Devon County Council

HER21: Integrating and Linking Historic Environment Data in Devon

Report

March 2011

www.devon.gov.uk

Table of Contents

Table of Figures

1. Executive Summary

This project looks at a trial sharing of historic environment data between Devon County Council Historic Environment Record (HER), South Hams District Council, South Devon Area of Outstanding Natural Beauty (AONB) and Dartmoor National Park Authority. It allows access to data and develops a sustainable way of sharing similar datasets in the future with these and other organisations. It allows historic environment information to be available through any geographic information system (GIS) so, for example, conservation officers in a district council will be able to directly see HER data on their GIS along with their own planning constraint layers. This report includes detail on the methodology for this project, the applicability of making this information available as well as the issues, challenges and opportunities it raises, and recommendations for future development.

The project concludes by stating that although there are a number of technical and organisational difficulties in setting up this data sharing, in many instances the technology is already in place and when set up this provides a sustainable and cost-effective method of sharing data about the historic environment.

2. Introduction

2.1. Project name

Integrating and Linking Historic Environment Data in Devon.

2.2. Summary of project aims and methodology

The aims of this project are to trial sharing of data between a number of project partners (Devon County Council Historic Environment Record, South Hams District Council, South Devon Area of Outstanding Natural Beauty and Dartmoor National Park Authority). In allowing access to data, it develops a sustainable way of sharing similar datasets in the future with these and other organisations. It will also report on the project methodology, issues and opportunities it raises, as well as recommendations for future development.

The project methodology will firstly develop methods of sharing geographical data between each organisation, then make HER information available on the web for use by these organisations and finally report on this.

2.3. Background

Currently there are a number of partner organisations involved in identifying, recording, protecting, conserving and interpreting the historic environment in Devon. Data is held by a number of organisations, particularly the County and National Park HERs, as well as the AONBs and Local Planning Authorities. Although Devon and Dartmoor HERs have HER Monument data available on Heritage Gateway, other HER and historic environment data is not currently very accessible between these organisations. For example, it is not possible to view other organisations historic environment information through a GIS so, for example,

conservation officers in a district council cannot directly see HER data on their GIS along with their own planning constraint layers.

Nationally, Heritage Protection Reform (HPR) has highlighted making useful, appropriate and accurate information readily available to those making planning decisions about the character and components of the historic environment. Government has recognised the central part which HERs play in providing access to this vital knowledge. In addition to the HER making information available, the planning authorities, national parks and AONBs involved can also share various historic environment-related datasets, to allow better working between these organisations, and to enrich the data held by the HER.

Making this data more available goes some way to making an HPR compliant HER, and allows for informed decision making. In addition, new planning policy, a desire for more efficient and closer working between local authorities, and the funding available from English Heritage at this time, makes this an appropriate time to investigate the sharing of historic environment data.

2.4. Research Aims and Objectives

The objectives of the project are:

- A trial sharing of historic environment data (held by Devon County Council HER, South Hams District Council, South Devon AONB and Dartmoor National Park Authority). This will make a number of datasets available between these organisations.
- Developing a methodology to allow access to historic environment data, and to develop the capability to enable further datasets to be made available in this way in the future. This will provide a sustainable way of sharing historic environment data between organisations.
- Reporting on the methodology of sharing information, the applicability of making this information available as well as the issues, challenges and opportunities it raises, and recommendations for future development.

2.5. Business Case

This is an appropriate time to investigate and deliver joined-up sharing of information because:

The current programme of Heritage Protection Reform encourages joined-up working across the Heritage Sector, as well as integration of historic buildings and archaeological protection and advice;

The new Planning Policy Statement for the Historic Environment (PPS5) emphasises the need for regional and local Planning Authorities to have access to evidence about the historic environment and heritage assets in their area;

Current financial and political pressures on Local Authorities make joint working with partners in the historic environment sector particularly desirable.

The new Planning Policy Statement 5, “Planning for the Historic Environment” (PPS5) states that “Regional and local planning authorities should ensure that they have evidence about the historic environment and heritage assets in their area and that this is publicly documented”. It also

states that local planning authorities should either maintain or have access to a historic environment record. Access to historic environment information for historic environment professionals (such as the district council conservation officers) is key to being able to assess the type, numbers, distribution, significance and condition of heritage assets and the contribution that they may make to their environment now and in the future, as well as helping predict the likelihood that currently unidentified heritage assets, particularly sites of historic and archaeological interest, will be discovered in the future.

The designation of AONBs states that their purpose “is to conserve and enhance natural beauty". Furthermore, the AONB Management Plan has a commitment to conserving the historic and archaeological features and to promote a widespread understanding of the distinctive cultural landscape. To this end, up-to-date and relevant historic environment information is critical to the AONBs conservation and education roles.

In addition to the sharing of historic environment data between partners, the project will create the capability for a version of this information to be made available to the public through the relevant web sites and web services. This will enable the capability for historic environment information to be available through any geographic information system (GIS) as well as on a web page.

SHAPE is English Heritage’s strategic framework for commissioned projects. The project is in line with SHAPE Sub-programme 41161.10 (*Systems Research for Historic Environment Records*), as well as SHAPE Sub-programme 14162.110 (*Information management innovation*).

2.6. Project scope

This project delivers a trial for historic environment data sharing between the partner organisations Devon County Council Historic Environment Record (HER), South Hams District Council, South Devon Area of Outstanding Natural Beauty (AONB) and Dartmoor National Park Authority. The data shared will consist of only the data as set out in this document, and only in the methods stated below. The project will deliver:

- Usable web mapping services that can be shared from each partner organisation
- For Devon and Dartmoor HER, web pages that link from the shared web mapping services. These web pages will be focussed on securely delivering HER data about monuments, events or sources when linked from the web mapping services. A sophisticated searchable front-end for these pages is outside the scope of this project.
- A report detailing the methodology of sharing information, the applicability of making this information available as well as the issues, challenges and opportunities it raises, and recommendations for future development.

This project will focus on the use of HER data in development management planning. While it is understood that use of these methods are equally applicable in the plan making aspects of planning, this project will trial this with development management planning because of the need to focus the project. However, it must be remembered that PPS5 gives equal weight to both the plan making aspects of planning and development management,

and highlights the importance of HER information in both. Sharing data in this way would be equally applicable and useful in plan making.

2.7. Interfaces

This project interfaced with a number of other projects and groups. These included:

Devon Conservation Officers Group

The Devon Conservation Officers Group consists of the conservation officers within Devon, who meet approximately every three months, and discuss historic environment issues. This project made a number of presentations to these groups, and sought feedback on the project as it developed.

Devon GIS group

Devon GIS group meets three or four times per year and consists of local government GIS specialists. The project was presented to this group, and feedback received.

Heritage Gateway

This project complements the Heritage Gateway project, and lessons from each will be beneficial in achieving sharing of historic environment data. This project interfaces with Heritage Gateway enhancements that are progressing at the moment. These enhancements involve HERs making their data available to Heritage Gateway via Web Mapping Services.

Other HER21 projects

This project corresponded and made comments on a number of other HER21 projects:

This project interfaces with the project being carried out by Gloucestershire County Council (project EH6027) “HER21:From SMR to HER-Integrating Built Historic Environment Records in Gloucestershire”. This aim of this project is to enhance Gloucestershire’s built historic environment content, in collaboration with District Council Conservation Officer colleagues. It looks at methods of editing and data retrieval to bring the quantity and quality of records up to the required standard for an HPR-complaint HER and examines methods of interoperability between the HER and the planning systems used by the district authorities and how access to the HER could be provided remotely.

This project also discussed a number of issues with the HER21 project being carried out by the consultants SAM (project EH6034) “Development of GIS Data Standards for Use in HERs in England.” The project manager attended a meeting in London, where a number of issues about GIS, HER and improving use of GIS was discussed.

This project also liaised with the following other HER21 projects:

- Project 6032. The Historic Environment Officer Managing an HPR Compliant HER.
- Project 6033. HER-Derived Alert and Constraint Mapping Supplied to Local Authorities.
- Project 6035. Interoperability of HERs and Local Authority Planning Systems.
- Project 6000. Bristol Historic Web Map.
- Project 6015. Heritage Asset Information Management in Kent.

3. Products delivered and methodology

Two main methods of delivering and receiving data were trialled. *Web mapping services* are GIS methods of delivering and receiving spatial data between organisations via the web. *Web pages* were also used as a method of disseminating and viewing data.

3.1. Web mapping services – an introduction

Web mapping services are standard protocols for serving geographic data online. The two most commonly used web mapping services (and those utilised in this project) are:

Web Map Service

A Web Map Service (WMS) is a standard protocol for serving georeferenced map images over the Internet. These images are generated by a map server using data from a GIS database. The specification was developed and first published by the Open Geospatial Consortium[1] (OGC) in 1999. Web map services allow a **map image** to be delivered over the internet, and displayed in a GIS.

Web Feature Service

A Web Feature Service (WFS) is a standard that provides an interface allowing requests for **geographical data** over the web. Web feature services allow actual geographic data to be delivered online – in contrast to web map services that only allow a georeferenced image to be delivered online. This allows the data to be displayed in any way that the user wants, and geographic analysis is possible, not just visual representation.

Web Feature Services are also a published standard of the OGC.

Web mapping services such as WMS and WFS provide a method for instant remote data access to geographical data. WMS and WFS are standards not owned by any one company allowing these to be used in many different software platforms and not locking a user into using one company, one software, or one solution. These standards can instead be used with multiple GIS server and client technologies. As this data is remotely accessed over the internet, “live” data can be accessed. This can eliminate time-consuming data downloading, translation and storage, and also avoid holding multiple sets of data. Reusing existing geospatial data over the web eliminates the need to have a local copy of the data and allows data providers to be the custodians of the data.

[1] The OGC is an international industry consortium of 416 commercial, governmental, nonprofit and research organizations worldwide who collaborate to provide open standards for geospatial content and services, GIS data processing and data sharing.

3.2. Web mapping services delivery

3.2.1. Introduction

Devon County Council, Dartmoor National Park Authority and South Hams District Council and South Devon AONB (working together from South Hams District Council's ICT department) shared mapping with each other using web mapping services. These are methods of sharing geographic data over the internet, so they can be read in any geographic information system (GIS).

The trial investigated two methods of sharing data:

- WMS (web map services)
- WFS (web feature services)

These methods were used by each partner in the project to expose map data to the other two partners. In addition, KML (keyhole markup language) (another method for sharing geographic data) was briefly investigated (see below)

3.2.2. Devon web mapping services

Devon County Council's ICT department carried out work in order to expose web mapping services. The following layers of geographic information were delivered as WMS (web map services) and WFS (web feature services):

- HER Monuments
    - HER Monuments polygon layer
    - HER Monuments points layer
- HER Events
    - HER Events polygon layer
    - HER Events points layer
- Historic Landscape Characterisation information:
    - Historic Landscape Characterisation modern layer
    - Historic Landscape Characterisation post-medieval layer
    - Historic Landscape Characterisation orchards layer
    - Historic Landscape Characterisation % field boundary loss layer
    - Historic Landscape Characterisation raw data layer
- Scheduled Monuments
- Listed Buildings
- Thatched Listed Buildings
- Registered Parks and Gardens
- World Heritage Sites
- Protected Wrecks

Devon County Council used ESRI ArcGIS Server to deliver the WMS and WFS services. The council stores their GI (geographic information) data in a SQL Server geodatabase, and used the product ArcGIS Server 9.3.1 to deliver the web mapping services.

Map services were viewed with the desktop product ESRI ArcMap and with the web-based product ESRI ArcGIS Server.

The HER and Historic Landscape Characterisation (HLC) data is created and held by Devon County Council. The Scheduled Monuments, Listed Buildings, Thatched Listed Buildings, Registered Parks and Gardens, World Heritage Sites and Protected Wrecks sites data was derived from English Heritage. This data is not yet available as a web mapping service, such as a WMS or WFS, direct from English Heritage. Therefore (with agreement from English Heritage), a copy of this data is held by Devon County Council, and kept as up-to-date as possible by downloading every month direct from English Heritage. This data is then made available alongside the other datasets, to provide a more complete set of historic environment data to partners. (It should be noted that some issues relating to the supply of data from English Heritage are due to be resolved during 2011 and 2012 after the introduction of the Unified Designation System and the Heritage List for England.)

All the layers listed above were shared as both a WMS and a WFS. KML (as another means of sharing this same data) was also investigated. However, while ArcGIS Server supports KML as a method of serving GI data, Devon ICT could not get this to function correctly, due to incompatibility of the software used and testing environments. It was estimated that extensive testing of this would have taken an extended period of time, so further exploration of a KML service from the Devon data was not carried out.

The WMS was served and should be visible to South Hams District Council and to Dartmoor National Park. However, there were a few issues with this. South Hams District Council use a GIS product from a company called Cadcorp. Cadcorp products are used for both viewing and service GI data. However, while Cadcorp serves WMS data well it does not support ‘Identify’ (also known as ‘GetFeatureInfo Request’), so can not read any of the features attributes. This meant that although the data was visible to South Hams via the WMS, none of the features could be interrogated. Furthermore, although Dartmoor National Park could open and read the available WMS layers, nothing was displayed. This issue was investigated, but while in project testing phase the issue could not be resolved. With further investigation this may be resolved.

The WFS service that was served by Devon County Council generally worked fine. However, there was an issue with indexing (and loading) two of the layers – Listed Building Points and Scheduled Monuments (all other layers worked fine). This is because they had many features on them (as they were datasets of the entire country, with around 360,000 and 22,000 feature respectively). Devon ICT set up a ‘view’ on the Listed Buildings and Scheduled Monuments data (so they only show Devon data) that substantially sped the WFS indexing up, and this now works. This also worked fine for South Hams District Council, (although the indexing was also quite slow), and the available layers could be viewed and queried at Dartmoor National Park in their GIS.

What worked well:

- The WMS was visible to South Hams
- The WFS was visible, and features could be identified, by Dartmoor National Park and South Hams

What didn’t work well:

- The WMS data does not support ‘Identify’ at South Hams
- The WMS wasn’t visible to Dartmoor National Park

- On large datasets, the WFS was slow
- It was not possible proceed with investigating KML, as another means of delivering GI data.

3.2.3. South Hams web mapping services

South Hams District Council's ICT department carried out work on behalf of South Hams District Council and South Devon AONB in order to expose web mapping services. The following layers of geographic information were delivered as WMS (web map services) and WFS (web feature services):

- Listed buildings polygons captured by South Hams District Council
- Conservation Areas
- Landscape Character Assessment information:
    - Landscape Character Types
    - Landscape Description Units

All the layers listed above were shared as WMS and WFS.

South Hams District Council used Cadcorp GeognoSIS to deliver the WMS and WFS services. The council stores their GI data in GIS files and a PostgreSQL geodatabase, and used the product Cadcorp GeognoSIS to deliver the web mapping services.
Map services were viewed with the intranet web-based product Cadcorp GTools.

The WMS service was visible to Devon County Council and Dartmoor National Park. However, only Devon could both view all the data, and get information on each feature (a 'GetFeatureInfo Request'). Dartmoor National Park could not get information on each feature (a 'GetFeatureInfo Request') as it returned an error "The server issued the following exception. The point (-1,-1) is invalid Unable to retrieve capabilities from the WMS server". This issue was investigated, and was thought to be related to how South Hams serves the data, but while in project testing phase the issue could not be resolved. With further investigation this may be resolved.

The WFS all worked for both Devon County Council and Dartmoor National Park. However, the listed buildings layer that was served by South Hams was so large that there were issues loading this layer into the GIS used by Devon County Council and Dartmoor National Park. This could be resolved by limiting the number of features returned.

What worked well:

- The WMS was visible to Devon County Council and Dartmoor National Park
- The WMS data supported 'Identify' at Devon County Council
- The WFS was visible, and features could be identified, by Dartmoor National Park and South Hams

What didn't work well:

- The WMS data does not support 'Identify' at Dartmoor National Park
- Large data sets (such as the listed building data) were very slow

3.2.4. Dartmoor web mapping services

Dartmoor National Park Authority's ICT department carried out work in order to expose web mapping services. They did this themselves, as well as employing the services of an external GIS contractor. The following

layers of geographic information were delivered as WMS (web map services) and WFS (web feature services):

- HER Monuments (Dartmoor National Park area only)
- HER Events (Dartmoor National Park area only)
- Conservation Areas
- Landscape Character Assessment information:
    - Landscape Character Types
    - Landscape Description Units

Dartmoor National Park Authority used the product MapServer to deliver the WMS and WFS services. The council stores their GI data in MapInfo TAB files, and used the Open Source product MapServer to deliver the web mapping services.

Map services can be viewed in both MapInfo Professional and QGIS (an Open Source desktop GIS).

The WMS was served, and was visible to South Hams. However, as above, Cadcorp does not support 'Identify' (also known as 'GetFeatureInfo Request'), so can not read any of the features attributes. This meant that although the data was visible to South Hams via the WMS, none of the features could be interrogated.

The WMS was visible to Devon County Council, and supported 'Identify'. However, this did require some extra work to change the way the data was served at Dartmoor National Park (using IP addresses, rather than a URL) and tweaks to their internet servers to allow the WMS to be available through the firewall. However, this was only a few hours extra work.

The WFS worked, and the features could be seen by Devon County Council and South Hams.

What worked well:

- The WMS was visible to South Hams
- The WFS was visible to Devon County Council and South Hams

What didn't work well:

- Extra work was required to change Dartmoor National Park Authority's web servers to allow the WMS to work correctly.

3.2.5. Web mapping services – issues

As can be seen above, there are a number of issues with serving and receiving web mapping services. Where these services worked, they proved to be relatively easy to set up, in most cases used existing technology, and when running (with the exception of some of the very large WFS services) were easy to integrate with GIS and other mapping, were fast and were easy to use. However, there were a number of negative issues:

- **Use of standards.** While the web mapping services are common standards that should work in most GIS systems, some parts of the standard were supported more than others. For example, South Hams GIS did not support 'Identify' (also known as 'GetFeatureInfo Request') for WMS, so can not read any of the features attributes. Also the WMS produced by South Hams did not support 'Identify' at Dartmoor National Park.

- **Security and firewalls.** Like most public and private sector organisations, security of data is very important, and all the authorities who were part of this project had a firewall to protect their servers. Extra work was required to ensure that these web mapping services worked correctly through the relevant firewalls.
- **Speed.** Some of the WFS services were rather slow to load into a GIS. This is due to the fact that a WFS delivers geographic data over the web (rather than just an image of the data over the web – as is the case in WMS). Therefore, a large number of features can be returned, and in order to display these correctly on the GIS, the GIS needs to cache these. This means that when a user loads a WFS with many features, it may take a while (maybe 30 seconds or a minute) to cache these features.

3.3. Web pages delivery

3.3.1. Introduction

As key partners in the HER21 project, Devon and Dartmoor HERs built a website with access to HER data to allow information on a particular monument, event or source in the HER to be viewed, and this was linked to the geographic information that was shared. This allows much greater access to HER data than the limited information that can be displayed for each monument or event within the GIS application.

The main object of these web pages is to deliver useful data especially when linked to the GIS. Therefore the main focus on these web pages is the content that is displayed for individual monuments, events and sources, and in ensuring that they can be linked to (from a GIS layer, for example) with a unique, stable URL. Therefore, the searching and results pages are designed minimally, as this was not a main requirement of the project.

3.3.2. Product delivered

The webpages consisted of the following:

- A web page with a simple search to allow a user to search by Monument ID, Monument Name or Monument Type, or Event ID, Event Name or Event Type or Source ID, Source Type or Source ‘Article Title’, or by location (using an embedded map).
- A web page for results from the above searches
- A web page for each monument, event or source. These detailed pages display monument, event or source data, all read-only with an embedded map. Each one of these pages has a unique and stable URL for each in the format www.devon.gov.uk/her/monument/xxxxx (where xxxxx is the Monument ID), and similar URLs for www.devon.gov.uk/her/event/xxxxx and www.devon.gov.uk/her/source/xxxxx. This is so the web mapping services can call up a web page detailing more information on this.
- Facility to login users to the system using user name and password for project partners to access restricted data.

3.3.3. Methodology

Devon County Council ICT constructed the web pages using their content management system (LiveLink) and middleware (WebLogic) to retrieve the

data from the SQL Server database that holds the HER data and display it on the relevant web pages. The GIS server product ArcGIS Server was used to embed maps for each monument or event. These web pages are located at http://www.devon.gov.uk/her

Search page

Three web pages were created that allow users to simply search for a Monument (by Monument ID, Monument Name or Monument Type), for an Event (by Event ID, Event Name or Event Type) or for a Source (by Source ID, Source Type or Source 'Article Title'). An embedded map was provided on the Monument and Event pages, to allow location-based searching.

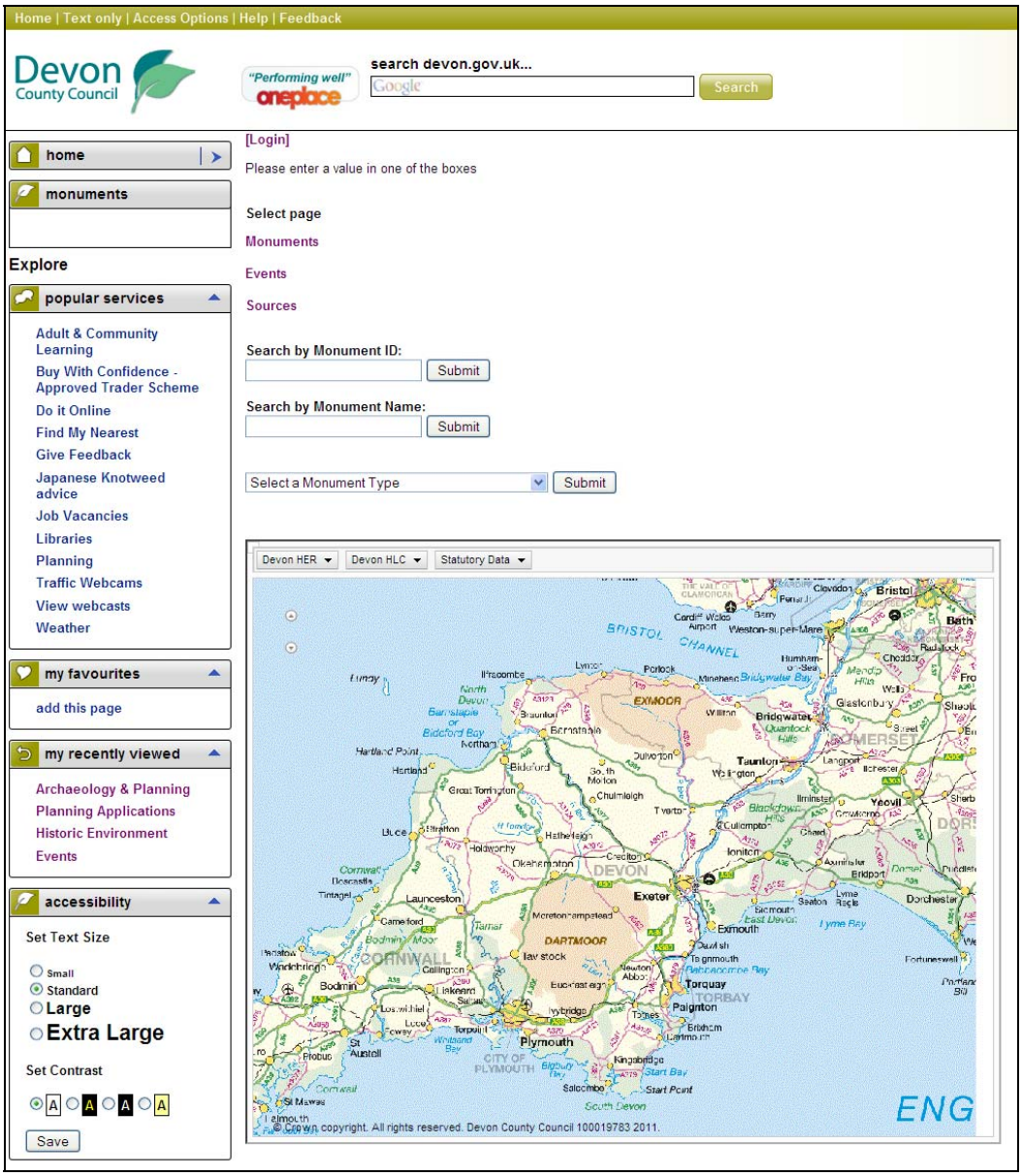


Figure 1. Monument search page

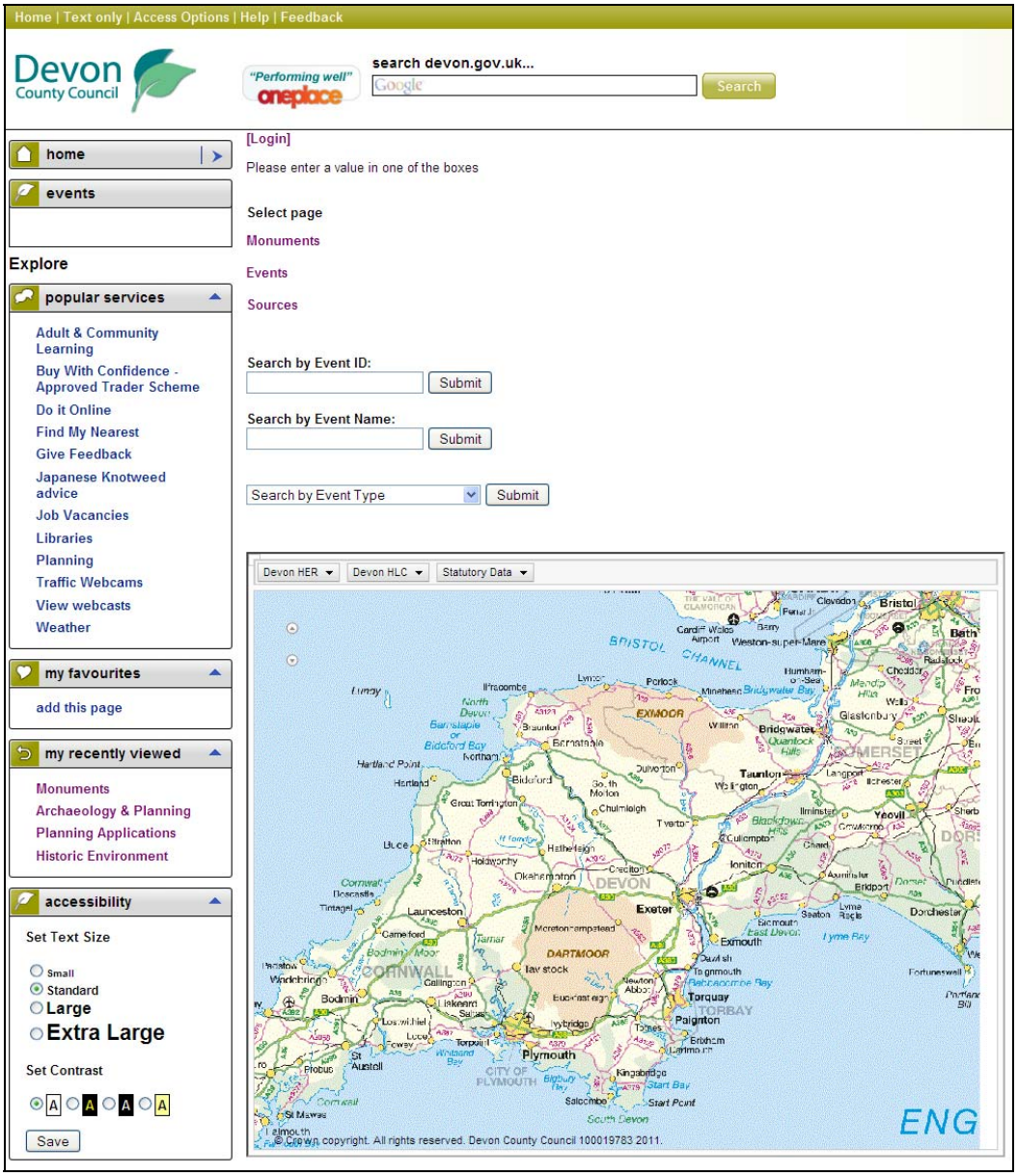


Figure 2. Events search page

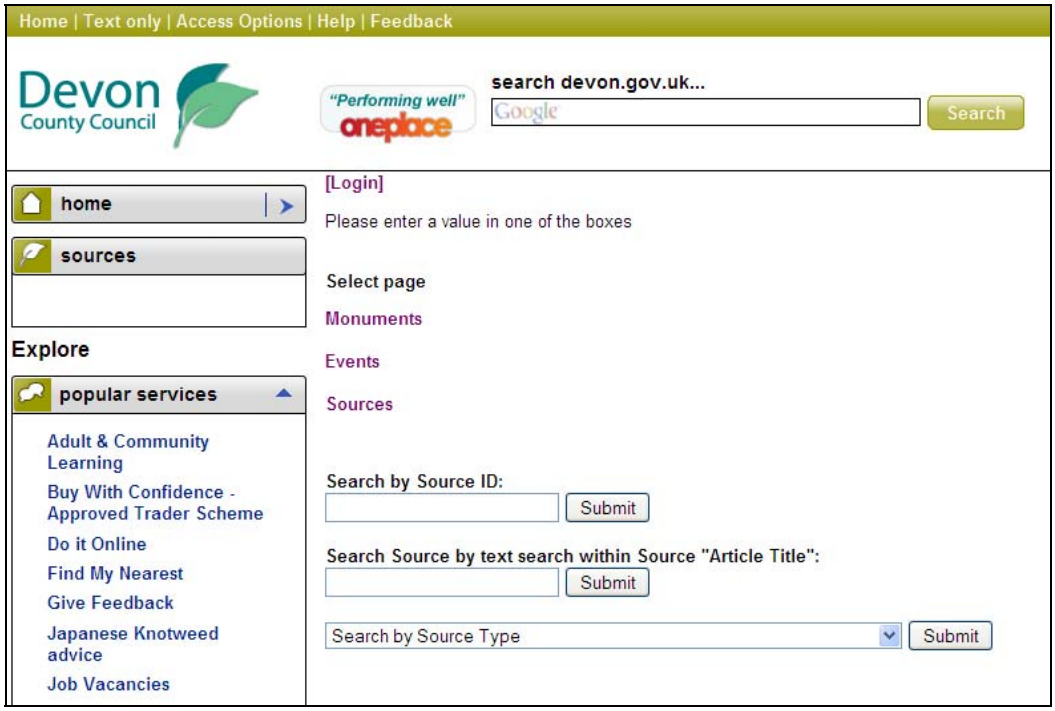


Figure 3. Sources search page

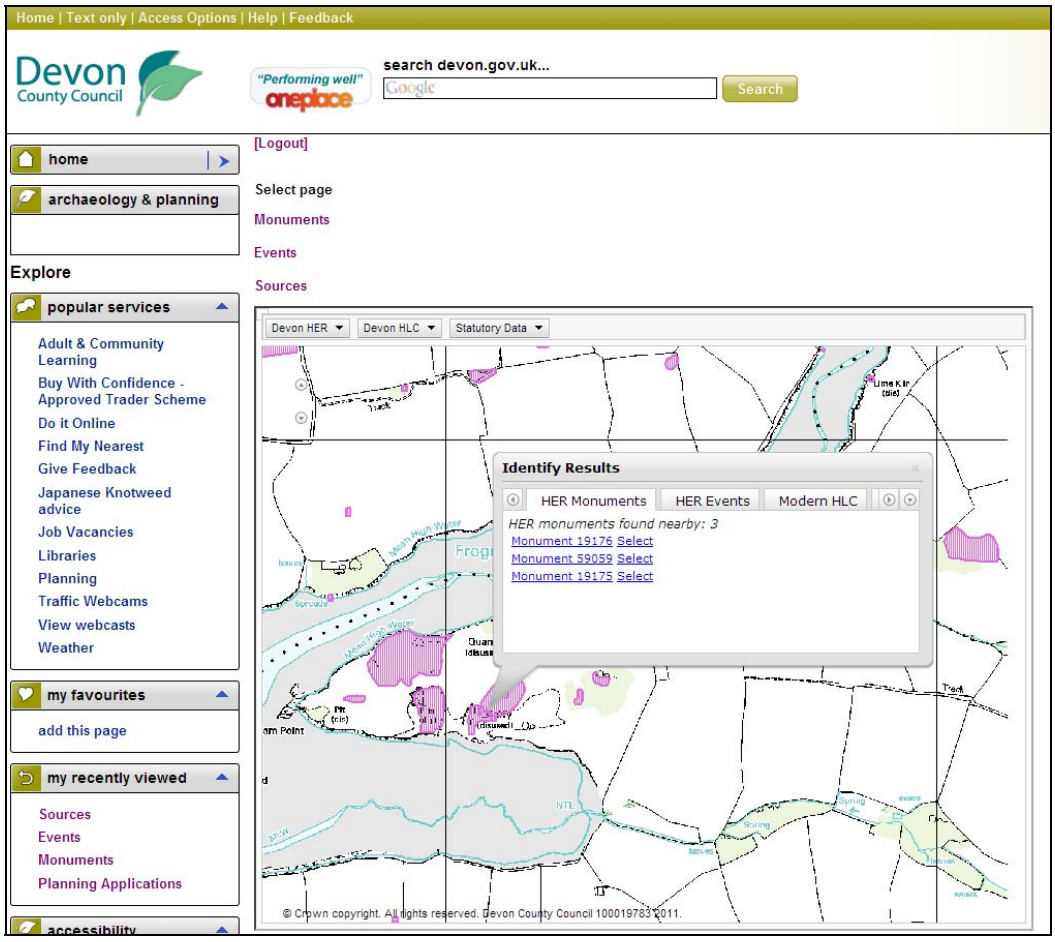
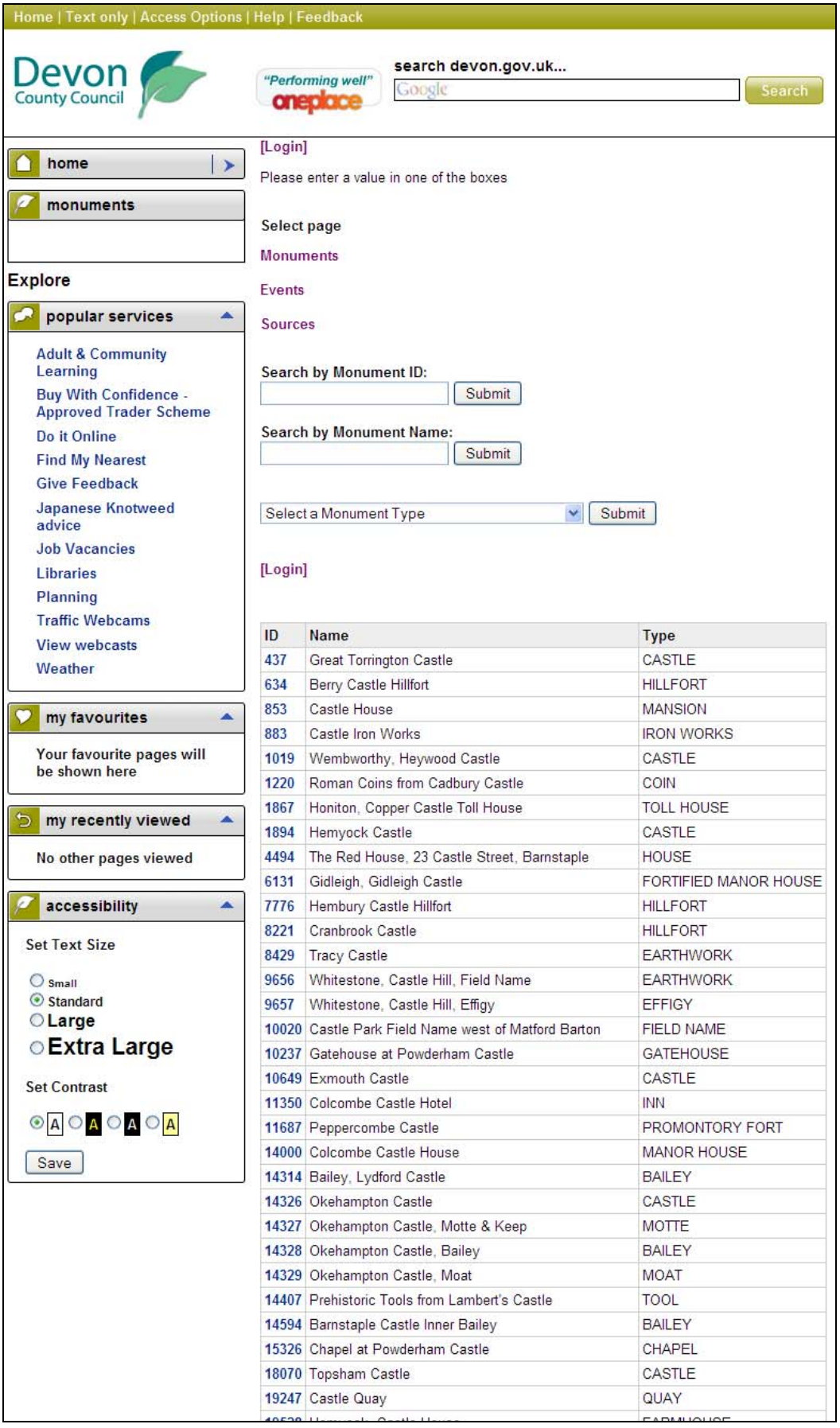


Figure 4. Search with embedded map

Results page

The requirements for the results screens was that when a user searches on a monument, event or source, a page detailing the list of monuments, events or sources that meets their search requirements is displayed. This lists (in order of ID number): Monument ID, Monument Type and Monument Name, or the Event ID, Event Type and Event Name or the Source ID, Source Type, Author, Source Year and Article Title. The ID is a hyperlink to the relevant Monument, Event or Source page.



ID	Name	Type
437	Great Torrington Castle	CASTLE
634	Berry Castle Hillfort	HILLFORT
853	Castle House	MANSION
883	Castle Iron Works	IRON WORKS
1019	Wembworthy, Heywood Castle	CASTLE
1220	Roman Coins from Cadbury Castle	COIN
1867	Honiton, Copper Castle Toll House	TOLL HOUSE
1894	Hemyock Castle	CASTLE
4494	The Red House, 23 Castle Street, Barnstaple	HOUSE
6131	Gidleigh, Gidleigh Castle	FORTIFIED MANOR HOUSE
7776	Hembury Castle Hillfort	HILLFORT
8221	Cranbrook Castle	HILLFORT
8429	Tracy Castle	EARTHWORK
9656	Whitestone, Castle Hill, Field Name	EARTHWORK
9657	Whitestone, Castle Hill, Effigy	EFFIGY
10020	Castle Park Field Name west of Matford Barton	FIELD NAME
10237	Gatehouse at Powderham Castle	GATEHOUSE
10649	Exmouth Castle	CASTLE
11350	Colcombe Castle Hotel	INN
11687	Peppercombe Castle	PROMONTORY FORT
14000	Colcombe Castle House	MANOR HOUSE
14314	Bailey, Lydford Castle	BAILEY
14326	Okehampton Castle	CASTLE
14327	Okehampton Castle, Motte & Keep	MOTTE
14328	Okehampton Castle, Bailey	BAILEY
14329	Okehampton Castle, Moat	MOAT
14407	Prehistoric Tools from Lambert's Castle	TOOL
14594	Barnstaple Castle Inner Bailey	BAILEY
15326	Chapel at Powderham Castle	CHAPEL
18070	Topsham Castle	CASTLE
19247	Castle Quay	QUAY

Figure 5. Results page (Monuments)

Monument Page

Each Monument has it's own web page, with a unique and stable URL for each in the format www.devon.gov.uk/her/monument/xxxxx (where xxxxx is the Monument ID). This page holds basic information if a user is not logged-in, and further information if a user is logged-in.

The information returned for users that are logged-in is:

> *Monument ID, Monument Type, Name, Short Description, Class, Status, SM number, SAM County Number, Listed Building Number, Listed Building Grade, Grid Reference, Parish, District, Broad period, Period, Minimum Date, Maximum Date, Date Range Qualifier* and *Evidence.* After this, a number of Source fields are shown: *Monument Source Description, Author, Source Year Source Type, Author, Source Year, Serial Title, Article Title, Serial Vol No., Page Frame* and *Source ID*. The Source ID is a hyperlink to the relevant Source page.
>
> Included is an embedded map with a polygon showing the location of the relevant Monument.
>
> After this, a number of Event fields are shown: *Event Name, Minimum Date, Maximum Date, Event Type, Organisation Name, Organisation Person, Organisation Role* and *Event ID*. The Event ID is a hyperlink to the relevant Event page.
>
> Then the following Relationships are shown: *Relationship, Monument Type* and *Monument ID*. The Monument ID is a hyperlink to the relevant Monument page.
>
> This is the followed by a disclaimer.

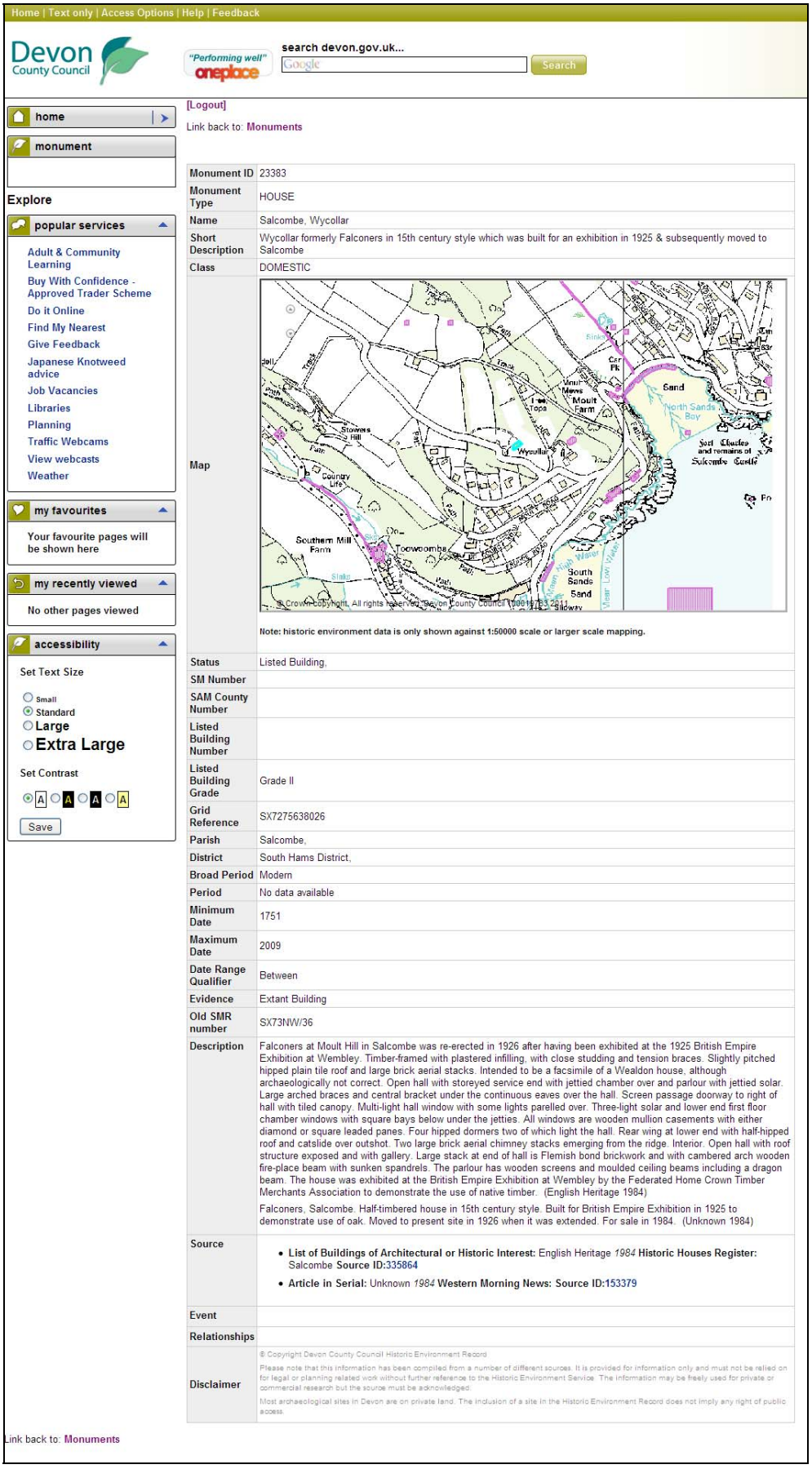


Figure 6. Monument page (logged in)

The information returned for users that are not logged-in is:

Monument ID, Monument Type, Name, Short Description, Class, Status, Grid reference, Broad period, Period, Evidence. After this, some fields are shown: *Source Type, Author, Source Year, Serial Title, Article Title, Serial Vol No., Page Frame* and *Source ID*. The Source ID is a hyperlink to the relevant Source page.

Included is an embedded map showing a point location of the relevant Monument.

After this, a number of Event fields are shown: *Event Name, Minimum Date, Maximum Date, Event Type, Organisation Name, Organisation Person, Organisation Role* and *Event ID*. The Event ID is a hyperlink to the relevant Event page. This is the followed by a disclaimer.

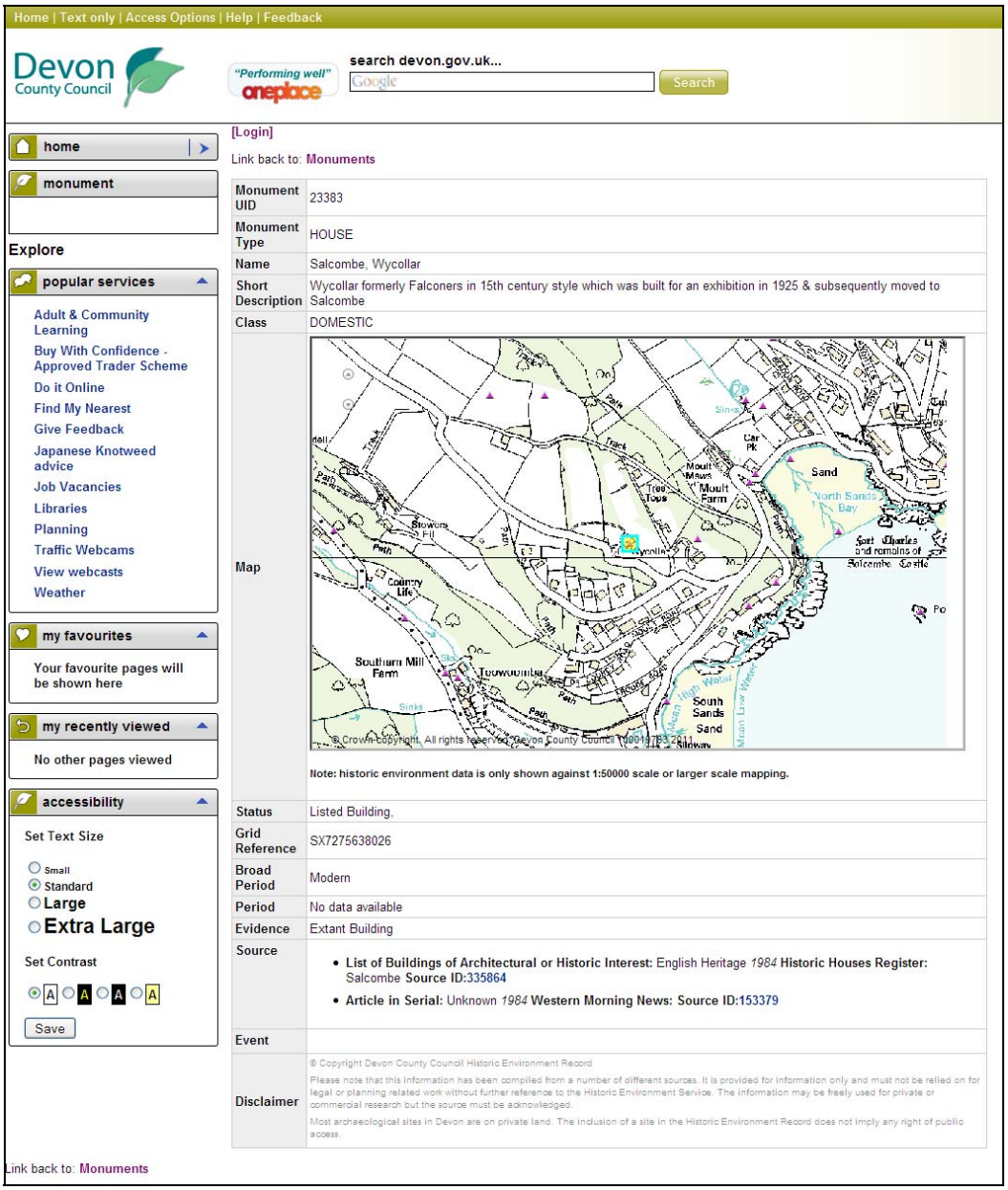


Figure 7. Monument page (not logged in)

Devon and Dartmoor HER has some records that are derived from an earlier iteration of the database that stored all the data in a flat file (rather than the relational database that the record is stored in today). This means that there are some monument records that contain many ‘migrated sources’, and have not been ‘cleaned’ to provide information in a more user-friendly, or searchable, format. Therefore, for these records (when a user is not logged-in) there is slightly less information returned.

Event Page

Each Event had it’s own web page, with a unique and stable URL for each in the format www.devon.gov.uk/her/event/xxxxx (where xxxxx is the Event ID).

The information returned for all users is:

> *Event ID, Event Type, Event Name, Short Description, Organisation Name, Organisation Person, Organisation Role, Grid Reference, Minimum Date, Maximum Date, Date Range Qualifier.* After this, a number of Source fields are shown: *Source Type, Author, Source Year, Source Year, Serial Title, Article Title, Serial Vol No., Page Frame* and *Source ID*. The Source ID is a hyperlink to the relevant Source page. Included is an embedded map with a polygon showing the location of the relevant Event.
>
> After this, a number of Monument fields are shown: *Monument Type, Class, Status, Broad period, Evidence, Monument ID.* The Monument ID is a hyperlink to the relevant Monument page.
>
> Then the following Relationships are shown: *Relationship, Event Type* and *Event ID*. The Event ID is a hyperlink to the relevant Monument page.
>
> This is the followed by a disclaimer.

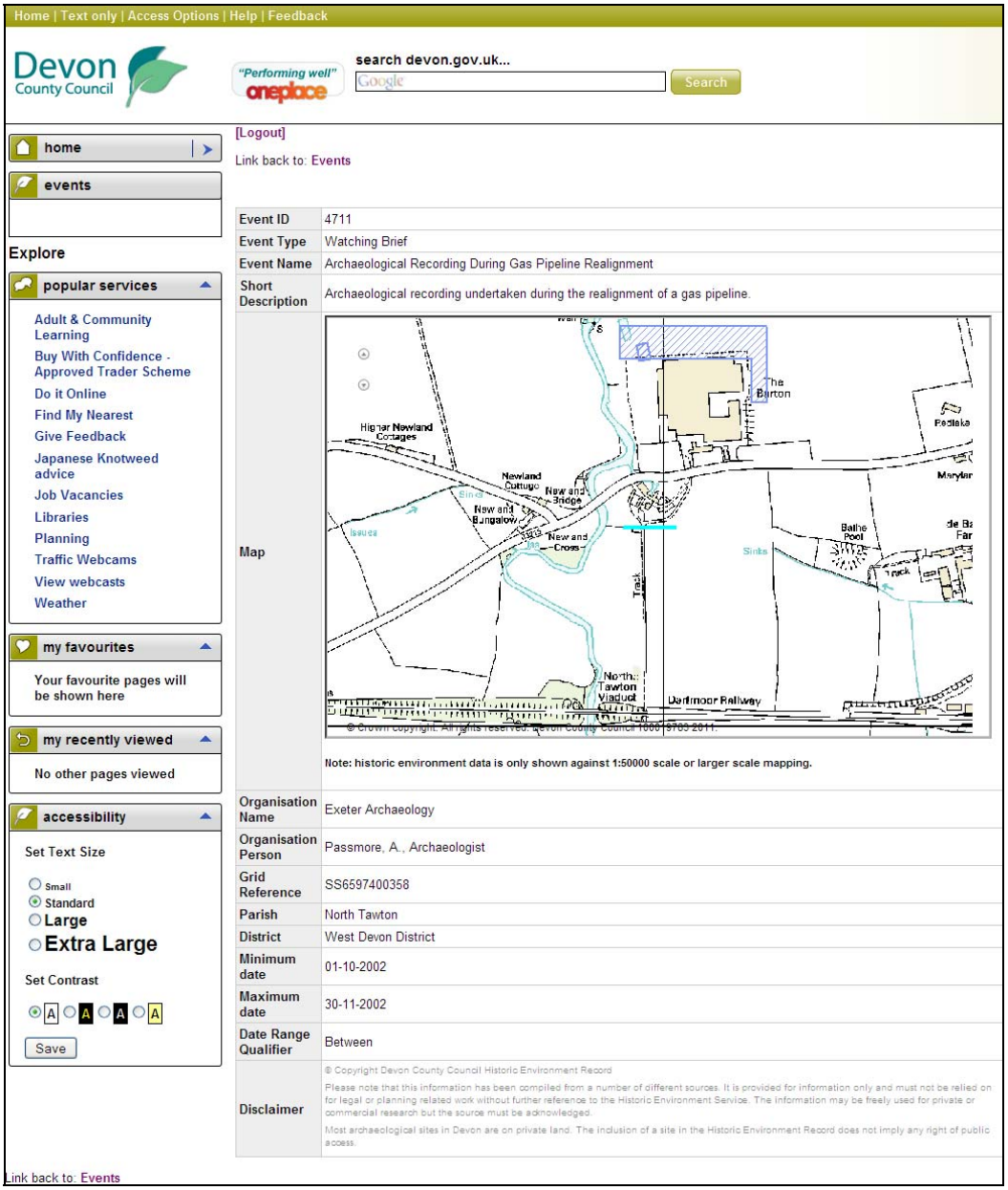


Figure 8. Event page

Source Page

Each Source had it's own web page, with a unique and stable URL for each in the format www.devon.gov.uk/her/source/xxxxx (where xxxxx is the Source ID).

The information returned for all users is:

> *Source ID, Source Type, Article Title, Serial Title, Author, Editor, Serial Vol No., Source Year, Minimum Date, Maximum Date, Date Range Qualifier, Source Year, Publisher / Issuer, Location.*
>
> This is the followed by a disclaimer.

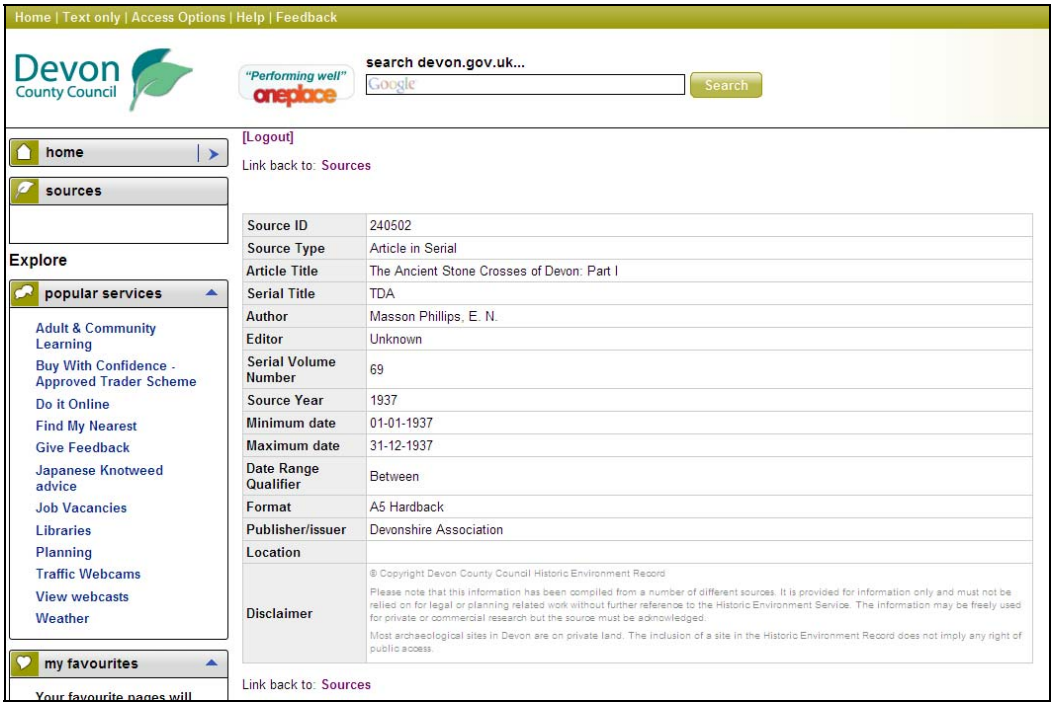


Figure 9. Source page

3.3.4. Issues

The web pages were written in-house by Devon County Council ICT. They provided a method of querying the Devon and Dartmoor HER database. Issues that arose included the following:

URLs

The project was built around linking GIS data to HER data via the internet. The project was also built so that this could continue working for many years. Therefore, it was important that the HER web pages had unique, stable URLs. This meant that users could be sure that visiting a certain web address, they would be presented with information about a particular Monument, Event or Source. The content management system that Devon County Council uses to maintain, author and serve it's web pages, did not provide suitable, stable URLs. However, Devon County Council uses a caching proxy (Squid caching proxy) in front of the web server. Although this is mainly used to reduce bandwidth and improve response times by caching and reusing frequently-requested web pages, it (and a redirector called Squirm) can also be used to re-write the URL requests before they are passed to the web server. Ensuring that unique, stable URLs were able to be passed to the web server, and that each page could be displayed with the correct URL, meant more work in this stage of the project – an estimated extra day-and-a-half of development time.

Specification

This part of the project needed to be finely specified, to ensure that exactly the correct information was available to the ICT specialists building the web pages. This specification needed to define exactly what fields were needed from the HER database and how they were to be presented on the web pages. With such a large amount of information available, this specification was very detailed, and probably took one extra day to fully specify this.

Testing

Draft web pages were written using a development version (a copy) of the HER database. These were tested, and any errors in both the content and the format of the web pages were resolved, as well as any errors in the URL construction. Due to the complexity of the web pages, these took some time to test – around day-and-a-half of testing time, overall.

4. Discussion – issues, challenges and opportunities

4.1. Sharing data

4.1.1. Sharing data - background

There is much guidance and advise on sharing data in the public sector. The following guidance all highlight the need for better data sharing and access.

Location Strategy

In 2008 the government issued “Place matters: the Location Strategy for the United Kingdom”. This set out that geographic data should be at the heart of government thinking and advice. It highlighted the fact that currently, too few government-owned datasets that incorporate location can be easily assembled and analysed with reliability across local and central government. It went on to say that at the moment there is too much duplication, too little reuse and too few linkages across datasets which are required to support policy implementation. The location strategy states that we should know what data we have and avoid duplicating it, that we use common reference data so we know we are talking about the same places, that we can share location-related information easily through a common infrastructure of standards, technology and business relationships and we have the appropriate skills to do this.

INSPIRE

On 31st December 2009, European INSPIRE regulations came into force. The EC INSPIRE Directive (2007) defines the legal framework for the establishment and operation of an infrastructure for Spatial Information in Europe. This is to enable the formulation, implementation, monitoring and evaluation of Community environmental policies at all levels – European, national and local – and to provide public information. Some datasets are required (by this legislation) to be published. The INSPIRE legislation sets out which datasets are to be published and how this should be carried out. While this does not include most historic environment data discussed here, conservation area data does fall under INSPIRE Annex I. English Heritage is currently working with the UK Location team at the Department for Environment, Food and Rural Affairs to ensure that this data is appropriately published.

Local government transparency

The present government is committed to increasing transparency across Whitehall and local authorities in order to make data more readily available to the citizen and allow them to hold service providers to account. The Government is already releasing much public data to help people understand how government works and how policies are made (see, for example, http://data.gov.uk/).

4.1.2. Standards for sharing

There are a number of important standards used on the web and in sharing data. To effectively share data as suggested by European and national government (see above) it is essential to use standard methods to do this.

Web Standards

There are many standards used for sharing data over the internet. Many of these describe the standards for delivering web pages (for example, HTML, CSS, etc) but discussion of these is outside the scope of this project. However, standards are also used to define web mapping services such as WMS and WFS (see section 3.1, above). These standards ensure that there is a method of sharing geographic data that any GIS should be able to utilise.

Semantic web and linked data

This project relates to methods of best practice for sharing data on the web. Many organisations share data with each other over the internet, and recent government initiatives in data sharing (such as http://data.gov.uk/) encourage use of Linked Data and the Semantic Web.

The **Semantic Web** is different to much of the internet we currently use. The Semantic Web is a web of data and a framework that allows data to be shared and reused across application, organisation and community boundaries.

One of the ways of making the Semantic Web a reality is that data needs to be available on the web in a standard, reachable and manageable format. In addition the relationships between the data also need to be made available. This collection of interrelated data on the web can be referred to as **Linked Data**. Linked Data says that URLs[2] (or, more accurately, URIs[3]) (such as http://www.devon.gov.uk/her/monument/2520) should be used as names for things (a archaeological monument or a listed building, for example). It says that when someone looks up a URI, useful information should be returned. Also Linked Data says that these should include links to other URIs, so they can discover more things. These general principles are used in this project.

Linked Data goes on to say that data should be shared by a defined Resource Description Framework (RDF). RDF is a standard model for data interchange on the Web and allowing data to be mixed, exposed, and shared across different applications. While this is outside the scope of this project, the general principles of Linked Data and the Semantic Web are applied in this project.

4.2. Use of shared data

4.2.1. South Hams District Council

One of the main aims of sharing data was to ensure that conservation officers and planning officers at district council level had access to historic environment data held at county council level. This meant that they were able to view this information to make more informed development management decisions and could liaise better with colleagues at the County Council Historic Environment Service over planning matters.

---

[2] Uniform Resource Locator

[3] Uniform Resource Identifier

South Hams District Council uses a number of GIS tools to deliver mapping. South Hams District Council ICT use Cadcorp Desktop products (SIS) to edit and manage the GIS data.
Most mapping is viewed on the staff intranet, and the maps are delivered to the staff intranet using Cadcorp GTools. There is also mapping available on the public internet (http://mapping.southhams.gov.uk/shdcwebmappingnew/map.aspx), and this also uses this uses a system developed by South Hams ICT and Cadcorp to provide this web mapping. More data is available on the intranet GIS than the public-facing internet GIS. However, many planners and conservation officers use the internet-based mapping, as they find the user-interface simpler to understand and more appropriate for their needs.

Furthermore, the planners and conservation officers at South Hams District Council also have a planning applications system (called M3 from the supplier Northgate), which also has an embedded GIS within it. While this embedded mapping software is also based on Cadcorp products, this mapping has not been updated by Northgate for some time and therefore does not support the web mapping services that were produced for this project. This means that the web mapping services produced for this project could not be seen in the same software application as the system for registering and assessing planning applications.

This project created a theme of mapping using the South Hams District Council intranet mapping. This collected the following layers of information together:

- **HER Monuments** [Devon County Council HER Monument polygon layer]
- **HER Events** [Devon County Council HER Event polygon layer]
- **HER Monument points** [Devon County Council HER Monument point layer]
- **HER Events points** [Devon County Council HER Event point layer]
- **Listed Buildings** [South Hams listed buildings polygon layer]
- **Conservation Areas** [South Hams conservation areas polygon layer]
- **Full Planning Applications** [South Hams full planning applications polygon layer]
- **LB Applications** [South Hams listed building applications polygon layer]
- **CA Applications** [South Hams conservation area consent applications polygon layer]
- **OS background maps**

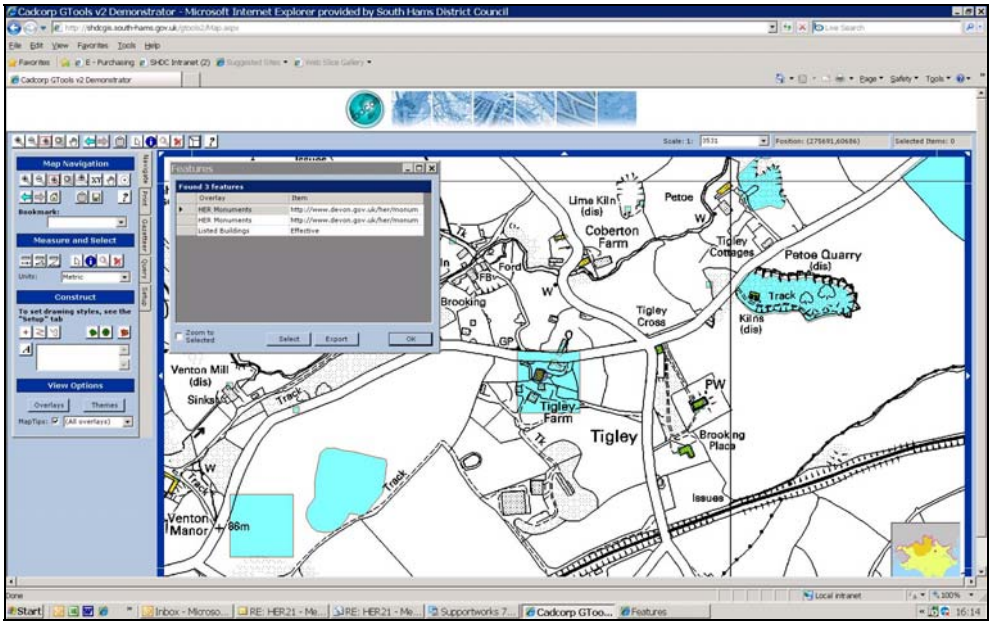


Figure 10. South Hams intranet GIS, showing web mapping services from Devon County Council

The HER Monuments and HER Events layers included URLs that linked through to the Devon and Dartmoor HER web pages; these provided more information on monuments and events. This allowed conservation officers (and planners) to view a number of layers of historic environment data together, and to view this with planning application areas and planning constraints. This allowed these members of staff to gain further information on the historic environment for casework purposes and to make more informed development management decisions.

An example: Before this project, when a Conservation Officer from South Hams District Council wanted more information on a specific monument, they would telephone or email the HER. The HER would then create a Portable Document Format (PDF) version of the monument record, and a PDF version of the GIS mapping (showing the monument location). This would then be emailed to the conservation officer. This would probably take about ten to fifteen minutes of time (combined) for both the HER Officer and the Conservation Officer. Using the information provided by the web mapping services and the web pages, this information can be retrieved in less than a minute. Cumulative savings can be made as more information is accessed in this way.

4.2.2. Dartmoor National Park Authority

Dartmoor National Park Authority uses MapInfo Professional as well as the intranet-based browser.

Staff at Dartmoor National Park Authority provide both the archaeology and conservation advice for the authority. The ability to see both the Devon County Council HER and Historic Landscape Characterisation data directly on their in-house GIS, allowed their staff to make better, informed decisions on the historic environment, and to provide better advice on the management of the historic environment. Similar savings in time taken to access records could be made, as at South Hams District Council.

It was also useful to test that Dartmoor National Park Authority had the ability to view the South Hams data; however as this was an entirely separate planning area there was little need to view South Hams data

(apart from to view planning constraints and historic environment data at the border of the South Hams / Dartmoor area).

4.2.3. Devon County Council

Devon County Council Historic Environment Service uses ArcGIS for desktop GIS and ArcIMS/ArcGIS Server for intranet/internet GIS.

Having access to their own Historic Environment GIS data, alongside historic environment and planning constraint data from both Dartmoor National Park Authority and South Hams District Council allowed members of staff from the Historic Environment Service at Devon County Council to provide more accurate, timely advice for planning, utility and agri-environment as well as provide better advise on the historic environment through HER enquiries. Savings each time a resource is requested from a partner organisation were similar to savings made between South Hams and Devon.

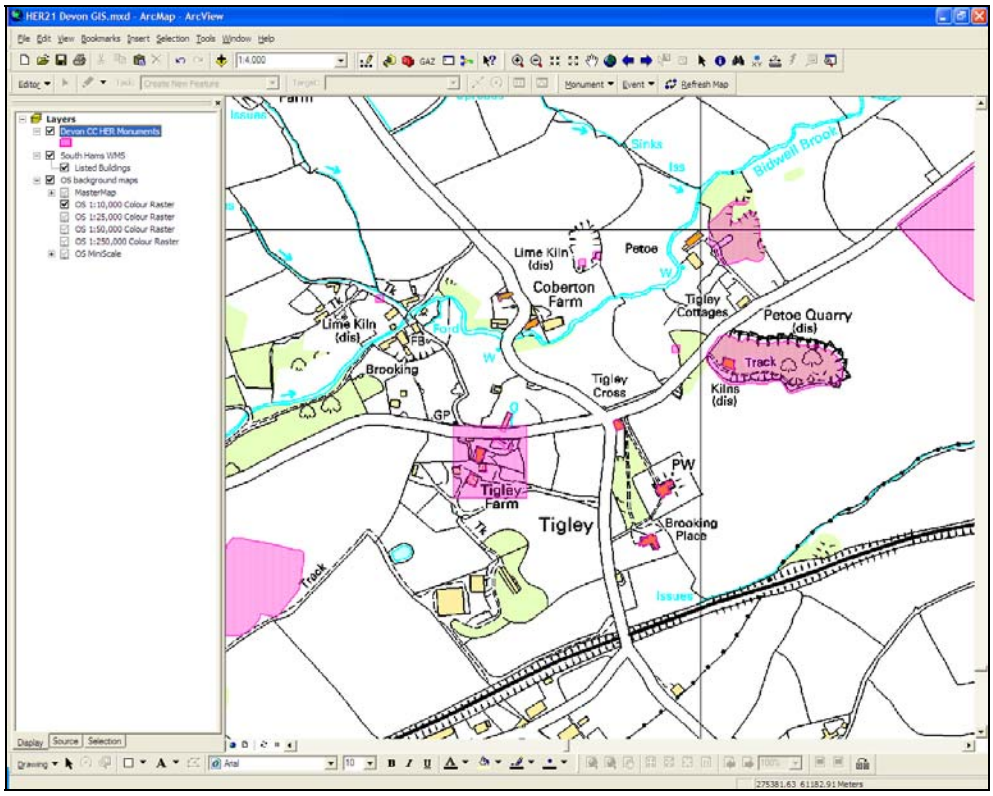


Figure 11. Devon County Council GIS, showing web mapping services from South Hams District Council

4.2.4. South Devon AONB

South Devon AONB service are hosted within South Hams District Council. Therefore they use the same GIS systems. However, their uses of the GIS data are different from their planning colleagues. Access to data from the partners involved in this project allows their members of staff to view historic environment information alongside their own data so that they can make informed decisions about the environment in South Devon. Access to this data also helps South Devon AONB in projects that they run, and in pointing members of the public to the relevant holders of data. Savings each time a resource is requested from a partner organisation were similar to savings made between South Hams and Devon.

4.3. Data and systems issues

4.3.1. Data and systems issues in the production of web mapping services and web pages.

Many of the issues in the production and delivery of web mapping services and web pages are described in the methodology (above).

The positive issues relating to the production of the web mapping services and web pages are:

- The relative ease in setting them up
- (In most instances) the use of existing in-house technology, and ICT staff that understand the technology. Most authorities already use technology that can be used to produce web mapping services.
- The integration with existing GIS systems. Because the web mapping services use existing standards, they can be viewed on most GIS systems
- The speed of production. Once the systems are in-place for the production of web mapping services, the production of a new web mapping service (a new layer) is very easy and quick.
- The production of web pages of HER data uses skills and technology that is available in-house. The parent body for the HER (in this case Devon County Council), hosts many web pages on their corporate website, and has a content management system and middleware in-place to do this, with in-house expertise to carry out these tasks.

The negative issues relating to the production of the web mapping services and web pages are:

- Use of standards. While the web map services are common standards that should work in most GIS systems, some parts of the standard were supported more than others. For example, South Hams GIS did not support ‘Identify’ (also known as ‘GetFeatureInfo Request’) for WMS, so can not read any of the features attributes.
- Security and firewalls. Like most public and private sector organisations security of data is very important and all the authorities who were part of this project had a firewall to protect their servers. Extra work was required to ensure that the web services would work correctly through the appropriate firewalls.
- Unresolved technical matters. Dartmoor National Park could open and read the available WMS layers from DCC, however, nothing was displayed. This issue was investigated, but not resolved. The WMS produced by South Hams did not support ‘Identify’ at Dartmoor National Park, and instead produced an error. Although this issue was also investigated, it was not possible to resolve this in the time set aside for project testing.
- The web pages need to be carefully specified, as they take data from many different parts of the HER database, and combine this together to form useful and suitable data for each web page.
- The production of URLs involve some technical work to ensure that unique, stable URLs were available for each Monument, Event or Source. This was more complex than is usual for authoring a page on the corporate website and, as such, took an extended period of time.

- The web pages needed to be carefully tested, to ensure that they all worked correctly, and displayed the right data.
- Project management. During the course of this project, it was clear that strong project management with an understanding of both the historic environment and the technology used, was vital to scope, specify, test and ensure that the project was completed.

4.4. Technical issues in the use of shared data

The following technical issues were highlighted in this project:

Speed of WFS. Some of the WFS services were slow to load into a GIS. This is due to the fact that a WFS can deliver a large number of features over the internet, each with many vertices. To be able to display these correctly on the GIS, the GIS may take a while (maybe 30 seconds or a minute) to cache these features. If many WFSs are loaded into a GIS at once, this slowness may impact the usability of the map. However, when the map is loaded the map usually works as well as if the data is held locally.

This could be improved by cutting down the amount of data being delivered, or in the organisation receiving the data only selecting part of the data.

Compatibility. As described above, compatibility of GIS systems was an issue in using the data, as well as in producing the data. While WMS and WFS are well documented international standards (see section 4.1, above), some of the GIS systems used by the project partners only partly implemented the relevant standards.

While these standards are well documented and agreed, support for them within GIS is increasing all the time. For example, it is understood that the issue relating to Cadcorp not supporting 'Identify' on web map services may be supported in future versions of their GIS software.

Numerous GIS systems. As discussed above, South Hams District Council uses a number of different GIS technologies (a desktop GIS (mainly for editing GI data), a web-based intranet GIS, a web-based internet GIS and an embedded GIS in the planning application logging system). Different systems have different support for WMS and WFS services, and different systems have different GIS layers loaded into them. Different members of staff also use different GIS systems. This complexity means further testing and deployment of web mapping services.

Symbology. As described above, a web map service returns an image that can be displayed as a layer in a GIS. As this is an image, this cannot be manipulated very easily, so the colour and symbology cannot generally be changed. Conversely, a web feature service returns that actual geographic data. This means that the although this may be slower (see above) the data can be symbolised much more effectively.

Links

Discussion with South Hams District Council conservation officers highlighted the issue of linking data. For example, South Hams had captured all their listed buildings as polygons. However, this data was not linked to the data held in the listed building descriptions (currently available at http://lbonline.english-heritage.org.uk/ and http://www.heritagegateway.org.uk/). This limited the use of this data, and meant that users relied on paper copies of the list descriptions or manually

looking the data up. Investigations are currently taking place to link this data.

4.5. Process issues in the use of shared data

Testing and feedback from the partner organisations proved useful in understanding the organisational issues in using shared historic environment data. During the development, and once the web mapping services and web pages of HER data had been produced, various discussions and feedback sessions took place with members of the project board, as well as other interested parties. This consisted of meetings with small groups of planners and conservation officers, presentation and discussion with groups (such as Devon Conservation Officers Group, Devon GIS Group), and one-to-one phone, email and in-person discussions.

Issues raised were varied, and discussion of both the nature and use of historic environment data, as well as the technical aspects of sharing the data was discussed.

Access to data

Some of the conservation officers that the project held discussions with were very keen to get access to data supplied by the HER as soon as possible. They felt that getting access to this data was important in their day-to-day casework, and that knowing more about the archaeology and history of various buildings, structures, archaeological monuments or earthworks would help them provide better and more timely evidence-based advice within their district planning authority. Having access to this information would also mean that discussions with county council-based archaeologists could be based on shared information.

Nature of the data shared

One of recurring topics of discussion with the partner organisations was that of the nature of the data being provided, both by the HER, and by the planning authorities.

The data provided by the HER was often felt to be rather specialist, and not always relevant to be a direct consideration in the planning process. For example, much of the HER monument information is imprecise (accurate to 100m or even 1km), or derived from antiquarian information, or from conflicting sources. Similarly, absence of evidence on the HER does not imply absence of potential archaeology. For these (and other) reasons, it was felt that the HER data supplied by Devon and Dartmoor HER could not be used as a constraint map.

HER data has been collected over many years, and may be derived from many sources. It was felt that the information is very useful for providing an evidence-base for archaeological and historic environment interpretation.

Furthermore, while some of the layers of information held by the district planning authorities (such as listed building information) is very beneficial to be used in other organisations, the information that this data contains or links to may be limited.

However, most project partners from various organisations (conservation officers at district council level, archaeologists at county council level) were keen to be able to view the data, and saw the positive benefits that this access could achieve.

Usefulness of data

Discussion with the conservation officers highlighted the difference

between planning constraint data and historic environment record data. For the planning and conservation officers within a local authority, statutory constraints (such as conservation areas, listed buildings, scheduled monuments) were a primary factor in decisions being made on planning applications and other consultations. These layers of GIS information were often used as automated planning constraints – so that a planning officer is notified that this may be an issue at the earliest opportunity. The nature (and partly the quality) of HER data, was such that it would be hard to justify using the HER layers (in particular the HER Monuments layer) as a constraint layer in this way. However, all the conservation officers agreed that it was great having access to this data, and that it was a very useful tool for specific casework.

In this way, HER GIS data is useful as background information to make informed decisions on specific planning matters. It was felt less useful as constraint data.

Conservation officers and planning officers also felt that they do not have time to look at layers of data over and above the constraint layers that they already have available to them.

Use of technology

Discussion with the South Hams conservation officers highlighted use of technology within the organisation. A number of planners and conservation officers did not use GIS that was available to them, or used a form of GIS that did not have all the data they needed. This may have been for a number of reasons, such as (but not limited to) unfamiliarity with the technology, lack of training opportunities, use of simpler (public-facing) web-based GIS, lack of a coherent set of data suitable for historic environment (or planning) consultation, reliance on a limited embedded GIS within planning application logging systems, a perception that GIS requires a steep learning curve, etc.

Use of technology to improve access to historic environment data (and therefore to make informed decisions) requires not only the right technology, but also the awareness and training to use these tools. It was notable that this training may be in an ad-hoc manner, and some of the organisations in this project had members of staff that acted as ‘champions’ for the technology involved; they showed other members of staff how to use the appropriate technology, and provided ad-hoc training and support.

4.6. Other issues with shared data

4.6.1. Copyright and data licensing

Most of the datasets being shared are the copyright of the host organisations (Devon County Council, South Hams District Council, Dartmoor National Park Authority, etc). These organisations were keen to share this data with the other partner organisations. Much of the data is also appropriate to be shared with the public. This project meets the requirements of those organisations to open their data up and allow further access to assist in the protection of the historic environment.

However, a number of these datasets were derived from data originally supplied by the Ordnance Survey. Up to now, there has been concern expressed, across the geographic information sector, about whether it is possible to supply this data more widely. However, local government licensing is due to change in April 2011, with the introduction of the Public Sector Mapping Agreement (PSMA). This agreement allows government

organisations to share Ordnance Survey data and Ordnance Survey derived data with other government organisations. It also allows for sharing the data with partner organisations who are not members of the agreement using a contractors/end user licence. The End User licence also allows government organisations to share data with third parties as needed as part of their core business. The End User licence allows government organisations to share data widely, and can now allow third parties to download the data or access a WFS provided that:

- The third parties use of the data is to support the organisation's core business.
- The third party has agreed to the end user licence.
- The government organisation has met the conditions of the PSMA licence (copyright statements, watermarking etc.)

English Heritage already make much data (also captured against Ordnance Survey base mapping) available via their website: http://services.english-heritage.org.uk/NMRDataDownload/) and it is possible to do this as there are a number of caveats in place.

Advice from English Heritage was that publishing Ordnance Survey derived-data over Google Maps was a problem (due to Google Map licensing issues), but that if this is not done, there are less issues.

4.7. Quantification of costs and sustainability

4.7.1. Costs

Web mapping services: Costs for each partner (Devon County Council, South Hams District Council and Dartmoor National Park) were broadly similar, with each organisation spending about 10 person hours to generate the web mapping services. In the case of South Hams District Council a small amount of money was spent to support an upgrade of their GIS system (so that it could better support the production of web map services) and the rest for staff time to produce the web mapping services. For Dartmoor National Park Authority, the 10 person hours were used by a consultant to set up MapServer, and in staff time to manage this. For Devon County Council, ten person hours was spent to set up the various web mapping services.

Web pages: Devon County Council ICT spent 28 person days building a website with mapping and text-based access to HER data. This included all the work needed to set up a web page for every single monument, event and source, and to build the embedded maps into the monument and event web pages.

4.7.2. Benefits

Benefits of the web mapping services and the HER web pages are numerous, but include:

- Time saving by all partners in accessing and delivering information (individuals can access live data, rather than having to telephone or email to request data, as well as a saving made by not sending data to partners). It is estimated that this saves approximately ten to fifteen minutes of time for each request.
- Avoids time-consuming data downloading, translation and storage, as live data is accessible to all partners. It is estimated that this may

save approximately 30 minutes of time each time that data is downloaded and stored.

- Work to enable sharing of this data goes a very long way to allowing access to data for other partners. Therefore, costs would be very much reduced to set up sharing of data for other partners or the public. Therefore greater access to this data can be much more easily available. It is estimated that to allow another similar partner organisation (e.g. another district council) access to this information would not take any significant amount to time to develop. To allow, for example, public access to detailed information would require more time to ensure that the appropriate caveats, contact information and background information is available – however, all the technical work to make access to this information has been carried out, so only a few hours of extra work would be required to make sure that the data shared was appropriate.

4.8. Links/interfaces to other projects

This project interfaced with a number of other projects and groups. These included:

Devon Conservation Officers Group

Presentations were made, and feedback received from the Devon Conservation Officers Group. This group approved of the idea to share data. Some members of the group outside the trial were keen that they could also share this HER web mapping services and web pages. Discussion with this group will be ongoing after this trial project has completed, and widening the scope of this project will be considered.

Devon GIS group

A presentation was made to the Devon GIS group. The group was supportive of this use of web mapping services to share data between public services, and saw this technology as a good case study in providing joined-up services for less overheads. It was stated that “most authorities were in a position to create and consume web mapping services”. It was felt that the use of web services to reduce the amount of data handling and transformation will produce efficiency savings.

The Devon GIS group discussed these methods of data sharing, highlighted the benefits of this approach and stated that this could be used as a method to allow a shared portal of GIS data for Devon. The minutes of a meeting that discussed this concluded that “we need to highlight these benefits to Devon IT Managers potentially using the excellent HER21 Project as pilot evidence”.

Heritage Gateway

Discussions were held with the project team at Heritage Gateway. The Heritage Gateway team are currently investigating enhancements to Heritage Gateway. These include proposals to get HERs to make their data available to Heritage Gateway via Web Mapping Services. The project manager provided comment on the proposals from the Heritage Gateway team, and the Heritage Gateway team were invited to make comments on this project.

Other HER21 projects

This project corresponded and made comments on a number of other HER21 projects:

This project interfaces with the project being carried out by Gloucestershire County Council (project EH6027) “HER21:From SMR to HER-Integrating Built Historic Environment Records in Gloucestershire”. Results from the Devon project and the Gloucestershire project complement each other, with the Devon project providing a mechanism for sharing of data, and the Gloucestershire project providing ideas on the content of data to be shared.

This project also discussed a number of issues with the project being carried out by the consultants SAM (project EH6034) “Development of GIS Data Standards for Use in HERs in England.” The project manager attended a meeting in London, where a number of issues about GIS, HER and improving use of GIS was discussed. Based on early trials with the Devon HER21 project, the project manager was able to advise the “Development of GIS Data Standards for Use in HERs in England” project on the use of web mapping services, and this is being followed up in that project.

This project also liaised with the following other HER21 projects:

- Project 6032. The Historic Environment Officer Managing an HPR Compliant HER. The Devon HER21 project provided feedback on suggestions made by this project.
- Project 6033. HER-Derived Alert and Constraint Mapping Supplied to Local Authorities. The Devon HER21 project provided feedback to the survey that was produced by this project. Also, from doing this, the Devon HER21 project considered the role and nature of HER-derived constraint mapping.
- Project 6035. Interoperability of HERs and Local Authority Planning Systems. The Devon HER21 project provided feedback on suggestions made by this project.
- Project 6000. Bristol Historic Web Map. The Devon HER21 project provided feedback on the initial project design of this project.
- Project 6015. Heritage Asset Information Management in Kent. The Devon HER21 project provided feedback on draft documents provided by this project.

4.9. Discussion of feedback from project partners

The project looked at a number of methods of sharing historic environment data between partner organisations. Feedback from the partner organisations involved has highlighted the benefits of sharing data, the general low-cost of doing this, and the sustainability of sharing data. Great benefits were highlighted in that in this way data does not need to be updated and so can eliminate time-consuming data downloading, translation and storage. Furthermore, as the methods set out here share ‘live’ data, amendments or developments to these web mapping services or web pages (for example, future developments to web pages, such as adding links to archaeological reports or historic building surveys) would enhance the data already shared. The method of sharing this data is therefore sustainable, even if the data changes over time.

Feedback also highlighted the practical use in having access to other organisations data, and while the data may not be suitable for use in every way than an organisation may wish (it’s difficult to use raw HER data as constraint maps, for example), the very fact that most of the data is being shared allows all parties to provide more timely evidence-based advice.

While there have been issues, these have generally been either technical issues to do with specific software or corporate ICT structures, or organisational issues relating to the practical use of GIS and web technologies by planners, conservation officers and archaeologists. Technical issues may be overcome by closer study of the issues, by revised software with better standards support, or changes to corporate ICT structures, to make sharing of data over the internet easier. Given the rise and use of internet technologies over the last few decades, internet technologies are likely to continue to grow and be used. Organisational issues may be overcome by continued use of the shared data, and in therefore seeing the benefits that it provides.

4.10. Discussion on the projects research aims and objectives

This project aimed to answer a number of questions. A discussion about each of these can be found below.

4.10.1. What methodology can best be used for sharing historic environment data between organisations?

This project has looked at some specific methods of sharing historic environment data between HERs, partner organisations and colleagues in the Historic Environment sector. These need to be compared to methods of sharing data that already exist, and methods of working that promote this sharing of data.

This project provides two methods of sharing data – via web pages and via GIS web mapping services. Whilst these took some work to set up and there were some technical issues that needed to be considered, the methods were well known in the technical support teams of the organisations and largely relied on technology that already existed (both for serving and viewing the data). For this reason, sharing of this data via these methods was felt to be relatively easy.

4.10.2. How can historic environment data best be shared between organisations so multiple versions of the data are not copied and become out-of-date?

Existing methods of sharing historic environment data has occurred in an ad-hoc manner. Where large sets of data (for example, Conservation Areas) was given to a partner authority, the time and resources to update these meant that this data was not updated regularly, meaning that out-of-date data was often used. This, in turn, could result in incorrect advice or decisions being made. The method of sharing data outlined by this project (via web pages and web mapping services), distributes live data, and therefore this data is never out-of-date. It also provides a mechanism for organisations to own their own data, and to distribute it as appropriate.

4.10.3. Can a sustainable method for sharing historic environment data be developed that is applicable for other organisations both locally and nationally?

The method of sharing data outlined by this project (via web pages and web mapping services), can be developed both locally and nationally.

At a local level the organisations that participate in this data sharing can be widened. This may be to other local authorities (such as other district

councils, unitary authorities and other national parks). Data could also be shared with local museums or other stakeholders in the historic environment. The scope of the data that is shared via these methods could also be widened. Within the historic environment sector, this may include the sharing of historic environment constraint mapping. This could also be developed wider to share other spatial data, such as county wildlife sites, or other environmental data.

On a national level, the ideas and themes outlined by this project could be taken on-board by other suppliers and consumers of historic environment data. This may be national bodies (such as English Heritage or the National Trust), or other local suppliers of historic environment data, such as commercial archaeological contractors or local authority archaeological curators.

4.10.4. What are the technical issues relating to sharing historic environment data in the methods suggested in this project?

There are technical issues relating to this project, as described above. These relate to the practical aspects of both delivering the data (as web mapping services and as web pages) as well as viewing the data (on a GIS or on the web). However, there are also technical issues relating to the use of data in the various partner organisations. This includes the expertise of both the technical staff, as well as the planning and historic environment staff.

4.10.5. What are the practical and organisational issues relating to the sharing of historic environment data?

The practical issues involved in sharing historic environment data in this way are described above, and concern aspects of both delivering the data as well as viewing the data. However, there may be other organisational issues that occur with sharing this data. For example, these may relate to the workflows already in place in planning and other local government departments and how GIS is currently used in the planning process.

4.10.6. How is the methodology for sharing historic environment data suggested in this project applicable for making historic environment data available to the public?

The methods for sharing historic environment data in this project (by web pages and web mapping services), are very applicable for sharing data with the public. Many HERs already share their data to the public online, and this project is no different from many of the HERs that have their data shared online. However, there may be scope to share geographical historic environment data to the public. This could then be integrated with existing GIS that the public may have, but is more likely to be used to deliver mapping to web page-based services that deliver HER information, such as Heritage Gateway.

4.11. Summary of issues – what to consider when developing shared data

Based on the above issues and discussion, below is a list of items to consider when developing shared data:

- ☐ Ensure that rigorous project management is in-place:
  - ☐ Plan the project appropriately,

- ☐ Include reference to relevant government and technical standards and best practice
- ☐ Research the needs of the people to whom you are sharing data, and share only the data that is required
- ☐ Research the format of the data, and where it resides
- ☐ Research the tools available in-house – there's no point 're-inventing the wheel' if the technology already exists
- ☐ Scope to some detail exactly what data will be shared. Include which attributes from GIS layers and which fields from a database will be shared, and in what format
- ☐ Include enough time for testing, and allow for testing on different platforms (e.g. different GIS systems)
- ☐ Link to ongoing data sharing that may already be occurring in the relevant organisations

☐ Where appropriate, ensure that shared GIS layers link to further information via URLs.

☐ Ensure that the datasets being shared by a WFS, are a suitable size, otherwise slowness may impact the usability of the data

☐ Decide what the best method for data sharing is – it might not be necessary to use WMS, WFS and web pages. However, each of these have advantages and disadvantages

☐ Ensure that any URLs used are stable, permanent URLs to avoid broken-links in the future

☐ Ensure that ICT security issues (such as firewalls) are fully investigated

☐ When procuring a new GIS, ensure that any GIS used by an organisation fully supports the various GIS standards (such as WMS, WFS, etc)

☐ Ensure that there is good description and metadata for the data to be shared. This is so that users know the source of the data and it's limitations, etc.

☐ Ensure that users are appropriately trained in various systems that the shared data is available in (for example, a GIS system).

☐ Ensure that the relevant copyright/licensing requirements are met for the shared data

☐ Demonstrate the shared data products to partners and get extensive feedback

4.12. Recommendations for future development

The sharing of data between organisations in Devon can be taken further. Possible future developments could include:

- Sharing of HER data from Devon County Council to all the other district councils in Devon, and to the other National Park in Devon (Exmoor National Park)
- Sharing of data from the other district councils in Devon to other partners, such as the County Council and National Parks
- Sharing of data from other organisations not involved in this trial, such as Exmoor National Park, or museums in Devon
- Sharing data with the public, as well as with other organisations

- Improving the user interface to the HER web pages, such as enhancing the search facility, more background about the data, etc.
- Incorporate links on other websites (e.g. Heritage Gateway) to the HER web pages developed by this project
- Incorporate links from the data held by all parties to relevant sources of information (e.g. linking listed building data held by district councils to listed building descriptions available online, linking to scheduled monument descriptions, etc)
- Using this project as good practice for sharing of data outside the historic environment sector, but within the organisations listed. For example, the Devon GIS group is keen to use this project as an example of best practice in sharing GIS data between local authorities

4.13. Conclusions

This project has demonstrated a number of technologies and working practices to enable sharing of historic environment data between organisations. Use of web mapping services and web pages to share data has improved access to this information, allowing all organisations involved to provide more informed advice on the historic environment.

Where the technology works, it works very well, integrating within existing technologies at a low cost, and using skills already available within these organisations. However, as a not very mature technology, and as a technology that has been little used by these organisations so far, there were various issues in delivering and viewing the data and in setting these services up. However, this need not be a barrier to pursuing this as a means to share historic environment data, and with good management, and well documented datasets, these can provide a useful, sustainable method of sharing data.

These methods of sharing data are likely to be increasingly used, due to pressure on organisations to make data available online, increase in internet speeds and computational power, and convergence of web technologies.

Most importantly, these methods of sharing up-to-date data between organisations allow for a low-cost and sustainable method of sharing historic environment data.

Project report written and prepared by:
Graham Tait
Archaeologist
Historic Environment Service
Devon County Council
Matford Offices
County Hall
Exeter
EX2 4QW
Telephone: 01392 382214
Email: graham.tait@devon.gov.uk

For more information about this project, please contact Graham Tait at the following email address: graham.tait@devon.gov.uk.

Date: 9th March 2011