Historic Land-use Assessment

Sources

Further Information
Information about Scotland's archaeological, architectural and maritime heritage can be found in Canmore (see above) and PastMap, at pastmap.org.uk. Archive items can be inspected in the RCAHMS Public Search Room, which is open Tuesday to Friday from 9.30am to 5.00pm (6.00pm on Thursdays), at the following address:

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Cover Page Image: Oblique aerial view, looking across Loch Lomond towards Ben Lomond and the Grampian Mountains. SC506616

1. INTRODUCTION

HLA (Historic Land-use Assessment) provides a systematic and rigorous means of 'reading' and recording features that survive from past activities that can be identified in patterns of current land use. It employs an archaeological approach to understanding the development and history of Scotland's landscape.

Data is gathered as a desk-based study and there is a field-checking element. All the component parts of the data have been interpreted, recorded, checked and edited using a comprehensive range of sources. Key sources are historical and current Ordnance Survey (OS) maps, the RCAHMS and local authority Historic Environment Records, and vertical and oblique aerial photography. HLA also draws on data held by the Forestry Commission, MLURI (Macaulay Land Use Research Institute), SNH and other organisations wherever relevant. This Technical Paper reviews the value of the various sources for HLA.

2. OS DATA

2.1 1st edition OS (1843-1878)

The OS 1st edition is a vital source for HLA because it is the first large scale map with national coverage. The survey was carried out on a county by county basis, beginning in Wigtownshire. It continued in a largely systematic progression from south to north. Arguments over the basic scale raged during the 1850s until it was resolved that the survey should be undertaken at 1:2,500 (25-inches to the mile) in farmland, reserving 1:10,560 (6-inches to the mile) for uncultivated areas.

The quality of the detail that was recorded at these scales is of great value to HLA. These maps are vital sources for such features as the shading of parkland, for which it has become a basic starting point for defining the extent of Designed Landscapes. Until 2000 when scanned versions of these maps were produced by Landmark Information Group, the paper maps were consulted. This meant that direct comparison with the current maps was difficult, especially for observing changes in field boundaries. Since 2000 the observations have been made significantly easier because they can be carried out on-screen.

The Landmark data was scanned at 1:200 dpi (dots per inch), which gives a fuzzy reproduction in some instances. In addition, in certain instances the maps did not fit well together. Despite this it was a very useful dataset until the National Library of Scotland digitised the maps at the higher resolution of 400 dpi. However, there are projection differences. The OS 1st edition was produced by means of creating a central meridian for each county based on a Cassini projection of the earth's surface. This means that it is not possible to ortho-rectify the maps to exactly fit the modern OS data.

The 1st edition maps are especially useful for their illustration of pre-improvement settlement and head-dykes, which can then be checked with other sources. Indeed, more detail is often shown on the earlier of the 1st edition county maps, such as Wigtownshire and the Isle of Lewis, than was included in the counties mapped subsequently.

2.2 2nd edition OS (1880-1895)

The 2nd edition of the OS was carried out primarily to revise the original surveys. These were considered inadequate because farmland had been mapped at 6-inches to the mile rather than 25-inches to the mile. This was particularly the case in the southern counties of Scotland, which had been surveyed before the scale issues were resolved (as mentioned in 1.1 above).

In 1892 the decision was taken to have a permanent revision programme so no map would be more than 20 years old. Thus the 3rd edition followed swiftly on from the 2nd edition survey in the first decade of the 20th century. While the 2nd edition covered the whole of Scotland, it was not a complete re-survey but an update that made use of the existing base. Subsequent surveys only remapped selected map sheets.

The 2nd edition is particularly useful where land management practices were introduced after the 1st edition survey as, for example, with some field enclosures in certain parts of Fife. This edition is useful for identifying late-19th century industry, particularly mining and industrial planned villages. The 2nd edition is also helpful in tracking early fence removal as a result of the amalgamation of fields since the time of the 1st edition.

2.3 The National Grid and Landline

The introduction of a National Grid for the United Kingdom after 1962 (known as OSGB 36) led to the conversion of the county series to nationally based quarter-sheets for each 10 kilometre square. This subsequently formed the basis of the OS Archaeological Survey teams' record sheet index of archaeological and historic sites. After metrication began in 1965, the 1:10,560 maps were progressively converted to 1:10,000. However, not all had been converted when the OS digitised the maps to create Landline in 1992. This Landline data was digitised from the 1:2,500 maps wherever these existed and the 1:10,000 maps in other areas. The data resulting from this process was created in a line format by following features on the paper maps and coding them so that they looked as much like paper maps as possible.

As the most up-to-date source of basic scale mapping, Landline maps have been used as the background for digitising many HLA data types in current use, such as rectilinear fields, managed woodland, holdings, urban areas, industrial areas, wind farms.

2.4 1:25,000 OS Pathfinder and Explorer Maps

The OS 1:25,000 maps are a reduced version of the 1:10,000 maps. Nevertheless, they have the advantage of enabling a wider area to be seen while still representing the built features of the landscape, including field boundaries. They have been a vital element in HLA, providing the base for interpretation. Since digital versions have become available they have become useful on-screen references during HLA digitisation. In particular, they show the contours that can help with the location of different areas of land use.

2.5 OS MasterMap

OS MasterMap replaced Landline in 2008 for basic scale mapping data. This data is based on a different model, in which each feature has a unique reference rather than a general code for its functional type. HLA uses MasterMap for both the coastline and inland water bodies. MasterMap also provides the most up-to-date mapping of new developments, such as housing.

3. PHOTOGRAPHY

Photography has been used for recording archaeological sites and landscapes for almost as long as the technology of photography has existed. However, it is aerial photography, which began in the 1920s, that has provided the most significant contribution to HLA's analysis of the landscape.

3.1 Aerial photography

Aerial photography is one of the most important tools of interpretation for HLA. Recent aerial photography is used in conjunction with maps to identify current land use, including Agriculture and Settlement, Woodland and Forestry, Urban Areas, and Power Generation. Past features that survive in the landscape are also often visible from the air.

3.1.1 Historical aerial photography

Historical aerial photography provides a snap-shot in time and is a key source in identifying the age of a particular land use, such as Coniferous and Deciduous Plantations, or 20th-century Military Sites. The presence or absence of a feature on these images can indicate the period in which it was created or went out-of-use. Printed vertical aerial photographs can be viewed as three-dimensional imagery via a stereoscope, as long as there are overlapping pairs, producing a more realistic view of the topography that helps to distinguish cultural features.

3.1.2 Digital aerial photography

Digital aerial photography is often the first photographic source consulted for HLA interpretation because it is the most up-to-date source and the quality of the imagery is so high. In 2008 the Next Perspective 25cm resolution photography became available in GIS. Although there isn't full national coverage, where it exists HLA can use it to digitise some land use types directly on-screen.

Next Perspective imagery was first used during 2009 for the southern part of the Western Isles. This has resulted in improved accuracy when recording types not depicted on OS mapping, such as Peat Extraction. The high resolution of this photography allows land use features to be examined in more detail, resulting in past Agriculture and Settlement remains, such as rig and furrow cultivation, being distinguished with greater clarity. The impact of this has been hugely beneficial in terms of data quality.

3.1.3 Web-based aerial photography

Web-based aerial photography is also widely used in HLA. Getmapping, Windows Live Search and Google Earth all provide quality imagery with regular updates. The imagery on these websites is often derived from the same source, but features on each website can be helpful. Google Earth has a 3D function, which allows the aerial

image to be draped over map contours, giving a life-like three dimensional view that the user can pan through. The effect of relief and height gives a better representation of the landscape and the land use at a particular location.

3.1.4 Specific aerial surveys: 1987–89

Until 2008 the All Scotland Survey (1987–89) was the most recent aerial photography available, and for several areas of Scotland this remains the case. The All Scotland Survey has full national coverage at a scale of 1:24,000. This is a similar scale to the 1:25,000 that HLA uses. This aids the process of interpretation and HLA digitisation. The date of this aerial photographic survey provides a key point of reference in the tracking of changes in land use patterns. Indeed, woodland plantations post-date 1989 and will therefore not appear on the All Scotland Survey photography, thus confirming its interpretation.

3.1.5 Specific aerial surveys: 1960s and 70s

The OS has produced a large number of aerial photographs as part of their mapping work. Sorties have been flown since the mid-1950s and the larger scale photography in particular is used for HLA. These are often the main aerial photographic source used for information from the 1960s and 1970s, creating a chronological link between post-2nd World War photography and the late-1980s All Scotland Survey.

3.1.6 Specific aerial surveys: 1940s and 50s

Thousands of sorties were flown as part of the RAF post-2nd World War aerial photography programme. Undertaken in the 1940s and 1950s, its full national coverage was achieved at different scales. HLA mainly uses the medium and large-scale photography for ease of interpretation and greatest coverage. The quality of the images differs, so a number of sorties might be consulted when working on a particular area. They are useful for recording a range of land use types, including 20th-century Military Sites, Peat Extraction, and medieval/post-medieval Farms and Farming. It is the mid-20th century context of this photography that makes it so useful, as some examples of now past land uses can be observed at a time when they were still active.

3.1.7 Specific aerial surveys: oblique imagery 1980s – present

The imagery produced by the oblique aerial photography programme carried out by RCAHMS also provides a useful source. By maintaining a sense of height and scale in the landscape, they give an alternative viewpoint to the vertical imagery. Further to this, these photographs are taken much closer to the ground and therefore capture more detail.

3.2 Photography

3.2.1 Site photography

RCAHMS has a vast archive of photography, much of which was taken during field survey projects. It includes a comprehensive record of particular buildings, sites and areas, typically with shots taken from multiple directions. This photography was primarily produced by individuals or organisations to record specific archaeological or architectural features. However, wider landscape views are frequently included to give context. It is these images that are of particular use to HLA.

Photographing sites and areas from ground level provides additional information and context that aerial photography and mapping cannot provide. In low sun light, for example, when shadows accentuate slight remains, archaeological features such as

cairns, round houses, or rig and furrow cultivation, can be seen clearly on ground photographs.

During field checking for HLA, photographs are taken to record areas where there has been a degree of difficulty in interpretation. This photography has an invaluable role in helping with the understanding of a particular landscape. They are also taken to illustrate the land use types listed in HLA.

3.2.2 Web-based site photography

On-line ground photography has become a useful source for HLA. GeographTM encourages individuals to upload photographs by OS 10km grid squares. The location of the photographer and the direction of the shot are recorded, along with the date. These images are particularly valuable when recording remote areas for HLA. They mean that recent events and changes in the landscape can be noted when other sources are not available and field visits have not proved possible.

Google's recently developed 'Streetview' photography has made available a huge, and growing, quantity of imagery that has become a regular source for HLA. Streetview provides up-to-date, 360 degree, ground level images that are used to help with the identification of modern and past land uses. It is particularly useful in solving discrepancies in the depiction of field boundaries on mapping. It is also referred to when a field visit is not possible but a decision needs to be taken as to whether, for example, a settlement is a planned village rather than a village developing over time. In such instances Streetview enables the assessment of the style and age of buildings which can prove invaluable.

4. RCAHMS MAPPED DATA

4.1 OS Archaeological Sites Index and Record Map

The OS Archaeology Service was established in the 1950s to record and map archaeological sites at all scales across the UK. This service created the Record Map Index of Archaeological Sites which, for Scotland, is now available for reference in the RCAHMS library. Each map quarter sheet of the 1:10,000 scale maps (and 1:10,560 where these had not been metricated) was used to plot the location of archaeological sites. Each was either recorded as a simple grid reference or as a pecked line around an archaeological area on the map. Where the surveyors recorded new sites, new points or areas were created for addition to the maps. Each site had a record card to go with it, describing it and listing any references to publications if appropriate.

The OS Archaeology Service was disbanded in the 1980s and the duties of maintaining the record were taken over by the respective Royal Commissions across the UK. This is the basis of the current database held by RCAHMS, which has since been extended to cover buildings, and is now available on-line through Canmore (www.rcahms.gov.uk). The Record Maps were updated regularly until around 2000. Since then the Record has been migrated to GIS.

Record Map data is most useful in outlining the extent of sites recorded by field surveyors that are not necessarily identifiable from aerial photographs and other sources. These include pre-improvement settlements, field systems, and rig and furrow cultivation, prehistoric cairnfields and round house groups, and defensive sites.

4.2 The RCAHMS First Edition Survey Project

The First Edition Survey Project (1995-2001) specifically recorded settlements with unroofed buildings along with their field systems as depicted on the 1st edition OS maps. They were mapped onto the modern OS map at 1:10,000 and added to Canmore. Some 26,000 sites were recorded in this way. The GIS digital data, in the form of polygons or line data, can be viewed as a layer on-screen. The scale and quality of the data means that the information is detailed, accurate, and quick to use as an aid to mapping HLA polygons.

4.3 RCAHMS cropmark transcription data

Aerial photo transcription data for cropmark sites started to come available in 1992, plotted onto OS maps at a scale of 1:2,500. When viewed as a GIS layer they provide easy to use plots of archaeological cropmarks for incorporation into HLA. As the data is derived from oblique aerial photographs the images are also reviewed, helping to refine the HLA interpretation.

4.4 RCAHMS field surveys

Since 1992 RCAHMS' field survey teams have produced digital data that is tagged with its functional type and/or land use. Their work provides accurate line data that can be used to define the extent of archaeological landscapes in GIS. Some areas visited by the field survey teams are remote but rich in complex archaeological remains, such as Mingulay or the more distant parts of Mar Loge Estate. It is highly unlikely that the HLA team will visit such places. The RCAHMS field survey teams' digital datasets of individual features at mapping scale are therefore extremely helpful in interpreting information from other sources. It is quick and easy to identify those features which HLA can include from field survey datasets, and means that digitising such areas will be accurate.

5. ADDITIONAL GIS DATA

In addition to RCAHMS GIS data sources, HLA makes use of GIS data from other bodies.

5.1 Forestry Commission Scotland (FCS)

Forestry Commission Scotland has been providing RCAHMS with GIS data since 2002. It includes the Digital Woodland Map of Scotland 2002 and Woodland Grant Scheme data. These sources provide information on areas of new planting that post-date the 1987–89 All Scotland Survey aerial photography on which the Land Cover data compiled by the Macaulay Land Use Research Institute (MLURI) is based.

5.2 Macaulay Land Use Research Institute (MLURI)

The Land Cover data produced by MLURI in 1988 provides land cover information rather than land use data for the whole of Scotland. It was compiled primarily through a desk-based study of the All Scotland Survey aerial photographs, plotting the data at 1:25,000 using the OS Pathfinder maps as its base. Some field checking was also carried out.

Land Cover data maps areas of similar vegetation so, for example, rough pasture may have more than one vegetation type creating what MLURI call 'mosaics'. The Land Cover types were recorded by soil surveyors with a wide knowledge of Scottish vegetation. Digitisation was carried out on tablets and checked by the surveyors, a technique that was designed to provide a tolerance of up to 25m for the edges of polygons in relation to the OS data.

Land Cover data has been used by HLA to help identify specific types of land use, particularly areas of Peat Extraction or Moorland and Rough Grazing, where the limits are imprecise. However, in some instances the 25m accuracy threshold for Land Cover has proved unhelpful, such as where the limits of HLA land use types follow fences.

5.3 Scottish Natural Heritage (SNH)

The main digital dataset held by SNH and available for use in HLA is the Ancient Woodland data. This records areas of woodland that could be traced back to the 1st edition OS maps (1843- 1878) and General Roy's Great Map of Scotland (1747-55).

5.4 Historic Scotland (HS)

The scheduled monuments designated by HS often cover areas that are too small to be included in HLA. However, the Inventory of Gardens and Designed Landscapes, first published in 1987 and most recently updated in 2007, has been used to inform the Designed Landscape type in HLA. The data in the Inventory identifies designed landscapes of national importance. Although the criteria used to compile the Inventory differ from those adopted by HLA, it is a very useful data source. More recently (2010–2012) HS has introduced an Inventory of Historic Battlefields. This identifies large areas where battles of national importance were fought but their transitory nature means that they are not incorporated within HLA.

5.5 Historic Environment Records (HERs) and Sites and Monuments Records (SMRs)

These Records are managed by local authority area, and comprise GIS datasets for archaeological and architectural sites. Although some of the data within these Records is also held within the RCAHMS database, in many instances local records contain more expansive or recent information. Some HERs and SMRs are maintained by local authorities themselves, others by an archaeological service on their behalf. Some are fully accessible to the public via the internet, while others are only accessible internally to the local authority.

HLA makes use of the HER and SMR data that is available via the internet. Although there are no GIS download options, the textual descriptions do contribute to the HLA interpretive process. In certain instances local authority archaeology services have been able to provide information as GIS datasets. For example, Aberdeenshire Archaeological Service provided the GIS data compiled following an aerial photography programme carried out to assess cropmarks across their area. This cropmark information has been incorporated into HLA.

6. PUBLISHED SOURCES

6.1 Publications

The HLA team researches published sources before and during the data collection for an area. In some instances, the documentary sources may not in themselves add specific detail to the interpretation of a particular part of Scotland, or of a particular land use type. However background knowledge of past human activities is crucial to the interpretation of the primary sources of mapping and aerial photography.

Sources used for background or general detail include such publications as the *Statistical Accounts of Scotland* which were produced in two series, the first between 1791 and 1799 and the second as the *New Statistical Account* in 1834-45. Compiled on a parish basis by local ministers they vary in the detail of their content but in many cases contain useful descriptions of agricultural and industrial developments. Architectural volumes such as the *Buildings of Scotland* or the Royal Institute of Architects of Scotland (RIAS) guides also provide useful information.

Archaeological and historical periodicals and reports are also valuable sources, as are the collected papers of archaeological and historical societies, such as *The Proceedings of the Society of Antiquities Scotland* (PSAS). In this context, the RCAHMS *Inventories* are invaluable as much for their general introductions to the archaeology and architecture of a county as for their detailed site descriptions, the majority of which are in the RCAHMS database.

Specific publications have proved invaluable for identifying certain land use types in HLA. For example, Pryde's *The Burghs of Scotland: A Critical List* is used as the primary indicator of the burgh status of a town and therefore its medieval origin. Whether there is any survival still visible in the location will be determined by an examination of the mapping and photographic sources. At an even more focused level, Buxton's *Vatersay Raiders* gives island-based details for the unenclosed areas of machair that became part of the agricultural landscape of parts of the Western Isles at a distance from individual crofts. Since these areas are unenclosed they are not depicted on mapping sources, although they are easily discerned on aerial photography, and Buxton's description assisted in the adoption of the HLA land use type, Allotted (crofting) Cultivation Plots.

6.2 OS Object Name Book

When carrying out the survey for the 1st edition maps, the OS also compiled the Object Name Book, gathering together descriptions from local informants relating to all the built and natural features named on the maps. Though many entries are little more than a basic description, there is useful general information contained in this source.

6.3 Web-based sources

Increasingly, the internet provides access to data from a variety of sources, including that produced by local history groups. Websites such as the *Gazetteer for Scotland* and *Undiscovered Scotland* provide much informative detail. As with all areas of study, the sheer scale of the array of internet sources results in a varying quality of content. However, the internet is on many occasions a practical resource for HLA.

7. FIELDWORK

Fieldwork plays an important role in confirming the HLA desk-based assessment. However, since 2009 and the advent of Streetview, much of what is described below as standard practice is done on the desktop, and fieldwork has been reduced to resolving interpretative issues.

Nevertheless, in addition to its primary role as a crucial review element of the project, fieldwork also has the obvious benefit of enabling observation on the ground of what has been interpreted from maps and aerial photography. It is an opportunity to view the primary source and to maintain a connection between the resulting HLA data and the actual landscape it records.

7.1 Fieldwork visits

For practical reasons only a limited amount of time has been spent on fieldwork, and it has been crucial to make the best use of each trip. In order to achieve this, locations where interpretation has proved to be difficult are noted and given priority. Similarly any land use types that are typical of a given area or those that are thought to be rare examples will also be considered. As well as targeting specific locations, the aim has also been to see and check the interpretation of as many polygons as possible. This has been achieved by focusing on areas that can be viewed from a vehicle. Stops are made whenever they are required, although walking complex landscapes may also take place. This approach allows the most effective use of available time, whilst making sure the data for an area is comprehensively evaluated.

7.2 Noting HLA changes

Paper copies of the overlay maps are used to note down any observations – a change to a land use designation or a redefining of the extent of an area of land use. These updates are transferred into the digital data once the fieldwork is complete. Fieldwork also allows for the opportunity to take photographs as an aide memoire for consultation and for illustrative purposes on return to the office.

HLA fieldwork has proved most useful in developing a largely up-to-date resource. Urban areas generally see the fastest and most radical land use changes, such as when new areas of housing are built or older industrial centres are redeveloped. Towns and cities are therefore checked for new development, particularly around the outskirts where whole fields may be turned over to new housing. Woodlands dating from the later-20th century may be checked if there is a possibility that evidence of previous land use could have been preserved within a plantation. The remains of rig and furrow cultivation or pre-improvement field banks might be untraceable on aerial photographs due to poor lighting or vegetation cover, but may be revealed during fieldwork.

7.3 Local contacts

It is standard procedure, as well as advantageous, to establish contact with the occupier during fieldwork. As well as providing an opportunity to explain the HLA project, listening to their local knowledge is beneficial for identifying a specific land use. For example, in the Western Isles the Factor of one of the large estates confirmed which plots of land were allotted to specific crofts and which areas were used as common grazings. This information helped ensure the accurate recording of this complex landscape.

Contact will also be made with the local archaeology service not only as a matter of courtesy, but also to benefit from their knowledge of their area. It is also an opportunity to explain HLA and encourage involvement in the process. Local authority archaeologists often supply information that is not available elsewhere. They are an important element in the suite of sources used by HLA.

8. CONCLUSION

HLA data is founded on a range of sources that, together, provide an authoritative dataset to enhance understanding of Scotland's landscapes. Bringing together the main sources for historic land use. a major resource has been created that can be explored, interrogated and adapted for use in a range of contexts and in a variety of powerful ways.