differences in ecosystem service values between HLC's can be interrogated. A more detailed GIS layer of land use and land cover with condition would have enabled a better differentiation.
8. Non-monetised services are listed in table 4. The full value of services is therefore higher than monetised value alone.

Conclusions

[1] The amount of carbon exchanged between Earth's carbon pools e.g. ocean, atmostphere, land, living things

Demonstrating the link between the historic environment and the natural capital stock is challenging, as it relies on having comprehensive datasets that are often not available at the correct resolution. In the Blackdown Hills AONB, as a result of the pre-designation archaeological surveys and recent National Mapping Programme survey that provides more detailed historic environment information, it transpires that in this case study the biological data was often at too coarse a scale for meaningful analysis. The methodology therefore requires sufficient detail of data that could be collated given resources to do so, or proxys used. The pros and cons of each are that gathering of detailed biological data is time demanding/ costly although proxys can be inaccurate. Including biological and historic/ cultural measures in one scoring system requires the appropriate expert specialisms of more than one person and can become subjective when trying to align one with the other (in terms of scoring).

The hypotheses were proved to be largely correct; there are differences between the natural capital resource between HLC types. Some HLC types within the study areas are richer in natural capital than others and provide a wider range and more benefit to society. In addition, there is evidence that the natural capital value is currently undervalued.

Looking over the tables on ecosystem service values for particular HER asset types, scored by Provisioning, Cultural, Regulatory and Supporting services, there is a trend of higher for those HER types that are most clearly part of the landscape, for example woodlands, orchards, various types of extractive pits (which mostly are tree covered now – by human or natural processes), field systems, trackways, boundaries, curvilinear enclosure.

Similarly the tabulation of land use type by HLC type seems to be showing high ecosystem service values in both study areas for those land uses (generally permanent pasture and woodland) that are most closely associated with the more ancient and heritage asset rich HLC types. For example, in the Hemyock study area medieval enclosure landscape HLC types accounts for 43% of the area's permanent pasture – which scores highly for a range of services.

In addition, proxy services were identified including pollinators (in species rich hedge margins in adjacent priority habitats) and cultural heritage.

The ecosystem services provided by a heritage rich HLC's in study squares is considered to be high when including actual services provided (including biomass, flood alleviation, access & recreation, biodiversity and cultural heritage) and proxy services provided (including pollinators).

What this study managed to demonstrate, albeit on a local scale, was that there are areas in study squares associated with HLC's of greater time depth where there is synergy, co-incidence and association of biological, historic and culturally rich field boundary networks, often in a good condition, that are associated with adjacent priority habitats, bounded by important boundaries (parish boundaries) and criss-crossed by public rights of way.

Recommendations and how we will apply this work

The Project Team will:

- work with the farm facilitation group (58 farmer members) to celebrate the richness of the farmed field boundaries, raise awareness on appropriate management and secure funding for management in addition to any agri-environment payments. An example is money through National Grid's Landscape Enhancement Initiative grant scheme.

- work with partners and decision makers to embed our findings into other plans and strategies including Management Plans and Natural Capital Mapping undertaken by others, for example linked to the Greater Exeter Strategic Plan.
- communicate the findings of the study to the AONB family (46 in England, Wales and Northern Ireland).
- use the outputs to help inform our response to the call for evidence for the Review of Protected Landscapes[2].
- use the outputs to inform the review of the Blackdown Hills AONB Management Plan, a statutory plan owned by the component Local Authorities.
- use the outputs to help shape the proposed Environment Land Management Scheme trial for the Blackdown Hills AONB (& East Devon AONB), that has been submitted to Defra for consideration.
- use the outputs to underpin a new work strand that will celebrate sense of place and further work to study what's changed in the landscape, what hasn't changed and what local communities value.

There are various areas of the study that would benefit from further analysis, to tease out the natural capital and ecosystem service benefits. Statistical analysis of data for ecosystem service flow could also be undertaken.

Replicability
Of the protected landscapes in South West England, five AONBs fall within the area covered by the Devon Historic Landscape Character project and have therefore been mapped to the same classification. Although each of these AONBs has its own character, they share a common framework of HLC types albeit with different evolutions and dominance of particular HLC types (See Turner 2007). It would therefore be valuable, to test the methodology in another landscape such as the East Devon AONB or Tamar Valley AONB.

It is considered that the score for replicability should be 4 i.e. we are confident that the methodology could be replicated.

However, there are a number of health warnings that would need to be considered when applying this methodology elsewhere:

1. The scoring system was designed to be objective, but ultimately there are many variables that mean that the scoring is quite subjective, as it is based on the best available data that is available and the interpretation of the data/ professional judgement.
2. Measuring ecosystem service flow from a study square rich in historic field boundaries, for example from biomass and flood alleviation, does yield results in terms of data but is an imprecise science, with many assumptions made.
3. Further measuring of ecosystem service flow linked to the historic environment is challenging, with many assumptions made. A further assessment needs to be made of the HER assets associated with field boundaries and whether assessing the services they provide (to a range of beneficiaries) is the best and most appropriate way of monetising the added value of the historic environment, in terms of historic field boundaries.

The decision about whether to roll-out this methodology across other landscapes is largely a question about what information is required from it. A more light-touch and landscape character scale approach could have been adopted for this study but would not have enabled the co-incidence, added value or more detailed ecosystem service benefits to be calculated.

[2] https://consult.defra.gov.uk/land-use/landscapes-review-call-for-evidence/

Contents page

Acknowledgements

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Members of the Blackdown Hills AONB staff team and other partners have provided valuable support and an AONB Family workshop in September 2018 helped to provide peer review.

Finally, the supporting evidence provided by members of the farming community (through the Blackdown Hills Farming and Woodland Facilitation Group), the Blackdown Hills Hedge Association, the Blackdown Hills Woodland Association and local historians (members of the Blackdown Hills AONB Community Heritage Forum) is much appreciated.

Project Aims and Objectives

This is one of a number of initiatives through which Historic England aim to support the heritage sector in engaging with natural capital and ecosystem services methodologies in order to protect the historic environment within future environmental policy. The case studies will primarily address how the historic environment might be better included, but will also inform the development of the guidance for the heritage sector on how to engage with natural capital and ecosystem services approaches. The development of the guidance itself will be the subject of a separate project. The original project proposal is in annex 1.

Methodological Aims

By looking in detail at the heritage associated with the historic landscape character of the Blackdown Hills, this pilot study meets the generic aims of the project, which are to:

- Identify the heritage alongside the natural capital associated with these environments. To what extent do the two coincide? What is the relationship between the two?
- Set out in the language of ecosystem services what public and environmental goods and services the heritage assets provide (including 'provisioning', 'supporting', 'regulatory' and 'cultural services')
- Identify other values that fall outside the ecosystem services framework that can be ascribed to the heritage assets.
- In doing the above develop a methodology that can be used to ensure that heritage can be reflected in a way that is compatible with natural capital and ecosystem services approaches.
- Provide the heritage and natural environment sectors with case study examples of how this might work for different environmental contexts.

In addition to the above, aims specific to the Blackdown Hills AONB Case Study are to:

- Identify what natural capital/ecosystem service value is associated with the antiquity and/or intactness of specific Historic Landscape Character types.
- Identify if this natural capital/ecosystem service value is enhanced by the presence of heritage asset types that are integral to or commonly associated with field boundaries or particular HLC types.

Management Aims

- Link and feed into on work being done through the Local Nature Partnerships (Devon & Somerset) and other strategic development partnerships (such as the Greater Exeter Strategic Plan https://www.gesp.org.uk/) who are undertaking Natural Capital assessments with a view to better informing strategic land use planning
- Link and feed into on-going consultations regarding the future shape of support schemes for agriculture and the rural economy, specifically around the benefits of managing natural, historic and cultural heritage assets across landscapes that deliver a full range of public and environmental goods and services

Outreach/ Dissemination Aims

- Understanding of natural capital/ ecosystem services within the heritage sector
- Understanding the integral value of the historic environment to the natural environment sector
- Work with the Blackdown Hills Farming & Woodland Group (Countryside Stewardship facilitation fund) to ground truth and engage the farming community in the process
- Use the outputs of the case study to link to underpin delivery of policies in the Blackdown Hills AONB Management Plan and other plans, projects and strategies for example trees outside woods and boundary initiatives
- Share the outputs with land use planners and other decision makers, for example to aid decision making around developments such as solar arrays

Hypotheses to test

- When comparing and contrasting discrete landscapes (with networks of field boundaries and linear landscape features), some are richer in natural capital than others and provide a wider range and more benefit to society (ecosystem services)
- The natural capital value of some landscapes (with networks of field boundaries and linear landscape features) is currently undervalued. Integrating heritage assets into natural capital assessments for some landscapes increases their natural capital value.

Background

Why do we need this study?

- To better articulate the natural capital, ecosystem services and other related work- to capture the richness of the protected landscape
- Networks of field boundaries are one of the special qualities underpinning the national designation as an AONB and a robust evidence base is important
- Boundaries are understudied and undervalued
- Link to sense of place and start a process of deeper engagement with local communities, helping them celebrate their cultural heritage and discover their rich historic and biological heritage
- Align the 25 Year Environment Plan with the AONB plans and strategies

Context:

- There is a government review of protected landscapes currently underway, led by an independent panel chaired by Julian Glover.
- Natural England are undertaking work linked to Biodiversity 2020 outcome 1C to better articulate the natural capital and ecosystem services provided by protected landscapes
- Brexit and CAP reform and the changes that agricultural policy could have on a marginal farming area such as the Blackdown Hills AONB. CAP reform payments are likely to be framed in terms of public goods and services, underpinned by a natural capital approach.
- Funding bodies are increasingly requesting robust evidence and better understanding the natural capital and public goods and services provided by protected landscapes is important
- There are links and synergy across different types of heritage, for example priority species that are associated with a network of hedgerows such as brown hairstreak butterflies and horseshoe bats

The project

Historic England commissioned the Blackdown Hills Project Team to undertake a pilot study to explore how the heritage sector might more fruitfully engage with natural capital and ecosystem services approaches, by looking in detail at the heritage associated with particular environmental contexts. The aim of the overall project is to explore how the historic environment might be better included in these approaches contribute to developing guidelines.

The Blackdown Hills AONB Case Study explores the Historic Landscape Character (HLC) of the AONB, looking at the pattern of fields, boundaries and linear landscape features of this 'everyday' but extremely special farmed and managed landscape. It considers the heritage assets that are integral to these patterns (e.g. prehistoric enclosures; parish boundaries) and those that are regularly associated with them (e.g. orchards within former extractive pits; veteran hedgerow trees and catch-meadow irrigation systems – Fig.13). The case study looks at the landscape as a provider of different and varied environmental services.

The AONB Partnership intends to investigate the application of natural capital and ecosystem services within the AONB, in relation to the various landscape management initiatives and are very enthusiastic about the potential to link this with appropriate appraisal of associated heritage value.

Project Team

Lead/ partners:

- The lead partner and applicant is the Blackdown Hills Area AONB.
- Partners include Historic England, Devon County Council, Somerset County Council/ South West Heritage Trust, Blackdown Hills Hedge Association, Blackdown Hills Rough Grazing Association, Historic England, the Blackdown Hills Farming & Woodland Group (established via the Countryside Stewardship Facilitation fund).

The choice of hand-picked staff (listed below with initials in brackets[3]) is based on the skills/experience required to deliver this project:

AONB

- Tim Youngs (TY) –AONB Manager Blackdown Hills AONB - over 20 years' experience in the heritage sector
- Lisa Turner (LT)- AONB Planning Officer- over 20 years' experience of local government, planning & environment

Devon County Council

- Bill Horner (BH) – Devon County Archaeologist (Devon County Council)- over 30 years' experience in the historic environment sector
- HER staff (Devon HER)- a small team of experienced staff

Experts

- Andy Bell (AB) – North Devon Biosphere Manager- over 30 years' experience in heritage, forestry and ecosystem service/ natural capital development
- Local Records Centres- (LRC) –Devon & Somerset- experienced staff
- South West Heritage Trust- Somerset HER and Historic Environment advice- a small team of experienced staff and technical input into teasing out the heritage value associated with field boundaries

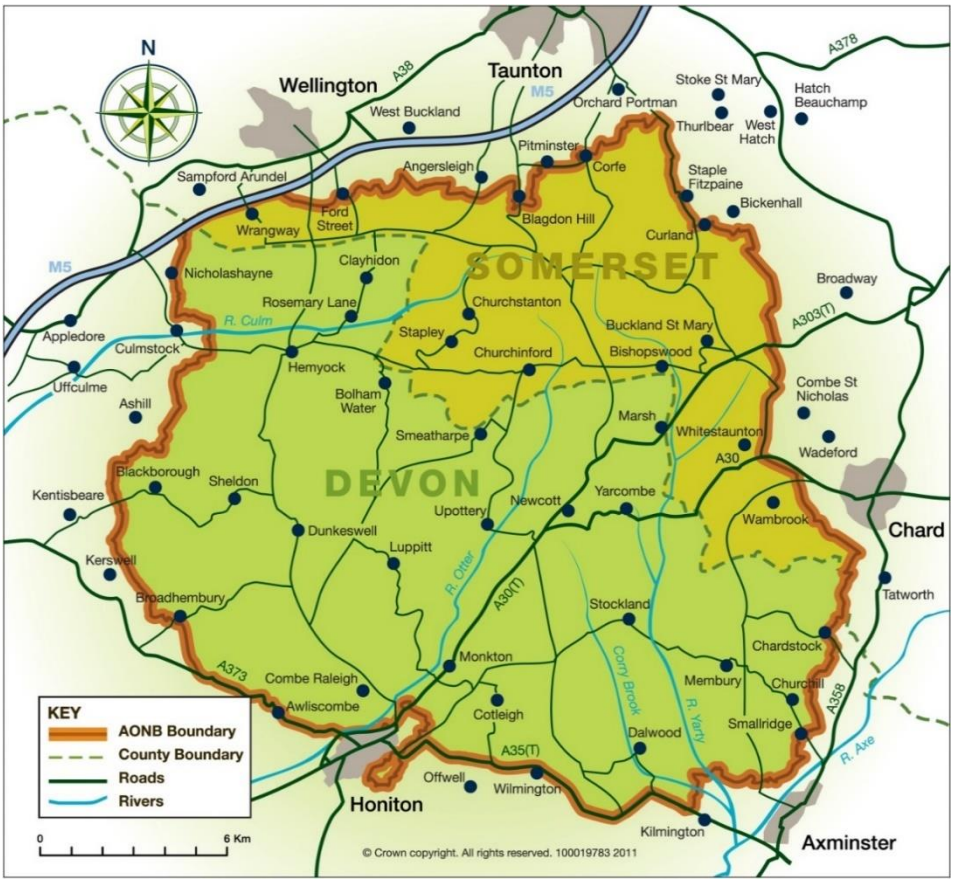
Tim Youngs and Andy Bell have undertaken quality assurance for the project.

Description of the Blackdown Hills area, the AONB Partnership and key stakeholders

The Blackdown Hills Area of Outstanding Natural Beauty (AONB) – see overview map below has a suite of special qualities that together make it unique and outstanding, underpinning its designation as a nationally important protected landscape (designated in 1991). The Blackdown Hills AONB Case Study explores the Historic Landscape Character (HLC) of the AONB, looking at the pattern of fields, boundaries and linear landscape features of this 'everyday' but extremely special farmed and managed landscape. It considers the heritage assets that are integral to these patterns (e.g. prehistoric enclosures; parish boundaries) and those that are regularly associated with them (e.g. orchards within former extractive pits; veteran hedgerow trees and catch-meadow irrigation systems – Figure 13). The case study looks at the landscape as a provider of different and varied environmental services.

[3] Note that the team member's initials are quoted throughout this proposal paper

Figure 1: Map of the Blackdown Hills AONB



The Resource

The Blackdown Hills straddle the county boundary between Devon and Somerset. They are a distinctive, diverse rural landscape stretching from the prominent scarp above the M5 in the north to Honiton and Axminster in the south, and from Chard in the east to Culmstock in the west. Ranging from around 50 to 310 metres above sea level, the area is characterised by a sense of relative remoteness and tranquillity. From the dramatic, steep, wooded north-facing scarp, the area dips gently southwards as a flat-topped plateau deeply dissected by valleys. This is the northern part of the East Devon Plateau – one of the finest, most extensive in Britain. The tops are open and windswept; in the valleys villages and hamlets nestle among ancient patterns of small, enclosed fields and a maze of winding lanes (Figure 2) lined with high hedgebanks. The steep valleys support a patchwork of woodland and heath, nationally and regionally important habitats which support a wealth of charismatic and priority species and interesting plant communities.

It is an isolated, unspoilt rural area and remains relatively undisturbed by modern development and so ancient landscape features, special habitats, historical and archaeological remains have survived intact. The traditional pattern of villages, hamlets, paths and roads remains largely unchanged and there is an identifiable and characteristic vernacular, pastoral landscape. There is a diversity of landscape patterns and pictures. The visual quality of the landscape is high and is derived from the complex patterns and mosaics of landscapes. Although the scenery is immensely

varied, particular features are repeated. Ancient, species-rich hedgerows delineate the fields and define the character of the landscape, enclosing narrow twisting lanes. There are long views over field-patterned landscapes. The high plateau is dissected by steep valleys, supporting a patchwork of woodland and heath, and fine avenues of beech along the ridge. The history of medieval and parliamentary enclosures has resulted in an individual, patchwork landscape of small fields in the valleys and larger fields with straight hedges on the plateau.

The landscapes of the Blackdown Hills have been created by the interplay of people and the land over the centuries. There are significant concentrations of early prehistoric evidence: since prehistoric times those who lived here have left evidence of their activities that can still been seen today; tools from the Neolithic, Bronze Age barrows on the ridge tops and spectacular Iron Age hillforts that dominate the surrounding lowlands. The Romans left their villas and extensive evidence of iron working. The pattern of fields medieval, and in places prehistoric, in its origins. The ancient woodlands and the Royal hunting forest of Neroche are also survivals of the medieval period. Parliamentary enclosure of the commons, culminating in the 19th century, created the regular fields and straight roads of the plateau tops. Three airfields on the plateau played important roles in World War Two. Since that time there has been a substantial loss of hedgerows and orchards to meet the needs of modern agriculture; simplifying parts of the landscape and masking their early origins.

The biodiversity of the Blackdown Hills is one of its greatest assets. The unique geology and landscape patterns of the area have combined with traditional management to support a rich diversity of habitats and species. This immense variety, with patches of valuable habitat scattered throughout the landscape, is notable; these include flower-rich meadows, ancient hedgerows, springline mire, wet woodland, heathland, calcareous grassland, ancient woodland, fen and bog. Bees, butterflies, birds, bats and many other animals, some nationally scarce, thrive in the Blackdown Hills, feeding and breeding in the habitats the area provides. These habitats and wildlife bring colour, texture, sound and life to the landscape, epitomising the mental picture of the ‘English Countryside’, which has, in reality, long since disappeared elsewhere.

The natural capital value of these features has not been measured and indeed there is little information on the extent and condition of the resource overall. There are some useful background reports that can be drawn upon, for example on the potential woodfuel resource from hedges in the Blackdown Hills. For the historic environment a baseline desk-based survey of the area was undertaken prior to designation as an AONB. Historic Landscape Characterisation was completed in 2005 and a National Mapping Programme project was completed in early 2018.

The AONB Partnership intends to investigate the application of natural capital and ecosystem services within the AONB, in relation to the various landscape management initiatives outlined under Aims (below), but are very enthusiastic about the potential to link this with appropriate appraisal of associated heritage value.

Figure 2: An historic road sign typical of the area along the county boundary in study area 1 and 2

Table 1: Key natural capital assets (stock) of the Blackdown Hills AONB and the associated ecosystem services (flow)

This table identifies the natural capital stock of the Blackdown Hills AONB. The stock forms an interconnected network of heritage assets across the area and together these form the special qualities that underpin the AONB national landscape designation.

Key natural capital assets of the Blackdown Hills- link to special qualities in the AONB Management Plan	**Provisioning** *Food production, fresh water, fuel wood*	**Regulating** *Climate regulation, disease control, flood control, erosion control, water purification*	**Cultural** *Spiritual aims, recreation, aesthetic, inspirational, educational, communal, tranquillity*	**Supporting** *Soil formation, photosynthesis, primary production, nutrient cycling, water cycling, pollinators, biodiversity*
Ancient species rich hedges and small copses creating a connected landscape	**Fuel wood, shelter for livestock, for the production of livestock (e.g. meat)**	**Flood control/ erosion control on slopes**	**Part of the historic landscape fabric (e.g. parish boundaries), tranquillity**	**photosynthesis, pollinators, biodiversity**
Wood pasture, deer parks, veteran trees	Livestock (e.g. meat), shelter for livestock	Carbon store, Flood control/ erosion control on slopes	Part of the historic landscape fabric	nutrient cycling, water cycling, biodiversity
Heathland	Livestock (e.g. meat), Material for bedding	Carbon store, Flood control/ erosion control on slopes	Part of the historic landscape fabric, recreation	nutrient cycling, water cycling, biodiversity
Ancient and PAWS woodland	Fuel wood, shelter for livestock	Carbon store, Flood control/ erosion control on slopes	Part of the historic landscape fabric	nutrient cycling, water cycling, biodiversity
Species rich grasslands	Livestock (food and other products)	Carbon store, Flood control/ erosion control on slopes	Part of the historic landscape fabric	Soil formation, photosynthesis, primary production, nutrient cycling, water cycling, biodiversity
Historic and archaeological remains	Where associated with land management then all the above apply	Where associated with land management then all the above apply	Spiritual aims, recreation, aesthetic, inspirational, educational, communal	Where associated with land management then all the above apply
Headwaters of 4 major river systems with spring line mires and fens	Fresh water	Flood control, erosion control, water purification, peat soils in mires store carbon	recreation, aesthetic, inspirational, educational	Biodiversity, nutrient cycling, water cycling

Methodology

Literature review

Using these papers listed below, our methodology was developed. We are liaised with the CCRI team early on and had an exchange visit with them to the Severn Vale area that is the focus of one of the CCRI studies

Risk & Policy Analysis (RPA) and LUC report, March 2018 *Environmental Capital Accounting and the Historic Environment*
High Weald AONB reports http://www.highweald.org/downloads/publications/uk-landscape-research-reports.html
Fairclough, G. and Aldred, A. 2013. *Somerset and Exmoor Historic Landscape Character.*
http://archaeologydataservice.ac.uk/archives/view/somersetexmoor_hlc_2013/
https://www.somersetheritage.org.uk/downloads/publications/SomHLCguide.pdf
Hegarty, C. Knight, S. and Sims, R. 2016. *The East and Mid Devon River Catchments National Mapping Programme Survey.*
https://research.historicengland.org.uk/Report.aspx?i=15681
Hegarty, C. Knight, S. and Sims, R. 2017. *The Blackdown Hills AONB and East Devon River Catchments National Mapping Programme Survey.*
https://historicengland.org.uk/images-books/publications/blackdown-hills-aonb-east-devon-river-catchments-nmp-survey/
Turner, S.C. 2005. *Devon Historic Landscape Characterisation: Phase 1 Report.*
https://new.devon.gov.uk/historicenvironment/the-devon-historic-environment-record/historic-landscape-characterisation/
Turner, S.C. 2007. *Ancient Country: The Historic Character of Rural Devon.*
Weddell, P.J. and Simpson, S.J. 1993. *Blackdown Hills AONB/ESA Preliminary Archaeological Survey Summary Report* (Exeter Museums Archaeological Field Unit Report 93.24).

Principles

1. The AONB as a protected landscape wasn't scored in this study.
2. This study focusses on the '*Ancient species rich hedges and small copses creating a connected landscape'* natural capital stock/ 'special quality' (see table 1 above), firstly by identifying all its component natural capital parts and its associations

3. Tests and measures are then applied to attempt to quantify the full value of the stock and flows, by:
   - identifying the extent of total stock
   - identifying and assess the impact of historic assets on natural capital stock
   - linking the historic environment stock to the stock of natural environment and to measure *how* these links affect the total stock
   - identifying and assess the flows of services and final benefits (this may be possible where historic assets are more directly associated with land use and land use management)
   - incorporating cultural services

4. Drawing the threads together:
   - *How* the condition of stock (and change in condition of stock) influences the extent of services that flow from the stock
   - What are the flows of services and the final benefits

- *How* the historic environment could influence the condition of the natural environment stock.
- Identify a premium associated with the historic environment that would add to the final benefits delivered [*added value*]
- Where no premium is identified, the value of the historic environment would be related to how it has *influenced* delivery of the final benefits

What was measured directly and what proxies were used

Referring to an extract of table 1- see below:

- those highlighted in red text are those that will be directly measured through this methodology (in some cases using anecdotal information for example from landowners).
- those in blue text would need to be measured using proxies but are not the subject of this study

Key natural capital assets of the Blackdown Hills- link to special qualities in the AONB Management Plan	**Provisioning** *Food production, fresh water, fuel wood*	**Regulating** *Climate regulation, disease control, flood control, erosion control, water purification*	**Cultural** *Spiritual aims, recreation, aesthetic, inspirational, educational, communal, tranquillity*	**Supporting** *Soil formation, photosynthesis, primary production, nutrient cycling, water cycling, pollinators, biodiversity*
Ancient species rich hedges and small copses creating a connected landscape	**Fuel wood, shelter for livestock, for the production of livestock (e.g. meat)**	**Flood control/ erosion control on slopes**	**Part of the historic landscape fabric (e.g. parish boundaries), tranquillity**	**photosynthesis, pollinators, biodiversity**

Choice of study areas

A methodology was designed in order to choose study areas (annex 2) that created a long-list (annex 3) of potential study sites and then reduced this down to the four study areas that are the focus for this project (annex 4).

There was an attempt in the study areas to include Scheduled Monuments (either integral to an HLC type or of linear character) as well as 'everyday' landscape incorporating a range of HLC types, a range of heritage assets recorded on the Devon and Somerset HERs and a range of natural heritage features including designated and non-designated wildlife sites.

Methodology applied to the study areas

A methodology was developed (see annex 5) and a summary is shown below:

Part	Description	Sub-part	Detail	Scoring? (Y/N)
1	**Type, extent and condition of total stock**	a	Collate records	N
		b	Type, extent & condition of boundaries	N
		c	Ground-truthing	N
2	**Assigning a value to heritage and quantifying associations**	a	Heritage base score	Y
		b	Additional score based on condition & local metrics	Y
		c	Co-incidence between heritage types	Y
3	**Function/ economics of the boundaries**	a	Biomass, flood alleviation and access/ recreation benefits	Y
		b	Questionnaire	N
4	**Natural capital stock to ecosystem service flow**			Y
5	**Drawing the threads together**		Total scores	Y
6	**Testing/ verifying and applying the results**		See results section	N

1. Type, extent and condition of total stock

Type, extent and condition of total stock (overlaying historic/ cultural and biological data that is associated with field boundaries & linear features (to give us our total natural capital stock).

a. Collate records

Following **part 1a** of the methodology, in all four study areas, an historic environment review was undertaken to assess all recorded (and publicly accessible) records of heritage assets in the Devon and Somerset historic environment records that are associated with field boundaries and associated linear features- see tables in annex 6 a,b,c,d.

Column headings in annex 6:

LCA	*HLC (modern)*	*HER sites historic features in HLC assoc. with linear features (HER No)*	*Summary of biological records assoc. with field boundaries in HLC*	*Other HER sites/historic features in HLC (HER No.)*	*Time Depth HER & HLC date range*

In addition, for study areas 1 and 2, a detailed discussion of Landscape Character Areas (LCAs), Historic Landscape Characters (HLCs) and HER records/other historical features can be found in annex 8.

Biological records were obtained from the Local Records Centres for all four study squares. For study area 1 and 2, these records were filtered by a Records Centre Ecologist (see annex 6 tables for study area 1 and 2, fourth column), using professional ecological knowledge to sift the results to identify those species and habitats that could be associated with field boundaries and linear features, for example by identifying mobile species that were recorded in the area such as horseshoe bats, or ancient woodland flora recorded in an area with no woodland, hence an association to hedge banks can be assumed.

b. Mapping the type, extent and condition of field boundaries & associated linear features

In two of the four study areas (following **part 1b** of the methodology), a GIS mapping study was undertaken to assess the type, extent and condition of all field boundaries and associated linear features.

Ordnance Survey Mastermap was used as a basis to define where field boundaries are currently located, whether this be a fence, hedge, wall or bank. In the two study squares, some pervious mapping of land use and boundary locations had been done previously for a bat project, that saved GIS time. **There was not time/ budget to undertake the GIS work across all 4 study squares, 2 of which had little or no current mapped information on field boundaries and land use.**

The Integrated Habitat System (IHS[4]) methodology was used to define 'form' and 'management' of field boundaries from API, as it was considered to capture all the attributes that we needed to collect in order to define the type, extent and condition of field boundary habitat. The IHS methodology was adopted as it was believed to have the best range of attributes that were deemed important for the analysis and was a recognised methodology.

Lidar API was investigated to try and determine whether a hedge was located on a hedgebank or not (vertical differences), but this proved too time consuming to complete for the mapping of boundaries process, however Lidar was used for the ecosystem service calculations (see part 3a).
Data on existing agri-environment scheme options within the study squares was obtained and the Farm Environment Plan (FEP) methodology (as used for Higher Level Stewardship agri-environment schemes) was considered as a basis for assessing field boundaries, but was considered too reliant on ground-truthing and we needed a methodology that could be done fairly rapidly via aerial photography (for each of the two, four square kilometre study areas, c5 days of GIS mapping work was required).

c. Ground truthing

Limited ground truthing of the mapping was undertaken in study area 1 &2 - as per **part 1c** of the methodology. This helped the GIS operator to fine-tune their aerial photography assessments of the type, extent and condition of field boundary features.

[4] http://www.somerc.com/products-services/integrated-habitat-system-ihs/

2. Assigning a value to heritage and quantifying associations

Using the information above, **part 2** of the methodology was devised (with quantitative scoring and more qualitative measures) - that probed the following:

- Link the historic environment to the stock of natural environment and to measure how these links affect the total stock
- Identify and measure how the historic environment could influence the condition of the natural environment stock
- Measure how the condition of stock (and change in condition of stock) influences the extent of services that flow from the stock
- Identify a premium associated with the historic environment that would add to the final benefits that are delivered [added value]. Where no premium is identified, the value of the historic environment would be related to how it has influenced delivery of the final benefits

When scoring part 2, scores were averaged across each HLC type, as there could be multiple polygons each of one HLC type in a study square and to score each of these polygons separately would have become overly complicated.

a. Heritage Base Score

Following **part 2a** of the methodology, an assessment was made (for each HLC type within a study square) by combining the following two elements:

1. the degree to which the historic environment interest identified matched the HLC type and/ or
2. the association between HER data obtained and field boundaries in the HLC area.

b. Additional score based on condition & local metrics

Part 2b is split into two elements:

1. *Condition of field boundaries:*

The table uses data from the mapping in part 1b of the methodology and records the number of lengths of field boundary that occur in each HLC type against the form and management types.

The methodology in part 2b was designed as an additional score using condition and locally derived metrics (see annex 7), through assessing field boundary condition data condition and also to quantify the sense of place.

It is assumed for the analysis of condition (within each HLC type) that hedged boundaries that have an *intact* form plus *with standards* (trees) plus some *overgrown* and *uncut* hedges management (as opposed to flailed hedges) are in a better condition than those that have a *defunct* form, *without standards* and a predominance of *cut* hedges.

The methodology for assessing condition of field boundaries was based on three variables (see below and attributes in annex 7) with scores averaged (hence two decimal places) and standard deviation calculated:

- 'Treedness' (i.e. how many hedgerow trees there are per length of field boundary)
- Thickness (of field boundary)
- General management condition (i.e. cut, uncut, outgrown)

2. *Locally devised metrics:*

The **second part of 2b** was to ascertain the 'value added' by introducing a local metric that involves talking to local historians about the historic and cultural heritage detail in two of the four study squares that might not be apparent in readily available datasets such as the HER. In essence, it tests the value added versus resource required to obtain the information and goes beyond simply remote sensing and desk-based analysis.

This local research has mapped the perimeters of certain medieval farm holdings (Figure 11). These still represent the boundaries of the modern farming unit and are more actively maintained, for practical stock management and for cultural reasons, than many of the boundaries on the interior of the holdings (Figure 12). This therefore provides an enhanced scoring for both documented time-depth and cultural significance.

c. Co-incidence between heritage types

For **Part 2c**, the scoring per HLC comprised two components:

1. Co-incidence of historic, cultural and biological records: Applying the professional judgement of the historic landscape and biological records centre Project Officers, the raw data for the historic and biological environment were filtered to create the following:

   Columns 3 & 5 in the tables in annex 6 outlines:
   - HER sites *historic* features in HLC associated with linear features
   - Other HER sites/historic features in HLC not associated with linear features are also listed for context
   - Time depth (HER and HLC date range) was also considered (see column in table)

   Column 4 in the tables in annex 6 outlines:
   - Summary of *biological* records (SERC/DBRC) associated with linear features in HLC

2. Using GIS, proximity/ no proximity of field boundaries to priority habitat (e.g. ancient woodland, species rich grassland).

3. Function/ economics of the boundaries

Part 3 of the methodology, study area 1 and 2 only. The methodology and results are outlined below. In summary:

- The function/ economics of boundaries were investigated by taking two examples of measurable natural capital stock to ecosystem service flow- biomass/ carbon stock (regulating service) and flood risk alleviation (regulating service).
- In addition, access and recreation benefits were tested (cultural service).
- For biomass, a methodology developed for the North Devon Pioneer was deployed that uses Lidar to calculate biomass volume in hedges and hedgerow trees and then converts this to total carbon stock.

- For flood alleviation, Lidar and slope data were used along with an assessment of aspect of hedge boundary in relation to slope i.e. was the hedge boundary aligned with contours along a slope or running straight down a slope; a the flood alleviation function in such cases is different, with a hedge boundary across a slope providing a higher potential flood alleviation (creating more complex flow pathways)/ storage function (upstream of the hedge). It was not possible using Lidar to accurately record the presence of ditches along hedged boundaries, that might further store and attenuate flows.

More detail on these methodologies is outlined below.

a. Biomass, flood alleviation and access/ recreation

Biomass (carbon stored in linear features)

References are listed in annex 13.

2016 1 metre resolution composite LiDAR DTM and DSM was sourced from Environment Agency

Polyline data derived from Mastermap and processed by the Devon Biodiversity Records

Centre for a range of hedge properties. Aerial imagery for confirmation.

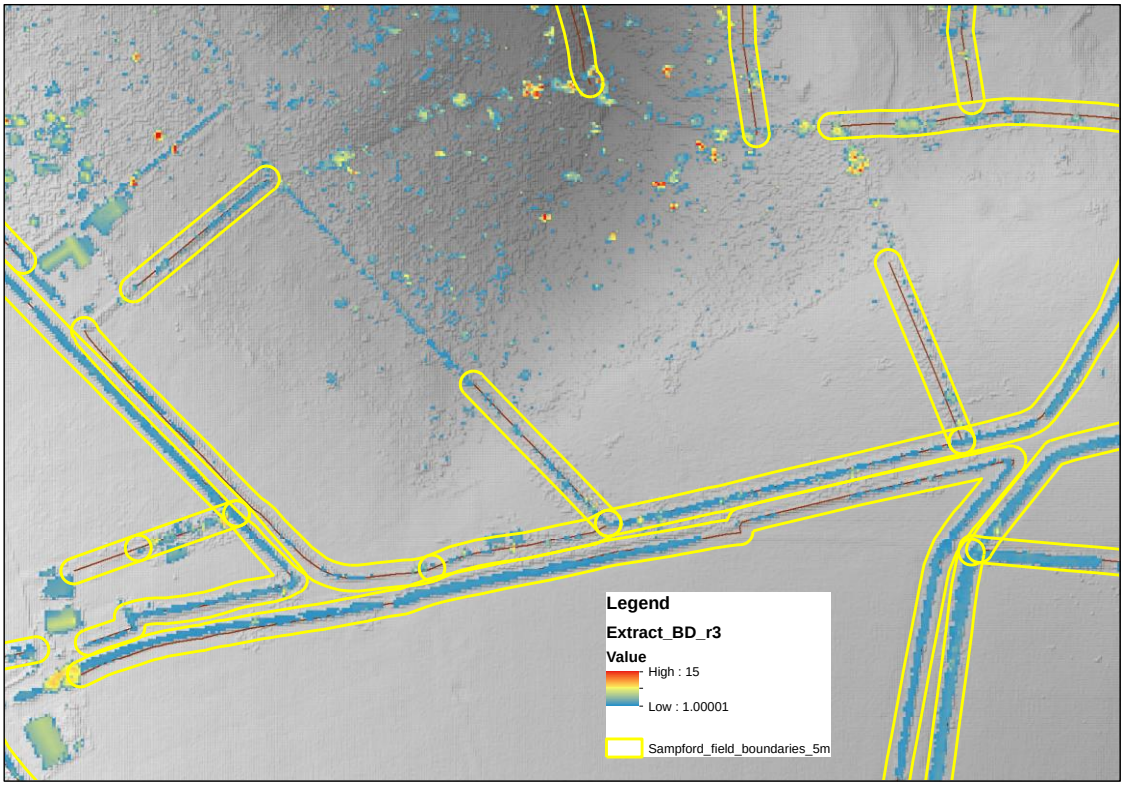
Method for Carbon Stocks:

2 individual merged layers (Surface and terrain) covering the study were created. A residual topographic feature layer was created by subtracting the DTM from the DSM.

The residual layer was filtered for outlier values. Since the hedgerow Lidar Raster did not match the Mastermap exactly, a 5 metre buffer was created around the polyline.

A fresh raster was created by extracting the intersection of the buffer from the residual layer of the raster. Since this “buffer raster” would also contain a significant amount of non-hedge land, the raster was cleaned again by removing all pixels with a value less than 1 m and assigning them null values. This has the effect of removing the flat field pixels and low

anomalous features. This removes the distortion of a lot of flat land within the buffer polygons that reduces the mean above ground volume of the hedge.



Zonal statistical analysis was undertaken from the clean raster with the buffer polygons, which yields the maximum height, mean height, median height and standard deviations.

Using the polyline files provided by Devon Wildlife Trust (DWT), the above ground total canopy volume per unit length of the hedge is calculated by using the assigned hedge width and the mean height from the LiDAR analysis. Using a comparison with previous work (Bell, 2014), the allocation of classes of hedge types identified by Jenks method was tested against the north Devon data set. This was a less than satisfactory match largely due to the extra widths or effective crown diameters provided in the DWT data.

Most allometric equations for biomass require diameter at breast height (DBH) to provide a most accurate estimate. Tree allometry equations were investigated, as documented in "Allometry and growth of eight tree taxa in United Kingdom woodlands" by Evans et al. However the growth forms in hedgerows may not meet match those used in the data for this particular study. The Organic Research Centre publication on carbon stock and flows in hedges models carbon flows in a hedgerow on managed and unmanaged systems was also investigated as a source for stock estimation (above and below ground). The hedges analysed in this article do not specifically include hedgerow trees, but consider a 15 year coppice rotation. These figures have been applied as a conservative estimate of carbon stock and flows;

Unmanaged hedgerows (where the crown diameter is greater than 4 metres) Managed hedgerows (where crown diameter is less than 4 metres)

Table 7. Estimated carbon stores and flows within and out of the system for hazel under both managed and unmanaged scenarios.

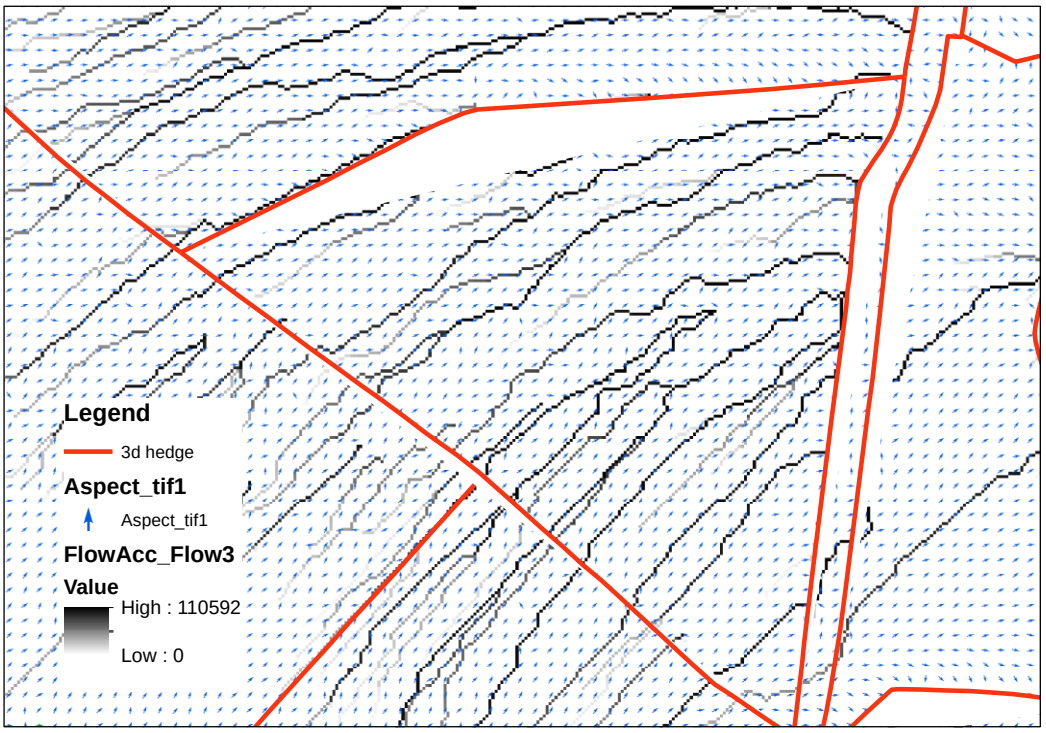
	Uncoppiced hedge	1 year after coppicing	Uncoppiced hedge	1 year after coppicing
Carbon stocks	t C ha^{-1}	t C ha^{-1}	t C km^{-1}	t C km^{-1}
Above-ground	45.08	34.35	18.03	2.52
Below-ground	15.03	13.52	6.01	5.41
SOC	85.36	88.80	68.29	71.04
Total stocks	145.46	136.67	92.33	78.97
Carbon flows within	t C ha^{-1} yr^{-1}	t C ha^{-1} yr^{-1}	t C km^{-1} yr^{-1}	t C km^{-1} yr^{-1}
Leaf litter	20.85	8.98	0.83	0.36
Total flows within	20.85	8.98	0.83	0.36
Carbon flows out	t C ha^{-1} yr^{-1}	t C ha^{-1} yr^{-1}	t C km^{-1} yr^{-1}	t C km^{-1} yr^{-1}
Woodchip	0	45.08	0	18.03
Total flows out	0	45.08	0	18.03

(Source: Carbon sequestration of hedges managed for woodfuel; Crossland, 2015)

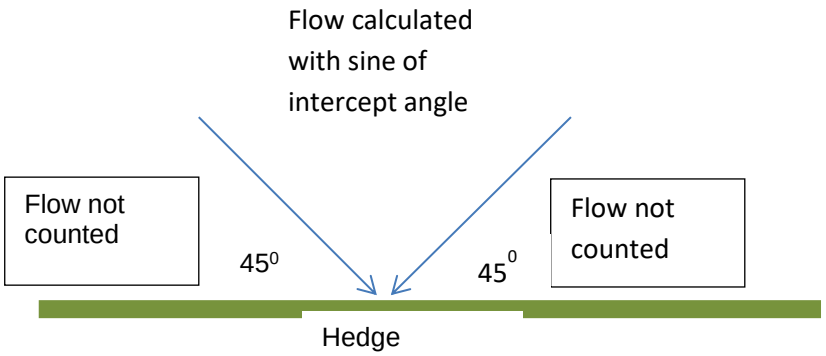
The 2017 UK Government conversion factors are applied to present the data in TCO2e and T C stored

Flood Alleviation: Method for surface water flow interception services

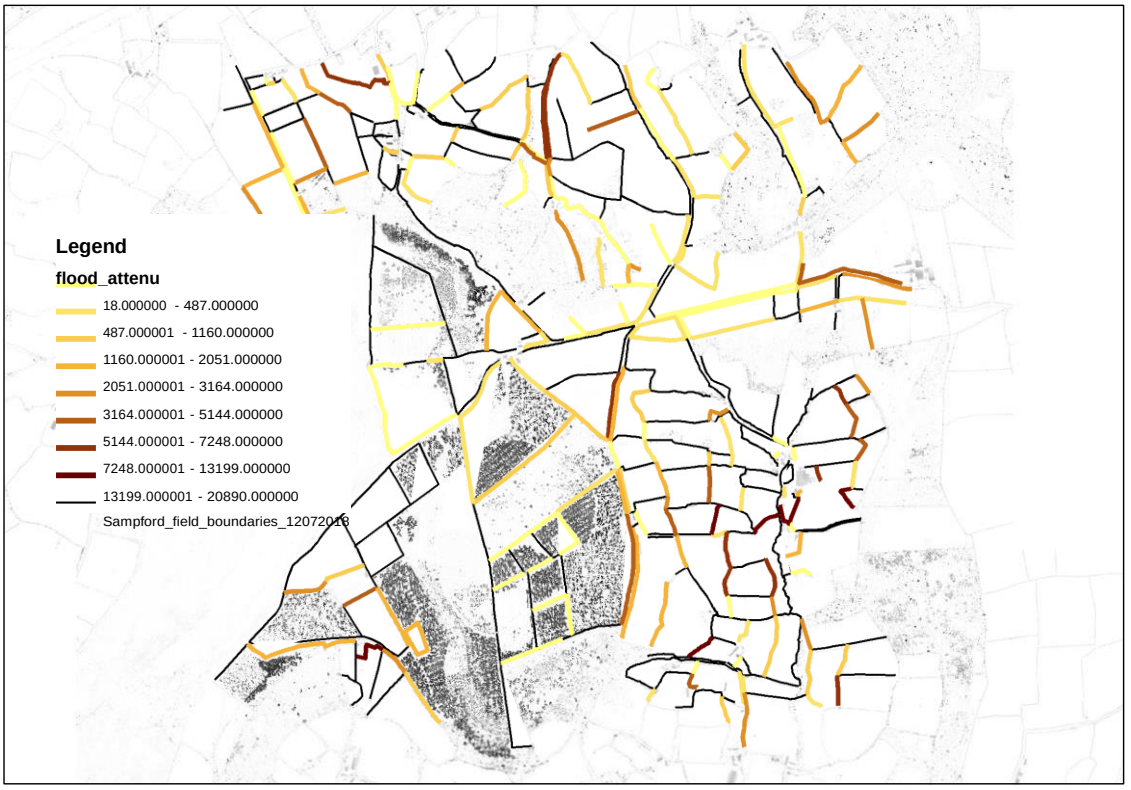
Using the same LiDAR data from the Digital Elevation model, aspect and accumulated flow rasters were generated. A sample of the resulting surface modelling is seen below.



To account for any true surface water interception, only the hedges where intersecting angle between the mean flow direction (taken from the buffer area around the hedge to avoid local distortion of data) and the mean bearing of the hedge was greater than 45 degrees and less than 135 degrees were scored. (This discounts the hedges where the flow is parallel to the hedge and where the hedge is unlikely to have any attenuation effect.)



The maximum accumulated flow (all the area of catchment reaching that point in the bank) and the sine of the angle were used to indicate the total surface water interception function of the hedge, as show in the map below.



Some inaccuracies can be expected due to the hedge-bank polylines often were combined sections with different aspects.

Public access and recreation benefits

The Outdoor Recreation Valuation Tool (ORVal) was traced across the bridleway that is next to a boundary feature Scheduled Monument 0380 in the Sampford Square (study area 2) in order to make an assessment of public recreation values.

No ORVal records were present for the Sampford area; i.e according to the MENE database (econometric model of recreational demand derived from MENE data), the area was not used to a statistically significant level.

There are 'health warnings' associated with this data, for example there is no causal link evidenced to say that the hedge is the reason for the walk.

b. Questionnaire

A questionnaire (a short series of questions) was sent to sample of the Blackdown Hills Farming and Woodland Group Facilitation Farmers who farm in or close to the study squares. The Blackdown Hills Woodland Association and the Blackdown Hills Hedgerow Association were also questioned. The questions were as follows:

1 List the functional (agricultural and amenity value) of the field boundaries and linear landscape features

2 What is their cultural and intrinsic value?

3 Costs:

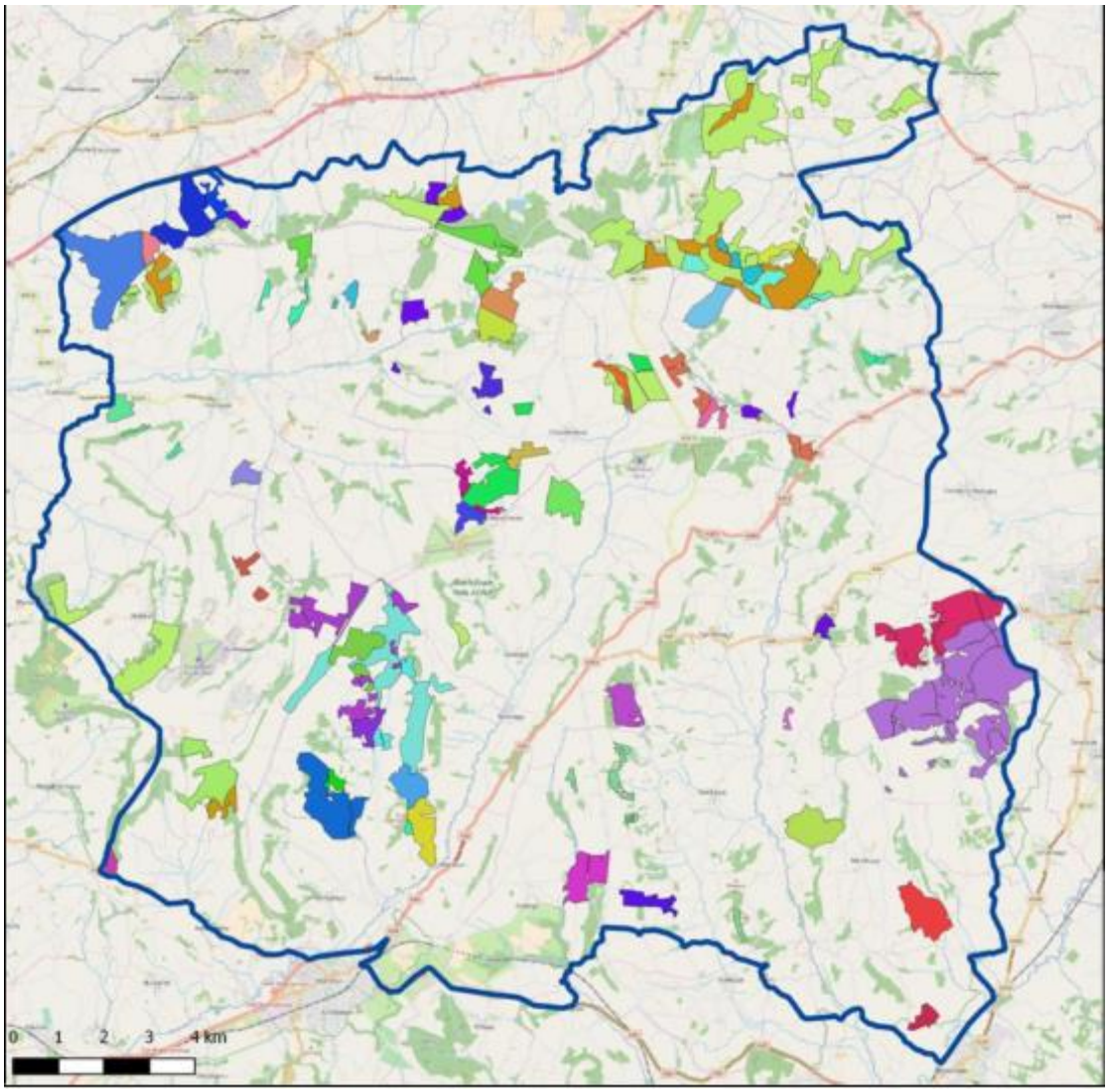
- What is the approx. cost of managing your field boundaries? (assumed to be hedges)- e.g. per kilometre or metre.
- How much of this cost (e.g a %) is covered by existing agri-environment/ Basic Payment Scheme grant aid?
- What would happen if there was less support in the future for managing your field boundaries? and how is this influenced between types of field boundary?

4 Please summarise the importance of boundaries to your farming management, the farm business and the value of the farm holding

The outputs were used as evidence of cultural ecosystem service benefits- see table 1

Figure 3: Green Lane in study area 1

Map 2: showing Facilitation Group members in the Blackdown Hills AONB



4. Natural Capital Stock to Ecosystem Service Flow

Study areas 1 and 2 only.

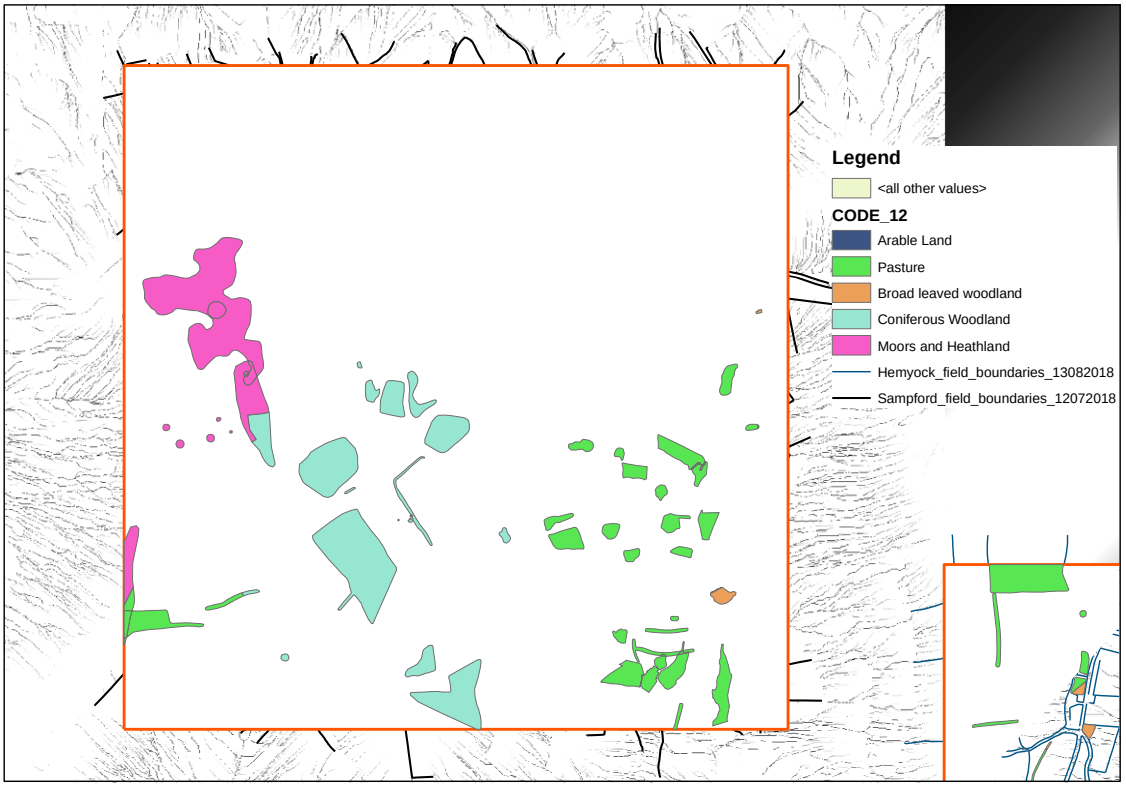
The biomass, flood alleviation and access/ recreation investigation described above formed part of the assessment of natural capital stock to ecosystem service flow analysis.

Annex 9 outlines a Natural Capital Account for the Blackdown Hills AONB. The HER assets in the study areas were assessed using a land cover tool and were fed into the national ecosystem assessment. However, this did not distinguish between HER associated with field boundaries and HER across the whole area.

Area based features
The polygon data sets from the HER for study areas 1 and 2 were used. The polygons relating to fields or land parcels were inspected for the constituent land cover. Since there was no data available other than aerial imagery, the Corine 2012 (Cole et al, 2015) dataset has been used. Using the intersect tool in ArcGIS, each HER polygon was split into land cover types.

The National Ecosystem Assessment was used for all the land in the sample squares. The second results are for the ecosystem services flowing from the land parcels in the HER database, but source data for values is still the same. However, using such broad descriptions (pasture, arable, deciduous woodland, conifer woodland and moor/heathland) does not make it possible to differentiate the archaeological features from the surrounding land-covers.

Therefore any comparative analysis of the natural capital from ecosystem service from the features and non-feature land is not possible given the data available. However, a more detailed land-cover and condition analysis could be undertaken using more detailed LiDAR coverage (or use Copernicus Sentinel 1 SAR data).



The land-cover types have then been allocated ecosystem service values as used in the North Devon Biosphere Ecosystem Service Assessment. These figures were derived from the National Ecosystem Assessment 2011 (http://uknea.unep-wcmc.org/Resources/tabid/82/Default.aspx) and have been peer reviewed.

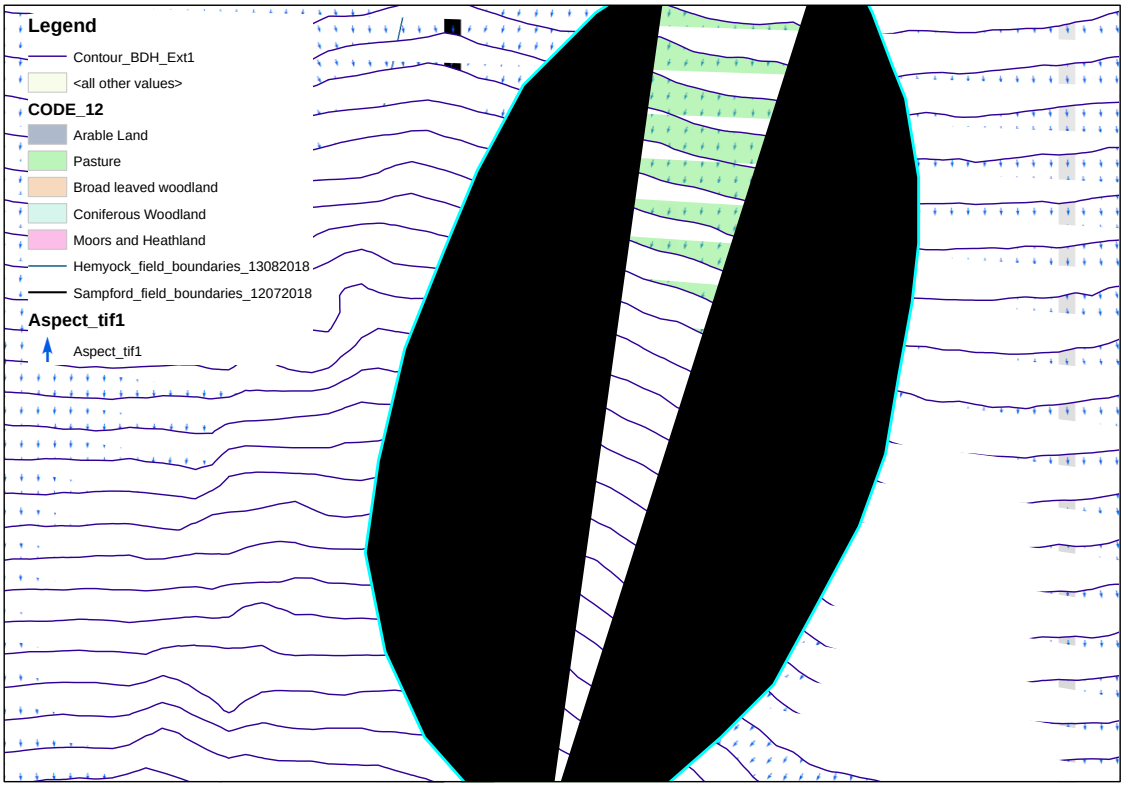
The values in £/ha/yr are shown in the table below.

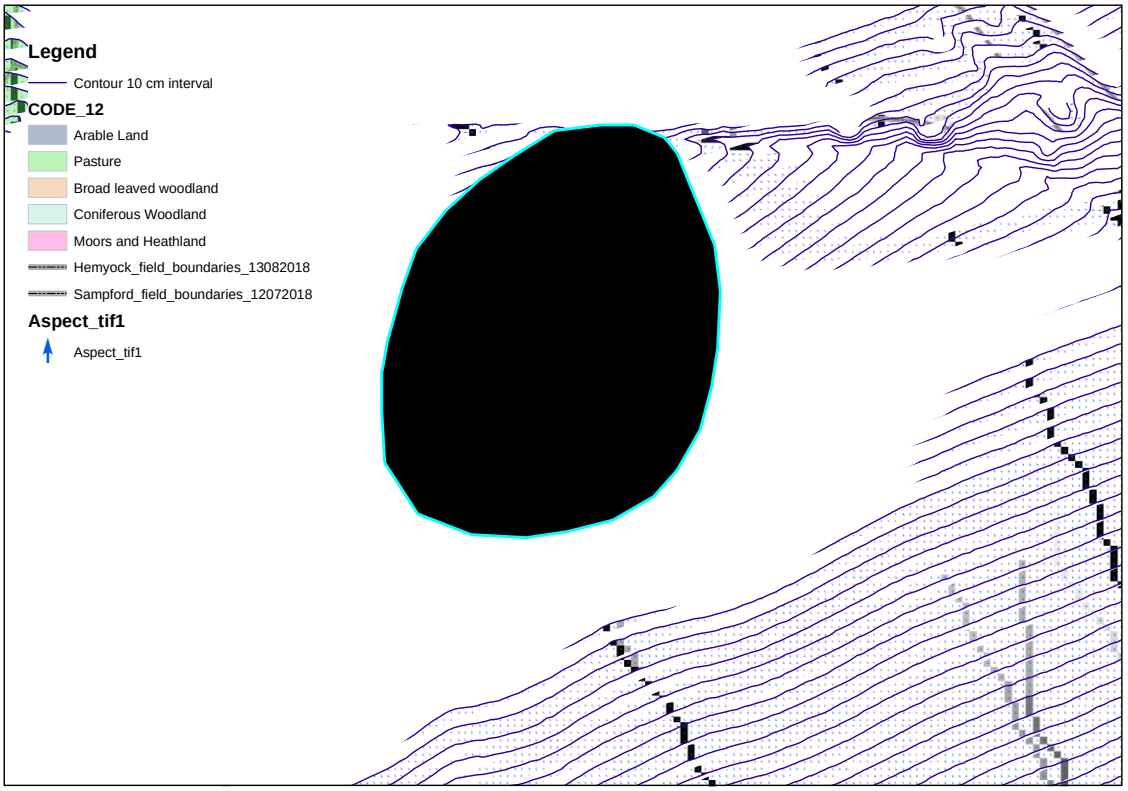
Habitat	Food	Timber	Energy	Carbon	Water Quality	Flood attenutation	Water Supply	Resource Protection	Pollution attenuation	Biodiversity	Visual Amenity	Recreation and tourism
Permanent grassland	128	0	0	201.4	0	0	0	5	5	200	113	1.8
Coniferous woodland	10	300	150	848	0	200	0	5	6	50	227	3.7
Deciduous woodland	10	160	100	530	200	400	1.5	6	7	600	377	3.7

Arable	1120	0	0	-21.2	0	0	0	0	1	100	113	0
Heath & Moorland	160	0	0	21.2	0	0	0	0.5	6	4	400	166

The historic extractive areas were investigated for their hydrological function by taking a random sample of sites (especially the extractive sites) and observing the impact they have on aspect and flow direction at a small scale. Same was applied for contour distortion at the sites.

Some of the sample indicated aberrations in flow were visually detected from the map analysis, but these are very difficult to quantify in the time and resources allowed for the project. Examples of aberration and no aberration are shown below.





5. Drawing the threads together

See results section for the total scores

6. Testing/ verifying and applying the results

The methodology in annex 5 was applied.

Results

Results are presented in the same format as the methodology (see above).

Part	Description	Sub-part	Detail	Scoring? (Y/N)
1	**Type, extent and condition of total stock**	a	Collate records	N
		b	Type, extent & condition of boundaries	N
		c	Ground-truthing	N
2	**Assigning a value to heritage and quantifying associations**	a	Heritage base score	Y
		b	Additional score based on condition & local metrics	Y
		c	Co-incidence between heritage types	Y
3	**Function/ economics of the boundaries**	a	Biomass, flood alleviation and access/ recreation benefits	Y
		b	Questionnaire	N
4	**Natural capital stock to ecosystem service flow**			Y
5	**Drawing the threads together**		Total scores	Y
6	**Testing/ verifying and applying the results**		See results section	N

Analysis was undertaken per Historic Landscape Character (HLC) type within a study square. In some cases, there are more than 8 HLC types per study area, but this was seen to more accurately reflect the natural capital stock (rather than just taking a generic score across a 4 square kilometre area).

The findings are as follows (with the methodology reference from the table above in brackets):

1. Type, extent and condition of total stock

Collate historic[5] and biological records data for the 4 study areas (part 1a)

- There is considerable historic environment interest in the four study squares tables (see annex 6).
- It is also clear that for study area 3 & 4 (where it has not been possible to undertake scoring via part 2,3 & 4 of the methodology due to lack of GIS data), that there is significant associated between field boundaries and heritage assets recorded on the HERs.

[5] Including time depth information

- The biological data collected and interpreted (by the Local Records Centre) show that comprehensive biological datasets are not available at the correct resolution to enable a detail analysis per HLC.

Extent of total stock (part 1b)- *type, extent and condition of field boundaries*

Findings:

1. The map of study area 1 (figure 6) and study area 2 (figure 5) illustrates that the study areas have extensive field boundary networks that are well connected, many intact and with variable numbers of hedgerow trees. Many are also uncut or overgrown and so not all are cut (flailed or layed). Thicker hedges indicate 'uncut' or 'overgrown' management.
2. Table 2 highlights the trend for intact hedges and hedgerow trees in the Blackdown Hills and the thicker and sinuous nature of hedges in more medieval landscapes. Another interesting finding is that the parliamentary/ modern enclosure field boundaries have a high density of hedgerow trees, equivalent to medieval HLC types and this adds to the belief that parliamentary enclosure landscapes are important in their own right in the Blackdown Hills.
3. This translates through to natural capital stock and ecosystem service flow.

2. Assigning a value to heritage and quantifying associations

Impact of historic assets on natural capital stock (part 2a)

The aim of this analysis is to identify the impact of historic assets on natural capital stock.

Scores are shown in the table below. The scores are derived from a heritage base score ascribed to the HLC type (time depth, or other historical significance, and intactness) plus an uplift (an enhanced score based on the association of HER asset types with that HLC type). Local historian information has also been factored into the uplift.

Area 1: Hemyock

HLC type	**Justification for heritage score**	**2a: total score** (heritage base + association with HER uplift)
Former orchards	Base Score 4 due to intrinsic heritage value. Uplift 1 due to their associations with earlier farmsteads.	5
Historic settlements	Base Score 1 and uplift 1 as there are no sites associated with the hedged boundaries in this HLC but several of the recorded sites are historic in origin.	2
Medieval enclosures	Base Score 4 due to intrinsic heritage value. No uplift as no HER heritage assets identified.	4
Medieval enclosures based on strip fields	Base Score 4 due to intrinsic heritage value. Uplift 1 due to date range and type of HER assets. In particular the medieval settlement and agricultural activity, which is focused around Ashculme, Byes Farm and Gladhayes and the pronounced surrounding pattern of hedged enclosure, which occupies a significant portion of the HLC.	5
Modern enclosures	Base Score 2 (characterised as modern due to extent of field boundary loss but still retaining traces of medieval origins). Uplift 1 due to strong correlation in terms of date range of the majority of the HER sites (extraction pits, catch meadow and orchard), their association with hedged boundaries and the date/origins of the HLC.	3
Modern settlement	Base Score 1 and uplift 1 as there are no sites associated with the hedged boundaries in this HLC but several of the recorded sites are historic in origin.	2
Conifers	Base Score 1. No uplift as no HER assets	1
Other woodland	Base Score 3 and uplift 1 as two out of the three sites recorded in this HLC (both extraction pits) are post medieval in date and are associated with a field boundary	4
Park/garden	Base Score 2. No uplift as no HER assets.	2
Post-medieval enclosures	Base Score 3. No uplift due to the few sites of a post medieval date being associated with hedged boundaries and the date/origins of the HLC	3
Rough ground	Base Score 4 due to intrinsic heritage value. Uplift 1 due to date range/type of HER assets (field boundaries,orchards and extraction pits)	5
Watermeadow	Base Score 2. No uplift as no relationship with HER assets.	2

Area 2: Wrangway/ Sampford & Blackdown

HLC type	**Justification for heritage score**	**2a: total score** (heritage base + association with HER uplift)
Anciently Enclosed Land modified 17th to 19th century	Base Score 3 due to intrinsic heritage value. Uplift 1 due to date range of t HER assets.	4
Conifers	Base Score 1. No uplift as the HER assets and other historical features are much earlier in date than much of the HLC (excluding the formerly Rough Ground area).	1
Former orchards	Base Score 4 due to intrinsic value. Uplift 1 due to association with earlier farmsteads.	5
Medieval enclosures	Base Score 4 due to intrinsic value. Uplift 1 due to range of medieval HER assets, including historic farmsteads, deserted farmsteads and relic boundaries.	5
Modern enclosures	Base Score 2 (characterised as modern due to extent of field boundary loss but still retaining traces of medieval origins). Uplift 1 due to date range of the HER assets.	3
Orchard	Base Score 4. Uplift 1 due to association with earlier farmsteads.	5
Other woodland	Base Score 4 due to intrinsic value. Uplift 1 due to association with heritage assets including deer parks, parish boundaries, extraction pits.	5
Post-medieval enclosures	Base Score 2. Uplift 1 due to date range of the HER assets.	3
Recently Enclosed Land 17th to 18th century	Base Score 3. Uplift 1 due to date range of the HER assets.	4
Recently Enclosed Land 18th to 21st century	Base Score 2. Uplift 1 due to date range of the HER assets.	3
Rough ground	Base Score 4. Uplift 1 due to time-depth of associated relic landscapes including prehistoric settlement, extractive industries, medieval and post-medieval field boundaries.	5
Woodland with old field boundaries	Base Score 4. Uplift 1 due to documentary history and associated wood banks.	5

Findings:

- Demonstrating the link between the historic environment and the natural capital stock is challenging, as it relies on having comprehensive datasets that are often not available at the correct resolution. In the Blackdown Hills AONB, as a result of the pre-AONB designation surveys and National

Mapping Programme surveys that have provided more detailed historic environment information, it transpires that it is the biological data that is often too coarse a scale for meaningful analysis. This is because of lack of data, as data is often only collected as a result of a funded biodiversity project (for example horseshoe bat project) and/or due to the proximity of an active biological recording surveyor or group.
However, age could still be considered to indicate greater overall biodiversity.

- Nevertheless, we have collected some evidence that shows synergy and added value and have attempted to measure how these links affect total stock and in turn ecosystem service flow.
- Annex 6 illustrates this for area 2 by creating a heritage base score (for each one of the nine HLC's). This takes into account the fact that an historic boundary is important in its own right, irrespective on the type, extent and condition of the boundary that sits on top of it, as maintaining the remaining feature and marking the line of the boundary, for example a parish boundary.

Additional 'value added' using condition and locally derived metrics (part 2b)

The explanation for the headings in the boxes below is as follows:

- The methodology is explained in section 2b, part b (1) on page 22 i.e. there are three variables
- There can be multiple (discrete) areas of one HLC type in one study square- see annex 4
- The scores derived are therefore a mean score across the same HLC type within one study square. There is also information on standard deviation and number of features

Area 1: Hemyock

Row Labels (HLC)	**Mean combined condition score for HLC**	Standard Deviation (SD)	Number of features
Former orchards	3.17	1.12	27
Historic settlements	1.93	1.16	5
Medieval enclosures	3.31	0.78	13
Medieval enclosures based on strip fields	3.14	0.99	316
Modern enclosures	3.30	0.94	46
Modern settlement	2.28	1.12	6
Other woodland	3.89	0.19	3
Park/garden	3.65	0.84	17
Post-medieval enclosures	2.86	1.03	156
Rough ground	3.45	0.91	70
Watermeadow	2.92	1.15	13

Area 2: Wrangway/ Sampford

Row Labels	Mean combined condition score for HLC	SD	Number of features
Anciently Enclosed Land modified 17th to 19th century. General field size, 6-12ha. Less than 25% boundary loss since 1905.	3.49	0.80	29
Conifers	3.97	0.15	20
Former orchards	3.67	0.47	2
Medieval enclosures	3.01	0.99	62
Modern enclosures	2.75	1.16	20
Orchard	2.29	0.62	7
Other woodland	3.94	0.61	19
Post-medieval enclosures	3.48	0.92	70
Recently Enclosed Land 17th to 18th century. General field size, 3-6ha. Less than 25% boundary loss since 1905.	3.13	1.04	125
Recently Enclosed Land 18th to 21st century. General field size, 3-6ha. Less than 25% boundary loss since 1905.	4.00	0.00	2
Rough ground	3.95	0.42	19
Woodland with old field boundaries	4.00	0.00	11

Findings:

- We have gathered information on the condition of field boundary stock and have made an assessment about what this means in terms of the extent of services that flow from the stock, based on the judgement that a more intact field boundary with hedgerow trees that isn't flailed every year is more likely to deliver a higher flow of ecosystem services. When such boundaries are also of historic heritage importance, the historic heritage is considered to add value.
- **Hemyock square:**
  256 features in 'good' condition (combined condition score 4 or above). This is 33% of the total 775 mapped features.
  51 of the good condition features (i.e. ~20%) proximal to known priority habitat.
- **Sampford square:**
  193 features in 'good' condition (combined condition score 4 or above). 48% of the total 405 mapped features.
  66 of the good condition features (i.e. 34%) proximal to known priority habitat.
- Refer to figure 4 below.

Figure 4: Excerpts from field boundary mapping undertaken in area 2 comparing two of the seven HLC types. The table below shows further details on their associated attributes:

Excerpts from field boundary mapping undertaken in Area 2 comparing two of the seven HLC types. See table for further details on associated attributes.

Table 2 below shows the results of part 2b condition scoring for the Devon part of study area 2 *(Wrangway) in each HLC:*

Comparison of hedges from 2 different HLC units within same 2km square study area

Sampford (comparison of hedges from 2 different HLC units within same 2km square study area)	Recently Enclosed Land 18th to 21st century (Higher Wrangway)	Medieval enclosures (Whitemoor/Blackaller Farms)
average hedge length (metres)	100	110
min (metres)	23	26
max (metres)	231	284
% of hedges containing trees (either as standards or where hedge outgrown into canopy > 7.5 m width)	90	82
mean number trees per 100 m of field boundary (not including undifferentiated tree canopy in overgrown hedges)	3.1	2.1
% hedges intact	93	83
% hedges recently cut	47	52
% hedges overgrown	31	34
% hedges not recently cut	22	14
width estimate (modal value)	2.5	3.25
straight/sinuous ratio	1	0.27

Comments:

- Medieval enclosures: there is a considerable extent of field boundaries and the majority of hedged field boundaries are intact, there are many overgrown hedges, many cut hedges do not have standard trees (possibly as they have been flailed and/or are not deemed of sufficient value by the landowner)
- Post medieval enclosure: there is a considerable extent of field boundaries and most hedges are intact, many cut hedges have standards, half are overgrown hedges and some uncut hedges.
- Former orchards: Mostly intact boundaries, some overgrown hedges
- Modern enclosures: Mostly intact hedges, many cut hedges have standards and there are many overgrown hedges.

Locally devised metrics:
The local metrics information (via local historians) in annex 12 is valuable in terms of adding depth, detail and additional information not available via readily available historic datasets, however it adds complexity, cannot easily be quantified in terms of scoring and therefore maybe difficult to feed into natural capital stock and ecosystem service flow methodologies. Some key pieces of information considered most notable are highlighted in red text in annex 12.

Figure 5: Map showing hedged boundaries in study area 2

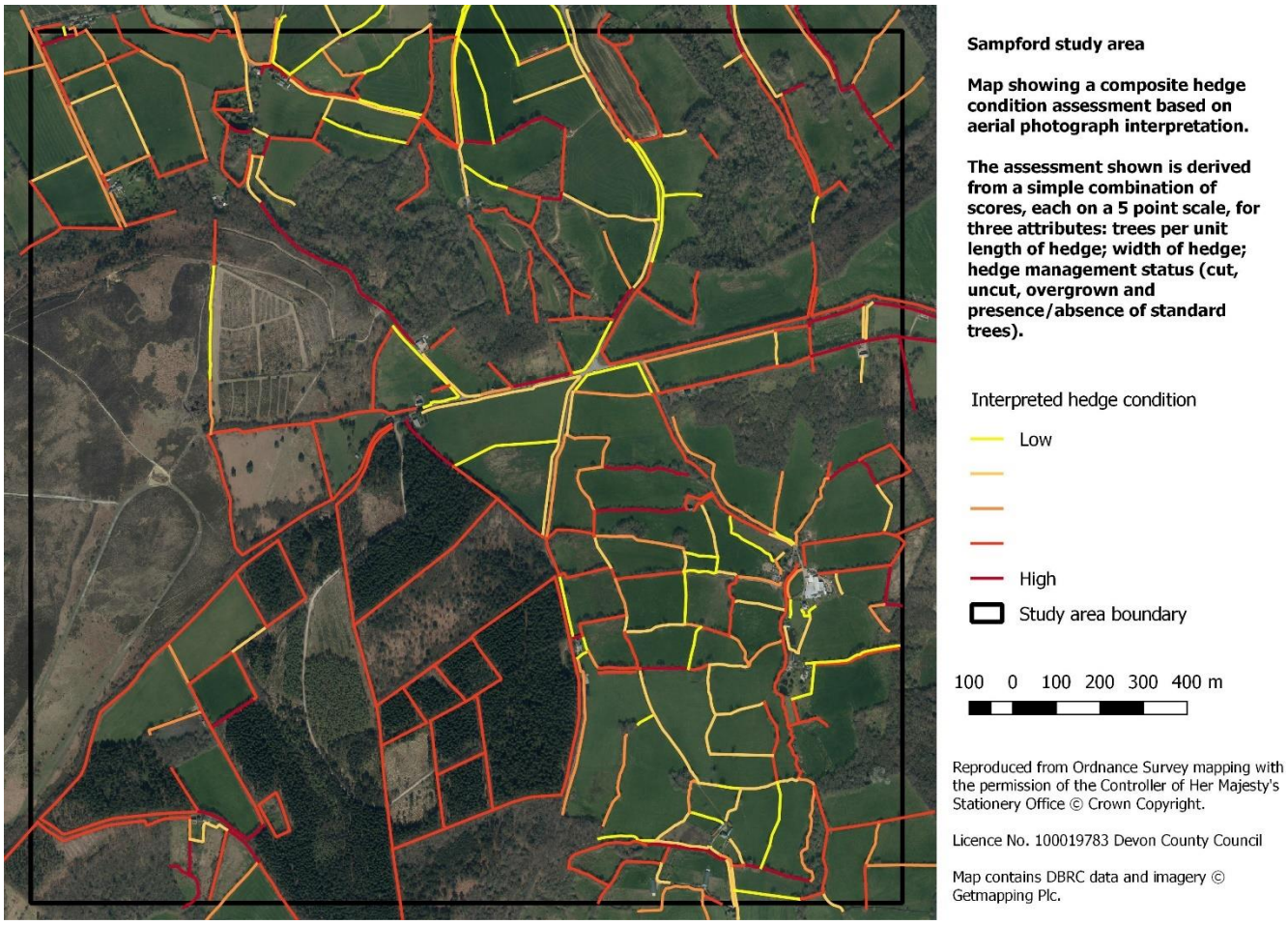
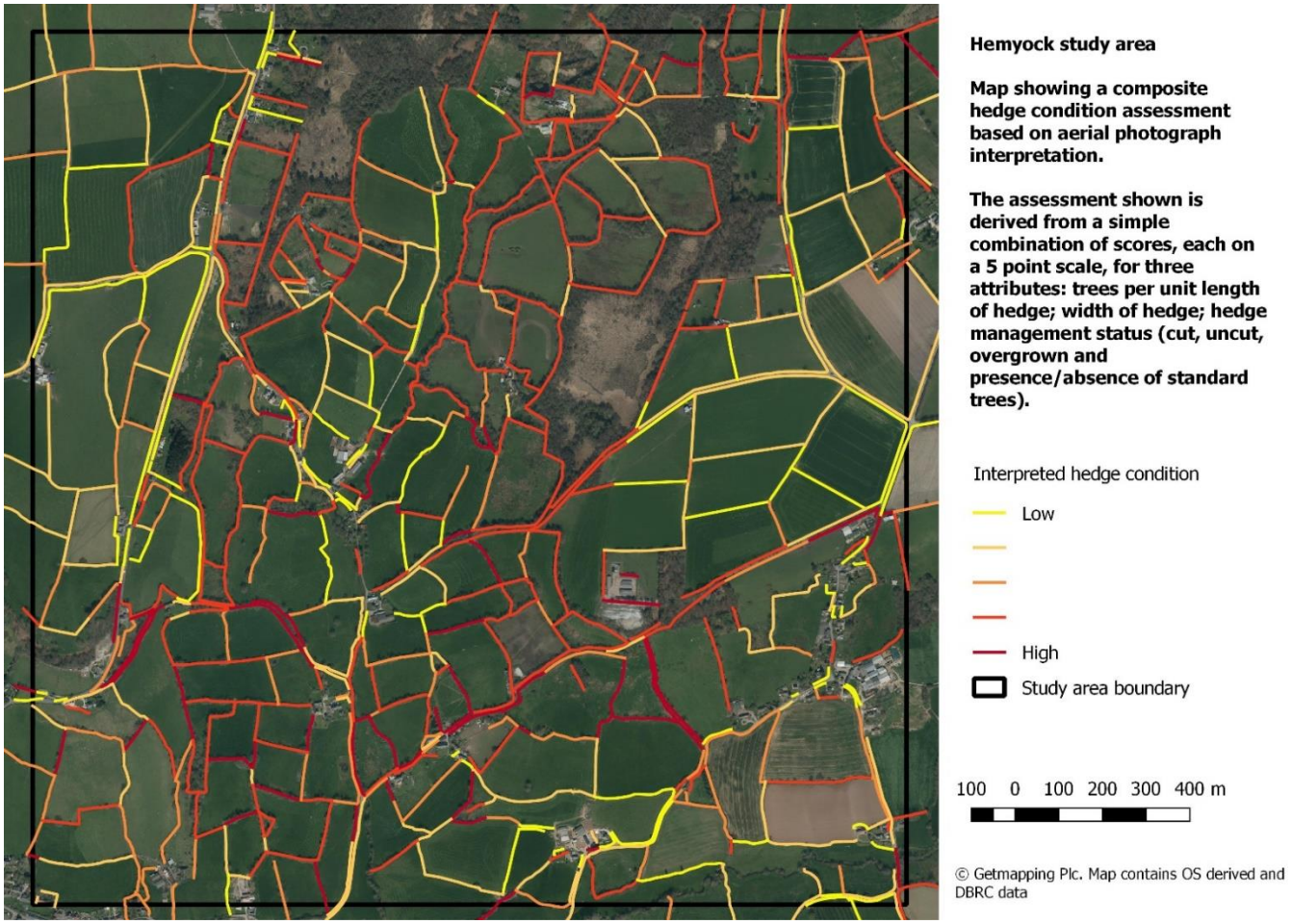


Figure 6: Study area 1 – Map showing composite hedge condition- note the better condition of boundaries in the HLC's with greater time depth and the poorer condition on plateau farmland typically of higher agricultural value
Note the higher hedge condition on valley sides and bottoms as opposed to lower condition on some flatter plateau tops



Assigning a value and quantifying associations (part 2c)

The table below details the scores for each HLC type, in order to define the co-incidence between different heritage types for study area 1 and 2.

Area 1 : Hemyock

HLC type	2c: Co-incidence score
Former orchards	5
Historic settlements	2
Medieval enclosures	4
Medieval enclosures based on strip fields	1
Modern enclosures	1
Modern settlement	1
Conifers and other woodland	2
Park/garden	4
Post-medieval enclosures	4
Rough ground	5
Watermeadow	4

Area 2: Wrangway (Blackdown/ Sampford)

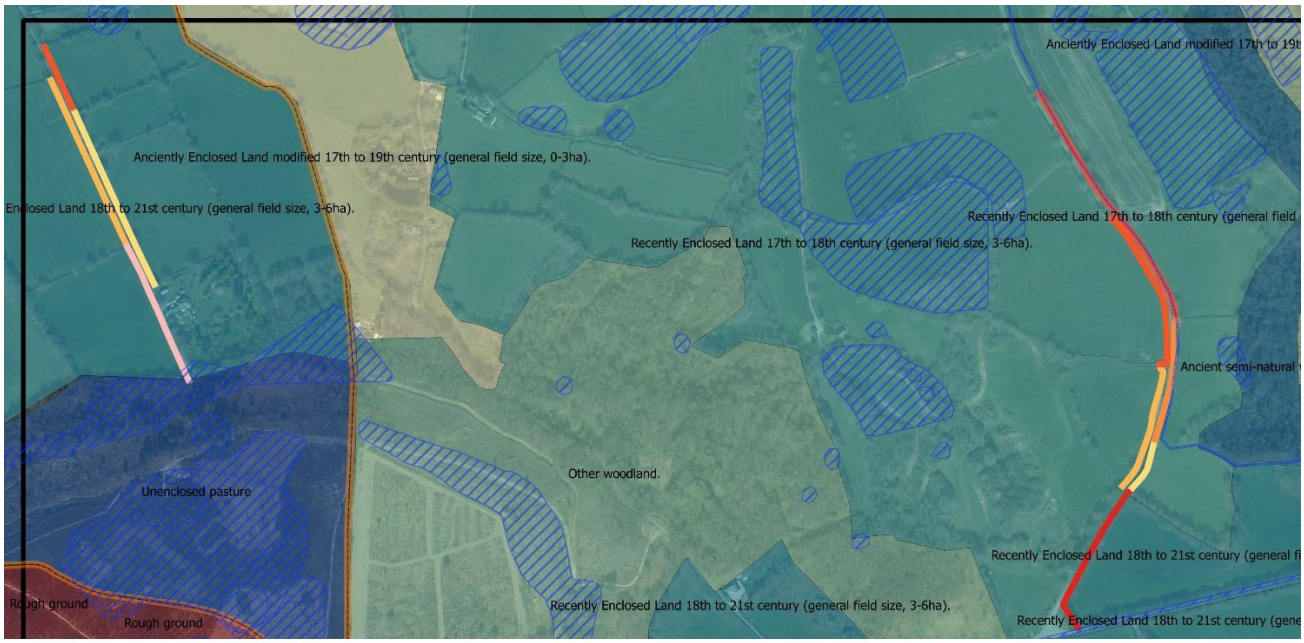
HLC type	2c: Co-incidence score
Anciently Enclosed Land modified 17th to 19th century	4
Conifers	1
Former orchards	1
Medieval enclosures	2
Modern enclosures	2
Orchard	3
Other woodland	2
Post-medieval enclosures	4
Recently Enclosed Land 17th to 18th century	2
Recently Enclosed Land 18th to 21st century	2
Rough ground	4
Woodland with old field boundaries	0

Results:

- There is some evidence of synergy between historic and biological heritage although this is hampered by a lack of detailed data, especially biological.

Figure 7: Map showing number of woody species along a hedge alongside HER and HLC

Note that this correlates to the Important Hedge definition in annex 10



Sampford study area

Ground truthing data from a sample of 12 hedges in the parishes of Sampford Arundel and Wellington Without. Text labels show Somerset Historic Landscape Characterisation polygons. The sample compares straight hedges from an area of 19th century enclosure with an area of earlier enclosure. The curvilinear hedges associated with a mapped HER feature (a deer park pale) appear to exhibit slightly higher tree and shrub species richness (further ground truthing work would be required to confirm the significance of this observation).

Number of woody species per hedge

- 3
- 5
- 7
- 8
- 9
- 16
- Study area boundary
- Features on Somerset Historic Environment Record
- Parish boundary

100 0 100 200 m

Devon Biodiversity Records Centre

3. Function/ economics of the boundaries

Part 3a

Biomass (carbon stored in linear features)
Using the North Devon Biosphere methodology[6], the monetised service values for hedges in study areas 1 and 2 are as follows:

Study area 1 (Hemyock):

- Carbon stock 1758 tonnes
- Carbon stock value= £341,972
- Annual carbon flux value[7]= 387 tonnes of carbon/year
- Annual flux value= £75,370/ year

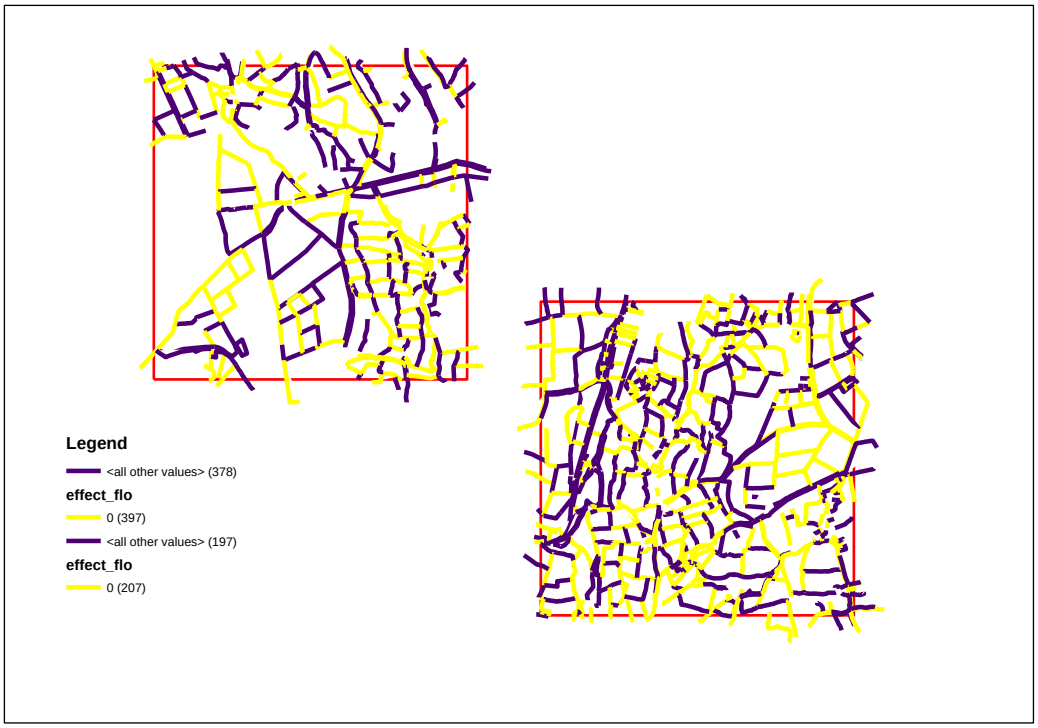
Study area 2 (Wragway/Sampford):

- Carbon stock 1235 tonnes
- Carbon stock value £240,411
- Annual carbon flux value= 263 tonnes/ carbon/ year
- Annual flux value £51,306/ year

Flood attenuation from linear features
Having assessed the capacity of hedges to attenuate flooding, there are two key interconnected functions: a) creating more complex flow pathways via disrupting surface water flows down slopes and b) storage of water behind the hedges.

The map below shows the Hemyock and Wrangway/ Sampford study square, where purple lines indicates a flood attenuation value from field boundaries and yellow indicates no attenuation value.

[6] See reference in annex 12
[7] The amount of carbon exchanged between Earth's carbon pools e.g. ocean, atmostphere, land, living things



Storage of water value has been approximated by having a storage of 10 centimetres depth of water for a small distance behind the hedge. The value of flood storage has been considered as £40/m3. The hedges are the attenuation features acting as mini-dams provided they are at a sufficient angle across the slope; the retained volume is adjusted by the angle of interception and the slope of the land.

The value of this water storage service is calculated as follows:

- Hemyock square: £174,323
- Sampford square: £120,111

Access & recreation supporting services

Since there are very few rights of way that are in this area of analysis, the values are not readily available to calculate. As an approximation, the ORVal tool (https://www.leep.exeter.ac.uk/orval/) was traced across the bridleway that is next to boundary feature Scheduled Monument 0380. The tool estimates approximately 1622 visits per year and a welfare value of £4406 in the Sampford Quadrat.

Applying the methodology for part 3a to each study square, the results are as follows:

Study area	Score	Rationale
1- Hemyock	5	*Clear evidence* of the impact of historic assets on natural capital stock and where historic assets are more directly associated with land use and land use management
2- Wrangway/ Sampford	4	*Evidence* of the impact of historic assets on natural capital stock and where historic assets are more directly associated with land use and land use management

Results: Part 3b
See annex 11 a,b,c,d for responses.

Findings:

- We have collected some evidence that shows that historically/ heritage rich more important field boundaries are more valued by the landowner, often as they form the ringfenced boundary of the farm (annex 11a).
- Is appears that a premium associated with the historic environment has been identified in some cases and more generally, we have evidence that the historic environment has influenced delivery of the final benefits
- The information gleaned through part 3b (farmer/ landowner questionnaires) is very valuable in terms of identifying the nuances of heritage value to the farm holding and business, the cultural heritage value and the linkages between the historic and natural heritage value. It also highlights the vulnerability of hedge management to changes in agri-environment scheme support and change in land management ownership/ farms getting bigger and removing hedges.

4. Natural capital stock to ecosystem service flow

Part 4

Annex 9 outlines the Natural Capital Accounts for the Blackdown Hills AONB Assessment.

The results can be summarised as follows[8]:

Stock inventory of the natural capital assets study area 1 (Hemyock square) is as follows:

- 78 kilometres of field boundary, 71 kilometres of which is hedged boundary
- Predominant landcover type is permanent grassland with some arable
- Predominant HLC type is medieval enclosures with strip fields and post medieval enclosures

Stock inventory of the natural capital assets study area 2 (Wrangway/ Sampford square) is as follows:

- 52 kilometres of field boundary, 49 kilometres of which is hedged boundary
- Predominant land cover type is permanent grassland, heath & moorland and conifers
- Predominant HLC type is conifers, medieval enclosure, other woodland, recently enclosed land (17 and 18th century) post medieval enclosure and rough ground.

Looking over the tables on ecosystem service values for particular HER asset types, scored by Provisioning, Cultural, Regulatory and Supporting services, there is a trend of higher for those HER types that are most clearly part of the landscape, for example woodlands, orchards, various types of extractive pits (which mostly are tree covered now – by human or natural processes), field systems, trackways, boundaries, curvilinear enclosure.

Similarly the tabulation of land use type by HLC type seems to be showing high ecosystem service values in both study areas for those land uses (generally permanent pasture and woodland) that are most closely associated with the more ancient and heritage asset rich HLC types. For example, in the Hemyock study area medieval enclosure landscape HLC types accounts for 43% of the area's permanent pasture – which scores highly for a range of services.

An analysis of HER assets and the National Ecosystem Assessment derived value was inconclusive insofar as there was no way to differentiate the ecosystem service values from land whether HER or HLC, because there was

[8] The values came from the national ecosystem assessment (see references in annex 12)

no data that could put in a differential between the two. This means that an ecosystem service ‘uplift’ from including HER’s cannot be demonstrated to stakeholders nor that differences in ecosystem service values between HLC’s can be interrogated. A more detailed GIS layer of land use and land cover with condition would have enabled a better differentiation.

Ecosystem service flows and beneficiaries

These tables summarise the ecosystem services and who benefits, for the purposes of the National Ecosystem Assessment, using two different analysis.

Table 3: Ecosystem service flows and beneficiaries

Ecosystem Service	Owner	Local Community	Wider Community
Food	Sold as goods		
Timber	Sold as goods		
Energy	Sold as goods		
Water Flow Attenuation		Flood resilience	
Pollution attenuation		Capture of pollutants	Capture of pollutants
Carbon			Climate regulation
Water Quality	Potable water	Potable water	
Water Supply	Water available for use	Water available for use	
Resource Protection	Retention of soils	Natural hazard avoidance	
Biodiversity	Supporting functions	Supporting functions	Supporting functions
Visual Amenity		Local enjoyment	National recognised landscape
Recreation and tourism		Local enjoyment and local tourism economy Health benefits	Tourism destination Health

Beneficiaries	Timber	Energy	Carbon	Water Quality	Flood attenuation	Water Supply	Resource Protection	Pollution Attenuation	Biodiversity Supporting functions	Visual Amenity	Recreation and tourism
Owner	X used and sold	X used and sold			x	x	x		x		x
Local Community	X used	X used		x	x	x	x	x	x	x	x
Regional Community				x		x		x	x	x	x
National			x					x	x	x	x
International/Global			x						x		

Table 4: Non Monetised services

Service type	Service	Rationale	Scale of value
Cultural	Knowledge	Information stored in the historic record on site	**
Cultural	Stability	Longevity of land cover	**

5. Drawing the threads together

Part 5

In terms of demonstrating/ illustrating the link between landscapes rich in natural capital stock and the resultant flows of ecosystem services, these summary tables can be used (colours show the same HLC's across study squares) :

Study area 1: Hemyock

HLC type	2a: Heritage base score	2b: Mean combined condition	2c: Co-incidence
Former orchards	5	3.17	5
Historic settlements	2	1.93	2
Medieval enclosures	4	3.31	4
Medieval enclosures based on strip fields	5	3.14	1
Modern enclosures	3	3.30	1
Modern settlement	2	2.28	1
Other woodland	4	3.89	2
Park/garden	2	3.65	4
Post-medieval enclosures	3	2.86	4
Rough ground	5	3.45	5
Watermeadow	2	2.92	4

Study area 2: Sampford/ Wrangway
HLC's reflect those in Devon and Somerset (that are different)

HLC type	2a: Heritage base score	2b: Mean combined condition	2c: Co-incidence
Anciently Enclosed Land modified 17th to 19th century	4	3.49	4
Conifers	1	3.97	1
Former orchards	5	3.67	1
Medieval enclosures	5	3.01	2
Modern enclosures	3	2.75	2
Orchard	5	2.29	3
Other woodland	5	3.94	2
Post-medieval enclosures	3	3.48	4
Recently Enclosed Land 17th to 18th century	4	3.13	2
Recently Enclosed Land 18th to 21st century	3	4.00	2

Rough ground	5	3.95	4
Woodland with old field boundaries	5	4.00	0

The results show that:

- **Part 2a:** Field boundaries in HLC types with greater time depth (e.g. medieval enclosures, rough ground) typically have a higher heritage base score and a stronger association with HER assets than HLC types with less time depth (e.g. modern enclosures), although this picture is not as clear cut as might have been expected in the Blackdown Hills AONB due to many of the boundaries in post medieval and modern enclosures being medieval in origin.
- **Part 2b:** There is some evidence that field boundaries in HLC types with greater time depth are in a better condition than those in more modern types, although this is not clear cut. This might be because many of the HLC types with greater time depth are on the steep valley sides along the spring line and wet valley bottom, as opposed to the flatter and drier plateau tops. Within such HLC types there tends to be smaller, more irregular fields and hedges are often on large hedge banks. In addition, they are often in proximity to priority habitats that are likely to less intensively managed than the farmland on the drier, plateau tops. The valley sides and bottoms can be more agriculturally challenging to manage and less labour on farms could also have led to partial abandonment in places and less regular/ traditional hedge management regimes. Figure 8 and figure 9 show composite maps.
  This can be compared to the plateau top farmed land, where agricultural intensification has continued to take place, with larger machines, less mixed farming and agricultural direct support payments that do not necessarily promote wide field boundaries with bushy hedges.
- **Part 2c:** Field boundaries in HLC types with more time depth do not necessarily have a greater co-incidence of historic, cultural and biological heritage (2c). However, this can be misleading as biological records across the study areas is generally poor/ lacking and can be can biased by recorder effort and presence of a mobile species e.g. bat that is recorded as being within 100 metres of a field boundary, when in fact that bat species is anecdotally known to be present across the whole landscape.
  Zooming into part of study area 1 (see figure 10 below) in order to tease out synergy and referring to the following figures, the co-incidence between the following can clearly be seen on some of the field boundaries (links to part 2 of the methodology):

    - Field boundaries that have a strong associated with HER's or historic features, including Parish boundary
    - Proximity of field boundaries to priority habitat (in this case SSSI or County Wildlife Site)
    - Field boundaries (predominantly hedges) that scores high for condition status
    - Ring fenced boundaries of farms accord with the medieval enclosure farmstead boundaries and have remained unchanged

- **Part 3a:** Field boundaries (many historic) in both Hemyock and Sampford study squares provide significant & measurable ecosystem services in terms of biomass, flood alleviation and access & recreation.
- Furthermore, we can determine from the cultural heritage anecdotal information from **part 3b** in the methodology (talking to facilitation farmers) plus through talking to local historians that the ringfenced boundaries on a farm are generally kept intact and in good condition through time (primarily to keep animals in and out in this pastoral landscape), as opposed to internal field boundaries that may change through time as farm systems change and become more mechanised (e.g. bigger machinery), less mixed farming and less labour available.
- **Part 4:** It was not possible to determine the score for the Natural Capital stock to Ecosystem Service flow calculations due to the difficulty with differentiating the values across HER's and HLC's.

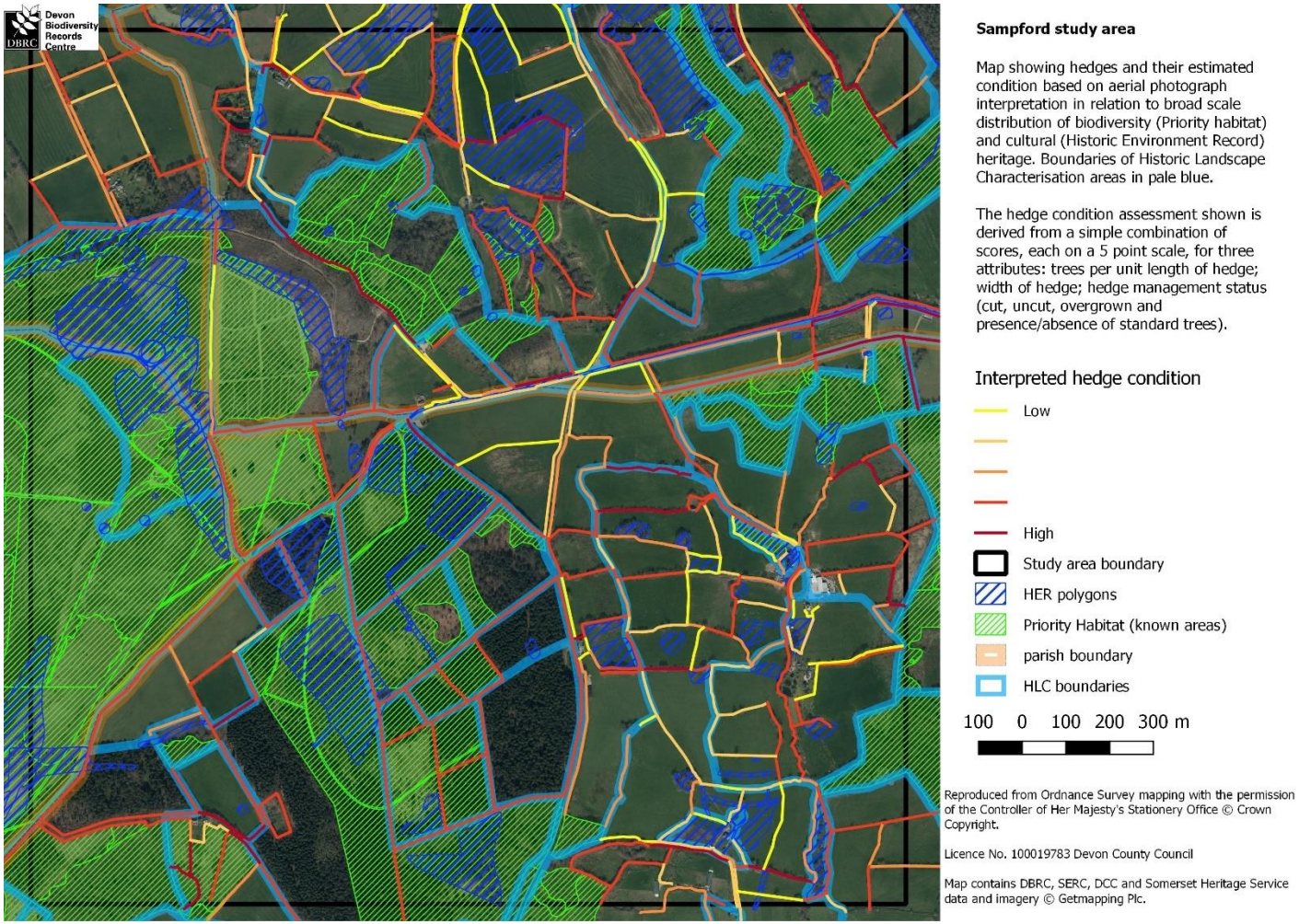


Figure 8: Study area 2 (Sampford)- the following composite map shows HLC boundaries, priority habitats and similarly HER polygons are shown as a single layer, all with hedges and their condition on top

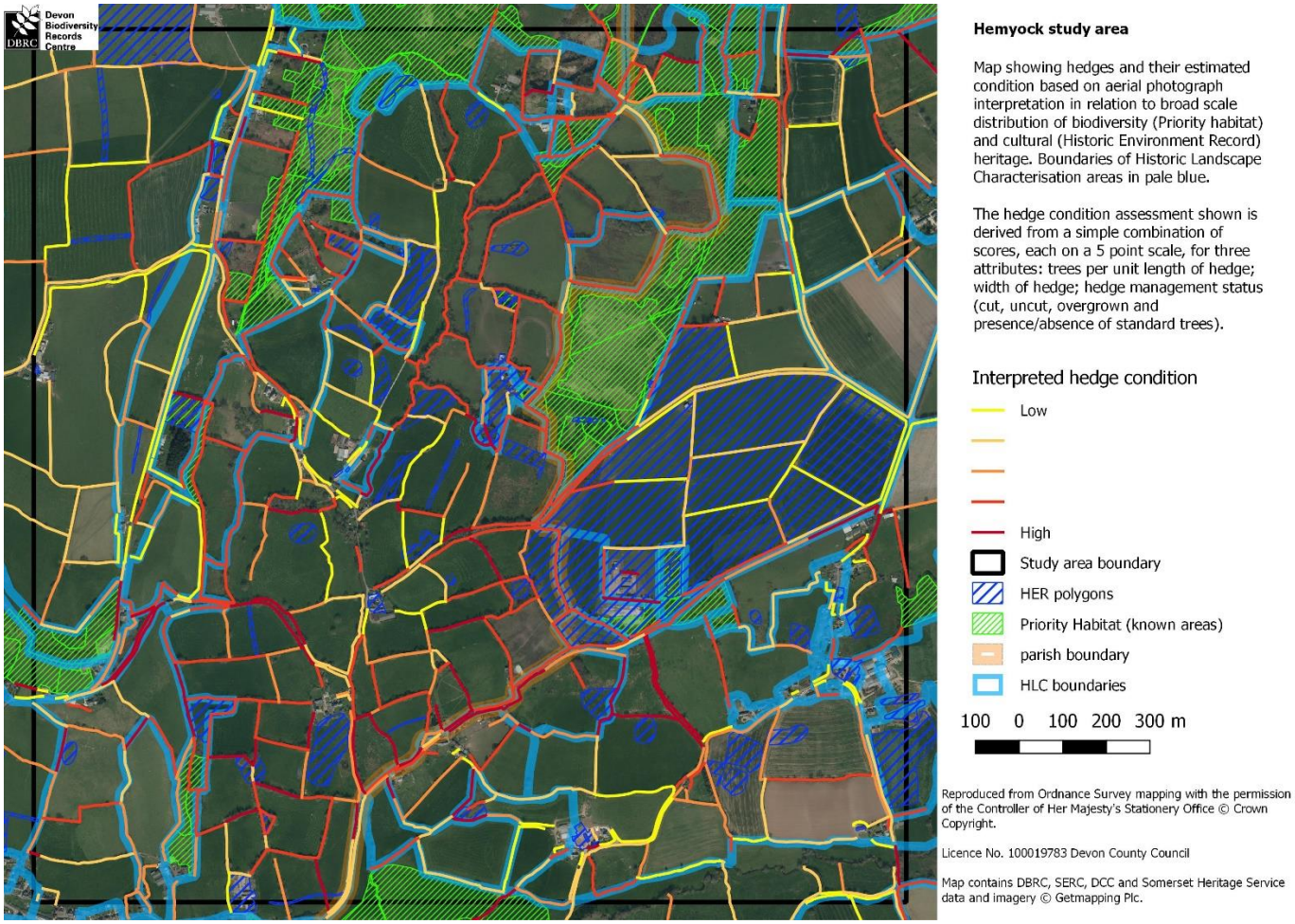


Figure 9: Study area 1 (Hemyock)- the following composite map shows HLC boundaries, priority habitats and similarly HER polygons are shown as a single layer, all with hedges and their condition on top

Figure 10: Study area 1 Hemyock- map showing condition of boundaries

Figure 11: Local historian- sketch map showing medieval farmstead ring fenced boundaries

Red letters indicate location of HER's
Pink, blue and green boundaries show the medieval enclosures

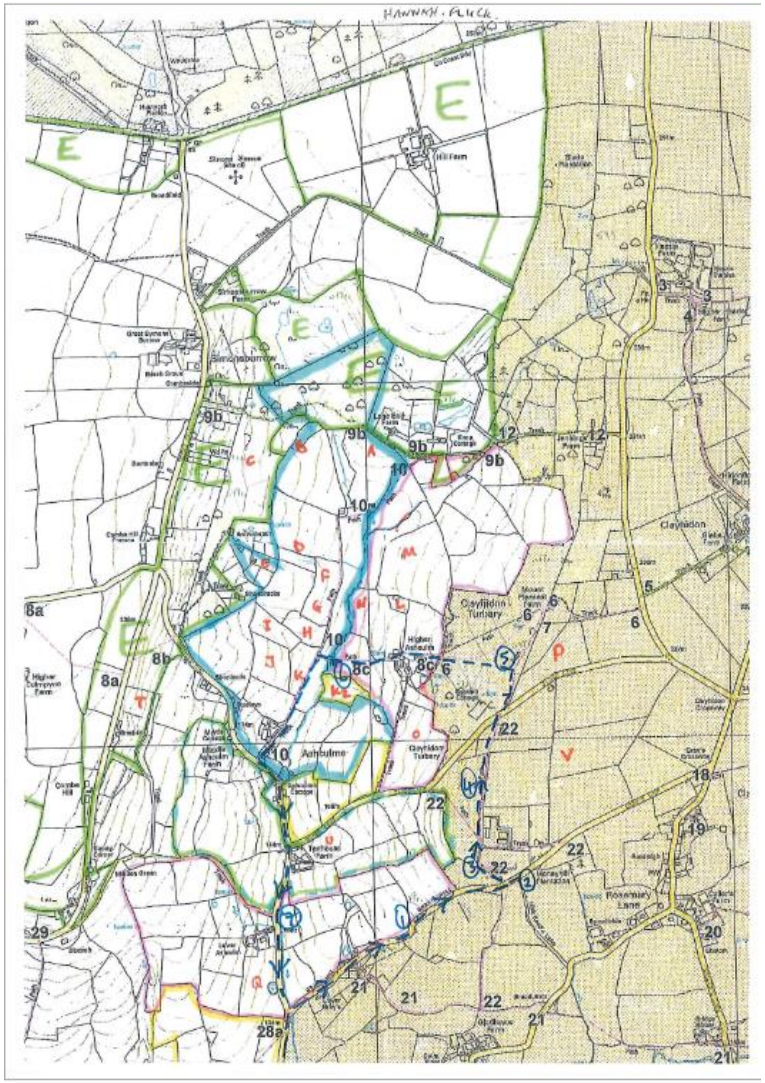


Figure 12: Study area 1- View looking across Clayhidon turbary (a common) towards Wellington Monument in the distance. Note farm perimeter boundary in the middle distance

A qualitative assessment of the threads can be determined by adding together the scores (1-5), to give a score of between 5 and 30 where 5= very little/very weak/ negligible and 30= very clear/strong/very high. The HLC numbers (1-11 and 1-12) in the table below relate to the HLC tables in part 5 (5) on page 5 above.

Hemyock- study area 1

Part	**Component score for each HLC type**												**Mean score for study area *(by part e.g. 2a)= totals/ number***
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**Total score (by part e.g. 2a)**	
2a	5	2	4	5	3	2	4	2	3	5	2	**37**	**3.36**
2b	3	2	3	3	3	2	4	4	3	3	3	33	3
2c	5	2	4	1	1	1	2	4	4	5	4	33	3
3a													5
3b													n/a
4													Not enough data
6													4
Total (by HLC)	13	6	11	13	12	11	17	16	19	23	9		**18.36 out of a possible 25**

Wrangway/ Sampford- study area 2

Part	**Component score for each HLC type**													**Mean score for study area *(by part e.g. 2a)= totals/ number***
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total score (by part e.g. 2a)**	
2a	4	1	5	5	3	5	5	3	4	3	5	5	**43**	**3.58**
2b	3	4	4	3	3	2	4	3	3	4	4	4	41	3.42
2c	4	1	1	2	2	3	2	4	2	2	4	0	27	2.25
3a														4
3b														n/a
4														Not enough data
6														4
Total (by HLC type)														**16.25 out of a possible 25**

6. Testing/ verifying and applying the results

Part 6:

Replicability
Of the protected landscapes in South West England, five AONBs fall within the area covered by the Devon Historic Landscape Character project and have therefore been mapped to the same classification. Although each of these AONBs has its own character, they share a common framework of HLC types albeit with different evolutions and dominance of particular HLC types (See Turner 2007). It would therefore be valuable, to test the methodology in another landscape such as the East Devon AONB or Tamar Valley AONB.

However, there are a number of health warnings that would need to be considered when applying this methodology elsewhere:

- The scoring system was designed to be objective, but ultimately there are many variables that mean that the scoring is quite subjective, as it is based on the best available data that is available and the interpretation of the data/ professional judgement.
- Measuring ecosystem service flow from a study square rich in historic field boundaries, for example from biomass and flood alleviation, does yield results in terms of data but is an imprecise science, with many assumptions made.
- Further measuring of ecosystem service flow linked to the historic environment is challenging, with many assumptions made. A further assessment needs to be made of the HER assets associated with field boundaries and whether assessing the services they provide (to a range of beneficiaries) is the best and most appropriate way of monetising the added value of the historic environment, in terms of historic field boundaries.

Part 6 of the methodology looks at the determination of *confidence* for replicability of data: Historic Landscape Characterisation (HLC)
Within the 4 study areas, assess individual HLC areas based on fit with the results of part 1. This is designed as a cross-check to allow:

- the HLC area types to be fine-tuned and verified
- ditto for field boundary loss in the HLC areas

The findings show that the results found do broadly fit with the HLC type, for example field boundaries in a medieval enclosure HLC had characteristics that fit with the HLC such as sinuous nature, small fields, thicker and more ancient boundaries. There was however the anomaly in the Blackdown Hills that many of the more recently enclosed HLC were in part made up of field boundaries that are more ancient in origin.
It was therefore assumed, albeit subjective, that a score of 4 is appropriate for study area 1 and 2.

Score	Rationale
4	*Confidence* fit between data obtained and HLC area characteristics and field boundary loss

This supplementary score then allows robust decision making regarding use of the data (in its relationship to an HLC type) elsewhere i.e. its replicability.

Recommendations and how we have applied this work

One of the objectives of this study was to advocate the use of the case study by others (in their plans & strategies) and that this work influences decision making.

To date, we have actively engaged with the following groups and will continue to use the outputs from this report after the end of the current contract to advocate for the inclusion of the historic environment in natural capital/ ecosystem service assessments:

- The Blackdown Hills AONB Partnership who are revising their 5 year Management Plan
- Other AONB protected landscapes across England and especially in Devon, Cornwall & Somerset, who are also revising their 5 year Management Plans
- Local authority colleagues- in County and District Councils
- Developers and promoters e.g. Greater Exeter Strategic Plan (GESP) who have been undertaking Natural Capital mapping
- Other decision makers such as the Environment Agency, Catchment Partnerships
- Aligning the 25 Year Environment Plan with the AONB plans and strategies

The Project Team will:

- use the outputs to help inform our response to the call for evidence for the Review of Protected Landscapes[9].
- work with the farm facilitation group (58 farmer members) to celebrate the richness of the farmed field boundaries, raise awareness on appropriate management and secure funding for management in addition to any agri-environment payments. An example is money through National Grid's Landscape Enhancement Initiative grant scheme.
- work with partners and decision makers to embed our findings into other plans and strategies including Management Plans and Natural Capital Mapping undertaken by others, for example linked to the Greater Exeter Strategic Plan.
- communicate the findings of the study to the AONB family (46 in England, Wales and Northern Ireland).
- use the outputs to inform the review of the Blackdown Hills AONB Management Plan, a statutory plan owned by the component Local Authorities.
- use the outputs to help shape the proposed Environment Land Management Scheme trial for the Blackdown Hills AONB (& East Devon AONB), that has been submitted to Defra for consideration (a proposal for the Blackdown Hills is included in a National Association of AONB's proposal[10] as well as well used in helping to shape post Brexit farm support mechanisms.
- use the outputs to underpin a new work strand that will celebrate sense of place and further work to study what's changed in the landscape, what hasn't changed and what local communities value.

[9] https://consult.defra.gov.uk/land-use/landscapes-review-call-for-evidence/
[10] http://www.landscapesforlife.org.uk/wp-content/uploads/2018/09/Farming-for-the-Nation-AONBs-as-test-beds-for-a-new-Environmental-Land-Management-Scheme-FINAL.pdf

There are various areas of the study that would benefit from further analysis in order to tease out the natural capital and ecosystem service benefits. Statistical analysis of data for ecosystem service flow could also be undertaken.

Lessons learnt

- Poor baseline data (GIS layers and biological data) hampered assessment. Based on the experience of the Project Team, this is assumed to be commonplace in other landscapes too.
- Modelling botanical biodiversity as a function of the estimated age of the boundary was suggested as a proxy. This would have involved assuming that the older the boundary the greater the number of species growing on it ('Hooper's Hedgerow Hypothesis') and see annex 10. In Devon traditional hedge planting in the historic era typically included a greater number of woody species than elsewhere. Therefore, a relatively modern boundary may have a comparable woody species count to a more ancient boundary. However, age could still be considered to indicate greater overall biodiversity.
- Gathering the type, extent and condition of boundaries in study areas was essential, to underpin assessment, however this was time consuming/ costly and there are limits to what is possible via use of aerial photographs (AP). For example, ascertaining the height of boundaries and whether a hedge was on a hedge bank or not from AP was very challenging and therefore time consuming/ costly. It was therefore possible in this study to determine the width of boundaries from AP, but not vertical distance (height).
- The method used was therefore resource hungry but without detailed assessment, the true value of natural capital stock and ecosystem service flow could not have been determined.
- Determining association of field boundaries and HER's was time demanding and ultimately hard to measure the benefits, but was considered to be an important element in making associations that can be valued.
- Ground truthing was essential and we needed to do more.
- Due to the fact that only two of the four study squares were studies in detail and these two squares were quite close to each other, we had less ability to compare and contrast than we had hoped and in effect had no control areas.
- Defining biomass (carbon) and flood alleviation services provided by field boundaries was not too challenging to calculate, although based on a series of assumptions.
- Natural capital accounting and measuring other ecosystem service flows was more complicated and despite testing various methods, we did not obtain conclusive results.
- It is important to have a range of skills within the team to enable professional judgements to be taken on the different types of heritage. The balance was about right in the team chosen.
- Differentiating between field boundaries and associated land management (for the purposes of this study) was perhaps an artificial divide, when in fact we were trying to demonstrate the link between land management, field boundaries and the integral contribution that historic and cultural heritage plays in fully valuing the natural capital value and ecosystem service flows.
- The extra effort of talking to local historians and facilitation farmers was considered worthwhile in terms of adding depth to the study and cultural heritage evidence
- More time analysing the results from our ecosystem service expert's work (Andy Bell) would have been good. Plus working with him on the trends/conclusions. But some interesting pointers have emerged. See comments below on a pre-sift of HER asset types, which could also have

been applied to Andy Bell's work – but it is useful to compare between 'relevant' and not relevant types.

- **HER Assets:** up-front rationalisation/ agreement of relevant heritage assets – which are clearly associated with HLC types – would have saved time for the experts in our team. But overall, it is considered that we ended up with the right approach for the part 2a methodology.
- **Compatibility of HLC:** Having two different HLC methodologies for Somerset and Devon added a level of complexity to the Sampford study area and to some extent comparing this with Hemyock. Keeping to a single methodology (for the whole study or for individual study areas) would have been simpler. Alternatively some up-front work could have been done to homogenise the HLC types.
- **Study Areas:** Lack of biodiversity (and capacity for condition analysis data) for 2 of the study areas (1). We could have based choice on availability of data.
- Following on from (1) the reduction to two study areas meant that we lost certain key HLC types, such as classic/documented Parliamentary Inclosure landscapes and LCA types such as valley bottom. Our two areas were quite similar in some respects – although Sampford had more extensive woodland and unenclosed common which has allowed some useful contrast. Though similarities in enclosed landscape types do allow for corroboration of results?
- **Level of Detail:** Condition analysis was very useful – probably some of the most useful evidence to sit alongside HLC and HER data - but complex/ time consuming (1). Could it realistically be applied over larger areas? Can a quicker version be developed, or was it in fact cost-effective? Is there a simpler but rigorous enough way of looking at condition, by area (e.g an HLC block) using aerial photos and LiDAR?
- **Specialist Input:** May have worked better if natural capital specialist led (3), with input from HE/AONB rather than the way we did it? But still a useful experience for all the non-specialist parties!
- **Access and other 'values'** : Pre-selection of study areas with measurable public access might have given useful/usable information. There was discussion around including a known 'magnet', such as a publicly accessible Scheduled Monument, within a study area. However, this did not fit easily with the projects objectives of assessing 'everyday' farmed landscape and 'linear features'. A Scheduled hillfort (but selected as it is part of an anciently enclosed HLC type) was included, but this study area could not be progressed for reasons set out in (1).
- Resources did not permit gathering of more information on valuing the landscape from various stakeholder sectors (part 5 of the methodology) – local historians, land managers, residents, visitors. Where we did have this it was shown to enhance results (part 2a/2b of the methodology) and could presumably have assisted with Ecosystem Services section as well.

Conclusions

Demonstrating the link between the historic environment and the natural capital stock is challenging, as it relies on having comprehensive datasets that are often not available at the correct resolution. In the Blackdown Hills AONB, as a result of the pre-designation archaeological surveys and recent National Mapping Programme survey that provides more detailed historic environment information, it transpires that in this case study the biological data was often at too coarse a scale for meaningful analysis. The methodology therefore requires sufficient detail of data that could be collated given resources to do so, or proxys used. The pros and cons of each are that gathering of detailed biological data is time demanding/ costly although proxys can be inaccurate. Including biological and historic/ cultural measures in one scoring system requires the appropriate expert specialisms of more than one person and can become subjective when trying to align one with the other (in terms of scoring).

The hypotheses were proved to be largely correct; some HLC's in study squares are richer in natural capital than others and provide a wider range and more benefit to society. In addition, there is evidence that the natural capital value is currently undervalued.

Looking over the tables on ecosystem service values for particular HER asset types, scored by Provisioning, Cultural/Regulatory and Supporting services, there is a trend of higher for those HER types that are most clearly part of the landscape, for example woodlands, orchards, various types of extractive pits (which mostly are tree covered now – by human or natural processes), field systems, trackways, boundaries, curvilinear enclosure.

Similarly the tabulation of land use type by HLC type seems to be showing high ecosystem service values in both study areas for those land uses (generally permanent pasture and woodland) that are most closely associated with the more ancient and heritage asset rich HLC types. For example, in the Hemyock study area medieval enclosure landscape HLC types accounts for 43% of the area's permanent pasture – which scores highly for a range of services.

In addition, proxy services were identified including pollinators (in species rich hedge margins in adjacent priority habitats) and cultural heritage.

The ecosystem services provided by a heritage rich HLC's in study squares is considered to be high when including actual services provided (including biomass, flood alleviation, access & recreation, biodiversity and cultural heritage) and proxy services provided (including pollinators).

What this study managed to demonstrate, albeit on a local scale, was that there are areas in study squares associated with HLC's of greater time depth where there is synergy, co-incidence and association of biological, historic and culturally rich field boundary networks, often in a good condition, that are associated with adjacent priority habitats, bounded by important boundaries (parish boundaries) and criss-crossed by public rights of way.

Further work/ what we don't yet know and would be helpful

- Further analysis on the GIS dataset collected (e.g. 'treedness' hedgerow trees, parish boundaries) would be worthwhile but has not been possible during this study.

- Statistical analysis of the ecosystem services benefits would be worthwhile
- Do the GIS work for other two survey squares in order that the type, extent and condition of field boundaries can be ascertained
- PROW next to field boundaries needs analysis

Figure 13: Water level sluice for catch meadow in study area 1

Annexes

Annex number	Title
1	Original Project proposal
2	Methodology for choice of study areas
3	Long-list of study areas
4	Location map of short-listed sites
5	Methodology for determining significance
6a	Tables outlining the combined historic and biological value of HLC's within study area 1 (Hemyock area)
6b	Tables outlining the combined historic and biological value of HLC's within study area 2 (Wrangway/ Sampford area)
6c	Tables outlining the combined historic and biological value of HLC's within study area 3 (Stockland area)
6d	Tables outlining the combined historic and biological value of HLC's within study area 4 (Monkton area)
7	Metadata used for mapping work for part 1b of the methodology
8	Discussion of Landscape Character Areas (LCAs), Historic Landscape Characters (HLCs) and HER sites/other historical features
9	Natural Capital accounts for the Blackdown Hills AONB assessment
10	Definition of an 'Important Hedgerow'
11 a,b,c,d	Responses to inform part 3c of the methodology
12	Evidence provided by local historians/ parish members who are born and bred in the landowning community in/ near a study square
13	References

Annex 1: Call for Proposals

Heritage, natural capital and ecosystem services: case studies

Project No: 7705

The Blackdown Hills Area of Outstanding Natural Beauty Case Study:

An integrated approach to valuing environmental capital and services (boundaries and linear landscape features)

Blackdown Hills
Area of Outstanding Natural Beauty

Devon
County Council

Project name:	**Heritage, natural capital and ecosystem services: case studies (Blackdown Hills)**
Historic England reference number:	**7705**
Authors:	Tim Youngs, Blackdown Hills AONB Manager St Ivel House Station Road Hemyock Devon EX13 3SJ 01823 680681 tim.youngs@devon.gov.uk http://www.blackdownhillsaonb.org.uk/ Bill Horner, County Archaeologist Devon County Council County Hall Topsham Road Exeter Devon EX2 4QD 01392 382494 bill.horner@devon.gov.uk https://new.devon.gov.uk/historicenvironment/
Origin date	4th January 2018
Reviser(s)	
Date of Last Revision	
Summary of Changes	

Background

Historic England propose a series of pilot studies to explore how the heritage sector might more fruitfully engage with natural capital and ecosystem services approaches. By looking in detail at the heritage associated with particular environmental contexts. The aim of the overall project is to explore how the historic environment might be better included in these approaches contribute to developing guidelines.

The Blackdown Hills Area of Outstanding Natural Beauty (AONB) – see overview map in annex- has a suite of special qualities that together make it unique and outstanding, underpinning its designation as a nationally important protected landscape (designated in 1991). The Blackdown Hills AONB Case Study will explore the Historic Landscape Character (HLC) of the AONB, looking at the pattern of fields, boundaries and linear landscape features of this 'everyday' but extremely special farmed and managed landscape. It will consider the heritage assets that are integral to these patterns (e.g. prehistoric enclosures; parish boundaries) and those that are regularly associated with them (e.g. orchards within former extractive pits; veteran hedgerow trees and catch-meadow irrigation systems). The case study will look at the landscape as a provider of different and varied environmental services.

The Blackdown Hills straddle the county boundary between Devon and Somerset. They are a distinctive, diverse rural landscape stretching from the prominent scarp above the M5 in the north to Honiton and Axminster in the south, and from Chard in the east to Culmstock in the west. Ranging from around 50 to 310 metres above sea level, the area is characterised by a sense of relative remoteness and tranquillity. From the dramatic, steep, wooded north-facing scarp, the area dips gently southwards as a flat-topped plateau deeply dissected by valleys. This is the northern part of the East Devon Plateau – one of the finest, most extensive in Britain. The tops are open and windswept; in the valleys villages and hamlets nestle among ancient patterns of small, enclosed fields and a maze of winding lanes lined with high hedgebanks. The steep valleys support a patchwork of woodland and heath, nationally and regionally important habitats which support a wealth of charismatic and priority species and interesting plant communities.

It is an isolated, unspoilt rural area and remains relatively undisturbed by modern development and so ancient landscape features, special habitats, historical and archaeological remains have survived intact. The traditional pattern of villages, hamlets, paths and roads remains largely unchanged and there is an identifiable and characteristic vernacular, pastoral landscape. There is a diversity of landscape patterns and pictures. The visual quality of the landscape is high and is derived from the complex patterns and mosaics of landscapes. Although the scenery is immensely varied, particular features are repeated. Ancient, species-rich hedgerows delineate the fields and define the character of the landscape, enclosing narrow twisting lanes. There are long views over field-patterned landscapes. The high plateau is dissected by steep valleys, supporting a patchwork of woodland and heath, and fine avenues of beech along the ridge. The history of medieval and parliamentary enclosures has resulted in an individual, patchwork landscape of small fields in the valleys and larger fields with straight hedges on the plateau.

The landscapes of the Blackdown Hills have been created by the interplay of people and the land over the centuries. There are significant concentrations of early prehistoric evidence: since prehistoric times those who lived here have left evidence of their activities that can still been seen today; tools from the Neolithic, Bronze Age barrows on the ridge tops and spectacular Iron Age hillforts that dominate the surrounding lowlands. The Romans left their villas and extensive evidence of iron working. The pattern of fields medieval, and in places prehistoric, in its origins. The ancient woodlands and the Royal hunting forest of Neroche are also survivals of the medieval period. Parliamentary enclosure of the commons, culminating in the 19th century, created the regular fields and straight roads of the plateau tops. Three airfields on the plateau played important roles in World War Two. Since that time there has been a substantial loss of hedgerows and orchards to meet the needs of modern agriculture; simplifying parts of the landscape and masking their early origins.

The biodiversity of the Blackdown Hills is one of its greatest assets. The unique geology and landscape patterns of the area have combined with traditional management to support a rich diversity of habitats and species. This immense variety, with patches of valuable habitat scattered throughout the landscape, is notable; these include flower-rich meadows, ancient hedgerows, springline mire, wet woodland, heathland, calcareous grassland, ancient woodland, fen and bog. Bees, butterflies, birds, bats and many other animals, some nationally scarce, thrive in the Blackdown Hills, feeding and breeding in the habitats the area provides. These habitats and wildlife bring colour, texture, sound and life to the landscape, epitomising the mental picture of the 'English Countryside', which has, in reality, long since disappeared elsewhere.

The natural capital value of these features has not been measured and indeed there is little information on the extent and condition of the resource overall. There are some useful background reports that can be drawn upon, for example on the potential woodfuel resource from hedges in the Blackdown Hills. For the historic environment a baseline desk-based survey of the area was undertaken prior to designation as an AONB. Historic Landscape Characterisation was completed in 2005 and a National Mapping Programme project will be completed in early 2018.

The AONB Partnership intends to investigate the application of natural capital and ecosystem services within the AONB, in relation to the various landscape management initiatives outlined under Aims (below), but are very enthusiastic about the potential to link this with appropriate appraisal of associated heritage value.

Aims

This is one of a number of initiatives through which Historic England aim to support the heritage sector in engaging with natural capital and ecosystem services methodologies in order to protect the historic environment within future environmental policy. The case studies will primarily address how the historic environment might be better included, but will also inform the development of the guidance for the heritage sector on how to engage with natural capital and ecosystem services approaches. The development of the guidance itself will be the subject of a separate project.

Methodological Aims

By looking in detail at the heritage associated with the historic landscape character of the Blackdown Hills, this pilot study will meet the generic aims of the project, which are to:

- Identify the heritage alongside the natural capital associated with these environments. To what extent do the two coincide? What is the relationship between the two?
- Set out in the language of ecosystem services what public and environmental goods and services the heritage assets provide (including 'provisioning', 'supporting', 'regulatory' and 'cultural services')
- Identify other values that fall outside the ecosystem services framework that can be ascribed to the heritage assets.
- In doing the above develop a methodology that can be used to ensure that heritage can be reflected in a way that is compatible with natural capital and ecosystem services approaches.
- Provide the heritage and natural environment sectors with case study examples of how this might work for different environmental contexts.

In addition to the above, aims specific to the Blackdown Hills AONB Case Study are to:

- Identify what natural capital/ecosystem service value is associated with the antiquity and/or intactness of specific Historic Landscape Character types.

- Identify if this natural capital/ecosystem service value is enhanced by the presence of heritage asset types that are integral to or commonly associated with field boundaries or particular HLC types.

Management Aims

- Link and feed into on work being done through the Local Nature Partnerships (Devon & Somerset) and other strategic development partnerships (such as the Greater Exeter Strategic Plan https://www.gesp.org.uk/) who are undertaking Natural Capital assessments with a view to better informing strategic land use planning
- Link and feed into on-going consultations regarding the future shape of support schemes for agriculture and the rural economy, specifically around the benefits of managing natural, historic and cultural heritage assets across landscapes that deliver a full range of public and environmental goods and services

Outreach/ Dissemination Aims

- Understanding of natural capital/ ecosystem services within the heritage sector
- Understanding of added value of historic environment within the natural environment sector
- Work with the Blackdown Hills Farming & Woodland Group (Countryside Stewardship facilitation fund) to ground truth and engage the farming community in the process
- Use the outputs of the case study to link to underpin delivery of policies in the Blackdown Hills AONB Management Plan and other plans, projects and strategies for example trees outside woods and boundary initiatives
- Share the outputs with land use planners and other decision makers, for example to aid decision making around developments such as solar arrays

Business Case

The field boundary patterns of the Blackdown Hills (predominantly hedges on tall hedgebanks with numerous hedgerow trees-some veterans- and numerous small copses) are a major part of the landscape value and one of the primary special qualities underpinning the area's designation as an AONB. The importance of boundaries and linear landscape features in the Blackdown Hills landscape is why this theme has been chosen.

The geographic focus within the Blackdown Hills AONB (part of the Blackdown Hills National Character Area number 147) are four case study areas that will be studied in detail.

By taking an evidence based approach within discreet areas of a protected landscape, it is envisaged that results can be extrapolated and used as proxies for the rest of the AONB but also for other AONB's in the AONB family and across the wider countryside, as the Blackdown Hills is considered to be a replicable case study.

The project should be undertaken at this time with the proposed team for the following reasons:

- There are several projects and initiatives running that would benefit from a more robust evidence base that better incorporates the historic environment, for example the Blackdown Hills Facilitation Fund, the AONB Management Plan review (for the next plan 2019-2024). Team members are engaged in all these.
- There are large strategic developments planned both within and adjacent to the Blackdown Hills AONB that would benefit from a more robust evidence base that better incorporates the historic environment, for example the Greater Exeter Strategic Plan and the A30/A303 strategic road improvements.

Outputs from the project will include:

- A final report including evidence base, ecosystem service narrative, analysis and draft methodology

Impact/ outcomes have been evaluated as follows and this process will continue at the inception/ planning stage of the project:

- Where we are at present (e.g. what we already know or what tools or information already exists).
- Planned outputs (products) and outcomes (the impact these products will have)
- How we will determine if your outcomes/ impact have been achieved
- When and how often we will assess outcomes/impact
- How we will present the evidence

The project directly links and supports the Historic England Corporate Plan and the South West Archaeological Research Framework.

The project will provide a good return on investment for Historic England as:

- The intervention rate being requested is 72% and represents good value for money
- The results are considered applicable across wider landscapes outside of the Blackdown Hills
- The project will provide leverage into other plans, strategies and policies and create a multiplier effect]
- The project will better embed historic heritage are an integral part of assessing the public goods and services provided from heritage rich landscapes

Various stakeholders will need to be involved in the project and have already been warmed-up, for example the AONB Partnership, other heritage contacts and local interest groups and farmers/ landowners.

The project will benefit the following groups:

- Decision makers who need a robust evidence base, for example local authorities who are undertaking generic natural capital assessments and would benefit from more detailed studies
- Policy makers who need case studies for natural capital and ecosystem services
- Landowners and farmers who need to demonstrate the public goods and services that their land/ land management provides

The project will also change attitudes and behaviours, especially towards the perception of the value of the historic and cultural heritage i.e. by better assigning and quantifying the value, the historic environment should become more integral in thinking, planning and delivering. In effect, sectoral attitudes should change over time, moving away from ‘silo’ thinking and actions.

The project has been well discussed with key players and there is keen support for it. Should the project be successful, a steering group will be established of the project team and other key players including Historic England staff and academics. The steering group will undertake roles including choosing the areas of focus and shaping the methodology. The project will be well publicised.

Key players engaged to date include the North Devon Biosphere Pioneer Programme (Natural Capital) and the Blackdown Hills AONB are proposed to be included in other pilots/ case studies linked to the forthcoming Defra 25 Year Environment Plan as well as developing environmental policy including and emerging Agriculture Strategy.

Need for the project:

High Level: Our proposal is looking at the historic landscape character of a Protected Landscape. This is the 'everyday' farmed/managed landscape within the AONB.

- We know from the recent National Mapping Programme (NMP) work that there is a correlation between HER's, SHINE sites, earthwork forms on a landscape scale and hedgebanks.
- The accurate extent and condition of the resource is currently unknown, especially for hedgerows/ hedgebanks/ hedgerow trees (including veterans). The NMP mapped linear earth banks across the Blackdown Hills.
- In a changing policy world post Brexit, earthwork forms on a landscape scale are vulnerable to change as the medieval boundaries in particular are associated with marginal, often family run farms that have remained mostly unchanged through time.
- The true heritage value to society of the earthwork forms on a landscape scale cannot currently be ascertained.

The strengths of this project:

- The Blackdown Hills AONB area represents an 'everyday, replicable protected landscape with strong Heritage Landscape Character areas.
- Strong existing partnership of AONB, Devon County Council /Somerset County Council/South West Heritage Trust
- The proposed project team are already working together on a number of projects with cross-sectoral input.
- Timely – there are various management initiatives already operational that will dovetail and add value
- Building on recent baseline surveys – most recently the National Mapping Programme
- The ability to draw and share expertise throughout the AONB Family (34 AONB's in England)
- The marginal farming landscapes of the Blackdown Hills area are considered to be vulnerable to land use policy change. A key strand of project development work generally is therefore looking at building farm resilience.

Development work
We would foresee that work undertaken throughout the project (via workshops, peer to peer learning and researching) would include:

- Apply a natural capital accounting measure to fully value the resource, in terms of historic/ natural heritage value and other value to society (e.g. carbon, fuel, amenity, landscape).
- Assess what other values fall outside the ecosystem services framework that can be ascribed to the heritage assets.
- Develop a methodology that can be used to ensure that heritage can be reflected in a way that is comparable with natural capital and ecosystem services approaches.

Project team

Lead/ partners:

- The lead partner and applicant will be the Blackdown Hills Area AONB.
- Partners include Historic England, Devon County Council, Somerset County Council/ South West Heritage Trust, Blackdown Hills Hedge Association, Blackdown Hills Rough Grazing Association, Historic England, the Blackdown Hills Farming & Woodland Group (established via the Countryside Stewardship Facilitation fund).

The choice of hand-picked staff (listed below with initials in brackets[11]) is based on the skills/experience required to deliver this project. A brief CV is included under each person's name.

AONB

- Tim Youngs (TY) –AONB Manager Blackdown Hills AONB - over 20 years' experience in the heritage sector
- Lisa Turner (LT)- AONB Planning Officer- over 20 years' experience of local government, planning & environment

DCC

- Bill Horner (BH) – Devon County Archaeologist (Devon County Council)- over 30 years' experience in the historic environment sector
- HER staff (Devon HER)- a small team of experienced staff

South West Heritage Trust (SWHT)

- Somerset HER and Historic Environment advice- a small team of experienced staff

Project Officer - (PO)- experienced staff

Experts

- Andy Bell (AB) – North Devon Biosphere Manager- over 30 years' experience in heritage, forestry and ecosystem service/ natural capital development
- Local Records Centres- (LRC) –Devon & Somerset- experienced staff

Tim Youngs and Andy Bell will undertake quality assurance for the project.

Methods Statement

Sources

Geographic focus: Four case study areas within the Blackdown Hills AONB in the Blackdown Hills National Character Area (number 147).

Four, two by two-kilometre case study areas (with 'fuzzy' boundaries) within the Blackdown Hills will be selected to:

- Identify the natural capital, historic landscape character and associated natural, historic and cultural heritage.
- Identify the co-incidence between natural, historic and cultural heritage, particularly that associated with field boundaries and linear landscape features.
- Compare the value of each case study area in terms of its combined natural capital and other valued heritage
- Analyse and reflect on the current support mechanisms in place to support conservation and enhancement of such landscapes and what a move to more natural capital and ecosystem service based reward systems would mean in each case study area

The four case study areas will include key Historic Landscape Character types:

- Anciently enclosed (Prehistoric and medieval) land.
- Ancient Woodland.
- Heathland/Waste
- Post-medieval enclosed land.
- Modern (Parliamentary Inclosure) enclosed land.

Two examples of possible case study areas are highlighted in the annex, one showing a landscape characterised by intact ancient prehistoric and medieval boundary patterns and a second showing field boundary patterns dominated by 19th century Parliamentary Inclosure.

[11] Note that the team member's initials are quoted throughout this proposal paper

The principal information sources will be:

- Devon and Somerset Historic Landscape Character mapping (held by the Devon and Somerset Historic Environment Records).
- Designated and undesignated Heritage Asset records held by the Devon and Somerset HERs.
- National Mapping Programme information held by the Devon and Somerset HERs.
- Vertical Aerial Photographic coverage (1940's – present) held by the HERs.
- Designated and un-designated natural environment data held by the Devon Biodiversity Record Centre and the Somerset Environmental Records Centre.
- Relevant reports (e.g. on Wood Fuel) held by the Blackdown Hills AONB and partners.

Within the four case study areas the following work will be undertaken:

- Ground truthing of key natural environment interest within HLC types (where not already clear from Record Centre data).
- Accurately map the current natural and historic environment resource. Focus on hedges/ hedge banks/ hedgerow trees (some veteran), historic landscape character, linear landscape features and heritage assets associated with them.
- Identify natural, historic and cultural heritage synergies.
- Express the synergies in terms of the public and environmental goods and services the heritage assets provided.

Health & Safety (H&S) Statement

The project will comply with all relevant Devon County Council Corporate H&S Policy
The AONB operates a Lone Worker Policy and has the correct Risk Assessments in place.

Risk log

Scale 0-3 where 0= none and 3=high

Risk number	Description	Probability	Impact	Counter measures/ mitigation	Residual total (P*I)	Owner	Date [12]
1	Failure to secure staff	1	3	Hand pick trusted experts	1	TY/ BH	
2	Staff leave	1	3	Hand pick trusted experts	1	TY/ BH	
3	Timescale	1	3	Steering Group and sound project management	1	TY	
4	Expertise on project team	1	3	Hand pick trusted experts	1	TY	
5	Over budget	1	3	Steering Group and sound project	1	TY	

[12] this entry last updated

				management			

Products, Communication and Engagement

A report will be produced to a common format for inclusion in a single edited volume within the Historic England Research Report series. The common format will be agreed at the first of the two-day seminars.

The report will include:

- Executive Summary
- Aims: Discussion of the project's aims.
- Background: Brief description of the AONB, the functions and management objectives of the AONB Partnership and key stakeholders in the landscape.
- The Resource: Introduction to the natural and historic landscape character of the AONB and key natural and historic environment attributes.
- The Study Areas: Discussion of the location of the case studies, more detail on the natural and historic environment resource within them and the rationale for their selection.
- Methodology: Discussion of the methodology applied to the case study areas (Expanding on Methodology described above)
- Results: Illustrated discussion of the findings within each case study area.
- Recommendations including Critical Review of the methodology.

Data storage and dissemination

The GIS mapping produced for the case study areas will be retained by the relevant HERs and Environmental Record Centres. That for Devon will be made publically available through Devon County Council's Environmental Viewer web portal (https://new.devon.gov.uk/environment/environmental-maps).

An illustrated summary of the project will be prepared for the Blackdown Hills AONB and the Devon County Council Historic Environment Group websites. This will include links to the published case study reports and overall project report on Historic England's website.

The Archaeological Data Service (ADS) will be contacted regarding storing relevant digital records.

Historic England will be granted a perpetual, non-exclusive royalty free licence to use the data resulting from the project.

Local communication and engagement will be undertaken through the Blackdown Hills AONB Partnership. This will include:

- Information about the commencement of and progress with the project on the AONB website (http://www.blackdownhillsaonb.org.uk/).
- Public presentation of the results on the website.
- A presentation on work while in progress and after completion at the Blackdown Hills AONB Heritage Forum and other relevant AONB public meetings.

Task list

Task No	Task detail	**Lead** (shown by initial)	No days
Project management			
1	Convene steering group	TY	0
2	Ecosystem Service mentoring and review	AB	2
3	Overall project management	TY	2
4	Historic Environment review and mentoring	BH	4
Stage 1: Delivery			
5	Attend Workshop 1	TY/PO	1+1
6	Attend steering group meetings	TY/PO/BH/SWHT	2+2+2+2
7	Data collation	PO/ LRC	2+3
8	Desk-based analysis of the resource using GIS	PO	4
9	Ground-truthing	PO/ LRC	2+1
10	Assess the synergy between historic, natural and cultural heritage[13]	PO	
11	Set out in the language of ecosystem services what public and environmental goods and services the heritage assets provide (including 'provisioning', 'supporting', 'regulatory' and 'cultural services')	AB	3
12	Assess what values fall outside the ecosystem service framework	PO	1
13	Develop a methodology that can be used to ensure that heritage can be reflected in a way that is comparable with natural capital and ecosystem service approaches	PO/ All	1
Stage 2: Reporting			
14	Produce draft of case study	PO	4
15	Attend Workshop 2	TY/PO	1+1
16	Produce final report	PO	2
	TOTAL number of days (grant funded)		**43**

[13] Express in the language of ecosystem services- provisioning, supporting, regulatory, cultural services

Budget

Costs (18/19)	Day rate (£)	Days	Cost (£)	Total
Direct costs- Contractor staff				
Project Manager		5		
Heritage Environment Expert		4		
Total salary costs for year				
Non-staff costs			-	-
Expert/ Project Officer		22		
Expert (historic environment SWHT)		3		
Expert (local records centre)		4		
Expert (ecosystem services)		5		
Net total 2018/19		**43**		
Heritage Environment Expert		5		
Support (Devon HER staff)		5		
Support (AONB staff)		2		
Greater Exeter Strategic Plan Natural Capital Mapping[14]				
Net total 2018/19				
Total project cost				**20235**
Total grant requested				**14610**
VAT (if applicable- that cannot be reclaimed)				**0**
Gross total 2018/19				**14610**

[14] The mapping study includes the Blackdown Hills area. A proportion of the total cost of this study has been included

Timetable

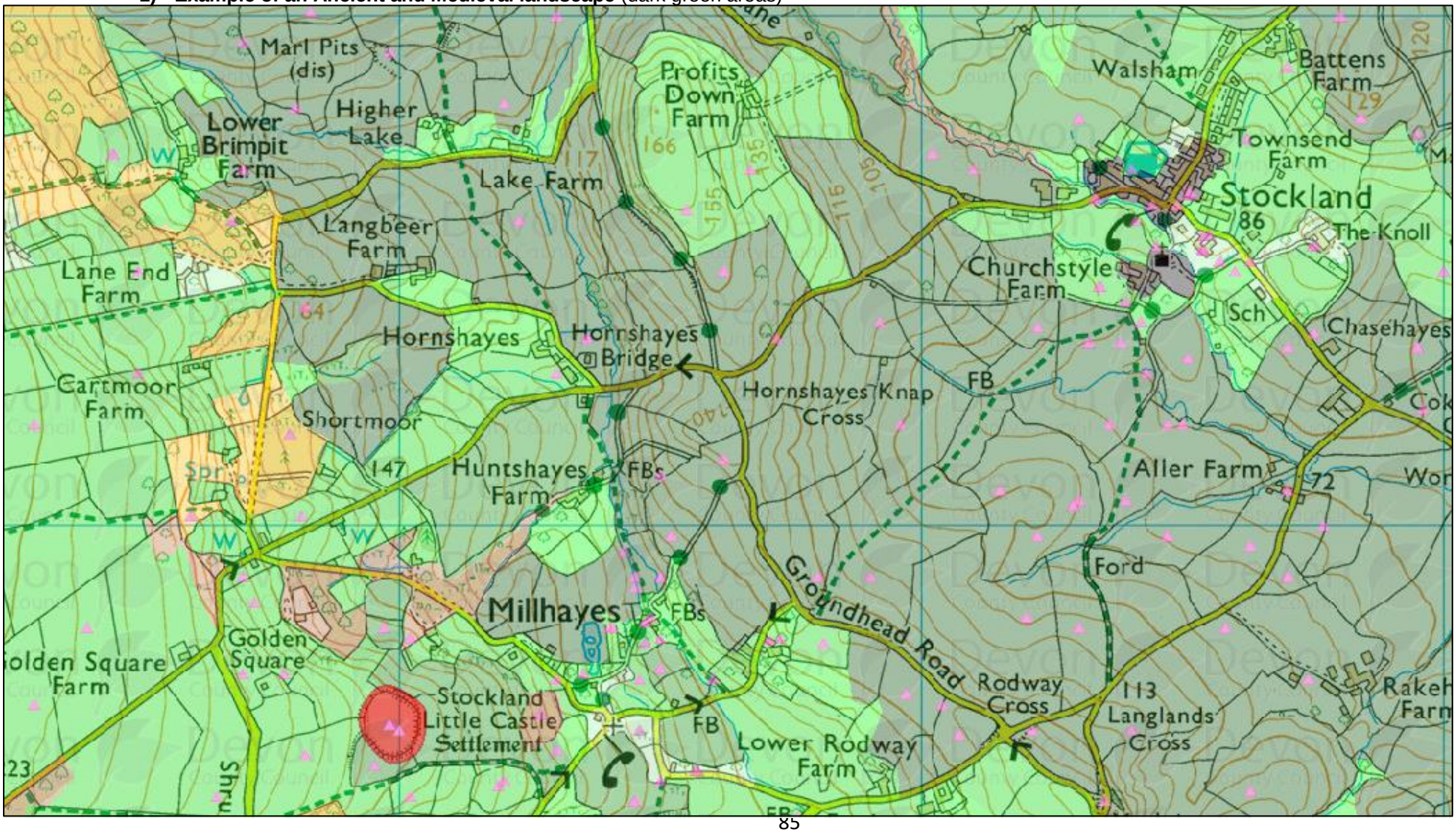
Task No	Task detail	Q1 18/19	Q2 18/19
1	Convene steering group		
2	Ecosystem Service mentoring and review		
3	Overall project management		
4	Historic Environment review		
5	Attend Workshop 1		
6	Data collation		
7	Desk-based analysis of the resource using GIS		
8	Ground-truthing		
9	Assess the synergy between historic, natural and cultural heritage[15]		
10	Set out in the language of ecosystem services what public and environmental goods and services the heritage assets provide (including 'provisioning', 'supporting', 'regulatory' and 'cultural services')		
11	Assess what values fall outside the ecosystem service framework		
12	Develop a methodology that can be used to ensure that heritage can be reflected in a way that is comparable with natural capital and ecosystem service approaches		
13	Produce draft of case study		
14	Attend Workshop 2		
15	Produce final report		

[15] Express in the language of ecosystem services- provisioning, supporting, regulatory, cultural services

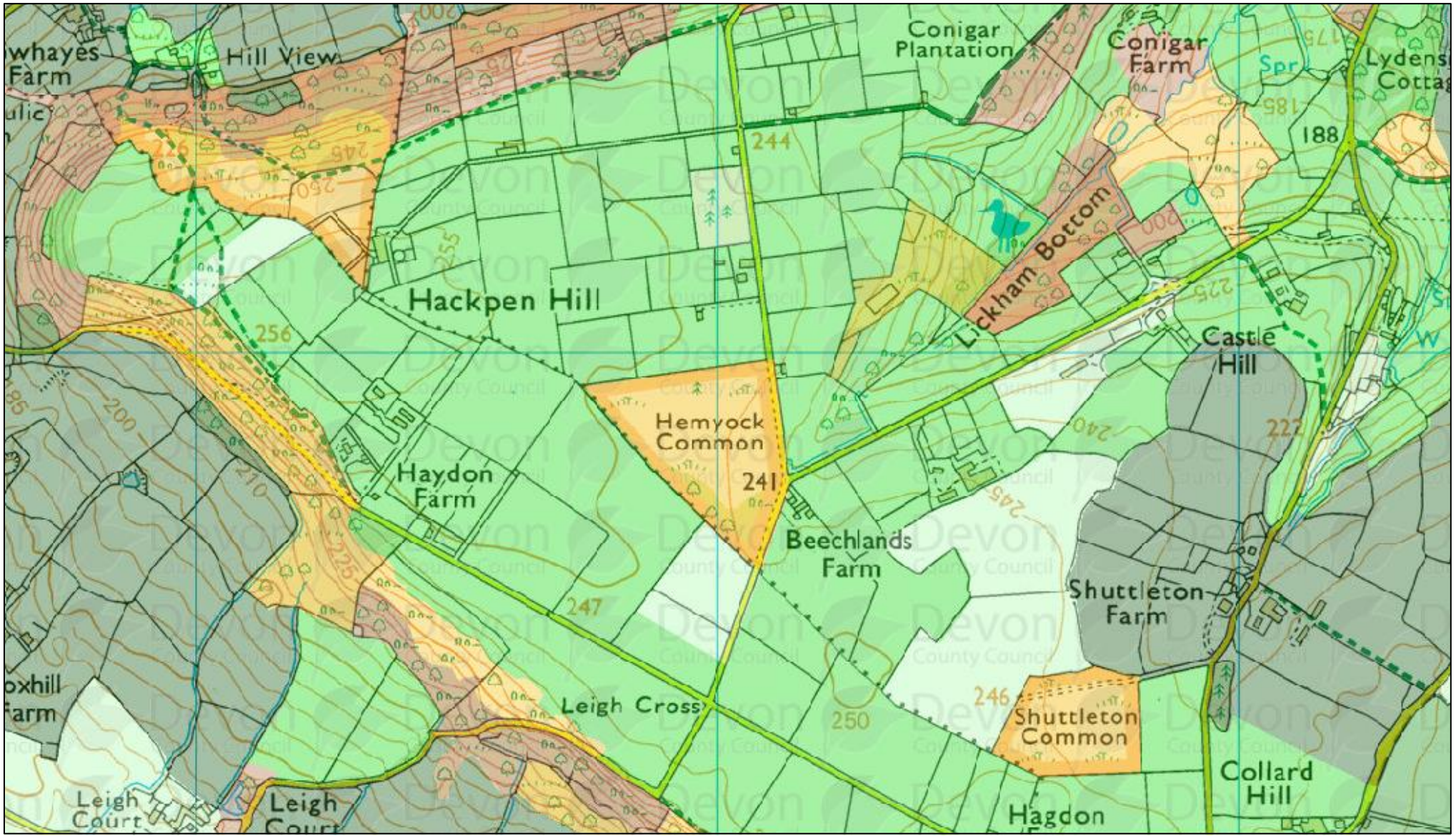
Location Map- Blackdown Hills AONB

Two case study example using the Historic Landscape Character assessment

1) **Example of an Ancient and Medieval landscape** (dark green areas)



2) Example of a Parliamentary Enclosure landscape (light green areas)



Annex 2: Methodology for choice of study areas

Tim Youngs, Bill Horner, updated 23 April '18

Criteria for choice of study areas
Four, 2 by 2 kilometre study areas are the focus for detailed study. The reason for this is that a sample of this size allows a representative slice of landscape to be studied and transitions/ differences between landscape/ historic landscape types and heritage features investigated.

A repeatable methodology of prioritising representative study areas has been designed based on applying a series of criteria (see below) backed up by 'sense checking' using expert opinion (in this case from the project steering group and other local experts).

These areas have been selected by the degree to which they:

1. Fit with and ensure a representative coverage the *primary* and *secondary* criteria (i.e. across Historic Landscape Character and Landscape Character Types - see below)
2. Provide an ability to compare and contrast study areas

Primary Criteria:

Using GIS, scope potential study areas via a desk based assessment (using publicly available information) of the following **base layers**:

Historic heritage:

1. Historic Landscape Character (HLC)- key types:
    - Anciently enclosed (Prehistoric and medieval) land
    - Ancient Woodland
    - Heathland/Waste
    - Post-medieval enclosed land
    - Modern (Parliamentary Inclosure) enclosed land
2. Scheduled Monument (SM)
3. Historic Environment Records associated with field boundaries and linear features (HER's), Shine sites, holloways/ tracks, National Mapping Programme (for example extraction pits)
4. Ancient, parish and county boundaries
5. Turbaries
6. Catch meadows
7. Orchards

Natural heritage:

8. Priority habitat types (associated with field boundaries and linear features): Ancient species rich hedge (old BAP)
9. Designated/ undesignated sites: SSSI, SAC, County Wildlife Sites (CWS), Strategic Nature Areas (SNA's)

Cultural heritage- see data section below

Other considerations:

10. Geographic spread across the AONB including ‘typical’ landscapes across the two counties. There are six Landscape Character Types (LCT) types in the Blackdown Hills AONB:
    - Open inland planned plateau (LCT 1A)
    - Wooded ridges and hilltops (LCT 1E)
    - Steep wooded scarp slopes (LCT 2A)
    - Upper farmed and wooded valley slopes (LCT 3A)
    - Lower rolling farmed and settled valley slopes (LCT 3B)
    - Sparsely settled farmed valley floors (LCT 3C)
11. Of interest due to proximity to potential built development locations

Secondary criteria/ ground truthing deliverability

12. Overlap with (Countryside Stewardship) facilitation farms
13. Known local historic knowledge that can be easily ‘tapped into’
14. Ability to apply a natural capital value or measure an ecosystem service, for example due to sufficient information being available

Study areas

The long list can be seen in annex 1. Priority 1 study areas are being progressed, the priority 2 study areas are not.

The short-list of priority 1 study sites (see below) is been based on ‘best fit’ and using expert opinion via two workshops with experienced historic environment advisers (part of the project steering group) who understand the area and the aims/ objectives of the project.

The second site is in Somerset, the rest are located in Devon:

1. Simonsburrow near Hemyock
2. Dommett
3. Stockland
4. Rawridge

See location maps in annex 2.

Next steps

Building on the base layers (see above), a thorough desk based study of each of the 4 study areas (with some ability to ground-truth and talk to local community historians and land managers) will be undertaken.

This data needs to be:

- common ‘currency’
- readily available
- compatible with information required for natural capital and ecosystem service valuation/ assessments or captured as a value that does not fit into current such assessment

Annex 3: Long-list of study areas (scoped via applying criteria)

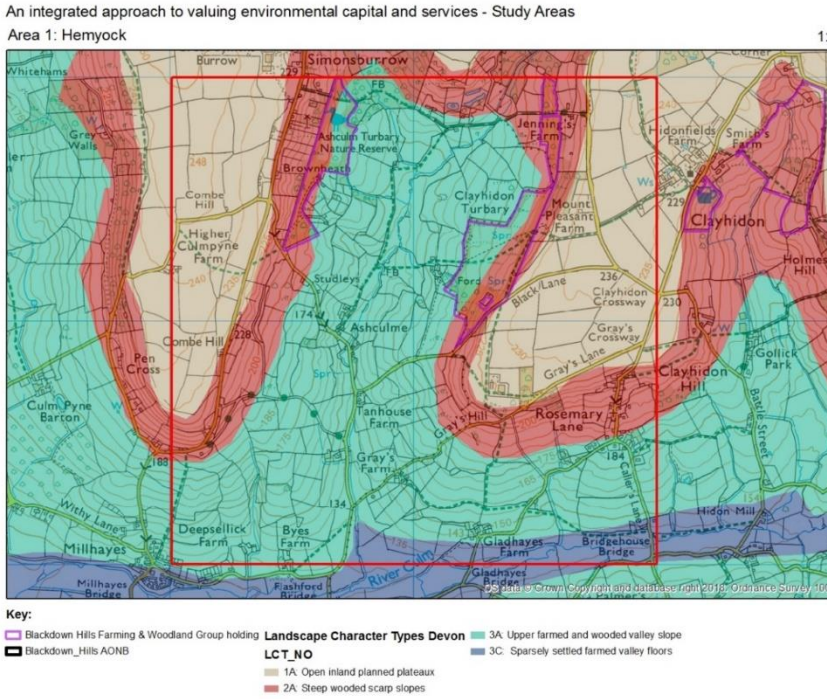
		Primary criteria					Secondary criteria	
No.	**Study Area**	**Landscape Character Type**	**Historic**	**Natural**	**Cultural**	**Other**	**Facilitation farms**	**Priority (1 or 2)**
1	Hemyock	1A Open inland planned plateaux 3A Upper Farmed and wooded valley slopes 2A Steep wooded scarp slopes	Medieval enclosure Parish boundary Heazle farm extraction sites Boundary patterns around settlement	SSSI, CWS, SNA Species?	Catch meadows Orchard and clay pits- up against boundaries Turbary- Clayhidon & Ashculme- with earthwork banks. DWT should have peat deposits study and old biological records for Ashculme turbary	Typical Blackdowns landscape Community Heritage Group locally sourced information	Yes, some facilitation farms	1
2	Dommett	1A Open inland planned plateaux 3A Upper Farmed and wooded valley slopes	Strip fields/ lynchetts	CWS	No known	Somerset site	Yes (keen)	2
3	Stockland	1A Open inland planned plateaux 3A Upper Farmed and wooded valley slopes	Medieval and prehistoric landscape Scheduled Monument- Little Castle HER's associated with field boundaries	SNA, CWS's Post medieval and enclosed land	Stockland turbaries- owned by parish council and information available	Not known	Yes	1

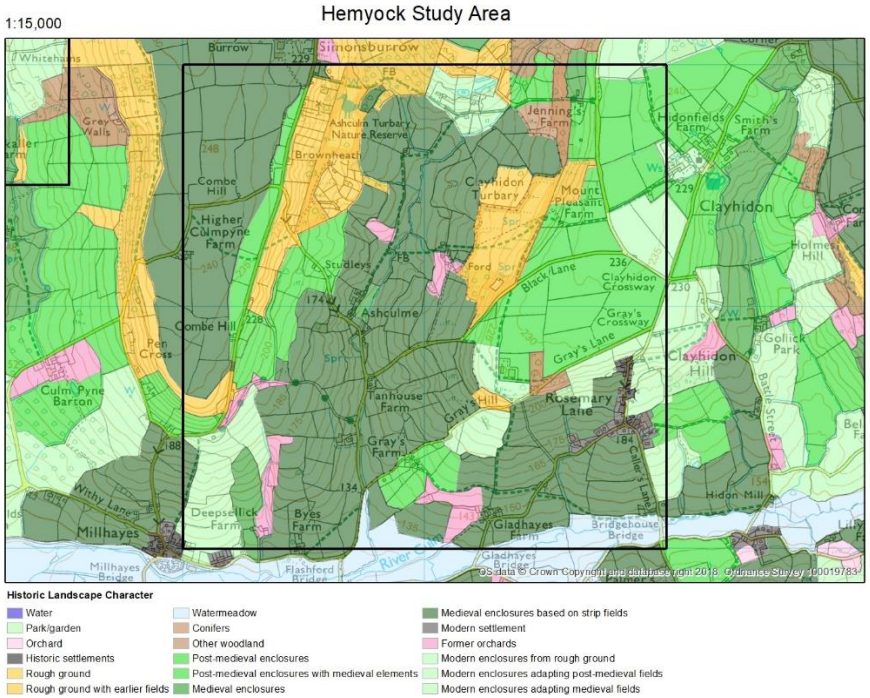
		Primary criteria					Secondary criteria	
		3B Lower rolling farmed and settled valley slopes 2A Steep wooded scarp slopes	Enclosure landscape on the western side					
4	Blackdown/ Sampford Common	1A Open inland planned plateaux 3A Upper Farmed and wooded valley slopes 2A Steep wooded scarp slopes	Linear ancient administrative boundaries SM's Relect field system, clearance cairn Somerset/ Devon county boundary and parish boundary Mining activity	SSSI, SNA, CWS, butterflies, heathland	Afforested enclosure landscape	Somerset/ Devon border	Yes	1
5	Monkton (A30 corridor)	1A Open inland planned plateau 2A Steep wooded scarp slopes 3A Upper farmed and wooded valley slopes 3C Sparsely settled	Wooded scarp and ancient woodland sites Mix of HRC types	Non statutory sites can be missed from natural capital assessment	Non known	A30 corridor	Yes	1

		Primary criteria					Secondary criteria	
		farmed valley floors						
6	Rawridge (A30 corridor)	1A Open inland planned plateau 2A Steep wooded scarp slopes 3A Upper farmed and wooded valley slopes	Strip fields Old road route Mix of HRC types	Non statutory sites can be missed from natural capital assessment	Not known	A30 corridor	Yes (part)	2
7	Membury	1A Open inland planned plateau 3A Upper farmed and wooded valley slopes 3B Lower rolling farmed and settled valley slopes 3C Sparsely settled farmed valley floors	Strip fields Medieval field boundaries Scheduled monument	Chalk pit SSSI CWS, SNA	Not known	Not known	Not known	2

Annex 4: Location maps of short-listed sites

Maps show Landscape Character Type (left) and Historic Landscape Character (right)

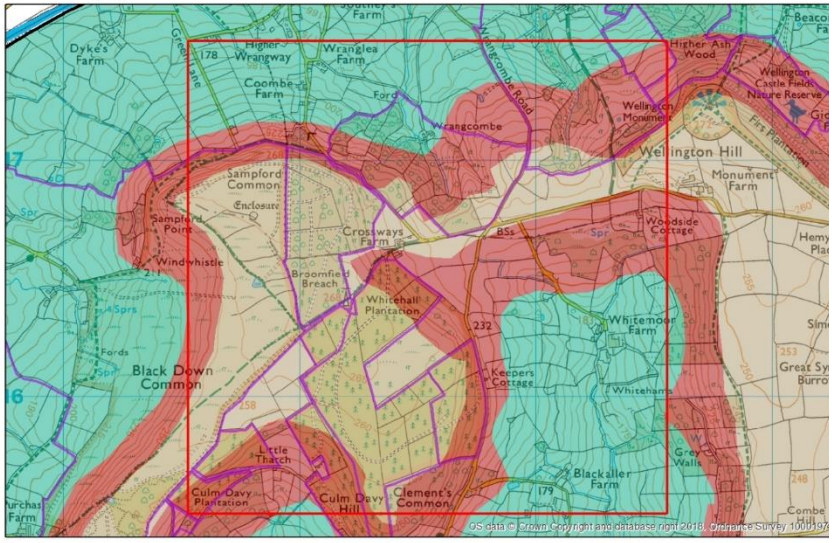




An integrated approach to valuing environmental capital and services - Study Areas

Area 2: Wrangway

1:15,0



Key:

Blackdown Hills Farming & Woodland Group holding

Blackdown_Hills AONB

Landscape Character Types Devon

LCT_NO

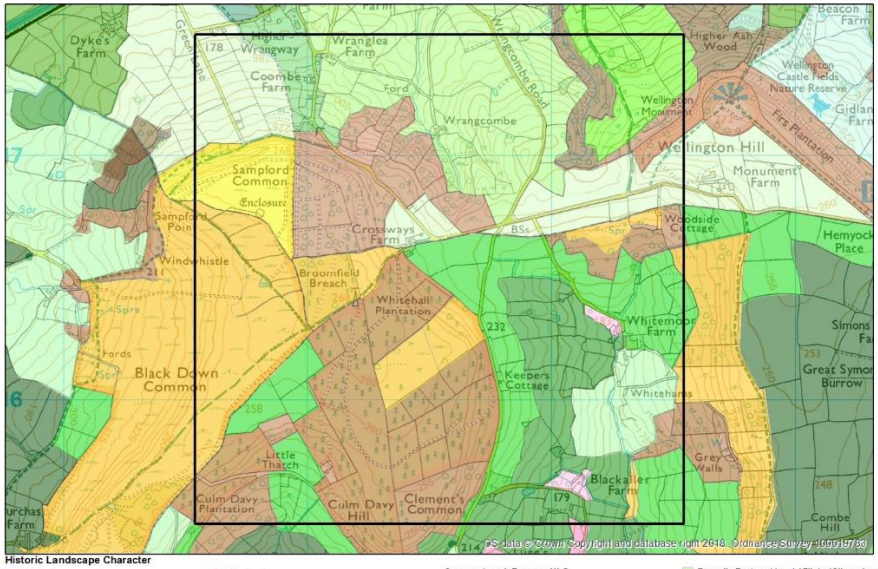
1A: Open inland planned plateaux

2A: Steep wooded scarp slopes

3A: Upper farmed and wooded valley slope

Sampford Study Area

1:15,000



Historic Landscape Character

- Park/garden
- Orchard
- Rough ground
- Rough ground with earlier fields
- Conifers
- Other woodland
- Post-medieval enclosures
- Post-medieval enclosures with medieval elements
- Ancient woodland
- Medieval enclosures
- Medieval enclosures based on strip fields
- Woodland with old field boundaries
- Modern enclosures replacing woodland
- Former orchards
- Modern enclosures from rough ground
- Modern enclosures adapting post-medieval fields
- Modern enclosures adapting medieval fields

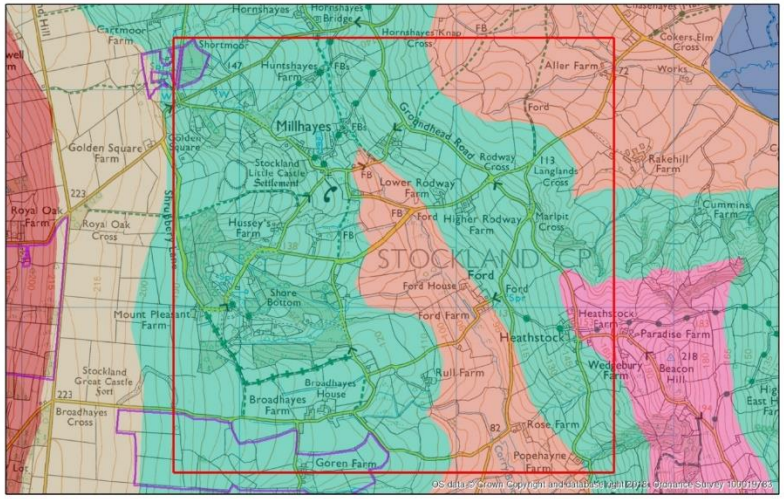
Somerset_and_Exmoor_HLC

- Ancienty Enclosed Land modified 17th to 19th century
- Ancienty Enclosed Land modified 17th to 19th century
- Ancienty Enclosed Land pre-17th century
- Ancienty Enclosed Land pre-17th century
- Other woodland
- Recently Enclosed Land 17th to 18th century
- Recently Enclosed Land 17th to 18th century
- Recently Enclosed Land 18th to 21st century
- Recently Enclosed Land 18th to 21st century
- Semi-natural ancient woodland
- Unenclosed pasture

An integrated approach to valuing environmental capital and services - Study Areas

Area 3: Stockland

1:15,000



Key:

- Blackdown Hills Farming & Woodland Group holding
- Blackdown_Hills AONB

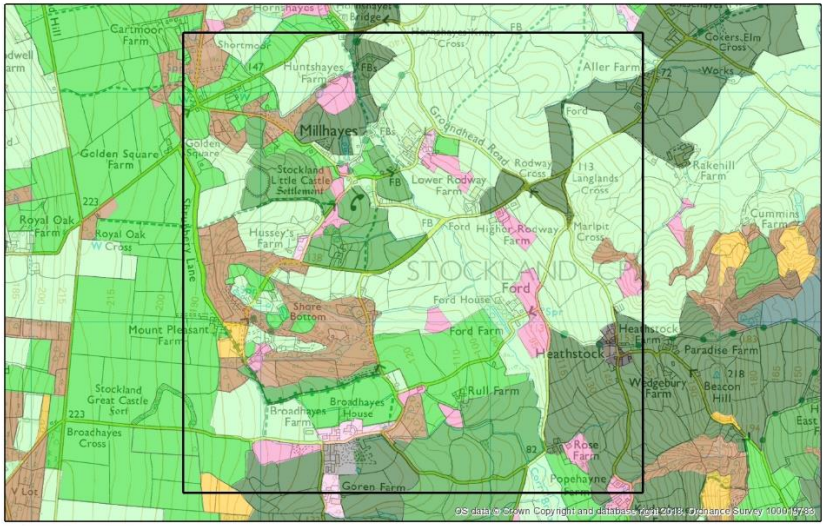
Landscape Character Types Devon

LCT_NO

- 1A: Open inland planned plateaux
- 1E: Wooded ridges and hilltops
- 2A: Steep wooded scarp slopes
- 3A: Upper farmed and wooded valley slope
- 3B: Lower rolling farmed and settled valley slopes
- 3C: Sparsely settled farmed valley floors

Stockland Study Area

1:15,000



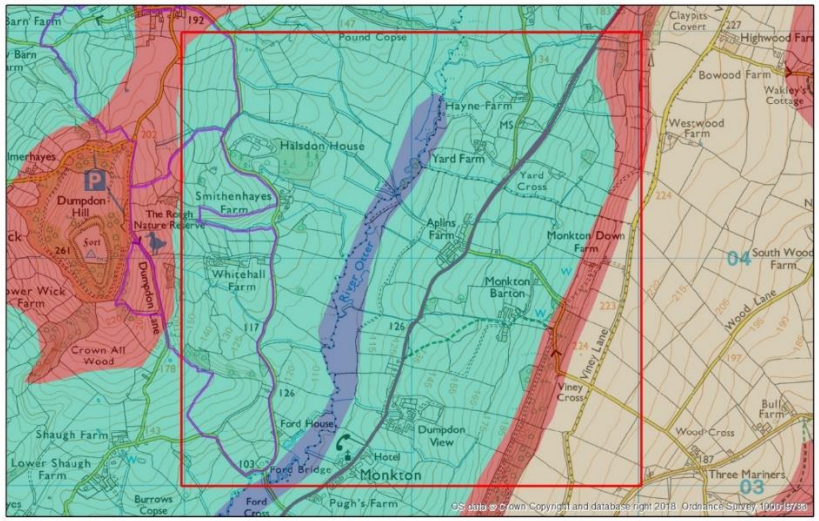
Historic Landscape Character

- Industrial complex
- Park/garden
- Orchard
- Historic settlements
- Rough ground
- Conifers
- Other woodland
- Post-medieval enclosures
- Post-medieval enclosures with medieval elements
- Barton fields
- Ancient woodland
- Medieval enclosures
- Medieval enclosures based on strip fields
- Modern settlement
- Woodland with old field boundaries
- Modern enclosures
- Modern enclsoures replacing medieval watermeadow
- Former orchards
- Modern enclosures from rough ground
- Modern enclosures adapting post-medieval fields
- Modern enclosures adapting medieval fields

An integrated approach to valuing environmental capital and services - Study Areas

Area 4: Monkton

1:15,000



Key:

Blackdown Hills Farming & Woodland Group holding

Blackdown_Hills AONB

Landscape Character Types Devon

LCT_NO

1A: Open inland planned plateaux

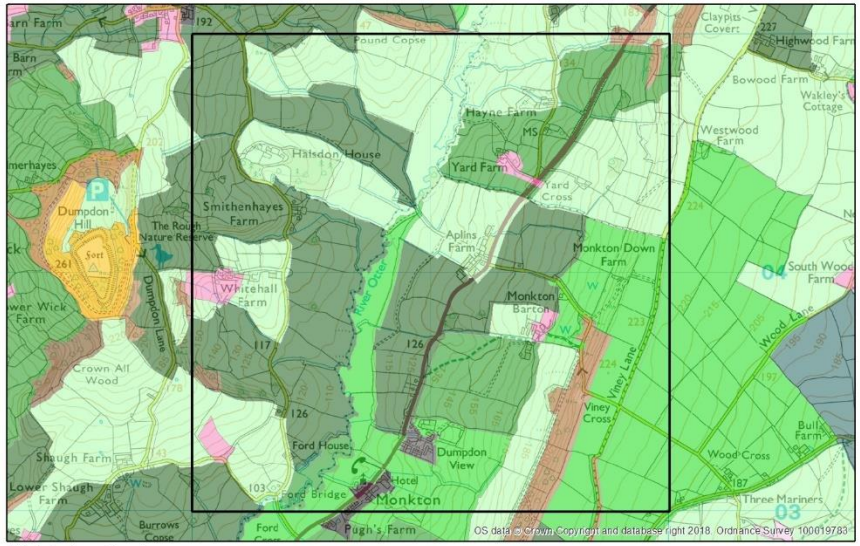
2A: Steep wooded scarp slopes

3A: Upper farmed and wooded valley slope

3C: Sparsely settled farmed valley floors

Monkton Study Area

1:15,000



Historic Landscape Character

- Park/garden
- Orchard
- Historic settlements
- Rough ground
- Other woodland
- Post-medieval enclosures
- Barton fields
- Rough ground with prehistoric remains
- Ancient woodland
- Medieval enclosures
- Medieval enclosures based on strip fields
- Modern settlement
- Woodland with old field boundaries
- Modern enclsoures replacing medieval watermeadow
- Former orchards
- Modern enclosures from rough ground
- Modern enclosures adapting post-medieval fields
- Modern enclosures adapting medieval fields

Annex 5: Methodology and Determining Significance

Tim Youngs & Bill Horner, updated 20 June '18

The aim of this case study is for it to be nationally relevant and locally applicable. In essence, we are producing a 'roadmap' and 'toolkit' to enable field boundaries and associated linear features an 'everyday' landscape such as the Blackdown Hills to be fully valued & quantified in natural capital stock and ecosystem service flow terms, using as much remote sensing work as possible backed up by limited ground-truthing.

RPA/ LUC[16] report summary- The key points are:

- To capture historic benefits within natural capital accounting, **it is necessary to identify and assess the impact of historic assets on natural capital stock, extent of stock, the flows of services and the final benefits.** The assessment shows that **this may be possible where historic assets are more directly associated with land use and land use management. This is especially true where a direct link can be made between the management of land and the management of an historic asset** (p.iii)
- **Need to value the fact that the area is a protected landscape (AONB)** and its landscape value (p.18, p.36)
- Incorporating historic environment benefits- priority is likely to be required on how to **incorporate cultural services** (p.26)
- Data need on **how condition and management may affect flood risk** (p.28)
- **Opportunities to work with organisations undertaking their own natural capital accounts** (p.29)- I met the FC Neroche team recently and we touched on Forest Enterprise England's natural capital accounts, which is now in its second year: https://www.forestry.gov.uk/forestry/beeh-aptcas
- …**value that a heritage designation may have in keeping land stable** (p.30)
- Further development of the benefits framework around historic assets [8 case studies]- p.32 ….[**that illustrates how and where the historic environment delivers through influencing management of the natural environment and/or through delivery of additional benefits that are not captured within the natural capital approach**…building on the ecosystem service and historic environment benefits mapping] **including clear definitions and investigations of the benefits at the local level to help refine the proposed framework**] p.34
- **Education, research and health benefits as a cultural service**

p.19 was interesting:
The benefits delivered by the historic environment **could be picked up within a natural capital accounting approach where it is possible to**:

- **Link the historic environment to the stock of natural environment and to measure *how* these links affect the total stock**
- Identify and measure ***how* the historic environment could influence the condition of the natural environment stock**
- Measure ***how* the condition of stock (and change in condition of stock) influences the extent of services that flow from the stock**
- **Identify a premium associated with the historic environment that would add to the final benefits that are delivered *[added value].*** Where no premium is identified, the **value of the historic environment would be related to how it has influenced delivery of the final benefits**

A six-part methodology process has been developed (parts 1-6) and we will need to present gaps in the data – but as a model that could work in an ideal world using readily available data (or with a bit more input/research – which we will not necessarily be able to do as part of this project, but we can show our workings and suggest a way forward).

[16] *Environmental Capital Accounting and the Historic Environment, RPA/ LUC, March 2018*

Part 1: Type, extent and condition of stock
Extent of total stock

Part 1a
Collate historic[17] and biological records data for the 4 study areas
Data needed: HER/ designated assets/ historic boundary (focussing on those HER features that are very closely associated with boundaries) **and** biological records
- all readily available

Part 1b
To be undertaken on 2 of the 4 study areas
Assess type, extent *and condition* of field boundaries (and associated linear features) stock. Overlay with HLC and LCT.
Data needed: using API and a repeatable methodology. Use historic maps to define remnant boundaries (where only traces currently occur e.g. 2 trees in a line)

Part 1c
To be undertaken on 2 of the 4 study areas
Undertake limited ground-truthing to test and verify the above

Analysis and determining significance
Parts 2, 3 and 4 all use scoring to quantify significance:

Scoring (1-5) where:
- 5= very clear/ strong/ very high
- 4=clear/ strong/ high
- 3= fit/ link/ partial/ added value
- 2= weak/ little
- 1= very little/ very weak/ negligible

Process:
1. Where data is available, analysis will be undertaken in all 4 of the study areas and in addition, where more detailed information is available for 2 of the 4 study areas, further analysis will be undertaken.

2. Within each study area (subject to number 1 above), analysis will be undertaken for **each** Historic Landscape Character (HLC) type. For example within one study area, there could be 6 HLC types and this would require scoring to be undertaken for each of the 6 in turn.

3. *For parts 2 and 3 only* and within each study area, the scores for each HLC type are averaged to give a **mean score** per study area.

4. This mean score per study area is then applied to part 4

Part 2: Assigning a value to heritage and quantifying associations
Identify and assess the impact of historic assets on natural capital stock

- Part 2a assigns a value to heritage features and gives an historic environment 'base' score
- Part 2b assigns an additional score using condition and locally derived metrics
- Part 2c quantifies the co-incidence between different heritage types[18] and their significance

Part 2a- Assigning a value to heritage features and creating a heritage base score

[17] Including time depth information
[18] i.e. natural, historic, cultural heritage

Within 2 of the 4 study areas, quantify *added value* to the field boundaries in an HLC type where there is a co-incidence of a) heritage data gathered with the historic environment interest of HLC type and/ or b) an association of HER's with field boundaries in an HLC type:

- type and extent of more *heritage rich*[19] boundaries[20] (from part 1a) and 'fit' with the HLC type
- the specific historic environment interest of the HLC type identified in part 1b

Data needed – Devon HLC, Somerset HLC[21], HER data (total range of HER monument types and numbers within each HLC). This should be readily available or achievable.

Score:
Evidence (that demonstrates enhanced natural capital stock):

- Fit [of historic environment interest data gathered] with the historic environment interest of an HLC type
- Association [of HER and other data obtained] with the field boundaries in an HLC type

Score	Rationale
5	*Very strong* fit with historic environment interest of HLC type and/or association between HER data obtained and field boundaries in an HLC area
4	*Strong* fit with historic environment interest of HLC type and/or association between HER data obtained and field boundaries in an HLC area
3	*Fit* with historic environment interest of HLC type and/or association between HER data obtained and field boundaries in an HLC area
2	*Weak fit* with historic environment interest of HLC type and/or association between HER data obtained and field boundaries in an HLC area
1	*Very weak* fit with historic environment interest of HLC type and/or association between HER data obtained and field boundaries in an HLC area

Part 2b- Additional score using condition and locally derived metrics
For 2 of the 4 study areas (i.e. where the required data is available), undertake an enhanced historic environment scoring exercise, based on:

- condition of these more heritage rich boundaries (from part 1b)
- sense of place

Data needed –
Assessment of most relevant HER data. Condition assessment being undertaken by Record Centres (so this may not be available for all the study areas). Subjective assessment of sense of place – backed up by LCA, AONB character statements, some liaison with local community historians. Some of this is readily available or factored in to the project, but we may have to flag up gaps.

Score:
Evidence: Enhanced data including for condition of boundaries and backed up by local evidence enables an enhanced environment score to be assigned

Score	Rationale

[19] Ancient, biodiverse
[20] i.e. hedge, hedgebank, wall, ditch as opposed to a fence
[21] Accepting that the Somerset HLC methodology is different to that in Devon

5	*Very high* added value as a result of assessing condition and including local evidence
4	*High* added value as a result of assessing condition and including local evidence
3	*Added value* as a result of assessing condition and including local evidence
2	*Little added value* as a result of assessing condition and including local evidence
1	*Very little or no* added value as a result of assessing condition and including local evidence

Part 2c- Synergy and Added Value
Link the historic environment to the stock of natural environment and to measure *how* these links affect the total stock

For 2 of the 4 study areas (i.e. where the required data is available), for current field boundaries (data from part 1a), quantify the link/ *co-incidence* between and their historic, cultural **and** biological heritage significance (data from part 1b).

In this quantification, take account of time depth (using data from part 1a). Therefore, a well preserved historic asset with strong archaeological potential/ particular significance would influence scoring more positively. An example is that the presence of a field name probably influences scoring less than the presence of a prehistoric barrow.

Data needed- Data from part 1a and 1b

Scoring:
Evidence required: Clear measurement and evidence to enable determination of how these links affect total stock

Score	Rationale
5	Historic environment stock is *very strongly* linked to the natural environment stock
4	Historic environment stock is *strongly linked* to the natural environment stock
3	Historic environment stock is *linked* to the natural environment stock
2	Historic environment stock is *weakly* linked to the natural environment stock
1	Historic environment stock is *very weakly or not* linked to the natural environment stock

Part 3: **Function/Economics of the boundaries**
It is necessary to identify and assess the impact of historic assets on natural capital stock, extent of stock, the flows of services and the final benefits. This may be possible where historic assets are more directly associated with land use and land use management……

Part 3a: *For 2 of the 4 study areas* (i.e. where the required data is available):

Using existing local methodologies and metrics, undertake:

- Biomass assessment using Lidar (Andy Bell methodology) and trial the Cordiale biomass toolkit (see Tamar AONB website)
- Flood risk and water quality multi-function benefits- using Environment Agency Natural Processes data that shows where landscape features help to create complex flow pathways

Data needed –

- Data from part 1a and 1b

Scoring:
Evidence required: Clear evidence of the impact of historic assets on natural capital stock, extent of stock, the flows of services and the final benefits and where historic assets are more directly associated with land use and land use management

Score	Rationale
5	*Clear evidence* of the impact of historic assets on natural capital stock and where historic assets are more directly associated with land use and land use management
4	*Evidence* of the impact of historic assets on natural capital stock and where historic assets are more directly associated with land use and land use management
3	*Partial evidence* of the impact of historic assets on natural capital stock and where historic assets are more directly associated with land use and land use management
2	*Weak evidence* of the impact of historic assets on natural capital stock and where historic assets are more directly associated with land use and land use management
1	*Very weak or no evidence* of the impact of historic assets on natural capital stock and where historic assets are more directly associated with land use and land use management

Part 3b

…….this is especially true where a direct link can be made between the management of land and the management of an historic asset

….. incorporating historic environment benefits- priority is likely to be required on how to incorporate cultural services

- Questionnaire to Blackdown Hills Farming and Woodland Group (facilitation fund) farmers to identify (and try to quantify) their functional (agricultural and amenity), cultural heritage and intrinsic value to groups of land managers (located in or close to study areas). Consider cost of maintaining the feature vs current agri-environment grant, future of the boundary if no grant aid, importance of boundaries to farming management, importance to the farm business

Scoring:
Qualitative assessment of results

Part 4: Natural Capital stock to Ecosystem Service flow calculations
For each of the 4 study areas (where data is available)

'Conventional' Natural Capital calculations. How would a Natural Capital/Ecosystem Services practitioner (e.g. Andy Bell) use the information that we are getting on biodiversity and boundary 'fluffiness' to calculate values? What values fall outside conventional natural capital/ecosystem services methodologies and how can these be otherwise measured?

Discuss what we do have, check the hypotheses (i.e. do high scores in parts 2 and 3 translate through to high scores in part 4?), what the gaps are and factor in AONB protected landscape status

Data needed – data from part 1 (a,b,c)

Scoring:
Evidence: Clear evidence of the enhanced flow of ecosystem services[22] as a result of having heritage rich natural capital stock in favourable management condition.

Scoring	Rationale
5	*Very clear* evidence of the enhanced flow of ecosystem services
4	*Clear* evidence of the enhanced flow of ecosystem services

[22] Break down into regulating, provisioning, cultural or supporting services

3	*Partially clear* evidence of the enhanced flow of ecosystem services
2	*Little clear* evidence of the enhanced flow of ecosystem services
1	*No/ very little* clear evidence of the enhanced flow of ecosystem services

Part 5- Drawing the threads together

- ***How* the condition of stock (and change in condition of stock) influences the extent of services that flow from the stock**
- **The flows of services and the final benefits**
- ***How* the historic environment could influence the condition of the natural environment stock**
- **Identify a premium associated with the historic environment that would add to the final benefits that are delivered *[added value].***
- **Where no premium is identified, the value of the historic environment would be related to how it has *influenced* delivery of the final benefits**
- Cross ref to other projects[23], discuss what we do have and what the gaps are
- Can we make the available data fit for purpose and applicable elsewhere (e.g. by getting an opinion on what HLC types or combinations are most likely to promote the particular biodiversity interest)
- Analysis by study area and other metrics e.g. HLC and Landscape Character Type (LCT)
- Use proxies for our ecosystem services not measured?- e.g. pollinators along field margins next to wide, ancient boundaries, peat (carbon) stored in turbaries, health & wellbeing benefits afforded by people walking along PROW along heritage rich field boundaries etc.
- No weighting has been applied, although it could be e.g. for parliamentary enclosure that is a particular feature of the Blackdown Hills landscape.

A qualitative assessment of the threads listed above can be determined by adding together the scores (1-5), to give a score of between 5 and 25, where 5= very little/ very weak/ negligible and 25 = very clear/ strong/ very high

See tables at the end of this annex

Part 6- testing/ verifying and applying the results

Determination of *confidence* for replicability of data: Historic Landscape Characterisation (HLC)
Within the 4 study areas, assess individual HLC areas based on fit with the results of part 1. This is designed as a cross-check to allow:

- the HLC area types to be fine-tuned and verified
- ditto for field boundary loss in the HLC areas

Data needed – Devon HLC, Somerset HLC, field boundary loss from Devon HLC and by professional judgement/map regression. This should be readily available or achievable.

Data confidence (supplementary) score:
Evidence: Fit [of data obtained] with the HLC indicates that the HLC's are robust in terms of their use as proxies e.g. that we would expect that more ancient field boundary patterns in a landscape would offer a higher (combined heritage) natural capital stock and subsequent ecosystem service flows (subject to condition of boundaries).

Score	**Rationale**

[23] Flag up how we think that methodologies being developed by other pilot projects (e.g. Peak or Severn methodology) could be applied

5	*High confidence* fit between data obtained and HLC area characteristics and field boundary loss
4	*Confidence* fit between data obtained and HLC area characteristics and field boundary loss
3	*Partial confidence* between data obtained and HLC area characteristics and field boundary loss
2	*Little confidence* between data obtained and HLC area characteristics and field boundary loss
1	*Very little or no confidence* fit between data obtained and HLC area characteristics and field boundary loss

This supplementary score then allows robust decision making regarding use of the data elsewhere i.e. its replicability.

Discussion
How common are the HLC's and LCT's found in the Blackdown Hills?- and therefore how replicable are the results? Produce a flow diagram for decision making/ scoring?

We are very keen that the results of the case study are applied by others (in their plans & strategies) and that this work influences decision making. To do this, we will actively engage with:

- other AONB protected landscapes
- local authority colleagues
- developers and promoters e.g. Greater Exeter Strategic Plan (GESP)
- other decision makers
- 25 YEP tests/ trails/ pilots in the area and decision makers shaping post Brexit farm support mechanisms

For parts 2 and 3 only and within each study area, the scores for each HLC type are averaged to give a **mean score** per study area (see below). Mean valued can be calculated by HLC type or by component part, for example part 2a.

The mean value is then applied to part 4.

Hemyock

Part	**Component score for each HLC type[24]**								**Mean score for study area *(by HLC type)= totals/ number***	**Mean score for study area *(by part e.g. 2a)= totals/ number***
	1	**2**	**3**	**4**	**5**	**6**	**7**	**Total score (by part e.g. 2a)**		
2a										
2b										
2c										
3a										
3b										
Total (by HLC type)										

Wrangway

Part	**Component score for each HLC type[25]**								**Mean score for study area *(by HLC type)= totals/ number***	**Mean score for study area *(by part e.g. 2a)= totals/ number***
	1	**2**	**3**	**4**	**5**	**6**	**7**	**Total score (by part e.g. 2a)**		
2a										
2b										
2c										
3a										
3b										
Total (by HLC type)										

Stockland

Part	**Component score for each HLC type[26]**								**Mean score for study area *(by HLC type)= totals/ number***	**Mean score for study area *(by part e.g. 2a)= totals/ number***
	1	**2**	**3**	**4**	**5**	**6**	**7**	**Total score (by**		

[24] See table above
[25] See table above
[26] See table above

								part e.g. 2a)		
2a										
2b										
2c										
3a										
3b										
Total (by HLC type)										

Monkton

Part	**Component score for each HLC type[27]**								**Mean score for study area *(by HLC type)= totals/ number***	**Mean score for study area *(by part e.g. 2a)= totals/ number***
	1	**2**	**3**	**4**	**5**	**6**	**7**	**Total score (by part e.g. 2a)**		
2a										
2b										
2c										
3a										
3b										
Total (by HLC type)										

[27] See table above

Annex 6a: Tables outlining the combined historic and biological value of HLC's within study area 1 (Hemyock area)

Explanation of columns:
LCT= Landscape Character Type
HLC= Historic Landscape Characterisation
HER= Historic Environment Records
SERC/ DBRC= Local Biological Records Centres in Somerset & Devon respectively

Total no of HER or other records: 106
Total no of HLC areas: 11

LCA	*HLC (modern)*	*HER sites historic features in HLC assoc. with linear features (HER No)*	*Summary of biological records assoc. with field boundaries in HLC*	*Other HER sites/historic features in HLC (HER No.)*	*Time Depth HER & HLC date range*
2A & 3A	***Rough ground*** (*Combe Hill, Clayhidon Turbary & Pen Cross)* (13)	• Tithe map field name 'Burrow Close' (47705) • Post med – C19th orchard (118995) • Site of cottage/garden (18th-C21st) (47706) • Post medieval/modern extractive pits (118917 & 118920) • Parish boundary between Clayhidon & Hemyock	• The habitat within these HLC polygons is a mosaic of semi-natural vegetation including heathland, broadleaved woodland/scrub and grassland (with a good part of the grassland being unimproved acid grassland) with a high nature conservation value. An appreciable part is designated SSSI or managed as a nature reserve. • Most of the available species records for this 2km study area pertain to these HLC areas (designated and a nature reserve in part). Range of species characteristic of the priority habitats present are recorded but with no evidence for strong association between linear boundary features and the species assemblage in general (though features will form part of the habitat). BAP or otherwise notable species recorded include reptiles and amphibians such as Grass Snake, Slow Worm, Adder, Common Lizard, Common Toad and mire species such as Oblong-leaved Sundew, White Beak-sedge etc.	• Post med-C19th trackway/field system (49860) • Field name 'Stoney Close' (114100) • Post medieval/modern extractive pits (114099) • Sandpit Cottage shown on tithe map (71419) • Shoebrooks Cottage: Late C17th, LB II (40520) • Site of well (71417 & 71418)	HER: Post medieval- C21st HLC: Post medieval
1A	***Conifers*** *(Honeyhill Plantation)*	N/A	• A small area of planted woodland, possibly including broadleaved trees as well as conifers • There is no available habitat (beyond API) or species data on this HLC	N/A	HER: N/A HLC: Post medieval
1A & 2A	***Other woodland*** *(Jennings Farm & Honeyhill Plantation)* (3)	• Post medieval/modern extraction pits (67552 & 115271) • Parish boundary between Clayhidon & Hemyock	• Appears to be a mixture of scrub and secondary woodland including planted and semi-natural stands. Not of ancient origin. • There is no available habitat (beyond API) or species data on this HLC	• Medieval curvilinear enclosure on Honeyhill (80725)	HER: Med-C19th HLC: Post medieval/ Modern
1A, 2A & 3A	***Medieval enclosures based on strip fields*** *(Combe Hill, Ashculme & Gladhayes/ Rosemary Lane)* (56) *Medieval enclosures based on strip fields contd…*	• Medieval curvilinear enclosure (80725) • Medieval building platform and assoc. boundaries (118928) • Higher Ashculme & Middle Ashculme shrunken medieval settlement (71416 & 53299) • C15th Byes Farm farmstead (113743) • Post med-C19th former orchards (118997 & 119318) • Former medieval/post medieval field boundaries & cultivation terraces (47723, 47724, 115772, 115785 & 115787) • Post med -C19th extractive pits (115274, 115277, 115789, 117190, 118920, 119319, 119327, 119329 & 115795) • Catch meadow (115783 & 115278) • Water channel (115780) • Field name Stone Barrow (47704) • Parish boundary between Clayhidon & Hemyock & detached portion of Clayhidon (47726) • Field name Stonebarrow (47704)	• Dominant habitat type by area is likely to be improved grassland, but there are significant areas of rougher more patchily structured grassland habitat (including locally designated Lowland Meadow priority habitat) likely to be semi-improved with the potential for unimproved grassland to persist in places where topography and land-use history have allowed. • Insufficient recording to characterise the biodiversity associations of the field boundaries. Brown Long-eared Bat, Common Pipistrelle and Whiskered Bat have all been recorded from the farms and/or surrounding farmland.	• Cropmark of a former barrow (Bronze Age) (118915) • Former medieval/post medieval field boundaries (115269, 115791, 118911, 118912, 118914, 118921, 118922 & 119317) • Medieval cultivation terraces (47510) • C19th-C20th traditional farm buildings at Higher Culmpyne Farm (113385) • Tanhouse Farm & Tannery (107188 + 47474) • Gladhayes Farm& barn (104627 & 108463) • Farm buildings at Middle Ashculme Farm (107182) and Bridge House Barn (78305) • Post med -C19th extractive pits (115788, 118918, 118926, 119321 & 115280) • Field names: Ridges Close (47158), Crib House (47157) & Burrow Land (47473) • Site of cottages (date unknown) (47479, 47484 & 47179) • WWII Nissan hut (107181)	HER: Bronze Age, Medieval-C19th HLC: Medieval
3A	***Medieval enclosures (hedgebanks)*** *(Deepsellick Farm, Ashculme & Jennings Farm*	N/A	• These two areas of medieval enclosures appear to support improved grassland within the enclosures themselves. • However, there are records of Hazel Dormouse, Wood Mouse and Bank Vole specifically associated with the enclosure boundaries (at Ashculme) and Brown Hairstreak (Deepsellick	N/A	HLC: Medieval
1A, 2A & 3A	***Post-medieval enclosures*** *(Studleys, Combe Hill, Gray's Farm ,*	• Medieval curvilinear enclosure (80725) • Medieval field boundary (118910)	• The bulk of the land surface within these areas is thought to be improved grassland but there are significant areas where improvement has been less intensive (land on sides of Combe Hill and around margins of Clayhidon Turbary) and some of the	• Medieval/Post medieval ridged cultivation marks (47722 & 48477) • C18th-C21st site of quarry (70233)	HER: Medieval - C21st HLC: Post medieval

LCA	*HLC (modern)*	*HER sites historic features in HLC assoc. with linear features (HER No)*	*Summary of biological records assoc. with field boundaries in HLC*	*Other HER sites/historic features in HLC (HER No.)*	*Time Depth HER & HLC date range*
	Honeyhill & Clayhidon) (14)	• Post med-C19th former orchard (118913) • Medieval/posts medieval extractive pit (119330) • Field name 'Stoney Close' (114100) • Parish boundary between Clayhidon & Hemyock	smaller polygons assigned to this HLC are known to contain priority habitat in the form of unimproved grassland (MG5), Mires, bogs, fens & swamps (M23) & Wet woodland (W7). • There are species records indicating the unimproved nature of some of the fields but no digital data currently available specifically relating to the condition of the hedges	• C18th-C21st site of cottage (47485) • Studleys, late C17th cottage, LBII, (40517/82760) • Ditch of unknown date at Callers Farm (115284) Former area of Clayhidon turbary (114101)	
3A	***Former orchards*** *(Combe Hill, Deepsellick Farm, Gladhayes Farm & Middle & Higher Ashculme)* (7)	• Post med-C19th former orchard banks (115784, 118823 & 119315) • Post med -C19th extractive pit (115781, 118924 & 119316) • Higher Ashculme medieval/post medieval settlement (71416)	• Although there are no field data currently available to confirm this, some of these orchards are likely to contain areas of unimproved grassland habitat (often where the surrounding fields will have been improved). • Long-eared Bat, Common Pipistrelle and Whiskered Bat recorded at one of adjacent farms. Orchards, including their boundary features, potentially significant resource for these protected species	N/A	HER: Post medieval -C19th HLC: Post medieval/Modern
1A, 2A & 3A	***Modern enclosures*** *(Deepsellick Farm, Gray's Hill, Mount Pleasant Farm & Rosemary Lane)* (10)	• Medieval curvilinear enclosure (80725) • Post med -C19th extractive pits (115283 & 115771) • Field name 'Barrow Close' (11564) • Post med-C19th catch meadow (115281) • Post med-C19th former orchard (115270) • Parish boundary between Clayhidon & Hemyock	• Interpreted remotely to be mainly improved grassland and with some fields in arable production or leys but with the potential for unimproved grassland to survive in some fields around the upper slopes of these HLC polygons (i.e. towards the edges of the hill plateaux). • The UK BAP butterfly species, Brown Hairstreak, is known to breed on hedges in the immediate vicinity.	• Medieval/Post med building platform (115276) • Post med -C19th extractive pit (115273) • Site of cottage on tithe map (unknown date) (47480 & 47178)	HER: Post medieval -C19th HLC: Post medieval/Modern
2A & 3A	***Modern/Historic settlement*** *(Rosemary Lane)* (4)	N/A	• The habitats present are likely to be those associated with domestic gardens. • There are old and non-specific records indicating the presence of bats at Rosemary Lane	• Flint arrowhead found in cottage garden (Prehistoric) (44788) • Brethren Meeting House C18th-C21st (35112) • Callers Farm (unknown date) (104623) • Medieval/post medieval site of Smithy (35110)	HER: Prehistoric-C21st HLC: Post medieval
3C	***Watermeadow*** *(Culm Valley)*	• Parish boundary between Clayhidon & Hemyock	• Most of the grassland within this HLC polygon has been assessed remotely as 'possibly unimproved' and managed by grazing. There is a significant amount of linear scrub or woodland associated with some of the watercourse boundaries. The field boundary network is generally sparser than in the other grassland HLCs of the study area, but the existing hedgerows are probably very old and are ecologically connected to these semi-natural riparian linear woody features • There are no available species data on this HLC within the study area boundary but there are recent reports of the UK BAP butterfly species, Brown Hairstreak, breeding on hedgerows within the HLC polygon and otter is present on the River Culm in the immediate vicinity.	N/A	HLC: Medieval
2A & 3A	***Park/Garden*** ***(****Knap Cottage/Lane End Farm & The rectory at Clayhidon)*	N/A	• These areas contain a number of habitats including the UK BAP priority habitat Purple moor grass and rush pastures (sheep grazed and/or cut for hay), scrub woodland, gardens and improved grassland. • At present DBRC hold no species data specific to these HLC polygons or their boundaries.	N/A	HLC: Post medieval/Modern

Discussion

- Ashculme, Gladhayes & DMV/SMV and shape of field boundaries/enclosure, parish boundary, farmsteads & place names
- Rosemary Lane
- The turbaries
- Med curvilinear enclosure
- S Rippon

Annex 6b: Tables outlining the combined historic and biological value of HLC's within study area 2 (Wrangway area)

Explanation of columns:
LCT= Landscape Character Type
HLC= Historic Landscape Characterisation
HER= Historic Environment Records
SERC/ DBRC= Local Biological Records Centres in Somerset & Devon respectively

LCA	*[1]HLC	*HER sites/historic features in HLC assoc. with linear features (HER No.)*	*Summary of biological records (SERC/DBRC) assoc. with linear features in HLC*	*Other HER sites/historic features in HLC (HER No.)*	*Time Depth HER & HLC date range*
Somerset					
1A & 2A	***Unenclosed pasture*** *(Sampford Common & Whitehall Plantation*) (8)	• Roman/post Roman ironstone working area (37230/119145) • Post medieval – C19th extractive pit area (37232) • Devon & Somerset County boundary • Parish boundaries between Culmtock, Sampford Arundel & Wellington Without	• SSSI Lowland heathland with scattered trees, scrub and some mixed woodland of planted origin at the margins (other priority habitats present are Lowland Fen, Lowland dry heathland and Deciduous woodland). • Good range of characteristic species recorded but with no evidence for strong association between linear boundary features and the species assemblage in general (though features will form part of the habitat). BAP or otherwise notable species recorded include Curlew, Meadow Pipit, Tree Pipit, Skylark, Stonechat, Kestrel, Red Kite, Linnet, Reed Bunting, Yellowhammer, Cuckoo and Spotted Flycatcher (birds), Common Lizard (reptiles), Heath Milkwort, Cross-leaved Heath, Bell Heather and Bristle Bent (vascular plants). • See also Devon, below, Rough ground – continuous with this HLC	• Prehistoric enclosure (57029) • Ridged cultivation on Sampford Common (45500) • Undated earthwork bank (37428)	HER: Iron Age/Roman /Post Roman/Post medieval-C1`9th HLC: Medieval/Post medieval
2A & 3A	***Anciently enclosed land modified C17th-C19th*** *(Higher Wrangway & Park Farm)* (10)	• Medieval deer park (43737) • Post medieval-C19th orchard/tree planting banks (37116) • Post medieval-C19th pits (37124, 37125 & 37126) • Parish boundary Sampford Arundel & Wellington Without	• Air photo interpretation indicates habitat is mostly permanent (grazed) grassland with improved grassland predominating. Some smaller fields potentially unimproved or 'Good quality semi-improved grassland' but only known priority habitat is a small area of 'Purple moor grass and rush pasture' at SW corner (extent and quality unknown). • Significant association between the biodiversity of the HLC and its field boundaries (which are generally quite thick) could be expected. • BUT: Generally no available species data at sufficiently precise resolution to relate to HLC. A notable record is of Lemon-scented Fern, a western woodland species, recorded at a location in the HLC lacking woodland. This is a potential indicator of high boundary biodiversity value here	• Field name 'Marl Pit' (45667) • C19th catch meadow (37119)	HER: Medieval/Post medieval-C19th HLC: C17th-C19th
1A, 2A & 3A	***Recently enclosed C17th-C18th*** *(Wranglea Farm/Wrangcombe Farm)* (18)	• Medieval deer park & park pale (43737) • Field names 'Pit Close' (45660) & 'Cold Harbour' (45668) • Post medieval-C19th former orchard banks (37233 & 37145) • Undated ridged cultivation (45694) • Post Medieval-C19th pits (37100, 37101, 37103, 37104, 37105, 37106, 37112, 37113 & 37115) • Post medieval/modern quarries (45659 & 45660)	• Remote interpretation suggests a fairly even mixture of improved and semi-improved or unimproved grassland covers the area, with occasional small stands of scrub (around transition to 6. Other woodland, below) and deciduous woodland (occupying old quarries or diggings or recently planted). • Available biological records mostly localised around southern fringe of HLC and unlikely to be representative of the general landscape within it. There are a number of records of notable plant species but their habitat requirements suggest association with flushed open habitats than with field boundary network more likely.	• Medieval field boundary (37108) • Post medieval-C19th pits (37102)	HER: Medieval/ Post medieval-C19th HLC: C17th-C18th
1A, 2A & 3A	***Recently enclosed C18th-C21st*** *(Higher Wrangway /Green Lane/ Wellington* Hill/ *Crossway Farm)* (9)	• Prehistoric/Post medieval-C19th earthwork banked feature (37120) • ? Medieval deer park pale (43737) • Blackdown Hills Ridgeway road (26698) • Post medieval-C19th gravel pit (37121 & 37123) • Post medieval/modern folly at Higher Wrangway (43534) • Somerset/Devon County boundary • Parish boundary Hemyock, Sampford Arundel/Wellington Without	• Predominantly interpreted as improved grassland and likely species poor. Patches of potentially unimproved grassland, bracken and, rarely, deciduous woodland persist around the margins with steeper ground to immediate S. Trees mostly associated with the linear boundary features and biodiversity probably disproportionately linked to the straight hedges and associated ditches and banks. • The scant species records definitely attributable to this HLC area include Bluebell and a few grasses and sedges of dry acidic soils. There are general (1km resolution) records of Whinchat, Garden Warbler, Green Hairstreak etc but these probably pertain to the adjacent commons.	• Cat & Fiddle public house (19959)	HER: Prehistoric/ Medieval/Post medieval-C19th HLC: C18th-C21st
1A, 2A & 3A	***Semi-natural ancient woodland*** (*Quelscoombe Bottom Wood*) (3)	• Medieval deer park & park pale (43737)	• Broad-leaved semi-natural woodland, apparently ancient.	• Post medieval-C19th extraction pit (37113 & 37114)	HER: Medieval/ Post medieval-C19th HLC: Medieval

LCA	*[1]HLC*	*HER sites/historic features in HLC assoc. with linear features (HER No.)*	*Summary of biological records (SERC/DBRC) assoc. with linear features in HLC*	*Other HER sites/historic features in HLC (HER No.)*	*Time Depth HER & HLC date range*
			• Woodland species records include Bluebell, Lemon-scented Fern, Hazel Dormouse and the BAP lichens, Usnea articulata, a pollution sensitive Atlantic woodland species, Usnea florida and Biatoridium monasteriense.		
1A, 2A & 3A	***Other woodland*** *(Wrangcombe & Firs Plantation)* (8)	• Medieval deer park & park pale (43737) • Post medieval-C19th extractive pits (37096, 37097, 37098, 37099 & 37231) • Somerset/Devon County boundary • Parish boundary Hemyock, Sampford Arundel & Wellington Without	• Mosaic of semi-natural habitats, not limited to woodland as HLC suggests but includes scrub, dry and wet heathland and Purple moor-grass and rush pastures, planted and felled conifers. The mosaic of habitats is probably mediated to some extent by the network of historical linear features (different phases of habitat development of disused fields) even if they do not constitute the habitat per se. • A good range of Lepidoptera recorded as associated with the woodland, woodland edge or fringes of Sampford Common including Pearl-bordered Fritillary, Small Pearl-bordered Fritillary, Silver-washed Fritillary, Dark Green Fritillary, Dingy Skipper, Grizzled Skipper, Brown Hairstreak, Green Hairstreak, Small Heath, Grayling and Wall. • There are old records of the BAP bird species, Wood Warbler and Nightjar. • The few available plant species records include Bluebell, Bristle Bent and Bog Asphodel. • Species interest is mostly associated with unenclosed habitats and does not speak of a strong association with linear features (although where present they may diversify the structure of the habitat generally)	N/A	HER: Medieval/ Post medieval-C19th HLC: Post medieval-C19th
Devon					
1A & 2A	***Rough ground*** *(Blackdown Common, Whitehall Plantation, Woodside & land E of Blackaller)* (21)	• Roman-C19th extraction pits, opencast, mines (119006, 119145) • Early-mid C19th extractive workings (49849) • Early medieval field boundaries (119005) • Devon & Somerset County boundary • Culmstock, Hemyock & sampford Without parish boundary (47693) • Undated/Prehistoric field system (21652) • Former orchard – remnant orchard banks E of Blackaller (47720)	• SSSI Lowland Heathland habitat with range of characteristic mire, heathland and open farmland species recorded including BAP species: Curlew, Skylark, Yellowhammer, Nightjar (birds); Adder (reptiles); Grayling, Small Heath (butterflies). Other notable species include Kestrel, Snipe and Meadow Pipit, Keeled Skimmer, Oblong-leaved Sundew and Heath Pearlwort. • This biodiversity not specifically associated with linear features	• Undated mounds (21653) • C18th clearance cairns (1881 & 61750) • Bronze Age barrows (1882, 11868 & 49869) • Roman open cast mine /extractive pit (11867 & 11869, 119009) • Medieval ridge & furrow (48428) • Medieval-Post Medieval field boundaries (54132) • Undated rectangular field (49843) • Woodside Cottage (80936) • Undated opencast mine in Broomfield Breach (54131)	HER: Bronze Age/Medieval/Post medieval-C19th HLC: Post medieval
1A & 2A	***Conifers*** *(Culm Davy Hill & Culm Davy Plantation)* (10)	• Roman, Post Roman Ironstone extractive workings (47728, 54130 & 119008) • Early medieval-post medieval field boundaries in Whitehall Plantation (49847, 49848, 54132 & 119005)	• Conifer plantation with broadleaved trees around compartment edges. • Few biological records available and mostly comprising common generalist woodland species with low numbers (7) of ancient woodland species (AWVPs). • AWVPs highly likely to be associated with old hedge banks rather than woodland itself	• Undated enclosure in Whitehall Plantation (47712) • Excavation of undated pit (109965)	HER: Roman/Post Roman/Medieval/Post medieval-C19th/Modern HLC: Post medieval/Modern
1A, 2A	***Other woodland*** *(Little Common, Foxes Planation & Grewalls Plnataion)*	• Post medieval – mid C19th extractive pit (119004 & 118951) • Gravel pit (47709) • Parish boundary Culmstock, Hemyock & Wellington Without	• Includes areas of secondary wet & dry broadleaved woodland, degraded wet heath & marshy grassland as well as planted mixed woodland. • No species records available within study area but Hazel Dormouse has been recorded (from feeding signs) as present within contiguous woodland parcel c.100m away. Associated vascular plant record dataset too poor in detail to characterise quality of woodland habitat.	N/A	HER: Post medieval-C19th HLC: Post medieval/ Modern
1A	***Woodland with old field boundaries*** *(Culm Davy Hill)*	• Post medieval-C19th earthwork banks (woodland planting) (118892)	• See 2. Conifers, above (from which this is not discernible on habitat and species evidence and possibly misclassified as separate HLC)	N/A	HER: Post medieval-C19th HLC:
3A	***Medieval enclosures based on hedgebanks*** *(Whitemoor Farm/Blackaller)*	• Medieval/Post medieval farmsteads at Blackaller, Goodall's, Whitemoor farms and pattern of surrounding enclosures	• Remotely interpreted as species poor improved grassland with occasional small stands of broadleaved woodland associated with old diggings ('post-medieval extractive pits') and pockets of potentially unimproved grassland (including Purple	• Bronze axe findspot (11535) • Medieval field boundaries at	HER: Bronze Age, Medieval/Post medieval-C19th HLC: Medieval

LCA	*[1]HLC*	*HER sites/historic features in HLC assoc. with linear features (HER No.)*	*Summary of biological records (SERC/DBRC) assoc. with linear features in HLC*	*Other HER sites/historic features in HLC (HER No.)*	*Time Depth HER & HLC date range*
	(14)	• Medieval field boundaries Blackaller (118898 & 118908) • Medieval-Modern former farmstead at Whitehams Farm (118947) • Post medieval- C19th extractive pits (118900, 118907, 118954, 119000 & 119003) • C19th catch meadow at Blackaller Farm (118909) • Orchard/tree planting banks at Whitemoor Farm (118948)	moor grass and rush pastures), some associated with small orchards. • Available species data, unfortunately, are very scant - consisting of a few records of mostly common wayside and ditch species. Strong correlation between overall biodiversity and linear features would be hypothesised in this HLC. An old long-eared bat (unknown species) record supports this but insufficient evidence to test.	Whitemoor Farm (49858) • Medieval cultivation marks SE Blackaller Farm (47719) • Field name Blackland (47697) • Post medieval- C19th extractive pit (119001)	
1A, 2A & 3A	***Post-medieval enclosures*** *(Culm Davy Hill/Plantation; land fringing Medieval enclosures based around Whitemoor & Blackaller)* (10)	• Pattern of enclosure to E of Whitemoor Farm • Post medieval- C19th orchard banks at Keepers Cottage (119002) • Post medieval- C19th extractive pit (118951) • Undated field boundary near Culm Davy Plantation (49841) • Parish boundary Culmstock, Hemyock & Wellington Without	• A mixture of improved and unimproved grassland, the unimproved parts including marshy and rushy areas (Purple moor grass and rush pastures) and dry neutral grassland habitats. Higher proportion of unimproved grassland than in medieval enclosure HLC above. • Species recording localities very limited and these from surveys which focussed on grassland interest. Woodland/hedgerow species largely unrecorded but this not evidence of absence.	• Bronze Age ring ditch (118888) • Post medieval- C19th extractive pits (118952) • Undated enclosure with entrance ditch (47713) • Field names incl. element 'Greywalls' (47711) • Site of house in parish of Hemyock (47700 & 47708) • Undated field boundary near Whiteham's Farm (47714)	HER: Bronze Age Post medieval-C19th HLC: C18th-C19th
3A	***Orchards/Former orchards*** *(Blackaller & Whitemoor)* (5)	• Medieval/Post medieval farmsteads: Blackaller (104667) & Whitemoor (80225) • Post medieval-C19th orchard/tree planting banks at Blackaller Farm (47720 &118899) & Whitemoor Farm (118948)	• Remotely interpreted as part improved, part unimproved grassland • Currently no species data available in support. Potentially associated old long-eared bat record (Blackaller)	N/A	HER: Medieval Post medieval-C19th HLC: Post medieval/ Modern
3A	***Modern enclosures*** *Created out of probable medieval enclosures based on hedgebanks (Whitehams Farm)* (5)	• Post medieval-C19th orchards banks (118946) • Post medieval orchard and extractive pit (118905) • Post medieval-C19th extractive pit (118906) • Medieval – C19th field boundaries at Whitehams Farm (47715) • Medieval/Post medieval field boundaries (118908)	• Predominantly improved grassland but with 'scattered trees and scrub' (actually remnant hedges) and with small pockets of rush-pasture, springline mire, wet woodland or damp heath associated with margins of this and adjacent 'Rough ground' HLC. Traditional orchards at settlement apparently now gardenised. Bisected by treed watercourse which has functioned as a field boundary and is potentially polygon's most stable semi-natural habitat feature. • No species level records available within HLC polygon	N/A	HER: Post medieval-C19th HLC: Post medieval/ Modern

*[1] Devon HLC used = Modern layer

Total no of HER or other records: 128
Total no of HLC areas: Somerset 6. Devon 7

Discussion

- Prehistoric/Roman/Medieval activity on Sampford/Blackdown Common
- Pattern of field boundary enclosure surrounding Whitemoor, Whitehams, Blackaller & Goodall's Farms
- Parish & County boundaries
- Pits & orchards in Medieval HLC

Annex 6c: Tables outlining the combined historic and biological value of HLC's within study area 3 (Stockland area)

Explanation of columns:
LCT= Landscape Character Type
HLC= Historic Landscape Characterisation
HER= Historic Environment Records
SERC/ DBRC= Local Biological Records Centres in Somerset & Devon respectively

LCA	*HLC (Modern)*	*[*1] HER sites/historic features in HLC assoc. with linear features (HER No.)*	*Other HER sites/historic features in HLC (HER No.)*	*Time Depth HER & HLC date range*
3A	**1.** ***Rough Ground*** 2. *(Mount Pleasant Farm)*	N/A	N/A	HLC: Post medieval
3A	2. ***Other woodland*** *(Short Moor, Huntshayes, Millhayes Cross, Shore Bottom & Piece Copse)* (13)	• Post med -C19th quarry (72124) • Gravel pit at Huntshayes Pits (72123) • Settlement at Huntshayes Pits (72135)	• Isolated find of worked flint (Prehistoric) (50451 & 50449) • Site of ridge & furrow (Medieval/Post medieval) (49376) • Sites of former garden & house (C18th-21st) (48635, 48636, 23332 & 49360) • C18th-C21st mill leat (46475) • Circular banked feature and trackway (Unknown date) (46471) • Site of well (72137)	HERs: Prehistoric, Medieval, Post medieval & Modern HLC: Post medieval/Modern
3A	***3. Woodland with old field boundaries*** *(Broadhayes House)*	N/A	N/A	HLC: Post medieval/Modern
3A & 3B	***4. Medieval enclosures based on strip fields*** *(Millhayes, Goren Farm, Heathstock, Rodway Cross & Aller Farm)* (30)	• Site of house/garden/shrunken village at Heathstock (Medieval) (20775 & 48638) • Field name 'Gills Stone' (48457) • C19th former gardens & grounds to Broadhayes (63564) • Former medieval/post medieval field boundaries (115422) • Modern earthwork enclosure (49381) • C18th-C21st mill leat (46474) • Extractive pit & holloway (115368) • Marl pit (36141)	• Findspots & flint scatters (Mesolithic-Prehistoric) (24457, 33071, 50445, 50450, 50509, 50550, 50557, 50412, 50413, 50457 & 59722) • Late Palaeolithic/Neolithic hand axes (1915, 1916 & 25843) • Rose Farm farmstead (C18th-C19th) (80924) • Post med -C19th extractive pits (115366, 115365, & 115374) • Post medieval-C20th orchard (115466) • C18th Wellens (LBII) (27164) • Broadhayes Cottage (82015)	HER: Mesolithic – Prehistoric /Medieval/Post med-C19th & Modern HLC: Medieval
3A & 3B	***5. Medieval enclosures – field enclosed with hedgebanks (****Stockland Castle area, Broadhayes Farm & S of Rull Farm/)* (16)	• Little Stockland Castle SM (Bronze Age-Roman) (1918) • Post med -C19th extractive pits (115375, 115380 & 115382) • File name 'Flood Hatch Mead' (48459) • Former catch meadow (Post med-C20th) (115447)	• Prehistoric flint finds & scatters (50446, 24522, 50447, 54668, 50324 & 50461) • Former medieval C19th field boundaries (115797 & 115448) • Post med -C19th extractive pit (115367) • Cawleys Farm House C18th, LBII (27158) •	HER: Bronze Age/ Prehistoric/ Medieval/ Post medieval – C20th HLC: Medieval
3A & 3B	***6. Post-medieval enclosures =Post med enclosures with medieval elements) (green stripes)*** *(Shrubbery Lane, Ford Farm, Rose Farm, Broadhayes, Groundhead Road & Millhayes)* (17)	• Extractive pit (115498) • Settlement at Huntshayes (72135) • C19th Broadhayes gardens & grounds (63564) • Stockland Great Castle Hillfort (Iron Age) (1913) •	• Worked flint finds & scatter (Prehistoric) (50422, 50433, 50554, 50508, 50510, 50511, 50512, 50452 & 1696) • Former medieval/post medieval field boundaries (115786) • Ridged cultivation marks (Medieval/Post medieval) (49379) • C19th Mount Pleasant farmstead (71410) • C18th/C19th Rose Farm (LBII) (80924) •	HER: Prehistoric & Iron Age/Medieval/Post medieval-C19th HLC: Medieval/ Post medieval
3A, 3B & 1E	***7. Orchards/Former orchards*** *(Hussey's Farm, Stockland Little Castle, Primrose Cottage, Higher & Lower Seavington, Higher Redway Farm, Marlpit Cross, Broadhayes Farm)* (15)	• Post med-C19th former orchard & banks 115798, 115429, 115428 & 115465 • Post med -C19th extractive pits 115353, 115386 & 115439) • C19th Broadhayes gardens & grounds (63564) •	• C16th-C17th Higher Seavington House & farm house LBII (27151 & 82020) • Goren Farm (77448 & 27165) • Barn & stables at Broadhayes (27163) • Former medieval/post medieval field boundaries (115801 • Site of house (72136)	HER: Medieval/Post medieval HLC: Post medieval/Modern
3A, 3B & 1E	***8. Modern enclosures (Light green stripe)*** *(Shortmoor Huntshayes, Groundhead Road, Little Stockland Castle, Hussey's Farm, Millhayes, Ford House & Marl Pit Cross****)* (70)	• Prehistoric settlement (20583) • Field boundary (115319 & 115422) • Post med/modern orchards (115430, 115433, 115434, 115431 & 115440) • Marl pit (36140) • Post med -C19th extractive pits (115355, 115464 & 115437) • Site of cottages (unknown date (48636 & 48637)	• Flint finds & scatters (20329, 20330, 46472, 48458, 50327, 50333, 50406, 50410, 50411, 50414, 50416, 50417, 50448, 50455, 50456, 50458, 50460,50462, 50499, 50548, 50449, 50459, 50541, 50556, 50560, 50561, 50562, 50563, 50564, 59721 & 59983) • Former medieval C19th field boundaries (115497 & 115497) • Site of Higher Huntshayes Farm (72142) • Medieval/Post med trackway at Ford Farm (115444) • Catch meadow (Post medieval) (115496 & 115495) • Post med -C19th extractive pits (115310, 115354, 115356, 115357 & 115358) • Site of cottage (unknown date) (48645) • Ford House, LBII (82018) • Mental Institution and fishponds at Ford (2) (48473 & 49371) • Le Chalet C17th-C19th, LBII (27159) • Early C19th Lower Rodway Farmstead, Threshing barn, cattle shed, stable, pigsties, LBII (105087, 105093, 105097, 105100 & 105103) • Leat (unknown date) (49361) • Sluice gate (46469) • Slag (unknown date) (533321) • Poss. moated site/natural feature (unknown date) (49370/60524)	HER: Bronze Age/Prehistoric/ /Medieval/Post med-C19th HLC: Medieval/ Post medieval/Modern

LCA	*HLC (Modern)*	*[*1] HER sites/historic features in HLC assoc. with linear features (HER No.)*	*Other HER sites/historic features in HLC (HER No.)*	*Time Depth HER & HLC date range*
1E	***9. Historic settlement*** *(Heathstock)*	N/A	• C17th Heathstock Farm and assoc. traditional farm buildings (LBII) (80919, 27160, 105006, 105047, 80919 •	HERs: Post medieval HLC: Post medieval
1E	***10. Modern settlement (Heathstock)***	N/A	N/A	HER: Post medieval HLC: C20th
13A	***11. Park/Garden*** *(Millhayes)* (11)	N/A	• Flint finds & scatters (Prehistoric) (50567 & 50453) • Ridged cultivation (Post med-Modern) (49378) • Former lane (46468) • C18th Poststock Cottage LBII (27152/82021) • Wesleyan Chapel & site of houses(7374, 48642, 48643 • Site of watermill (18846) • C18th-C19th leat (46473)	HER: Prehistoric -Modern HLC: Post medieval/Modern
3A	**12. *Industrial Complex*** *(Broadhayes)*	• C19th gardens to Broadhayes House (63465)	N/A	HER: C19th HLC: Post medieval/Modern

[*1] Association with linear feature for Natural Capital Value assessment needs to be confirmed. This data is only derived from proximity of HER site to boundary feature on Devon HER records.

Total no of HER entries for study area: 174
Total no of HLCs: 12

Discussion

- HLC by HER entry types?
- Check for parish boundaries & farmstead enclosures e.g. Hussey's & Cawley's etc. Steven Rippon
- Which HLC has majority of sites & what date are they?
- Field boundary shapes west of Aller Farm (ST 242 040)

Annex 6d: Tables outlining the combined historic and biological value of HLC's within study area 4 (Monkton area)

Explanation of columns:
LCT= Landscape Character Type
HLC= Historic Landscape Characterisation
HER= Historic Environment Records
SERC/ DBRC= Local Biological Records Centres in Somerset & Devon respectively

LCA	*HLC*	**1 HER sites/historic features in HLC assoc. with linear features (HER No.)*	*Other HER sites.historic features in HLC (HER No.)*	*Time Depth HER & HLC date range*
2A (9)	***1. Other woodland/*** *(Hedgend Plantation & Viney Lane)* (9)	• Post med -C19th extractive pits (116127, 116135, 116140, 116141 &116144)	• Possible barrow (Bronze Age) 116147 • Post medieval field boundary (116138)	HER: Bronze Age, Post medieval & C19th HLC: Post medieval/Modern
2A & 3A	***2. Woodland with old field boundaries*** *(E of Claypitts Bungalow)* (3)	• Post med -C19th extractive pit (114110 & 116200) • Early medieval/post medieval earthwork bank/lynchet) (117684)	N/A	HER: Medieval, Post medieval-C19th HLC: Medieval/Modern
3A	***3. Medieval enclosures based on strip fields*** *(Smithenhayes Farm & Ford House, Oaklands Farm & E of Aplins Farm)* (24)	• Post med -C19th extractive pits (46425, 46427 & 114110, 115168, 1151760, 116100, 116150, 116079, 116080, 116085, 116088 & 116149) • Medieval/post medieval field boundaries (115122, 116057 & 116078) • Field name 'Rexy'(38413) • Parish boundary between Lupitt, Monkton & Upottery	• C13th-C20th findspot (81039) • Medieval/Post medieval earthwork banks & lynchets (114932) • Medieval/Post medieval field boundaries (115565 & 116089) • Post med -C19th extractive pit (116097) • Site of cottage on tithe map (unknown date)(46452) • Smithenhayes farmstead & buildings LB II* (20649/80238)	HER: Medieval/ Post med-C19th HLC: Medieval
2A & 3A	***4. Medieval enclosures – field enclosed with hedgebanks*** *(Ford Farm/Monkton Barton & Yard Farm* (14)	• Deserted medieval/post medieval settlements with associated fields and orchards (Hayne & Ford House) (16212 & 38410) • Post med -C19th extractive pits (114110, 116202 & 116212) • Banks & lynchets assoc. with former medieval/post medieval fields (114931, 114933, 117684, 116154, 16204, 116206 • Former hollow way (unknown date) (117694) • Post medieval-C19th orchard (116209) • Parish boundary between Lupitt, Monkton & Upottery	• Post medieval/modern milestone, LBII (36101)	HER: Medieval-C19th HLC: Medieval
1A, 2A & 3C (	***5. Post-medieval enclosures*** *(Monkton & Viney Lane)* (16)	• Roman Road (46455) • Deserted medieval settlement at Monkton (38410) • Medieval/Post med banks & lynchets assoc. with former field system (114931 & 117675 – many separate sites under these HER Nos and not all are associated) • Post med -C19th extractive pits (36105, 114110, 115149, 116126 & 116144– many separate sites under these HER Nos and not all are associated) • Parish boundary between Lupitt, Monkton, Upottery & Cotleigh	• Worked flint scatter (Prehistoric) 50524 & 50525 • Possible Prehistoric/Roman settlement remains (114263) • Post med/Modern field boundary (116096) • Ford Bridge (LBII) (36109) • Site of a building (46421) • WWII Temporary military camp (116151)	HER: Prehistoric/ Roman/ Medieval -C19th HLC: Post medieval
3A	***6. Orchards/Former orchards*** *(Yard Farm, Monkton Barton, Whitehall Farm & SW Fordhill Cottage)* (9)	• Medieval/Post med bank/lynchet assoc. with former field system (114933) • Post med-C19th former orchard & banks (115144) • Post med -C19th extractive pits (115166 & 116219)	• Medieval/Post medieval farmsteads: Whitehall Farm & Yard Farm & C19th farm building at Monkton Barton, 2 x LBII, (45107+82079, 22054+820241 & 122117)	HER: Medieval/Post medieval HLC: Post medieval/Modern
3A	***7. Modern enclosures*** ***(****Pound Copse, Hayne Farm, Halsdon House, Whitehall Farm, Ford House, Viney Cross, Monkton Barton &Yard Cross)* (30)	• Deserted medieval settlement at Yard Cross (38414) • Post med -C19th extractive pits (36104, 46420, 115164, 115167, 116107,114110, 116126, 116144, 116184 & 116155 – multiple sites under single HER entry) • Medieval/Post med banks & lynchets assoc. with former field system (117682) • Catch meadow (Post medieval) (115165) • Monkton/Upottery parish boundary (45118) • Mill leat (Aplins farm) (46378) • C19th -C21st Honiton-Ilminster turnpike road (46383) • Parish boundary between Monkton & Upottery	• Round barrow (Bronze Age) (114092) • Medieval deer park in vicinity assoc. with Mohun's (59619) • Medieval-Post medieval field boundary (116077 & 116312) • Possible house platform (Med-C19th) (114157) • Medieval/Post med banks & lynchets assoc. with former field system (116312) • Medieval/Post medieval leat (46378) • Post med -C19th extractive pits, incl. clay pits (36100, 46424, 46426, 46429, 115148 & 116311) • Site of cottage (Unknown date) (36099)	HER: Bronze Age/ Medieval/ Post med-C19th HLC: Post medieval/Modern
3A	***8. Historic settlement*** *(Monkton)* (9)	N/A	• Settlement at Monkton is mentioned in Domesday (C8th-Medieval) (18778) • C15th church of St Mary Magdalene, LBII* (7369 & 7370) • C17th cottages Glen Eden, LBII (36112) • C19th -C21st Honiton-Ilminster turnpike road (38711) • Monkton Court (78478 • Monkton School (36107) • Site of Smithy/Forge (36103) • C19th water pump, LBII (36113)	HER: C8th-Medieval, Post med-C21st HLC: Post medieval
3A	***9. Modern settlement***	N/A	N/A	HLC: C20th

LCA	*HLC*	*[*1] HER sites/historic features in HLC assoc. with linear features (HER No.)*	*Other HER sites.historic features in HLC (HER No.)*	*Time Depth HER & HLC date range*
3A	***10. Park/Garden*** *(Halsdon Farm & Hayne Farm)* (4)		• Clay pit (46428) • C16th and later rebuilt, Hayne Farm farmstead, 2x LBIIs (105378, 82074 & 82076)	HER: Post medieval-Modern HLC: Post medieval/Modern

*[1] Association with linear feature for Natural Capital Value assessment needs to be confirmed. This data is only derived from proximity of HER site to boundary feature on Devon HER records.

Total no of HER entries for study area: 118
Total no of HLCs: 10

Discussion:

- Place names & settlements: Monkton, Monkton Barton, Aplins Farm, Hayne Farm, Smithenhayes & Yard Farm, Mohuns deer park at very top of study area see boundaries…
- Parish boundaries – see Rippon …..
- Roman Road ….

Annex 7: Metadata used for mapping work for part 1b of the methodology

Incid	unique alphanumeric file-code for each feature, in the form: SAM_1234; HEM_0001
Ihsmainhab	Integrated Habitat System code for habitat (normally from air photo interpretation, unless ground survey data available) EQUATES TO FULL TEXT IN 'Ihsmhabtxt'
Ihsmatrix1	not used in Sampford and Hemyock pilot - IHS matrix habitat (i.e. if secondary habitat feature present within boundary feature - could be used to record presence of ancient or verteran trees, species rich verges etc if data became avaialble)
Ihsmatrix2	not used in Sampford and Hemyock pilot (2nd matrix habitat)
Ihsform1	Integrated Habitat System code for hedge form (if hedge or line of trees derived from hedge) (normally from air photo interpretation, unless ground survey data available) EQUATES TO FULL TEXT IN 'Ihsfrm1txt'
Ihsform2	Generally not used in Sampford and Hemyock pilot. Field required if 2nd form recorded within same hedge feature (e.g. part defunct, part recently planted). >30 metre stretches of hedge with different form or management ideally mapped as discrete features.
Ihsman1	Integrated Habitat System code for hedge management (if hedge or line of trees derived from hedge) (normally from air photo interpretation, unless ground survey data available) EQUATES TO FULL TEXT IN 'Ihsmantxt1'
Ihsman2	Generally not used in Sampford and Hemyock pilot. Field required if 2nd management recorded within same hedge feature (e.g. part cut, part overgrown). >30 metre stretches of hedge with different form or management ideally mapped as discrete features.
Ihsmhabtxt	Full text of interpreted habitat (Ihsmainhab)
Ihsmat1txt	not used in Sampford and Hemyock pilot - IHS matrix habitat text description
Ihsmat2txt	not used in Sampford and Hemyock pilot - IHS matrix habitat text description
Ihsfrm1txt	Full text of interpreted boundary form (Ihsform1)
Ihsfrm2txt	Full text of interpreted boundary form (Ihsform2) if 2nd form type recorded. Generally not used in Sampford and Hemyock pilot
Ihsmantxt1	Full text of interpreted management of feature (Ihsman1)
Ihsmantxt2	Full text of interpreted management of feature (Ihsman2) if 2nd management type recorded - Generally not used in Sampford and Hemyock pilot
Ihsversion	Version number for IHS definitions used (Somerset ERC)
Createdate	date data entered
Createdby	name of AP interpreter/digitiser
IHS_featur	Geometry type of feature (i.e. line, polygon, point etc)
THEME	inherited from OS MasterMap (may provide useful information but can be removed and need to be aware that many OS features will have been merged during creation of features in this dataset so THEME may not be wholly accurate for each feature)
TREES	Simple count of number of visible trees (interpreted as per IHS definition of standard tree) in feature: -1 = presence of trees in feature but not countable; 0 = actual count of zero
HT_EST	Height estimate of hedge. Not used in Sampford and Hemyock pilot unless ground truthed data available. Could be populated from LiDAR analysis given resources.
SIN_STR	1 = 'sinuous'; 2 = 'straight' (quick and subjective assessment applied to each feature on basis of overall form of boundary line and taking into account connecting boundaries for very short features. e.g. some short hedges appear straight in isolation but are part of longer curvilinear features viewed at landscape scale)
PARISH_B	1 = feature is coincident or closely parallel with parish boundary; 0 = not so
COMMENTS	free text for working comments, not systematically populated
DITCH-BANK	D = ditch, B = bank coincident or closely parallel (within 5m) with feature (or combination, e.g. DBD = bank with ditch both sides). LiDAR based analysis required to populate field, resource limited in pilot work.
LENGTH	length of feature in metres (minimum 20)
WIDTH_25CM	ESTIMATE of typical width of top of feature edge to edge as interpreted from AP to nearest 25cm. Higher accuracy for cut and uniform hedges, lower for uncut and variable width hedges. Where hedge not visible due to canopy closure of hedge trees above, typical crown width has been entered.
PROW_PACC	Public Right of Way/Public Access: 0 = feature with no known public accessibility; 1 = feature contiguous or within 10m of a PROW; 2 = feature contiguous or within 10m of a public road; 3 = feature within or contiguous with other public open access land.
WOODY_SPP	count of tree and shrub species within whole feature (defined as 2007 Hedgerow Survey Handbook). NOTE that convention in some hedgerow analyses proceeds on spp. per 30m stretch. Generally not used in Sampord and Hemyock pilot but ground truthing data on some features could later be added.
PHT_PROX	Proximity to known or interpreted Priority Habitat type: 1 = feature contiguous or within 10 metres of known PHT polygon; 0 = not so
GEOMSRC	Source of line data: OSMM = Ordnance Survey MasterMap; HAND = free digitised from API/map by 'Createdby' (note that 1. OSMM derived features may not correspond to individual OSMM features due to amalgamation of multiple OSMM features into single boundary feature 2. minor editing of OSMM geometry may have been undertaken in order to rationalise the boundary feature map, and avoid gaps at hedge nodes where OS maps features shorter than 20m nominal minimum feature length)
INFOSRC	Source of information used in AP interpretation: 2015-2017 AP = air photos flown 2015 to 2017 © Getmapping Plc

ANNEX 8: Discussion of Landscape Character Areas (LCAs), Historic Landscape Characters (HLCs) and HER sites/other historical features

AREA 1: HEMYOCK

1. Discussion of Landscape Character Areas (LCAs), Historic Landscape Characters (HLCs) and HER sites/other historical features

1.2 Landscape Character Areas (LCAs)

There are four landscape character types within the study area. These comprise 1A: Open inland planned plateaux, 2A: Steep scarp slopes, 3A: Upper farmed and wooded valley slope and 3C: Sparsely settled farmed valley floors. Their key characteristics may be summarised as follows:

1.2.1 1A Open Inland planned plateaux

- High open flat plateau
- Rectangular field pattern of medium to large scale
- Predominantly pastoral farming on heavy soils
- Well-trimmed hedges on narrow earth banks
- Sparsely scattered boundary trees, usually beech with oak towards plateau edge
- Very uniform appearance
- Beech is frequent at the northern end of the area, with oak and hazel more common towards south and around edge
- Occasional copses and small conifer plantations punctuate the open farmland
- Long straight roads in centre, with narrow winding minor roads towards the edge
- Isolated farmsteads and clusters of buildings at crossroads; 20th century settlement associated with airfields
- Extensive views often blocked by woodland on boundary

1.2.2 2A Steep scarp slopes

- A narrow band of steeply sloping land immediately below the plateau edge
- Mixed woodland and semi-improved or unimproved pasture
- Pastoral cultivation, with small-scale irregular field pattern
- Springline mires
- Lightly settled
- Narrow winding lanes with well treed banks
- Occasional long views out over adjoining valleys
- Many patches of semi-natural habitats, including springline mires and scrub

1.2.3 3A Upper farmed and wooded valley slope

- Undulating upper valley slopes below the scarp slope
- Well treed pastoral farmland, with arable cultivation on lower slopes
- Small to medium size fields with irregular boundaries
- Deciduous woods and copses, especially on hilltops and upper slopes
- Very wide, usually low, species-rich hedges with many hedgerow trees
- Dispersed settlement pattern of isolated farms and small villages
- Very winding narrow lanes
- An intimate and intricate landscape with views out confined by vegetation
- Remote and with little 20th century development

1.2.4 3A Sparsely settled farmed valley floors

- Open flat landform, often with distinct vegetated floodplain edge confined by valley sides
- Watercourses screened by riparian vegetation often with low flood-banks
- Hedges, not banks, generally on the boundary with rising land.
- Pastoral land use, with wet meadows and some arable, with variable field sizes
- Saltmarsh and reedbeds sometimes occur locally especially near the sea
- Sparsely settled
- Stone sometimes used for walls, bridges and quays.
- Network of narrow winding lanes, sometimes with major roads along boundaries
- Open internally, with views out screened by boundary vegetation
- Variable field pattern, with some areas apparently unenclosed
- Frequently tranquil although main transport routes may occur, reducing tranquillity
- River views

1.2 Historic Landscape Character (HLC)

The study falls within the Devon Historic Landscape Characterisation, which was prepared as part of Wave 4 programme. There are twelve HLC types.

Details of the HLCs discussed below are summarised in Table 1: Area 1 Hemyock - summary of LCAs, HLCs, Biological records & HER Sites/historical features.

1.3 Historic Environment Record Sites (HER sites)

Historic Environment Records from have been used to prepare the information outlined below and discussed in Table 1. A total of 106 sites have been recorded. Further historical features not recorded on the HER has been identified as a consequence of observations made during data collection. At this stage these relate solely to County/Parish Boundaries and the morphology of the enclosure pattern based upon what appears to be medieval farmsteads. Further research combined with ground truthing and information from local historians will result in the identification of many more heritage features associated with hedgerows, which have not been identified at this stage.

Details of the HER site/historical features discussed below are summarised in Table 1: Area Hemyock. HER sites discussed as being 'associated' with hedgerows are only given this this description based on their proximity to hedged boundaries recorded by Devon Wildlife Trust. In the absence of ground truthing and/or detailed research exact relationships or correlations with hedged boundaries cannot be confirmed at this level of assessment.

2. HEDGEROWS: DISCUSSION OF HER SITES BY HLC TYPE WITHIN STUDY AREA

2.1 Rough Ground

2.1.1 Landscape Character Areas

The *Rough Ground* HLC lies within the 2A (Steep scarp slopes) and 3A (Upper farmed and wooded valley slopes) LCAs (see above for key characteristics). The field boundaries within the HLC appear to be 'typical' of the 3A LCA.

2.1.2 HER/HLC Time depth

The *Rough Ground HLC* is located primarily on Combe Hill, Ashculme Turbary Nature Reserve, Clayhidon Turbary and Pen Cross. It is classified as rough, grazing ground, heathland or moorland that shows signs of earlier historical use as agricultural land. It is attributed a medieval/ post medieval date. A turbary is a wetland area (often common land) where traditionally local people held the rights to cut turf, or peat, for fuel. The turbaries in the study area are located directly upon the springline mires.

The HER sites present are generally post medieval in date. They include former field boundaries, an orchard, several extractive pits, Shoebrooks Cottage (a Grade II listed building) and the sites of cottages and two wells. The field names (Burrow & Stoney Close) which could be indicative of a barrow, stony soil or land from which stone was taken, are also recorded in this HLC. The parish boundary between Culmstock and Hemyock also runs along the western edge of the HLC in the vicinity of the Clayhidon Turbary.

2.1.3 HER sites/historical sites associated with hedgerows

HER sites which lie near or appear associated with hedged boundaries within this HLC area include the field name 'Burrow Close', a former orchard, two extractive pits and the site of a cottage. The date of these HER sites is therefore similar to that of the HLC.

All the hedgerows associated with the HER sites are considered 'important' in terms of the 1997 Hedgerow Regulations (see Appendix 1).

2.2 Conifers & Other Woodland

2.2.1 Conifers

The only area of the *Conifer HLC* is Honeyhill Plantation, which lies to the north of Rosemary Lane. It falls within the 2A (Steep scarp slopes) LCA (see above for key characteristics). The *Conifers HLC* does not seem typical of the woodland for this LCA type. The HLC is considered post medieval in date. There are currently no HER sites associated with this HLC.

2.2.2 Other woodland

The *Other Woodland HLC* comprises broad leaved plantations, replanted ancient woodland or secondary woodland that has grown up from scrub. It is generally considered post medieval/modern in date. This HLC can be found at Jennings Farm and on Honeyhill. It falls within the 1A & 2A LCA areas and as a woodland type appears typical of these LCAs.

There are three HER entries associated with this HLC. All are located in the Honeyhill area of the *Other Woodland HLC*. The sites include a medieval curvilinear enclosure and two post medieval extraction pits. Both extraction pits lie near hedged boundaries and while post medieval in date, must be indicative of earlier extraction activities, pre-dating the woodland. The medieval enclosure is further discussed in Section 2.5 below. The parish boundary between Culmstock and Hemyock also runs along the southwest edge of the HLC in the vicinity of Jennings Farm.

All the hedgerows associated with the HER sites are considered 'important' in terms of the 1997 Hedgerow Regulations (see Appendix 1).

2.3 Medieval enclosures based on strip field

2.3.1 Landscape Character Areas

The *Medieval enclosures based on strip fields HLC* is can be found in the 1A, 2A & 3A LCA, although primarily it is located with the 3A (Upper farmed and wooded valley slopes) LCA (see above for key characteristics). The main areas of this HLC can be found on Combe Hill, around Ashculme/Tan House Farm/Byes Farm & Rosemary Lane/Gladhayes Farm. The key features of the field boundaries within this HLC seem typical of the 3A LCA.

2.3.2 HER/HLC Time depth

These *Medieval enclosures* were fields that were probably first enclosed with hedge-banks during the middle ages. The curving form of the hedge-banks suggests that earlier, the area may have been farmed as open strip fields. This HLC is considered medieval in origin. It is therefore noteworthy that it is focused around the settlements/farmsteads of Ashculme, Byes Farm and Gladhayes, all of which are known to be farmsteads with early medieval origins.

This HLC contains the greatest concentration of HER sites/ historical features (56 sites in total) within the study area. With the exception of the site of a possible barrow, all largely range in date from the medieval to post medieval periods and appear to be associated with settlement and agricultural activity. The majority of the sites comprise former field boundaries and extraction pits (28 in total). These sites are discussed below by the three broad locations of the HLC areas.

Combe Hill
The sites within the Combe Hill area of this HLC include the cropmark remains of a possible barrow, a former post medieval orchard, three former medieval/post medieval field boundaries, traditional farm buildings at Higher Culmpyne Farm and interestingly a detached portion of the parish of Clayhidon. Its exact location has not been identified at this stage. The orchard is the only site in this area associated with a hedged boundary.

Ashculme (Higher, Middle & Lower Farms), Tanhouse Farm & Byes Farm
The majority of the HER sites fall within this area of the HLC. Sites which appear associated with hedged boundaries include a field with the name 'Stone barrow' (possibly a reference to a barrow, an area from which stone was excavated, a former stone building or simply stony soil), a small area of a medieval enclosure (see Section 2.5 below); medieval building platforms and associated boundaries near Ashculme; Higher & Middle Ashculme deserted medieval settlement; Byes farmstead (an early medieval farm); a former post medieval orchard established over earlier extraction pit; former medieval/post medieval field boundaries/cultivation terraces and extraction pits; a post medieval/modern catch meadow and water channel associated with Lower Ashculme Farm and part of the parish boundary between Hemyock & Clayhidon runs along the eastern edge of this HLC.

Catch meadows provided a simple, inexpensive and effective form of irrigation. When irrigation was required water was diverted from a source such as a pond, river, spring or spring-fed stream and passed along the meadow slopes via one or more of the gutters, which was then caused to overflow. The lower, roughly parallel gutters then 'caught' and redistributed water passing it evenly over the surface of a meadow below. The gently flowing water prevented the ground freezing in winter and encouraged early growth in spring, thereby providing extra feed for livestock, particularly important during the hungry gap of March and April. This water meadow might have operated as what has been called an 'integrated' catch meadow, in which manure from the cow sheds within the farmyard was mixed with the water supply to supply liquid manure to the pasture.

Sites within this HLC but not associated with hedged boundaries include farm buildings at Middle Ashculme Farm; Tanhouse Farm & Tannery; former medieval/post medieval field boundaries and extraction pits; the field name 'Burrow Land' (meaning land by or on a mound); the sites of two former cottages and a WWII Nissan hut.

The majority of these sites are of a medieval/post medieval date and agricultural in origin; they therefore correlate in terms of date with the HLC. The pattern of field boundaries surrounding the settlements at Ashculme and Byes Farm is of note, as it is almost possible to begin to break down these areas in terms of the morphology of the enclosures into the original land units ssociated with the farmsteads/settlements when they were first established. Byes Farm and Ashculme appear to have been the principle foci of enclosure, with perhaps Ashculme being the initial settlement in the valley, followed by Byes Farm.

Rosemary Lane/Gladayes Farm
Sites within this part of the HLC which appear associated with a hedged boundary include Gladhayes Farm & barn which is first recorded in 1330 as Clodeheis; post medieval extraction pits and a former catch meadow. It is not clear which farm the catch meadow was associated with and therefore it could have operated as a detached system.

Other sites which seem unconnected at this level of assessment include, Bridge House barn, a post medieval extraction pit, the field name 'Ridges Close' (perhaps indicative of former ridge & furrow) and 'Crib House' (reference to the site of a former cottage).

As discussed previously the enclosure pattern surrounding early medieval settlements such as Gladhayes Farm, can provide an indication of the settlement sequence. Gladhayes is situated on the southern edge of large globular area of enclosed land; Grays' Farm (see Section 2.5 below) although not recorded as an early farmstead sits centrally within this area.

2.3.3 HER sites/historical sites associated with hedgerows

The key features adjacent to hedgerows within this HLC are medieval/post medieval in date. They include settlements (current and former), farm buildings, former field boundaries and extraction pits, former orchards, field names, catch meadows and parts of the parish boundary between Clayhidon and Hemyock. The medieval farmstead/settlements seem associated with larger, enclosed areas of land, which are likely to reflect the sequence in which they were established and the surrounding land enclosed. Hedged boundaries and roads/tracks forming the margins of these land units should be considered historically important.

All the hedgerows associated with these HER sites and earlier enclosures can be considered 'important' in terms of the 1997 Hedgerow Regulations (see Appendix 1).

2.4 Medieval Enclosures

2.4.1 Landscape Character Areas

The *Medieval Enclosures* HLC is only found in three discrete locations at Jennings Farm, Ashculme and Deepsellick Farm. Jennings Farm is situated within the 2A (Steep scarp slopes) LCA. Ashculme and Deepsellick within the 3A (Upper farmed and wooded valley slopes) LCA (see above for key characteristics). The field boundaries present within Ashculme and Deepsellick appear to fit with the key characteristics descriptions.

2.4.2 HER/HLC Time depth

The *Medieval Enclosures* HLC comprises fields which were first enclosed with hedge-banks during the medieval period. It is therefore considered to be medieval in date. There are currently no HER sites recorded within this HLC, however the boundaries of this HLC are all formed by hedgerows.

2.5 Post Medieval Enclosures

2.5.1 Landscape Character Areas

This *Post Medieval Enclosures* HLC is located across three Landscape Character Areas, 1A(Open inland planned plateaux), 2A (Steep scarp slopes) and 3A (Upper farmed and wooded valley slopes) . The field boundaries present appear typical of those described as part of the 1A LCA.

2.5.2 HER/HLC Time depth

Post medieval enclosures are field laid out in the C18th-C19th that commonly have surveyed straight boundaries. Thus, HLC is therefore considered to be post medieval in date. This HLC occurs in five general locations across the study area, Combe Hill/Studleys, Honeyhill, Gray's Farm, Callers Farm and land west of Clayhidon (Mount Pleasant Farm).

The HER sites within this HLC range in date from the medieval to post medieval periods and are associated with settlement and agricultural activity. The date range is therefore consistent with the date of the HLC. These sites are discussed below by the five broad locations of the HLC areas.

Combe Hill/Studleys

Sites within this area of the HLC include a medieval field boundary, former orchard, two areas of ridged cultivation, the sites of a quarry and cottage and Studley's a Grade II Listed Building,

Honeyhill

Much of the HLC area on Honeyhill is encompassed by a large medieval curvilinear enclosure. The presence of this enclosure is based upon the field pattern. Such enclosures are believed to have been the focus for the development of the surrounding field patterns. They therefore considered to pre-date the field pattern which surrounds them. Any settlement associated with these enclosures may have early origins. The only other sites in this area comprises the field name 'Stoney Close' (perhaps a reference to land from which stone was excavated, the site of a former building or simply stony soil) and a former area of Clayhidon Turbary.

Callers Farm

An earthwork ditch of unknown date or function has been recorded on land to the east of Callers Farm. It may represent the remains of a former Holloway. It is not associated with any hedged boundaries.

Gray's Farm& Land west of Clayhidon (Mount Pleasant Farm).

No HER sites are currently recorded within these areas of the HLC, however the parish boundary between Clayhidon and Hemyock runs along the road which forms the northwest edge of thi HLC area.

With exception of the medieval enclosure on Honeyhill and a medieval field boundary these HER sites are generally of a similar date to the HLC.

2.5.3 HER sites/historical sites associated with hedgerows

The key HER sites in the HLC which appear associated with hedged boundaries include the medieval enclosure on Honeyhill, a former field boundary, former post medieval orchard, an extraction pit, the field name 'Stoney Close' and sections of the parish boundary between Clayhidon and Hemyock.

All the hedgerows associated with these HER sites and earlier enclosures can be considered 'important' in terms of the 1997 Hedgerow Regulations (see Appendix 1).

2.6 Former Orchards

2.6.1 Landscape Character Areas

The Former Orchards HLC can be found at five separate locations within the study area; north of Middle Ashculm Farm, at Higher Ashculm Farm, south of Combe Hill, Deepsellick Farm & Gladhayes Farm. With the exception of the area near Combe Hill, the majority of these areas lie within the 3A LCA (see above for key characteristics). The Combe Hill area falls within the 2A LCA. Former orchards are not included as features within either of these LCAs.

2.6.2 HER/HLC Time depth

The Former Orchard HLC is generally of a Post medieval in date. There are seven HER entries associated with this HLC; all are associated with hedged field boundaries. Due to the dispersed nature of this HLC type, the HER sites are discussed separately by location as follows: -

- *Middle Ashculme*: Extraction pit & orchard banks
- *Higher Ashculme Farm*: Extraction pit, orchard banks and settlement at Ashculme which is recorded in 1330
- *Land South of Combe Hill*: No HER sites
- *Deepsellick Farm*: Orchard banks, which are all that remains of the former orchard
- *Gladhayes Farm*: An extraction pit. Gladhayes Farm is first recorded in 1330.

The association between extraction pits and former orchards seems a common feature of the study area, with the orchards being developed on top of the former extraction pits. It is of note that at least two areas of former orchard are associated with farmsteads (Higher Ashculme & Gladhayes) which are known to have medieval origins (see Section 2.3 above).

2.6.3 HER sites/historical sites associated with hedgerows

All of the HER sites discussed above are associated with hedged boundaries. These hedgerows may therefore be considered important in terms of the 1997 Hedgerow Regulations.

2.7 Modern enclosures

1.7.1 Landscape Character Areas

The *Modern Enclosures* HLC can be found in the 1A (Open inland planned plateaux); 2A (Steep scarp slopes), and 3A (Upper farmed and wooded valley slopes) LCAs (see above for key characteristics). The field boundaries present appear typical of those described as part of the 1A LCA. This HLC can be found at four different locations across the study area, around Deepsellick Farm, Gray's Hill, Rosemary Lane and Mount Pleasant Farm.

2.7.2 HER/HLC Time depth

The *Modern enclosures HLC* comprises modern fields which have been created by adapting earlier fields of a probable post medieval date. It is therefore considered to be modern in date but with post medieval origins. With the exception of the medieval enclosure and a field name, the HER sites recorded in this HLC are generally of a post medieval to modern date, and therefore consistent with the date of the HLC. Again, due to the dispersed nature of this HLC type, the HER sites are discussed separately by location.

- *Deepsellick Farm*: Site of a post medieval cottage and extractive pit;
- *Gray's Hill*: Medieval enclosure, former post medieval orchard and part of the parish boundary between Clayhidon & Hemyock;
- *Rosemary Lane*: 'Barrow Close' field name, site of a cottage (post medieval), a possible building platform (post medieval/modern and a post medieval/modern 'detached' catch meadow; and,
- *Mount Pleasant Farm*: No HER sites currently recorded.

2.7.3 HER sites/historical sites associated with hedgerows

HER site associated with hedged boundaries in this HLC include part of the medieval enclosure, post medieval/modern extractive pits, the former catch meadow and orchard. All the hedgerows associated with the HER sites can be considered 'important' in terms of the 1997 Hedgerow Regulations (see Appendix 1).

2.8 Modern/Historic settlement

2.8.1 Landscape Character Areas

These HLCs which encompass the village of Rosemary Lane, lie within two LCAs, 2A & 3A (see above for key characteristics). As settlement types they seem typical of these LCAs.

2.8.2 HER/HLC Time depth

The *Historic Settlement* HLC comprises the core of an historic settlement, which is based on the late C19th 1st edition Ordnance Survey maps. The *Modern Settlement* HLC relates to settlement which has been developed during the C20th. In this case the later settlement elements of Rosemary Lane.

All four of the HER sites identified lie within the historic core of Rosemary Lane. These include a flint arrowhead found in the gardens of Brock Cottage, the site of a medieval/post medieval forge, Callers farm & a brethren meeting house. The latter three are of a similar date to the Historic Settlement HLC. None of these HER entries are associated with any hedged boundaries.

2.9 Watermeadow

2.9.1 Landscape Character Areas

The *Watermeadow* HLC lies in the Culm Valley and is confined wholly within the 3C LCA area. It therefore fits exactly with the LCA description. This area was probably watermeadows in the late medieval and/or post medieval periods and has changed little in the C20th century.

2.9.2 HER/HLC Time depth

There are no HER sites associated with this HLC, however a short section of the parish boundary between Culmstock and Hemyock runs north to south across this area. This section is a hedged boundary. The orientation of this boundary fits with the pattern of other field boundaries across the Blackdown Hills whereby they appear to run across watersheds as opposed to along the river valleys (Stephen Rippon, *Making Sense of a Historic Landscape*, p176, 2012)

2.10 Park/Garden

2.10.1 Landscape Character Areas

The *Park/Garden* HLC can be found in two separate locations. At the northern end of the study area it lies within the 2A & 3A LCA. It is not a typical feature of these LCA types. This HLC comprises a park planted with ornamental trees or a garden around a house. In this case two houses; Lane End Farm and Knapp Cottage. It is broadly Post medieval/Modern in date.

The other area is situated on the very eastern edge of the study area in the 1A LCA. It comprises the gardens associated with the rectory at Clayhidon. Again, it is not a typical feature of this LCA.

There are no HER sites currently recorded within this HLC at either of these locations.

ANNEX 8 CONTINUED

AREA 2: BLACKDOWN/SAMPFORD COMMON

1. DISCUSSION OF LANDSCAPE CHARACTER AREAS (LCAS), HISTORIC LANDSCAPE CHARACTERS (HLCS) AND HER SITES/OTHER HISTORICAL FEATURES

1.2 Landscape Character Areas (LCAs)

There are three landscape character types within the study area. These comprise 1A: Open inland planned plateaux, 2A: Steep scarp slopes and 3A: Upper farmed and wooded valley slope. Their key characteristics may be summarised as follows:

1.2.1 1A Open Inland planned plateaux

- High open flat plateau
- Rectangular field pattern of medium to large scale
- Predominantly pastoral farming on heavy soils
- Well-trimmed hedges on narrow earth banks
- Sparsely scattered boundary trees, usually beech with oak towards plateau edge
- Very uniform appearance
- Beech is frequent at the northern end of the area, with oak and hazel more common towards south and around edge
- Occasional copses and small conifer plantations punctuate the open farmland
- Long straight roads in centre, with narrow winding minor roads towards the edge
- Isolated farmsteads and clusters of buildings at crossroads; 20th century settlement associated with airfields
- Extensive views often blocked by woodland on boundary

1.2.2 2A Steep scarp slopes

- A narrow band of steeply sloping land immediately below the plateau edge
- Mixed woodland and semi-improved or unimproved pasture
- Pastoral cultivation, with small-scale irregular field pattern
- Springline mires
- Lightly settled
- Narrow winding lanes with well treed banks
- Occasional long views out over adjoining valleys
- Many patches of semi-natural habitats, including springline mires and scrub

1.2.3 3A Upper farmed and wooded valley slope

- Undulating upper valley slopes below the scarp slope
- Well treed pastoral farmland, with arable cultivation on lower slopes
- Small to medium size fields with irregular boundaries
- Deciduous woods and copses, especially on hilltops and upper slopes
- Very wide, usually low, species-rich hedges with many hedgerow trees
- Dispersed settlement pattern of isolated farms and small villages
- Very winding narrow lanes
- An intimate and intricate landscape with views out confined by vegetation
- Remote and with little 20th century development

1.2 Historic Landscape Character (HLC)

The study area covers parts of Somerset And Devon. The Somerset Historic Landscape Characterisation (SHLC) was carried out as part of Wave 3, the Devon Historic Landscape Characterisation (DHLC) as part of Wave 4. The Devon HLC types were designed with reference to the Somerset (& Cornwall) HLC types to enable comparison. There are six HLC types in Somerset; seven types in Devon.

Details of the HLCs discussed below are summarised in Table 1: Area 2 Blackdown & Sampford Commons - summary of LCAs, HLCs, Biological records & HER Sites/historical features. This information can also be found as a GIS layer.

1.3 Historic Environment Record Sites (HER sites)

Historic Environment Records from Devon & Somerset have been used to prepare the information outlines below and discussed in Table 1. Further historical features not recorded on these HERs have been identified as a consequence of observations made during the data collection. At this stage these relate solely to County/Parish Boundaries and the morphology of the enclosure pattern based upon what appears to be medieval farmsteads.

Further research combined with ground truthing and information from local historians will result in the identification of many more heritage features associated with hedgerows, which have not been identified at this stage.

Details of the HER site/historical features discussed below are summarised in Table 1: Area 2 Blackdown & Sampford Commons - summary of LCAs, HLCs, Biological records & HER Sites/historical features. This information can also be found as a GIS layer.

2. HEDGEROWS: DISCUSSION OF HER SITES BY HLC TYPE WITHIN STUDY AREA

2.1 Unenclosed pasture (SHLC) = Rough ground (DHLC)

2.1.1 Landscape Character Areas

These HLCs are located across two Landscape Character Areas (LCAs), 1A: Open inland planned plateaux and 2A: Steep scarp slopes (see above for key characteristics). Neither of the field boundaries within these HLCs appear to be 'typical' of the two LCAs.

2.1.2 HER/HLC Time depth

Rough Ground (DHLC) which is located primarily on Blackdown Common & in Whitehall Plantation is rough grazing ground, heathland or moorland that shows signs of earlier historical use as agricultural land. The DHLC is attributed a Medieval/ Post medieval date. The *Unenclosed pasture* (SHLC) is located on Blackdown Common and can be considered to have the same time depth as Rough Ground.

The HER sites present include a relict prehistoric settlement and burial activity (Iron Age), Roman/Post Roman ironstone extraction activities, Medieval & Post medieval field boundaries and enclosures and Post medieval extraction pits.

2.1.3 HER sites/historical sites associated with hedgerows

The key features adjacent to hedgerows within these HLC areas are the Roman/Post Roman ironstone workings, Post medieval/C19th extractive pits, the Devon/Somerset County boundary & parish boundaries between Culmstock, Sampford Arundel & Wellington Without.

All the hedgerows associated with the HER sites, County & Parish Boundaries can be considered 'important' in terms of the 1997 Hedgerow Regulations (see Appendix 1).

2.2 Medieval enclosures (DHLC)

2.2.1 Landscape Character Areas

This HLC is wholly within the 3A LCA: Upper farmed and wooded valley slope (see above for key characteristics). The key features of the field boundaries within this Medieval enclosures HLC would seem quite typical of the LCA.

2.2.2 HER/HLC Time depth

These *Medieval enclosures* were fields that were probably first enclosed with hedge-banks during the middle ages. They are therefore considered medieval in origin. This HLC is mainly concentrated around Whitemoor and Blackaller Farm.

The HER sites/ historical features within this HLC include the following: -

Prehistoric

- A Bronze axe findspot (location is not specific);

Medieval/Post medieval

- Blackaller and Whitemoor farmsteads and their pattern of surrounding enclosures. The name Blackaller may be indicative of dark soil or vegetation as a result human activity – possibly in this instance an indication of earlier settlement, or a reference to blackthorn. Aller from the OE alor means land on or near where alder trees grew. The name Whitemoor may simply mean land with a white surface. The pattern of enclosure surrounding Blackaller suggests that it may have been the original settlement, with Whitemoor/Whitehams (to the north) and Lugg's/Goodall's (to the south) being established subsequently;
- The deserted medieval farmstead at Whitemoor may be a precursor to the later farmstead);
- Medieval field boundaries and cultivation marks at Blackaller & Whitemoor;

Post medieval-C19th

- Extractive pits several of which were later used as orchards;
- the C19th catch meadow at Blackaller Farm. This water meadow might have operated as what has been called an 'integrated' catch meadow, in which manure from the cow sheds within the farmyard was mixed with the water supply to supply liquid manure to the pasture; and,
- Orchard/tree planting banks at Whitemoor Farm.

Undated

- Field name Blacklands, which may be indicative of dark soil (or vegetation) as a result human activity.

2.2.3 HER sites/historical sites associated with hedgerows

The key features adjacent to hedgerows within this HLC are medieval in date. They include the two farmsteads of Blackaller and Whitemoor (+ the deserted medieval settlement), their associated pattern of enclosures (which seem to reflect the sequence in which farmsteads were established and enclosed) and the field boundaries at Blackaller. Further documentary research needs to be undertaken to further investigate the settlement sequence and pattern.

The key features adjacent to hedgerows within this HLC area of a Post medieval-C19th date includes a number extractive pits one of which (119954) to the SW of Whitemoor Farm was later used as an orchard. The field boundary curves around this former pit

and orchard. Another former orchard has also been recorded at Whitemoor Farm. The C19th catch meadow at Blackaller Farm covers an area of approximately 0.60 hectares of southeast facing slope on the east side of Blackaller Farm.

All the hedgerows associated with these HER sites and earlier enclosures can be considered 'important' in terms of the 1997 Hedgerow Regulations (see Appendix 1).

2.3 Anciently enclosed land modified 17th-C19th

2.3.1 Landscape Character Areas

This HLC covers two Landscape Character Areas, 2A: Steep scarp slopes and 3A: Upper farmed and wooded valley slopes (see above for key characteristics). The field boundaries present within the HLC appear to fit with the key characteristics descriptions.

2.3.2 HER/HLC Time depth

This HLC comprises land which was enclosed in the medieval period but modified between the 17th – 19th centuries. It is therefore considered to be post medieval in date with medieval origins. This HLC covers land at Higher Wrangway and Park Farm.

The HER and historical features within this HLC include the medieval deer park at Park Farm, post medieval-C19th former orchards, extraction pits, and catch meadow. The Parish boundary between Sampford Arundel & Wellington Without also runs through the Higher Wrangway section of this HLC.

2.3.3 HER sites/historical sites associated with hedgerows

The deer park, post medieval-C19th former orchards at least one extraction pit and the parish boundary are all associated with hedgerows. These hedgerows may therefore be considered important in terms of the 1997 Hedgerows Regulations (see Appendix 1).

2.4 Recently enclosed C17th-C18th

2.4.1 Landscape Character Areas

This HLC is located across all three Landscape Character Areas. 1A: Open inland planned plateaux; 2A: Steep scarp slopes, and 3A: Upper farmed ad wooded valley slopes (see above for key characteristics). The field boundaries present appear more typical of the 2A & 3A LCAs.

2.4.2 HER/HLC Time depth

This HLC comprises land which was enclosed in the post medieval. It is therefore considered to be post medieval in date. This HLC covers land at Wranglea Farm/Wrangcombe Farm.

The HER sites for this HLC in the medieval period include the deer park and park pale at Park Farm; and field boundaries SE of Wrangway. The Post medieval period is represented by former orchards, extraction pits and quarries. Undated HER sites include the field names: Pit Close, which suggests an extraction site; Cold Harbour, which means sheltered place in the open and is often a name associated with Roman settlement and cultivation ridges.

2.4.3 HER sites/historical sites associated with hedgerows

The majority of the HER sites discussed above except for one extraction pit and a former field boundary are located close to an existing hedgerow. All hedgerows associated with these sites may therefore be considered important in terms of the 1997 Hedgerow Regulations (see Appendix 1).

2.5 Recently enclosed C17th-C21st

2.5.1 Landscape Character Areas

This HLC is located across all three Landscape Character Areas, 1A: Open inland planned plateaux; 2A: Steep scarp slopes, and 3A: Upper farmed and wooded valley slopes (see above for key characteristics). The field boundaries present appear typical of those described as part of the 1A LCA.

2.5.2 HER/HLC Time depth

This HLC comprises land which was enclosed in the post medieval to modern period. It is therefore considered to be post medieval/modern in date. This HLC covers land at Higher Wrangway, Wellington Hill and Crossway Farm.

The HER sites for this HLC include a possible prehistoric (or post medieval) earthwork feature; the Blackdown Hills Ridgeway Road (which could have ancient origins as a prehistoric ridgeway route) and a short section of the medieval Park Farm deer park pale. Post medieval/modern sites include a gravel pit, a folly at Higher Wrangway and the former Cat & Fiddle public house.

2.5.3 HER sites/historical sites associated with hedgerows

The majority of the HER sites discussed above apart from the former Cat & Fiddle public house are located close to an existing hedgerow. These hedgerows may therefore be considered important in terms of the 1997 Hedgerow Regulations (see Appendix 1).

2.6 Post Medieval enclosures (DHLC)

2.6.1 Landscape Character Areas

This HLC is located across all three Landscape Character Areas, 1A: Open inland planned plateaux; 2A: Steep scarp slopes and 3A: Upper farmed and wooded valley slopes (see above for key characteristics). The field boundaries present appear typical of those described as part of the 1A LCA.

2.6.2 HER/HLC Time depth

Post medieval enclosures are field laid out in the C18th-C19th that commonly have surveyed straight boundaries. Thus, HLC is therefore considered to be post medieval in date. It covers land on Culm Davy Hill and land fringing the medieval enclosures based around Blackaller and Whitemoor Farm.

This HER sites/historic features within this HLC are quite random in date (Bronze Age-C19th) and nature and include a Bronze Age ring ditch. The pattern of enclosure to NE of Whitemoor could have earlier origins as a unit of enclosed land (? medieval in origin). The Post medieval-C19th period is represented by orchard banks, extractive pits, the sites of former cottages/houses and? the parish boundary between Culmstock, Hemyock & Wellington Without.

Undated sites may be summarised as follows: -

- Field boundaries near Culm Davy Plantation & Whiteham's Farm;
- Field name Greywalls (which may be indicative of a former settlement); and,
- Enclosure with an entrance (E of Whitehall Planation)

2.6.3 HER sites/historical sites associated with hedgerows

The principal sites associated with hedgerows in the HLC include the pattern of enclosed land to the east of Whitemoor Farm (which may relate to an earlier enclosure associated with the precursor to Whitemoor Farm); former orchards (at Keepers Cottage); extraction pits (post medieval-C19th); a former undated field boundary/settlement and the parish boundary between Culmstock, Hemyock & Wellington. Further documentary research needs to be undertaken to further investigate the settlement sequence and pattern.

All the hedgerows associated with the HER sites, possible earlier enclosure at Whitemoor Farm and the Parish Boundaries can be considered 'important' in terms of the 1997 Hedgerow Regulations (see Appendix 1).

2.7 Modern enclosures (DHLC)

1.7.1 Landscape Character Areas

This HLC is wholly within the 3A Upper farmed and wooded valley slope LCA (see above for key characteristics). The field boundaries present appear typical of those described as part of the LCA.

2.7.2 HER/HLC Time depth

The *Modern enclosure (DHLC)* comprises modern fields which have been created out of probable medieval enclosures enclosed with hedgebanks. The sinuous medieval boundaries survive in places. It considered to be post medieval/modern in date but with medieval origins. This HLC is located around Whitehams Farm.

All five of the HER sites recorded in this HLC lie adjacent to hedgerows. They range in date from the medieval to the post medieval period and include two areas of medieval/post medieval field boundaries, post medieval-C19th former orchard, two post medieval - C19th extractive pits (one later used as orchard with the field boundary fitting the 'shape' of the extraction pit.

All the hedgerows associated with the HER sites can be considered 'important' in terms of the 1997 Hedgerow Regulations (see Appendix 1).

2.8 Woodland (Semi-natural ancient woodland + Other woodland SHLC; Conifers, Other woodland + Woodland with old field boundaries DHLC)

2.8.1 Landscape Character Areas

Semi-natural ancient woodland and *Other woodland* (SHLCs) are located across all the 3 LCAs within the study area. Both fit broadly with the descriptions for wooded areas. The *Conifer* and *Other Woodland* (DHLCs) cover LCAs 1A & 2A. Both fit the woodland character descriptions for 1A LCA. The Woodland *with old field boundaries* (DHLC) is restricted purely to the 1A LCA. The old field boundaries element of this type of woodland does not fully fit the woodland description of this HLC. (See above for key characteristics).

2.8.2 HER/HLC Time depth

2.8.2.1 Semi-natural woodland SHLC as defined by English Nature is woodland with evidence of continuous wooded cover since 1600 AD. There is only one location within the study area at Quelscoombe Bottom Wood, which lies within the Park Farm medieval deer park. Documentary evidence indicates that the licence to enclose the park was awarded in to the Bishop of Bath and Wells 1139. The stream and woodland running along Quelscoombe Bottom would have been integral to the deer park and perhaps one of the key reasons as to why this part of the Bishop of Bath and Well's estate was selected for this usage. Several post medieval-C19th extraction pits are also located in the woodland. None are associated with a hedgerow.

2.8.2.2 Other woodland SHLC covers Wrangcombe Copse & Firs Plantation. The only HER entry for Firs Plantation is the deer park and park pale at Park Farm. Wrangcombe Copse contains several post medieval-C19th extraction pits, many of which look to be situated next to divisions within the woodland. Other features associated with boundaries in this HLC

include the County Boundary and the parish boundary between Hemyock, Sampford Arundel & Wellington Without. Hedgerows associated with these boundaries are considered important under the Hedgerow Regulations 1997.

2.8.2.3 The *Conifers DHLC* comprises conifer plantations is located on Culm Davy Hill, Whitehall Plantation & Culm Davy Plantation. The Culm Davy part of this HLC is also recorded formerly as *Rough Ground* so the date range for the entire is broadly Post Medieval-Modern. HER sites associated with hedgerows in this HLC include areas of Roman-C19th mining (ironstone open cast and extraction pits) and early medieval field boundaries. There is also an undated enclosure in Whitehall Plantation. Hedgerows associated with these HER sites are considered important under the Hedgerow Regulations 1997.

2.8.2.4 The *Other Woodland DHLC* is broad leaved plantations, replanted ancient woodland or secondary woodland that has grown up from scrub. It is generally considered post medieval/modern in date. This HLC located on Little Common, Foxes Planation and Greywalls Planation. The only HER entry comprises a post medieval-C19t extraction pit, which is associated with a hedgerow (*check Historic PBs Appendix 1*).

2.8.2.5 The *Woodland with old field boundaries* is broad leaved plantations, replanted ancient woodland or secondary woodland that has grown up from scrub, incorporating the remains of earlier field boundaries (post medieval enclosures – see above). It is generally considered post medieval/modern in date. This HLC can be found on Culm Davy Hill. The only HER entry comprises post medieval-C19th wood planting banks. These banks are located near a line of trees, which form internal compartment to the coniferous forestry.

2.9 Orchards/Former Orchards (DHLC)

2.9.1 Landscape Character Areas

This HLC is wholly within the 3A LCA: Upper farmed and wooded valley slope (see above for key characteristics). These orchards are typical of the isolated farmsteads which are characteristic of the LCA. The LCA can therefore be considered to 'fit' with the LCA key characteristics.

2.9.2 HER/HLC Time depth

Orchards/Former Orchards are Post medieval in date. Both orchards are associated with two farmsteads – Whitemoor (the name is thought to mean land with a white surface) which is post medieval in date and Blackaller also post medieval, but which could have earlier origins as suggested by the shape of the surrounding enclosures. Traces of the former orchard tree planting banks have been identified in both areas.

2.9.3 HER sites/historical sites associated with hedgerows

Both the farmsteads and the orchards are associated with field boundaries. These hedgerows may therefore be considered important in terms of the 1997 Hedgerow Regulations.

Annex 9: Natural Capital accounts for the Blackdown Hills AONB assessment

Stock Inventory

The natural capital assets of archaeological interest in the 2 zones sampled. The HER "BLD" records have not been included since as buildings we do not normally include them in natural capital accounts.

Hedgerows

Zone	Hedge Class	LENGTH(m)
Hemyock		
	Summary for 'Hedge Class' = (51 detail records)	
	Sum 4230	
	Coppiced	
	Summary for 'Hedge Class' = Coppiced (691 detail records)	
	Sum 71532	
	Uncoppiced	
	Summary for 'Hedge Class' = Uncoppiced (33 detail records)	
	Sum 2291	
Summary for 'Zone' = Hemyock (775 detail records)		
Sum		78053
Sampford		

No hedge	
Summary for 'Hedge Class' = (4 detail records)	
Sum	385
Coppiced	
Summary for 'Hedge Class' = Coppiced (374 detail records)	
Sum	48424
Tree Dominated	
Summary for 'Hedge Class' = Tree Dominated (5 detail records)	
Sum	495
Uncoppiced	
Summary for 'Hedge Class' = Uncoppiced (21 detail records)	
Sum	2658
Summary for 'Zone' = Sampford (404 detail records)	
Sum	51962

Historic Landscape Character split by landcover type from Corine EU data base and Sample area

Row Labels	Sum of Shape_Area
Hemyock	**400.00**
Conifers	**0.69**
Arable	0.370
Permanent grassland	0.317
Former orchards	**8.69**
Permanent grassland	8.69
Historic settlements	**1.50**
Permanent grassland	1.50
Medieval enclosures	**5.73**
Arable	1.29
Permanent grassland	4.44
Medieval enclosures based on strip fields	**190.93**

Arable	13.10
Deciduous woodland	10.22
Permanent grassland	167.60
Modern enclosures	**36.32**
Arable	7.11
Permanent grassland	29.21
Modern settlement	**2.32**
Permanent grassland	2.32
Other woodland	**5.61**
Arable	3.06
Deciduous woodland	2.02
Permanent grassland	0.52
Park/garden	**6.29**
Deciduous woodland	5.69
Permanent grassland	0.60
Post-medieval enclosures	**85.04**
Arable	38.41
Deciduous woodland	4.13
Permanent grassland	42.49
Rough ground	**46.65**
Arable	2.57
Deciduous woodland	16.64
Permanent grassland	27.43
Watermeadow	**10.25**
Permanent grassland	10.25
Sampford	**399.90**

Anciently Enclosed Land modified 17th to 19th century. General field size, 0-3ha. Less than 25% boundary loss since 1905.	**6.96**
Coniferous woodland	1.23
Permanent grassland	5.73
Anciently Enclosed Land modified 17th to 19th century. General field size, 6-12ha. Less than 25% boundary loss since 1905.	**14.21**
Deciduous woodland	5.85
Permanent grassland	8.35
Conifers	**51.25**
Coniferous woodland	39.76
Permanent grassland	11.49
Former orchards	**0.04**
Permanent grassland	0.04
Medieval enclosures	**33.57**
Coniferous woodland	0.72
Permanent grassland	32.85
Modern enclosures	**13.77**
Deciduous woodland	4.23
Permanent grassland	9.54
Orchard	**2.02**
Permanent grassland	2.02
Other woodland	**19.11**
Coniferous woodland	7.93
Deciduous woodland	5.93
Permanent grassland	5.25
Other woodland.	**33.96**
Coniferous woodland	19.41
Deciduous woodland	1.28

Heath&moorland	5.67
Permanent grassland	7.60
Post-medieval enclosures	**54.88**
Coniferous woodland	5.73
Deciduous woodland	5.02
Permanent grassland	44.13
Recently Enclosed Land 17th to 18th century. General field size, 3-6ha. Less than 25% boundary loss since 1905.	**52.38**
Coniferous woodland	6.48
Deciduous woodland	3.98
Permanent grassland	41.92
Recently Enclosed Land 18th to 21st century. General field size, 3-6ha. Less than 25% boundary loss since 1905.	**35.85**
Coniferous woodland	1.52
Deciduous woodland	6.66
Heath&moorland	0.28
Permanent grassland	27.38
Rough ground	**55.53**
Coniferous woodland	16.50
Deciduous woodland	3.49
Heath&moorland	26.22
Permanent grassland	9.32
Semi-natural ancient woodland (as defined by English Nature).	**6.40**
Deciduous woodland	4.07
Permanent grassland	2.33
Unenclosed pasture.	**13.24**
Heath&moorland	12.57
Permanent grassland	0.68

Woodland with old field boundaries	**6.74**
Coniferous woodland	6.74
(blank)	
(blank)	
(blank)	
Grand Total	**799.90**

Historic Environment Record sites (land not built)

Sum of Shape_Area (m2)	Column Labels					
Row Labels	**Arable**	**Grassland**	**Broadleaf Wood**	**Conifer**	**Heath**	**Grand Total**
BARN		136				136
BARROW		13398			158	13555
BARROW; MOUND					321	321
BARROW; RING DITCH?		308				308
BARROW?					420	420
BOUNDARY				42700		42700
BUILDING		92				92
BUILDING PLATFORM; EXTRACTIVE PIT		4039				4039
BUILDING PLATFORM; FIELD BOUNDARY		2706				2706
CAIRN; BUILDING	16165	8972				25137
CATCH MEADOW		41129				41129
CATCH MEADOW; DRAIN?		19910				19910
CIRCULAR ENCLOSURE		12664				12664
CLEARANCE CAIRN					466	466
COTTAGE NON SPECIFIC	30		1133			1163
CULTIVATION MARKS; ORCHARD		7319				7319
CULTIVATION TERRACE	698	1909				2607

CULTIVATION TERRACE; FIELD BOUNDARY		1444				1444
CULTIVATION TERRACE?; FIELD BOUNDARY		4705				4705
CURVILINEAR ENCLOSURE	269246	46268				315514
DESERTED SETTLEMENT		2720				2720
ENCLOSURE		11292			2108	13400
ENCLOSURE?; NATURAL FEATURE	1780					1780
EXTRACTIVE PIT	7747	70896	493	906		80042
EXTRACTIVE PIT; HOLLOW WAY		1856				1856
EXTRACTIVE PIT; ORCHARD		2164	2313			4477
EXTRACTIVE PIT; PEAT CUTTING?; GRAVEL PIT?		943				943
FARM BUILDING	4	141				145
FARMHOUSE		1233				1233
FARMSTEAD	521	32474				32994
FIELD BOUNDARY	4066	31133	125	2624		37948
FIELD BOUNDARY; FIELD SYSTEM				19993		19993
FIELD BOUNDARY; HOLLOW WAY; DRAINAGE DITCH		838				838
FIELD BOUNDARY; NON ANTIQUITY	343	817				1160
FIELD NAME		5875				5875
FIELD SYSTEM		10779		464		11243
FINDSPOT		413				413
FISHPOND		1141				1141
GARDEN	66000	107263				173263
GRAVEL PIT		17756				17756
HILLFORT	1486					1486
HOSPITAL		363				363
HOUSE	38	209				247

LYNCHET; FIELD BOUNDARY		840				840
NISSEN HUT		52				52
OPEN CAST MINE; EXTRACTIVE PIT					68141	68141
OPEN CAST MINE?; EXTRACTIVE PIT				2221	165	2386
OPEN CAST MINE?; EXTRACTIVE PIT?; MINE?				42527		42527
ORCHARD	45319	104027	1195			150541
ORCHARD?		28139	800			28938
PLACENAME	327	156				483
QUARRY; EXTRACTIVE PIT; SPOIL HEAP		2648		7698	19174	29519
RING DITCH; NON ANTIQUITY?				400		400
SAND PIT	200					200
SETTLEMENT		5208				5208
SHRUNKEN VILLAGE		3770				3770
SPOIL HEAP?; EXTRACTIVE PIT	787					787
TRACKWAY		2506				2506
TRACKWAY; FIELD SYSTEM		444	3817			4261
WATER CHANNEL		473				473
WELL	3	4	12			19
WOOD?				4401		4401
(blank)						
Grand Total	**414760**	**613571**	**9888**	**123934**	**90952**	**1253105**

Monetised Service Values

All Hedge Ecosystem Service value

Zone	carbon stock (Tonnes C)	Carbon Flow TC/yr	Carbon stock value £	Carbon Flow Value£/yr	Hydrology Value £
Summary for 'Zone' = Hemyock (775 detail records)					
Sum	1758	387	341972	75370	174323
Summary for 'Zone' = Sampford (404 detail records)					
Sum	1235	263	240411	51306	120111
Grand Total	2994	651	582383	126677	294434

HLC areas

Provisioning Services

Row Labels	Sum of Food	Sum of Timber	Count of Energy
Hemyock	**112027.06**	**6192.03**	**3870.02**
Arable	73831	0	0
Deciduous woodland	387	6192	3870
Permanent grassland	37809	0	0
Sampford	**35328.66**	**38286.62**	**19953.46**
Coniferous woodland	1060	31805	15903
Deciduous woodland	405	6481	4051
Heath&moorland	7158	0	0
Permanent grassland	26706	0	0
(blank)			
(blank)			
Grand Total	**147355.71**	**44478.64**	**23823.48**

Regulating Services

Row Labels	Sum of Resource Protection	Sum of Carbon Sequestration	Sum of water_Supply	Sum of Flood_attenuation	Sum of Water_Quality

Hemyock	**1709.11**	**3870.02**	**58.05**	**15480.06**	**7740.03**
Arable	0	0	0	0	0
Deciduous woodland	232	3870	58	15480	7740
Permanent grassland	1477	0	0	0	0
Sampford	**2084.74**	**19953.46**	**83.13**	**37406.64**	**8101.52**
Coniferous woodland	530	15903	0	21204	0
Deciduous woodland	243	4051	61	16203	8102
Heath&moorland	268	0	22	0	0
Permanent grassland	1043	0	0	0	0
Grand Total	**3793.85**	**23823.48**	**141.18**	**52886.70**	**15841.55**

Supporting Services

Row Labels	Sum of Biodiversity	Sum of Pollution attenuation
Hemyock	**88888.39**	**1813.73**
Arable	6592	66
Deciduous woodland	23220	271
Permanent grassland	59076	1477
Sampford	**89227.25**	**2141.80**
Coniferous woodland	5301	636
Deciduous woodland	24305	284
Heath&moorland	17894	179
Permanent grassland	41728	1043
(blank)		
(blank)		
Grand Total	**178115.64**	**3955.52**

Cultural Services

Row Labels	Sum of Visual_Amenity	Sum of Rec_and_tourism
Hemyock	**55417.07**	**674.88**
Arable	7449	0
Deciduous woodland	14590	143
Permanent grassland	33378	532
Sampford	**70339.67**	**1141.37**
Coniferous woodland	24066	392
Deciduous woodland	15271	150
Heath&moorland	7426	224
Permanent grassland	23576	376
(blank)		
(blank)		
Grand Total	**125756.74**	**1816.25**

HER ES Values by type

Row Labels	Cultural		Regulating	
	Sum of Rec_and_t	Sum of Visual_A	Sum of Biodiversity	Sum of Poll_A
BARN	0	2	3	0
BARROW	2	154	274	7
BARROW; MOUND	0	5	13	0
BARROW; RING DITCH?	0	3	6	0
BARROW?	0	7	17	0
BOUNDARY	16	969	214	26
BUILDING	0	1	2	0

BUILDING PLATFORM; EXTRACTIVE PIT	1	46	81	2
BUILDING PLATFORM; FIELD BOUNDARY	0	31	54	1
CAIRN; BUILDING	2	284	341	6
CATCH MEADOW	7	465	823	21
CATCH MEADOW; DRAIN?	4	225	398	10
CIRCULAR ENCLOSURE	2	143	253	6
CLEARANCE CAIRN	0	8	19	0
COTTAGE NON SPECIFIC	0	43	68	1
CULTIVATION MARKS; ORCHARD	1	83	146	4
CULTIVATION TERRACE	0	29	45	1
CULTIVATION TERRACE; FIELD BOUNDARY	0	16	29	1
CULTIVATION TERRACE?; FIELD BOUNDARY	1	53	94	2
CURVILINEAR ENCLOSURE	8	3565	3618	50
DESERTED SETTLEMENT	0	31	54	1
ENCLOSURE	3	163	310	6
ENCLOSURE?; NATURAL FEATURE	0	20	18	0
EXTRACTIVE PIT	13	928	1530	37
EXTRACTIVE PIT; HOLLOW WAY	0	21	37	1
EXTRACTIVE PIT; ORCHARD	1	112	182	3
EXTRACTIVE PIT; PEAT CUTTING?; GRAVEL PIT?	0	11	19	0
FARM BUILDING	0	2	3	0
FARMHOUSE	0	14	25	1
FARMSTEAD	6	373	655	16
FIELD BOUNDARY	7	462	684	18
FIELD BOUNDARY; FIELD SYSTEM	7	454	100	12
FIELD BOUNDARY; HOLLOW WAY; DRAINAGE DITCH	0	9	17	0

FIELD BOUNDARY; NON ANTIQUITY	0	13	20	0
FIELD NAME	1	66	118	3
FIELD SYSTEM	2	132	218	6
FINDSPOT	0	5	8	0
FISHPOND	0	13	23	1
GARDEN	19	1958	2805	60
GRAVEL PIT	3	201	355	9
HILLFORT	0	17	15	0
HOSPITAL	0	4	7	0
HOUSE	0	3	5	0
LYNCHET; FIELD BOUNDARY	0	9	17	0
NISSEN HUT	0	1	1	0
OPEN CAST MINE; EXTRACTIVE PIT	34	1131	2726	27
OPEN CAST MINE?; EXTRACTIVE PIT	1	53	18	1
OPEN CAST MINE?; EXTRACTIVE PIT?; MINE?	16	965	213	26
ORCHARD	19	1733	2605	57
ORCHARD?	5	348	611	15
PLACENAME	0	5	6	0
QUARRY; EXTRACTIVE PIT; SPOIL HEAP	13	523	858	14
RING DITCH; NON ANTIQUITY?	0	9	2	0
SAND PIT	0	2	2	0
SETTLEMENT	1	59	104	3
SHRUNKEN VILLAGE	1	43	75	2
SPOIL HEAP?; EXTRACTIVE PIT	0	9	8	0
TRACKWAY	0	28	50	1
TRACKWAY; FIELD SYSTEM	1	149	238	3

WATER CHANNEL	0	5	9	0
WELL	0	1	1	0
WOOD?	2	100	22	3
(blank)				
Grand Total	**205**	**16316**	**21270**	**466**

Supporting

Row Labels	**Regulating Services**				
	Sum of Resource_P	**Sum of water_S**	**Sum of Flood_att**	**Sum of Carbon**	**Sum of Water_Q**
BARN	0	0	0	3	0
BARROW	7	0	0	270	0
BARROW; MOUND	0	0	0	1	0
BARROW; RING DITCH?	0	0	0	6	0
BARROW?	0	0	0	1	0
BOUNDARY	21	0	854	3621	0
BUILDING	0	0	0	2	0
BUILDING PLATFORM; EXTRACTIVE PIT	2	0	0	81	0
BUILDING PLATFORM; FIELD BOUNDARY	1	0	0	54	0
CAIRN; BUILDING	4	0	0	146	0
CATCH MEADOW	21	0	0	828	0
CATCH MEADOW; DRAIN?	10	0	0	401	0
CIRCULAR ENCLOSURE	6	0	0	255	0
CLEARANCE CAIRN	0	0	0	1	0
COTTAGE NON SPECIFIC	1	0	45	60	23
CULTIVATION MARKS; ORCHARD	4	0	0	147	0
CULTIVATION TERRACE	1	0	0	37	0
CULTIVATION TERRACE; FIELD BOUNDARY	1	0	0	29	0

CULTIVATION TERRACE?; FIELD BOUNDARY	2	0	0	95	0
CURVILINEAR ENCLOSURE	23	0	0	361	0
DESERTED SETTLEMENT	1	0	0	55	0
ENCLOSURE	7	0	0	232	0
ENCLOSURE?; NATURAL FEATURE	0	0	0	-4	0
EXTRACTIVE PIT	36	0	38	1514	10
EXTRACTIVE PIT; HOLLOW WAY	1	0	0	37	0
EXTRACTIVE PIT; ORCHARD	2	0	93	166	46
EXTRACTIVE PIT; PEAT CUTTING?; GRAVEL PIT?	0	0	0	19	0
FARM BUILDING	0	0	0	3	0
FARMHOUSE	1	0	0	25	0
FARMSTEAD	16	0	0	653	0
FIELD BOUNDARY	17	0	57	848	2
FIELD BOUNDARY; FIELD SYSTEM	10	0	400	1695	0
FIELD BOUNDARY; HOLLOW WAY; DRAINAGE DITCH	0	0	0	17	0
FIELD BOUNDARY; NON ANTIQUITY	0	0	0	16	0
FIELD NAME	3	0	0	118	0
FIELD SYSTEM	6	0	9	256	0
FINDSPOT	0	0	0	8	0
FISHPOND	1	0	0	23	0
GARDEN	54	0	0	2020	0
GRAVEL PIT	9	0	0	358	0
HILLFORT	0	0	0	-3	0
HOSPITAL	0	0	0	7	0
HOUSE	0	0	0	4	0
LYNCHET; FIELD BOUNDARY	0	0	0	17	0

NISSEN HUT	0	0	0	1	0
OPEN CAST MINE; EXTRACTIVE PIT	41	3	0	144	0
OPEN CAST MINE?; EXTRACTIVE PIT	1	0	44	189	0
OPEN CAST MINE?; EXTRACTIVE PIT?; MINE?	21	0	851	3606	0
ORCHARD	53	0	48	2062	24
ORCHARD?	15	0	32	609	16
PLACENAME	0	0	0	2	0
QUARRY; EXTRACTIVE PIT; SPOIL HEAP	17	1	154	747	0
RING DITCH; NON ANTIQUITY?	0	0	8	34	0
SAND PIT	0	0	0	0	0
SETTLEMENT	3	0	0	105	0
SHRUNKEN VILLAGE	2	0	0	76	0
SPOIL HEAP?; EXTRACTIVE PIT	0	0	0	-2	0
TRACKWAY	1	0	0	50	0
TRACKWAY; FIELD SYSTEM	3	1	153	211	76
WATER CHANNEL	0	0	0	10	0
WELL	0	0	0	1	0
WOOD?	2	0	88	373	0
(blank)					
Grand Total	**429**	**6**	**2874**	**22705**	**198**

Row Labels	**Provisioning Services**		
	Sum of Energy	**Sum of Food**	**Sum of Timber**
BARN	0	2	0
BARROW	0	174	0
BARROW; MOUND	0	5	0

BARROW; RING DITCH?	0	4	0
BARROW?	0	7	0
BOUNDARY	641	43	1281
BUILDING	0	1	0
BUILDING PLATFORM; EXTRACTIVE PIT	0	52	0
BUILDING PLATFORM; FIELD BOUNDARY	0	35	0
CAIRN; BUILDING	0	1925	0
CATCH MEADOW	0	526	0
CATCH MEADOW; DRAIN?	0	255	0
CIRCULAR ENCLOSURE	0	162	0
CLEARANCE CAIRN	0	7	0
COTTAGE NON SPECIFIC	11	5	18
CULTIVATION MARKS; ORCHARD	0	94	0
CULTIVATION TERRACE	0	103	0
CULTIVATION TERRACE; FIELD BOUNDARY	0	18	0
CULTIVATION TERRACE?; FIELD BOUNDARY	0	60	0
CURVILINEAR ENCLOSURE	0	30748	0
DESERTED SETTLEMENT	0	35	0
ENCLOSURE	0	178	0
ENCLOSURE?; NATURAL FEATURE	0	199	0
EXTRACTIVE PIT	19	1777	35
EXTRACTIVE PIT; HOLLOW WAY	0	24	0
EXTRACTIVE PIT; ORCHARD	23	30	37
EXTRACTIVE PIT; PEAT CUTTING?; GRAVEL PIT?	0	12	0
FARM BUILDING	0	2	0
FARMHOUSE	0	16	0

FARMSTEAD	0	474	0
FIELD BOUNDARY	41	857	81
FIELD BOUNDARY; FIELD SYSTEM	300	20	600
FIELD BOUNDARY; HOLLOW WAY; DRAINAGE DITCH	0	11	0
FIELD BOUNDARY; NON ANTIQUITY	0	49	0
FIELD NAME	0	75	0
FIELD SYSTEM	7	138	14
FINDSPOT	0	5	0
FISHPOND	0	15	0
GARDEN	0	8765	0
GRAVEL PIT	0	227	0
HILLFORT	0	166	0
HOSPITAL	0	5	0
HOUSE	0	7	0
LYNCHET; FIELD BOUNDARY	0	11	0
NISSEN HUT	0	1	0
OPEN CAST MINE; EXTRACTIVE PIT	0	1090	0
OPEN CAST MINE?; EXTRACTIVE PIT	33	5	67
OPEN CAST MINE?; EXTRACTIVE PIT?; MINE?	638	43	1276
ORCHARD	12	6408	19
ORCHARD?	8	361	13
PLACENAME	0	39	0
QUARRY; EXTRACTIVE PIT; SPOIL HEAP	115	348	231
RING DITCH; NON ANTIQUITY?	6	0	12
SAND PIT	0	22	0
SETTLEMENT	0	67	0

SHRUNKEN VILLAGE	0	48	0
SPOIL HEAP?; EXTRACTIVE PIT	0	88	0
TRACKWAY	0	32	0
TRACKWAY; FIELD SYSTEM	38	9	61
WATER CHANNEL	0	6	0
WELL	0	0	0
WOOD?	66	4	132
(blank)			
Grand Total	**1958**	**55896**	**3876**

Annex 10: Definition of an 'Important Hedgerow'

Summary of Hedgerow Regulations 1997

Hedgerows meeting the criteria for 'Important' hedgerows as defined in The Hedgerow Regulations 1997. For the purposes of these regulations, a hedgerow is 'important' if it, or the hedgerow of which it is a stretch, has existed for 30 years or more; and satisfies at least one of the criteria listed below:

1. The hedgerow marks the boundary, or part of the boundary, of at least one historic parish or township; and for this purpose, 'historic' means existing before 1850;

2. The hedgerow incorporates a recorded archaeological feature;

3. The hedgerow is situated wholly or partly within an archaeological site or on land adjacent to and associated with such a site; and is associated with any monument or feature on that site;

4. The hedgerow marks the boundary of or is visibly related to any building or other feature of a pre-1600 AD estate or manor;

5. The hedgerow is recorded as an integral part of a field system pre-dating the Inclosure Acts;
6. The hedgerow contains or has been recorded as relatively recently containing rare or protected species;

The hedgerow includes at least 7 woody species; OR at least 6 woody species and has associated with it at least 3 of the features specified (a-i) below; OR at least 6 woody species including one of the following: black-poplar tree (*Populus nigra ssp betulifolia*), large-leaved lime (*Tilia platyphyllos*), small-leaved lime (*Tilia cordata*), wild service-tree (*Sorbus torminalis*); OR at least 5 woody species and has associated with it at least four of the features specified (a-h) below:

(Where the hedgerow in question is situated wholly or partly in the county (as constituted on 1st April 1997) of the City of Kingston upon Hull, Cumbria, Darlington, Durham, East Riding of Yorkshire, Hartlepool, Lancashire, Middlesbrough, North East Lincolnshire, North Lincolnshire, Northumberland, North Yorkshire, Redcar and Cleveland, Stockton-on-Tees, Tyne and Wear, West Yorkshire or York, the number of woody species is to be treated as reduced by one.)
(a) a bank or wall which supports the hedgerow along at least one half of its length;
(b) gaps which in aggregate do not exceed 10% of the length of the hedgerow;
(c) where the length of the hedgerow does not exceed 50m, at least one standard tree;
(d) where the length of the hedgerow exceeds 50m but does not exceed 100m, at least 2 standard trees;
(e) where the length of the hedgerow exceeds 100m, such number of standard trees (within any part of its length) as would when averaged over its total length amount to at least one for each 50m;

(f) at least 3 woodland species within one metre, in any direction, of the outermost edges of the hedgerow;
(g) a ditch along at least one half of the length of the hedgerow;
(h) connections scoring 4 points or more (A connection with another hedgerow scores one point, a connection with a pond or a woodland in which the majority of trees are broadleaved scores 2 points.)
N.B. The number of woody species in a hedgerow shall be ascertained by
(i) where the length of the hedgerow does not exceed 30m, counting the number of woody species present in the hedgerow;
(ii) where the length of the hedgerow exceeds 30m, but does not exceed 100m, counting the number of woody species present in the central stretch of 30m;
(iii) where the length of the hedgerow exceeds 100m, but does not exceed 200m, counting the number of woody species present in the central stretch of 30m within each half of the hedgerow and divide the aggregate by two;

(iv) where the length of the hedgerow exceeds 200m, counting the number of woody species present in the central stretch of 30m within each third of the hedgerow and divide the aggregate by three.

8.) The hedgerow is adjacent to a bridleway or footpath, within the meaning of the Highways Act 1980, a road used as a public path, within the meaning of section 54 (duty to reclassify roads used as public paths) of the Wildlife and Countryside Act 1981, or a byway open to all traffic, within the meaning of Part III of the Wildlife and Countryside Act 1981, and includes at least 4 woody species

Annex 11: Responses to inform part 3c of the methodology

11a: Site meeting with Barnie & Jeanne Foyster, Gray's Farm, near Stockland (close to study area 3), 16 July 2018

- Small farm of 10 ha
- Local employment e.g. via local contractors is seen as an important benefit from management of field boundaries on their farm as these people form the social/ cultural fabric of rural areas e.g. young families. Fencing, hedgelaying and tree cutting all require local contractors.
- Field boundaries keep livestock in and out of fields
- They are of high biodiversity value and provide wildlife corridors
- Scenic value of trees, value of shade and shelter, value to tourism and why people visit the area (thereby bringing money into the area).
- Neighbouring more intensive farms are concerned about the heavy shade cast by tall, bushy hedges and the effect on their grass growth/ hay takes longer to dry.
- Hedges play a visible role in catching sediment and stone that otherwise ends up on the road below
- There are no parish boundaries on the farm but it is located near the county boundary
- There are many interesting historic heritage features on the farm, some associated with field boundaries and linear earthworks that include: an ancient track believed to be a former coach road, hedges on hedgebanks, leats leading to catch meadows, old burial mounds by spring line mires and remains of what are believed to be iron age roundhouses and Mesolithic/ Medieval pottery,
- The farm is in HLS
- Many hedges have ancient veteran trees including crab apple. 180 year old ash, cherry & oak trees
- Value provided by fruit trees, fruit bushes (blackberry etc.)
- Ditches hold water and support dragonflies etc.
- Field names include stony acre and orchard field (used to be an orchard)
- Holes are built into hedges to aid water movement
- Medieval landscape with irregular shaped field boundaries
- Species rich hedges with more than 5 species
- Hedgelaying rotation every 15-20 years

- Finances of managing field boundaries- Cost £6K/year overall- mostly laying and fencing (labour cost not included). Making a loss on average of £1200/year on field boundary management. £3K/year grant via BPS/HLS
- A well maintained field boundary network is seen to add capital value to the farm
- Concerns that some small farms in the area are disappearing, other farms are getting bigger and there has been some hedge removal and less sensitive management of older, more heritage rich hedges.

Annex 11b: Response from the Blackdown Hills Woodland Association/ Blackdown Hills Farming & Woodland (facilitation) farmer (John Greenshields- close to study area 2)

13 July '18

1. List the functional (agricultural and amenity value) of the field boundaries and linear landscape features
    a. We don't see an amenity value , A wildlife value yes , main function being to hold stock
2. What is their cultural and intrinsic value?
    a. 80% of our hedges are double bank and incorporate a Deer Park Pale with Deer leaps
3. Costs:
4. What is the approx. cost of managing your field boundaries? (assumed to be hedges)- e.g. per kilometre or metre.
    a. all ours are double bank and if you disregard the ones we lay every 10 year the ones that are stock proof and cut each year is about £25 - £35 per Kilometre
5. How much of this cost (e.g a %) is covered by existing agri-environment/ Basic Payment Scheme grant aid?
    a. Only hedge laying
6. What would happen if there was less support in the future for managing your field boundaries? and how is this influenced between types of field boundary?
    a. For us as we are in HLS it would make a big hole in our income
7. Please summarise the importance of boundaries to your farming management, the farm business and the value of the farm holding
    a. We have removed all wire fencing and rely on well kept hedges to be stock proof

Annex 11c: Site meeting with Jonathan Farey (part of the Blackdown Hills Farming & Woodland Facilitation Group, Folly Farm, near Dommett (in the Somerset part of the Blackdown Hills), 1 August 2018

30 acre farm
All boundaries important, not just the ringfenced boundary
Ditches are 'cast up' onto banks
There are old ash and oak pollards in the hedges
The field boundaries have not changed since 1946- see map below-i.e. none removed. Photo shows old mining pits, possible old lynchets and there is also an old lime kiln

1946 (Somerset County Council)

Farm is in HLS and was in the ESA scheme
All hedges are on banks- there are some double hedges with a hedgebank wide enough to walk down the middle
The farm is part of the 'slow the flow' Interreg Triple C scheme with features designed to store water along hedged boundaries with ditches- flow pathways have been mapped
Ditches are located on the side of the boundary owner (for maintenance)
Cattle browse the hedges sometimes preferentially to the grass sward
Hedgelaying rotation 10-15 years
Mental health groups visit the farm to undertake practical work

Notes from Jonathan Farey:
'HEDGES:

1. Keep stock in, in my case Dexter cattle, and give them shelter and shade.
   The ditches help keep the field and hedge banks drier.
   Provide valuable fuel in the form of logs when a hedge is laid or coppiced.

Provide habitat for a wide variety of wildlife, eg birds, bats, dormice, butterflies, particularly old established hedges with a large range of species.

Broad untrimmed margins either side help to add biodiversity.

Absorb large amounts of carbon dioxide and air pollutants.

Through their diversity of flora and fauna they provide us with beauty, delighting our senses of smell sight and taste.

Provide us with valuable food sources eg blackberries, hazelnuts, sloes, crab apples, elderflowers and berries.

Provide us with willow and hazel for hurdles, oak for gate making, ash for tool handles, sycamore for turning and skittle pins, maple for furniture, birch for besom brooms.

Provide a wind break thus helping reduce the likelihood of soil erosion.

2. Traditional hedge management skills of laying and coppicing are handed down through generations, local techniques and idiosyncrasies being of particular value and interest.

Hedgerows and banks can inspire art, photography, poetry and indeed music and dance.

The Blackdown Hills are famous for their rich array of hedges and patchwork field arrangements attracting visitors and tourists from far and near, thus boosting the local rural economy.

3. a) cost in the region of £1.00 per metre per annum, some years up to £2.00/m

b) grant aid and BPS cover about 50% on average.

c) without grant aid considerably less hedge management would take place to the serious detriment of the farm.

4. My hedges are of immense value to the farm, more than one can express in a few scant sentences for all of the above reasons and more besides.

When, as you're working away, you come across and old glass bottle tucked away in the hedge bank for maybe thirty forty or fifty years or more, one imagines who left it there, did it hold water or cider, were they hedging or ditching or courting or poaching, or simply out walking…an imaginary story unfolds and before you know it hours have flown by.

When you see a huge tree trunk bent in a mighty curve or suddenly growing from the horizontal to the vertical, you imagine the man who laid it as a sapling all those years ago, in a similar way to what you are doing today but in a different world and different times, he walked to work or rode on horseback and he used the same sort of hand tools but didn't have a chainsaw of course as we do today saving us hours and hours of hard toil.

Digging out ditches by hand in inaccessible places reminds you of countless generations of farmers who have done this work to keep their hay fields dry, sending the water on down the ditches and streams, not flooding the land.

The manual labour involved in traditional hedge management can be looked upon as a boon, some might even say a therapy. I love it and recommend it. Who needs a Gym?'

Annex 11d: Blackdown Hills Hedgelaying Association

Blackdown Hills Hedge Association Historic Hedges Report- Martin Turner

Without prejudice, I have been asked to comment on the importance of hedges on and within the Blackdown Hills (BH) and their value to the environment.

My sources are members of the Blackdown Hills Hedge Association (BHHA). We are a group of hedgelayers, farmers, landowners and rural craft practitioners, which has been in existence for 21 years. BHHA runs training courses in hedge laying and rural crafts and hold the second largest hedge laying competition in the country.

Our members are representative of many other committees and groups including Devon Hedge Group, Somerset Hedge group, Blackdown Hills Management Comm, National Hedgelaying Society, Hedgelink, Young Farmers and several Parish councils.

For us, hedges not only provide a livelihood, they are our passion.

Looking at the landscape and network of hedges on the BH many less well-informed people would consider this to be a natural environment and take little account of the influence of people over the ages, and current land management.

What you see today is not natural, it has been sculpted by the influence and management of people over millenia from when people ceased to be nomadic hunter gatherers. Hedges were used primarily to keep stock from wandering, delineate boundaries and to prevent predation and theft.

Later as populations increased, and pressure on land to produce more food and income increased, more and more land was enclosed, resulting in more hedges. This would have begun with the more fertile, easily accessible valley bottoms followed by the higher more marginal land.

All this historical evidence is well documented by published historians like Hoskins and Rackham so I shall not repeat but will refer in passing.

What can be seen when one takes time to look at the BH countryside, is
that all of this influence of man on the land, from the dawn of civilisation can be interpreted by studying hedges. Their shape, form, construction, size and use all help to tell their story and I shall attempt to illustrate this. Ownership also greatly influenced field boundaries. Landlords, be they Crown, Church or Landed Gentry dictated its use (Farming, hunting etc)

Interestingly another great influence was The Plague. Prior to this, the population had increased to such an extent that much of the marginal land had been enclosed to feed the people. Suddenly the population fell to such a number that there was no need to produce so much food so the marginal, hard to farm land, was no longer needed and allowed to ‘re-wild’ (Hints of more modern political views from some quarters)

This rewilding can be seen in many of the wooded valley tops on the BH (Yarty valley, Yarcombe) where banks and overstood hedges can be seen.

Many of these hilltop woods were then managed for hunting and shooting and this is still the case today.

If one takes an overview (aerial photo of Stockland) showing the valley and higher ground of the Blackdowns it is easier to interpret the age of a hedge.

Because here is no dating evidence to be found in a hedge it is its linear shape and construction which can give the greatest clues to its age and origin.

On the BH typically the hedge takes the form of a substantial earth and stone bank, wider at the base, on which woody shrubs and tree species are planted on the outer edges of the bank giving what is called a double combe. Very often a ditch was dug on one side or both, this would have provided material for its construction.

Using the well known aerial photo of Stockland one can clearly see the two distinct shapes of the hedges. In the lower valley bottoms the hedges are irregular in shape with very few corners these hedges are very likely Saxon in date.

When we give talks on hedges, one of the reasons I give for this is that the land would have been ploughed by oxen so corners would be impossible to plough (they don't have a reverse gear)

Also the hedges would have incorporated existing features and at Stockland you can clearly see two prehistoric ditch and bank enclosures in the field shape. And where the saxon enclosures have incorporated cleared wooded areas the ancient wood edges become the boundary

The second most significant event to influence hedges on the BH were the Enclosures Acts between 1750 and 1850.

During this period nationally some 200,000 miles of hedges were created to enclose mostly common land, this is at least equal to all of the land enclosed in the previous 500 years.

Again these are very easily identified by their shape. Enclosure hedges are more regular, they are straighter and tend to be of a similar size.

A good example of this is on the high ground of Stockland, the fields are square with straight hedges and were originally all 11 acres in size (post-war hedge removal has made many larger now).

Another indicator of a hedge's age can be obtained by identifying the species growing.

Typically enclosure hedges are single species, with occasional natural seeding as can be seen on the Ridgeway (A Saxon Herepath originally) near Quarts moor. The hedges are predominantly Beech with Scots Pine for standard trees. When enclosed the influential local landlord dictated this. In time, most of the Scots pine have been removed for timber but at this location they can still be seen (This can also be seen on Exmoor, I am unaware if the same landlord was the influence)

Older pre-enclosure hedges have a more species rich bank, typically five or more with ancient indicators like Alder blackthorn, Spindle and Oak

A fine example of species-rich ancient hedges can be seen at Lemons Hill, near Hemyock a county road of historic age which has 16 different woody species and a bank width of 4 metres in places.

Some theorists favour the Hoopers Law for ageing hedges but we have found it to be unreliable as it takes no account of hedge planting. We cite this in our talks - when The Centre for Ecology dated a hedge at Pond Farm, Yarcombe some years ago at 600 years because of its rich diversity only to be informed by the land owner that he helped his father plant it in 1963.

The physical size, as well as the shape of the bank is a great help in ageing a hedge and giving some idea of its origins.

On the BH there are many examples of hedge banks. Those greater in height and width can mark ancient boundaries such as parish, manorial and ecclesiastical

In the parishes of Hemyock and Dunkeswell there is a good example:

Here the river Madford forms the boundary but opposite the ruined Dunkeswell Abbey the abbey retained land in the Hemyock parish on the opposite side of the river and created a substantial banked enclosure and ford to incorporate it into their ownership. It remains to this day.

The monks also managed the river diverting it to create ponds and water courses as part of their land management. Remains can still be seen upstream of the Abbey.

On the county road between Burnworthy and Churchstanton can be seen a triple hedge, bank and ditch. The present road runs alongside a clearly ancient raised track and is believed to be the original track to the Church, created to traverse the boggy land. Species within the hedge are good ancient indicators

On the Ridgeway near Wellington monument the road forms the Devon Somerset border. This was established by Colin Clements (deceased), a local historian, as a Saxon Herepath

As the road passes Monument Farm it traverses a series of bends, however the county line continues in a straight line, following the path of a substantial but obvious Enclosures

Act hedge and bank. Investigation by Colin established that the hedge replaces the original Saxon Herepath.

Not all of the Blackdowns have been enclosed. Former open Heath remains at the Western end of the North Blackdown Hills ridge and Sampford Common.

In conclusion, the BH is a diverse mixture of habitats due to the unique geological and ecological varieties in soil types and soil wetness, but there is one feature which connects all of them into one great web. Spread like a net across all of the hills…..Hedges!

Hedges combine the best features of all the wild places of the area, with plants of ancient woodland rubbing shoulders with those of open grassland.

Their value to the unique landscape of the Blackdown Hills is immense.

First and foremost hedges have to provide a good stock proof barrier being regularly layed and the ditches and banks dug up. When this is done they can then provide a rich, mixed and diverse habitat for all species of wildlife, Provide shelter to stock, Link woods, copse and habitats by providing wildlife corridors. Help reduce crop pests, Be a source of biomass, Prevent soil erosion, Combat and alleviate flooding by retaining run-off Enhance the appeal of the countryside to visitors Improve people's wellbeing and Provide rural employment.

In short if the hedges of the Blackdown Hills are ignored or abandoned it will be nothing short of an environmental catastrophe and will have a devastating effect on the wildlife and community and we as a group are determined not to let this happen.

Annex 12: Evidence provided by local historians/ parish members who are born and bred in the landowning community in/ near a study square

To be used in relation to part 2c of the methodology

Sources of information on the historic cultural 'eco-systems services' value of linear features (particularly hedge banks) in the Blackdown Hills AONB, with examples compiled relating to study areas 1 and 2 and immediately adjacent countryside

Information provided by Penny Lawrence and Wendy Lutley of the Blackdown hills AONB Heritage Forum, July 2018.

Many of the examples below illustrate the value of local voluntary and community history projects in gathering information, and the potential of local history information, to contribute 'ecosystems service value' via local community development, educational and training programmes and other rural development and rural tourism initiatives, once such projects start to 'drill down' into more depth of research. We hope the examples below assist in understanding this.

It is clear that hedge banks have contributed in the past to ecosystem services, do so at present and have the potential in the future, to a much greater degree than simply Sense of place/inspiration, Sense of history and Biodiversity [28]. In some cases historic cultural value may coincide with contemporary biodiversity value, in others not, but in the latter case there will often be the potential to enhance biodiversity of features of historic interest by appropriate management.

1. Sense of place/inspiration and Sense of history - documentary research with evidence on: the age and ownership of hedge banks; earlier routes of roads; and those hedge banks that are, or have been, the boundaries of small farms, small holding, larger estates and/or parish or county boundaries - and the changes of those boundaries over time.

a) 1709 Enclosure Award for Culm Davy

Devon Heritage Centre: DRO 2547M/SS19/1 and DRO 3137A/PD1 and Somerset Heritage Centre: DD\DP 12/9. These documents provide information on early enclosure for part of Pilot area 1 and adjacent countryside - allowing information to be gleaned on relative age of

[28] See National Character Area profiles No 147 Blackdowns and 148 Devon Redlands (also relevant to the pilot study, as effectively the valleys within the Blackdowns are largely of similar landscape character to it) at https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making
The headings included there for **Ecosystem services** (which are intended to include cultural services) are: Food provision; Timber provision; Climate regulation; Coastal flooding; Water (Supply, Quality and Flow); Soil erosion; Sense of place/inspiration; Sense of history; Recreation; Tranquillity; Biodiversity; and Geodiversity. Hedgerows/banks are currently only mentioned under Sense of place/inspiration for these two NCA profiles, with very little comment in the Blackdowns - and only a little more under the Devon Redlands (which does also mention winding lanes, flower covered banks and fields of different shapes and sizes). NB There may be more on hedgerows/hedgebanks in the descriptive historic sections of each NCA profile, etc.

some hedge banks, old road routes and their changes - and confirming the ancient origin of some features along boundaries, such as the pond on Sanford Moor at an angle on the boundary bank between Sandford Arundel and Wellington parishes. (*Information from personal research by Penny Lawrence*)

b) 1812-1836 Enclosure Award for Hemyock Commons

Devon Heritage Centre: QRR1/41. This award provides information on mid nineteenth century enclosure of parts of both Pilot areas 1 and 2 and adjacent countryside, providing information on the relative age of hedge banks, etc. (*Penny Lawrence, ibid*)

c) 1816-7 Enclosure in Wellington parish 1816 - 17

Somerset Heritage Centre: DD\CH/100/1 and /2: papers relating to the enclosure of Wellington common land 1816. This archival material includes the minute books of the Commission for inclosing land in Wellington 1816, but no map. The owner of this former common land at the time was the Duke of Wellington. However **DD\AY/26: Kinglake and Newman family papers 1618-1915** includes a deed headed '*The Commissioner of the Wellington Enclosure, 6 December 1817, to W. Kinglake and trustee, release in fee of parcels of the commons'* **.** It covers the purchase of: Lots 1, 2, 3, 4, 5 (in or close to Pilot area 1) from the enclosure and there is a plan. Lot 1 covers the wider area around the Wellington Monument (purchased for the purpose of acquiring the site for the building of the Wellington Monument) with '*lands of his Grace the Duke of Wellington'* still remaining in his ownership to the north (ie the steep slopes below the hilltop). Lot 1 has since been subdivided with new hedge banks, with some realignment of the road to create Monument Farm (see Wellington Tithe map for the situation in 1839). Lots 2 and 3 are south of the ridge top road (adjacent to Hemyock parish). Lots 4 and 5 are west of Wrangway Hill (adjoining Sampford Arundel parish). This provides evidence of the age of some of the hedge banks in Pilot area 1 - and potential former ownership of some of them as part of the Duke of Wellington's estate and its boundary, ie linear features may also have associations with individuals of historic interest. *(Wendy Lutley, 2015-17: research carried out on a voluntary basis on the history of Wellington Monument, Somerset, for the National Trust)*

d) Tithe maps for the relevant parishes

The Hemyock parish Tithe map (1841) shows two areas within Hemyock parish that were formerly in Clayhidon parish: one centring on Culm Pyne (the edge of which is in the south-east corner of Pilot area 1); the other a hilltop area (part of the boundary of which is in the north-west corner of Pilot area 2). The Tithe map also indicates which hedge banks are of historic interest as farm boundaries at that time, with subsequent records for 1910 and 1941 (see below), allowing changes farm boundary hedge banks to be mapped over time. *(Penny Lawrence, 1988: research on the Hemyock Tithe Map; research on the 1910 and 1941 records for the local area is currently in hand). Nb* ***See the accompanying two images showing farm holdings for Hemyock parish in 1841 with Pilot areas 1 and 2 indicated.***

e) 1910 Valuation Office records: IR58 and associated maps IR128

Records at the National Archives - http://www.nationalarchives.gov.uk/help-with-your-research/research-guides/valuation-office-survey-land-value-ownership-1910-1915/ These contain information on farm boundaries and sale dates, where applicable, and value of timber in hedges. NB The Field Books (IR58) are organised by Income Tax Parish, so finding the records for some contemporary parishes in the Blackdowns can be challenging: some parishes (e.g. Dunkeswell) may apparently have no Field Book entries. (*Penny Lawrence, ibid, records accessed 05/07/2018*)

f) 1941 National Farm Survey: MAF32 and associated maps MAF73

Records at the National Archives - http://www.nationalarchives.gov.uk/help-with-your-research/research-guides/national-farm-survey-england-wales-1941-1943/

Contain information including maps with farm boundaries and length of occupancy. (*Penny Lawrence, ibid, records accessed 05/07/2018*).

g) **Farm sale catalogues**

A sale catalogue exists for the 'Follet Estate' (c 1920), which covered ownership in Hemyock parish of land in the Culm Davy area (including part of the ancient manor of Whitehall and Culm Pyne) in the late 1800s and early 1900s. This shows hedge banks of the estate and estate boundary at the time of sale – possibly also including the value of timber. There is also a 1912 sale catalogue of various properties for the late Mrs Tapscott, including areas of Coombe Hill and Ashculm, with maps, and with prices pencilled in, relevant to Pilot area 2. Copies of both of these are held locally (*pers comm Penny Lawrence*).

h) Manorial records

The ancient manor of Whitehall, within Hemyock parish, would have extended into Pilot area 1. A report was produced for Devon County Council in relation to the history of Whitehall Manor house, following a fire in the 1997 (Report K502), and refers to older records on the Manor (*pers comm Wendy Lutley*).

The Manorial Documents register has been completed for Somerset and Devon.

i) Ecclesiastical records

Dunkeswell Abbey (only a few kilometres to the south of Pilot area 2) would have held both enclosed land and extensive unenclosed hilltop 'sheep walk' land during the mediaeval period - so that some linear features in the Blackdowns may mark former ecclesiastical estates. A research project to further knowledge on Dunkeswell Abbey is currently being developed by the Blackdowns AONB in conjunction with Historic England and Devon County Council - including proposals, for example, for a potential modern footpath 'pilgrim' route that might contribute to rural tourism.

Other linear boundaries in the Blackdowns may relate to the boundaries of land held by other ecclesiastical organisations. Pilot area 3 (Stockland) includes land that was formerly part of Dorset, presumably relating to formerly being within the diocese of Salisbury. Stockland and Dalwood were transferred subsequently to diocese of Exeter, with the civil boundaries changed from Dorset in 1844 when these two parishes were transferred to Devon (Bryan Drew, 2016: *A Journey through the history of Stockland* vii). In a similar way Chardstock parish, in the eastern part of the Blackdown AONB, was formerly part of Salisbury diocese. At a more local scale some boundaries may surround former parish glebe lands for individual parishes.

j) Saxon boundary charters

The concept of the circular Herepath route, established in recent years in the north-eastern part of the AONB, was based on historic research that suggests that the northern ridge top of the Blackdown Hills was an ancient, Saxon and possibly earlier, trackway - as suggested by names such as Hare Lane, etc. The former 'Cat and Fiddle' pub was along this route at the western end, between the Wellington Monument and the top of Wrangway Hill, within or close to Pilot area 1.

The following may provide additional information:

k) Searches of Devon & Somerset online catalogues and National Archives "Discovery"
http://discovery.nationalarchives.gov.uk/ .

l) County history societies and specialist societies

e.g. Devon History Society, Somerset Archaeological and Natural History Society SANH, British Agricultural History Society, Society for Landscape Studies, plus their Journals; and other contacts beyond the pilot study areas but with relevant research.

m) Local history societies in or near the Blackdowns

May also have websites and publications.

n) Parish records

e.g. Parish Council minute books - obstructions of footpaths, trees and School log books – for example blackberrying references.

o) Photographic records

e.g. the Blackdown Archives and many parish/local history websites

p) Newspaper Archives

e.g. Auctioneers' adverts for property sales

q) Blackdowns Bibliography

Most recent version as compiled for the AONB (*Penny Lawrence, 2016*).

2. Sense of place/inspiration and Sense of history - other sources and examples on oral history, customs and traditions, local history groups and local family and other local knowledge

a) Folk South West's *Sights and sounds of the Blackdowns community and schools project, 1995-6*

This culminated in an exhibition of ten A1 panels, a copy of which was produced for the Blackdowns AONB. Excerpts from oral history quotes on the panels illustrate some of the 'ecosystems service' values of linear features in the Blackdown AONB in terms of local customs and traditions (quotes from various parishes):

Panel 9: Faggots of wood

'*We all had faggots of wood made from the hedge – you would say pea sticks and bundles – they were put into a rick. It was called a wood rick, and you would pull from that to light the fire.'*

'We burnt the ashen faggot every year on Christmas Eve. It was made of ash sticks cut out of the hedge and tied round with willow binds. It was put into the open fire.'

'It would always burn, even if it was green. We would just feed the ends in as it burned through. I don't know why they did it, but it was an old custom.'

'When there are about three or four binds left they used to start singing and step dancing and concertina playing – beautiful!'

'*They did dancing the broomstick as a party piece. The dancer would hold up a broomstick and kick his legs over back over the broomstick. Then he put it on the floor and dance all the way up and down it.'*

Burning the ashen faggot is a custom that was apparently unique to an area of south-west England, centring on the Brendon and Blackdown Hills. The custom was practised within Hemyock parish, with memories of it still held by local people. Traditional broomsticks would also have been made from hedging materials.

Panel 5: One day year

'*Father used to belong to the Friendly society. They used to have one day year celebrations.'*

'I can remember when the used have club walks down Hemyock. Father used to belong to it. … What they done, they marched and carried a flag – a sort of banner. They went down Station Road. They had a drink and walked over towards a bridge over the river. You go over that bridge and up through they fields. It was a footpath and come out in the middle of Culmbridge Farm. Then they went into the Railway Hotel and had dinner.

Friendly societies provided an early form of insurance to help working people in times of need and usually had an annual procession.

Panel 1: It's a living landscape

'The roads were all broken flint stone. There used to be great heaps of stone on the verge. … I can picture the stone cracker now, sitting there all day long, breaking the stones. He had goggles on to protect his eyes – and different kinds of hammers and sledges to break the stones.'

Many of the roads in the Blackdowns are underlain by flint/chert, quarried from pits in the hilltop areas – see further below.

Matthews, *Tales of the Blackdowns borderland,* book, in Somerset Heritage Centre, may hold some further information on customs and folklore relating to linear features in the Blackdowns.

b) Historic interest of roads re local flint/chert - and associated ancient cairns

DD\THR/13/2 (Somerset Heritage Centre reference) Historical notes and research, especially on Wellington and locality, written for lectures to local bodies; papers of Robert Thorne. Note 45 Simonsburrow - refer to the second field on the left hand side going towards Hemyock, named Barrow Close (close to/between Pilot areas 1 and 2). Thorne reports that before 1870 there was a huge cairn of stones there covering one acre. Reputed to be the grave of Sigbud, c 700 AD, a Dane who married and became an overlord of Exmoor and who was subsequently killed in battle with Ina, King of Wessex. Thorne indicates that in 1870 the stones were used by James Bale for the laying of the Hemyock Road. There is brief mention too of a former similar cairn near the Merry Harriers, further along the Blackdowns ridge, reputedly marking the brother of Ina who was killed in the Battle of Buckland Hill in 710 AD. (*Wendy Lutley, research on the Wellington Monument, op cit).*

See also p 123 of Blackdowns Writers Group, 1999: *Memories from the Blackdowns*, Devon Books for a section on use of flints for the roads and flint nappers working at the roadside at particular locations, including Whitehall in Hemyock parish (close to Pilot area 1). The book is an excellent example of personal memories of various aspects rural life in the area, although without any specific mention of hedgebanks.

c) Processional routes

See above for processional routes taken by local friendly societies on their 'club day'.

Beating the bounds at Wellington, 1903, book held at Somerset Heritage Centre is a bound article from the Wellington Weekly News, May 1903, which includes a delightful description of the event. The party beating the bounds lunched at the Firs, then proceeded westwards along the ridge road and county/parish boundary (just to the south of Monument Farm) to Sampford Moor. i.e. the route would have followed the boundary banks along the parish

boundary between Wellington and Hemyock and then against Sampford Arundel in the north-east part of Pilot area 1. (*Wendy Lutley, ibid)*

See also R D Blackmore's (author of Lorna Doone) 1894 novel: *Perlycross* which is based on the village of Culmstock and includes a fictional account of beating the bounds between Culmstock and Hemyock.

d) Cultural value of hedgerows in terms of food (both historically & present with current revival in foraging etc)

Examples include: gathering blackberries (one memory for Pilot area 2 includes the use of a special stick to pull the branches closer) and wild crab apples for jam making; rosehips for vitamins C and acorns for pig food in World War 2 (see Blackdowns Writers Group, 1999: *Memories from the Blackdowns*, Devon Books); sloes for sloe gin; hazelnuts; rabbiting; and even in the past, the use of small birds, as a food source (eg rook pie). Comparison with, for example, Tolpuddle parish in Dorset (home of the Tolpuddle Martyrs and the first agricultural trade union and a parish underlain by chalk, with mainly arable cultivation and very few hedge banks), suggests that in the past in the Blackdowns AONB, informal food (and fuel) sources would have been much more readily available to and help support those on a low income, because of the presence of so many hedge banks. In addition, in the Blackdowns many hedge banks fell within the ownership of numerous small farmers and smallholders - in contrast to parts of England falling under the ownership of individual large estates.

e) Cultural value of hedgerows in terms of wood and timber

Examples include the use of standard oak trees (that are frequent within many Blackdown AONB hedge banks) for timber and the associated history of local saw yards and builders, with the use of wood from individual trees for individual local buildings being in some cases within living memory. See above re documentary sources on the historic value of hedgerow timber.

Other uses may have included thatcher's spars, etc. See also above under Customs and traditions, re use for kindling, etc. A recent SW AONB inter-reg project explored the potential for wood-fuel from hedge banks, with learning from Brittany.

f) Children's 'play' in hedge banks

Examples include play pretend 'houses' and dens. The Blackdowns' hedges were particularly suitable - pre mechanical hedge trimmers - because of the bank-top shaded area between the double line of shrub growth of hazel. Other play examples from the local area include: collecting oak apples for Oak Apple day from hedge oak trees; jumping over broken cow parsley stems from the hedge bank along the lane on the way home from school, pretending to be a race horse(!); popping snap jacks (the seedheads of a bedstraw); and sticking sticky burrs or the sticky bedstraw on friends' backs. There must be many more!

A report produced by Taunton Deane in the early 1990s (in the lead up to Folk South West's *Sights and sounds of the Blackdowns* project) covered reminiscences of children's play in the Blackdowns and may provide further examples.

g) Aesthetic value of local wildflowers and views associated with hedge banks

There is of course the aesthetic value of the enjoyment of coming across stretches of hedge bank, where there are primroses or stands of bluebells on ungrazed lane hedges in spring; patches locally -known for snowdrops, wild daffodils, or an individual tree of wild cherry blossom, when everything else is wintery; a wet patch with a fluff of creamy meadowsweet and angelica in the summer; views framed through gateways with the enjoyment of the hedgebank patterns in the wider view; seeing stock sheltering from the heat in the shade under a hedgerow tree; knowing a local spot where early purple orchids can be found on lane hedge bank; autumn colour of

hedgerow oak trees holding their leaves late etc. All personal examples from in or near the two pilot areas.

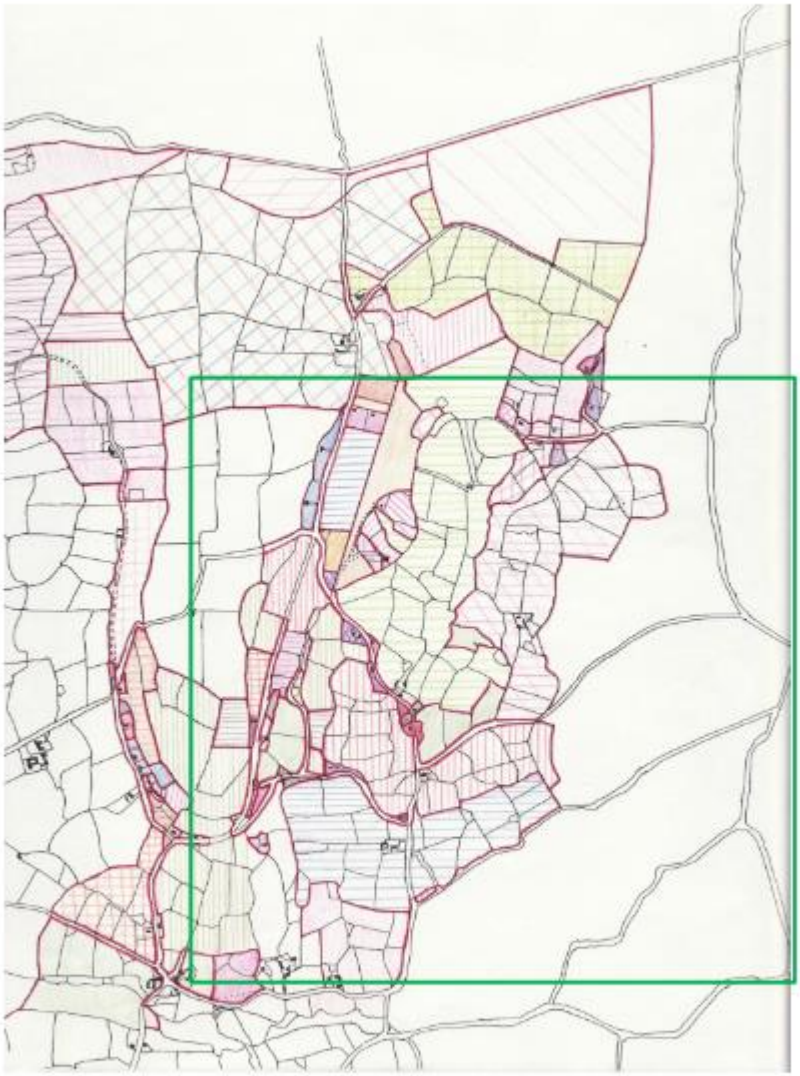
h) Historic cultural value of water features

Many hedgebanks, lanes and other field boundaries in the Blackdowns also have associated water features - including substantial ditches, leats, streams, etc with historic cultural value. For example, there is the 'Shutlake' leat that runs from the stream above Hemyock Castle, taking a route (now partially underground) through the village, including beside Station Road (to the south of Pilot area 2). There is reference in the Blackdowns Writers Group book to a memory of collecting water from a pump by the road, opposite Whitehall Manor in Hemyock parish (to the south of Pilot area 1), while the *Sights and Sounds of the Blackdowns* exhibition refers to a memory of an old laundry washing spot on a stream. Many houses in the Blackdowns rely for wells within their gardens - and there are examples of cottages being situated along lane that run along the spring line (there is a good example between Pilot area 1 and 2). In some cases, such as at Culm Davy (to the south of Pilot area 1), local spring sources may be piped underground to a number of houses. There is the history of underground linear features too: for example, the route of water mains to the former Hemyock milk factory.

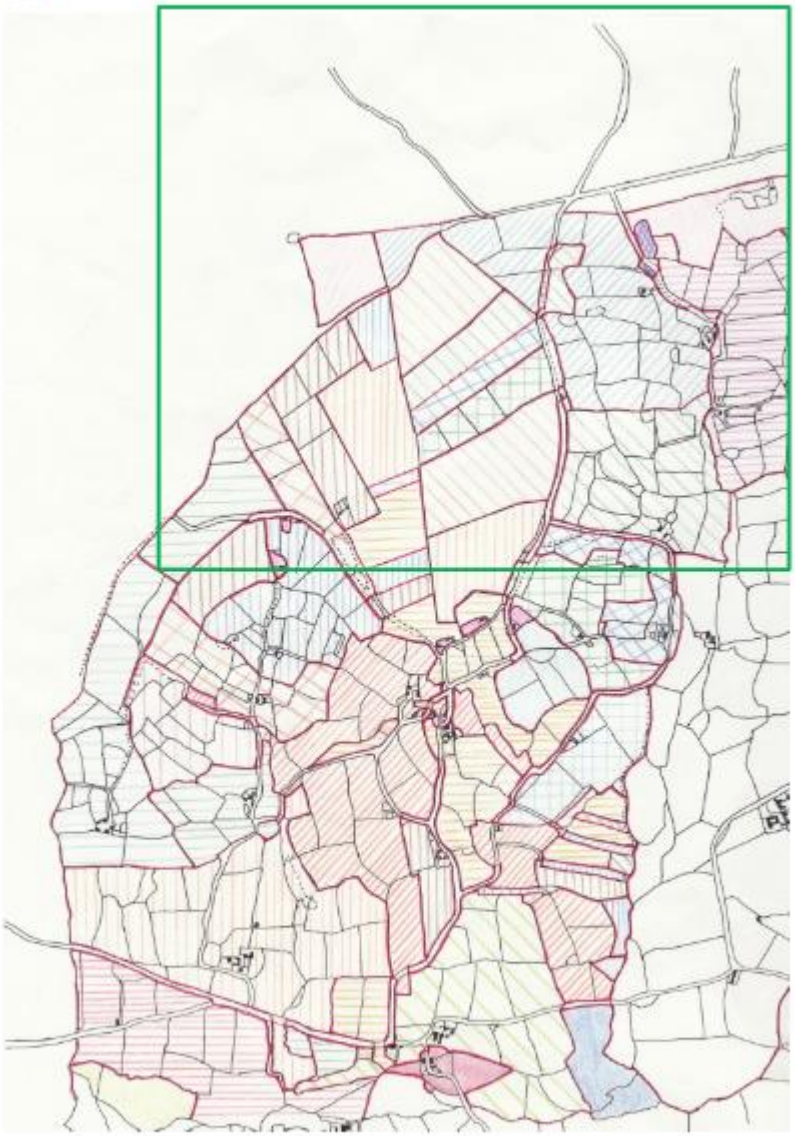
i) **Social and historic value of old footpath, trackway and country lane routes**

Many footpaths, green lanes and other country lanes will be not only be of contemporary 'ecosystem services' value for their recreational /exercise and public health value, etc but may also have sense of history value: for example, their use as old postal delivery routes. *WL and PL, July 2018*

Area 1



Area 2



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