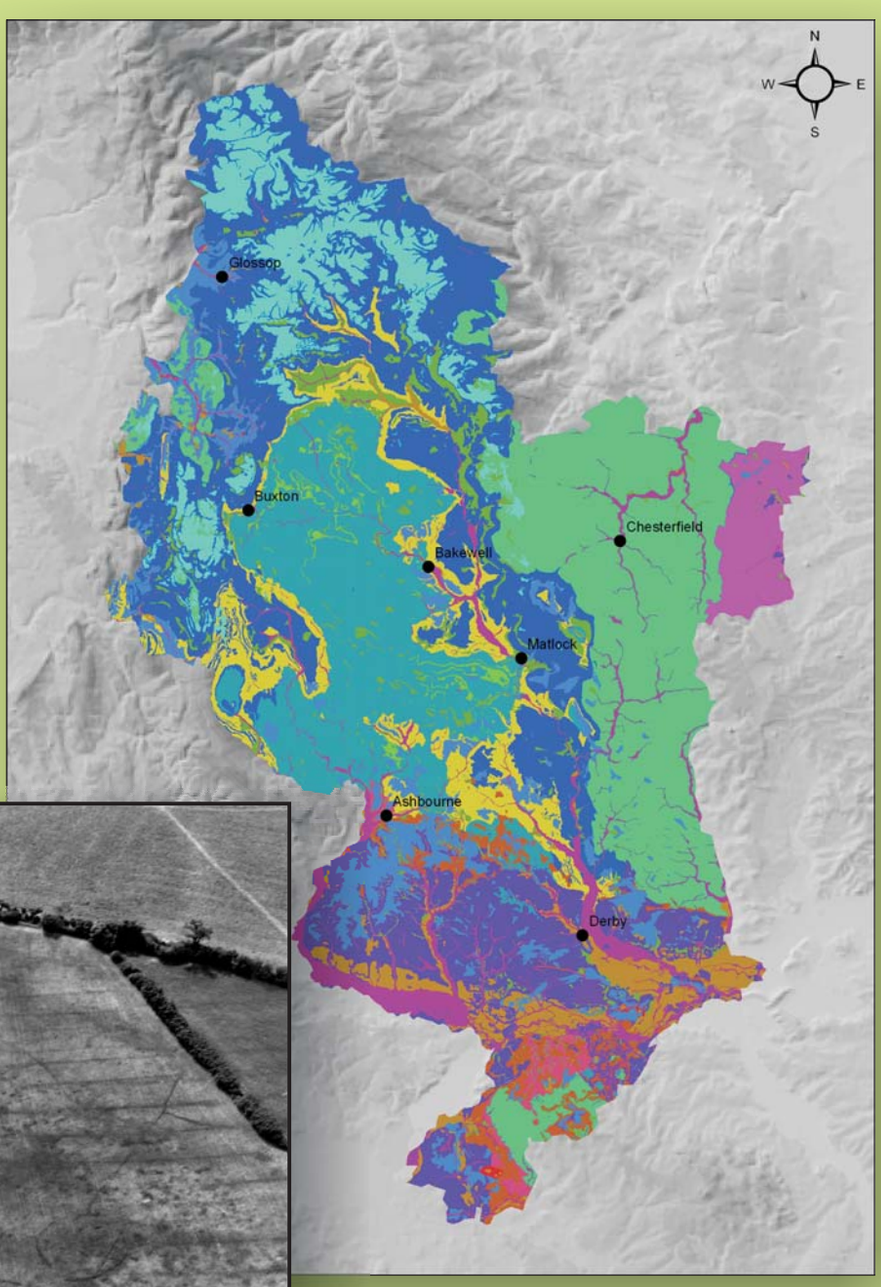
# AGGREGATES AND ARCHAEOLOGY IN DERBYSHIRE AND THE PEAK DISTRICT




This document has been prepared as part of the Derbyshire and the Peak District Aggregates and Archaeology Resource Assessment undertaken by Archaeological Research Services Ltd, Derbyshire County Council and the Peak District National Park Authority funded by the Aggregates Levy Sustainability Fund, distributed by English Heritage. This document is intended to provide a clear reference guide to the application of the aggregates management framework and the landform element approach with regard to the aggregates and minerals landscapes of Derbyshire and the Peak District.

This guide was authored by James Brightman and Clive Waddington of Archaeological Research Services Ltd (ARS Ltd), and published by ARS Ltd on behalf of English Heritage, Derbyshire County Council and the Peak District National Park Authority.

This document should be referenced as follows: Brightman, J. and Waddington, C. 2010. *Aggregates and Archaeology in Derbyshire and the Peak District*. Bakewell, Archaeological Research Services Ltd.

Front Cover: Aerial photograph shows extensive cropmark remains on the Trent Valley sand and gravel terraces showing the Neolithic Potlock cursus. NMR SK 3128/25 CAP 7908/UCAP6367 30-JUN-1975 © ULM. Map depicts all landform elements mapped within Derbyshire and the Peak District.
Inside Front: Tunstead and Topley Pike limestone quarries either side of Wye Dale on the Carboniferous Limestone of the Peak District plateau. NMR SK 1072/60 NMR 20256/2 22-JUN-2005 © English Heritage. NMR.
Rear Cover: Extensive post-medieval lead mining remains at Bonsall on the Carboniferous Limestone testifying to the long history of mineral extraction in the county. NMR SK 2657/23 NMR 17841/16 16-JUN-2003 © English Heritage. NMR

## CONTENTS



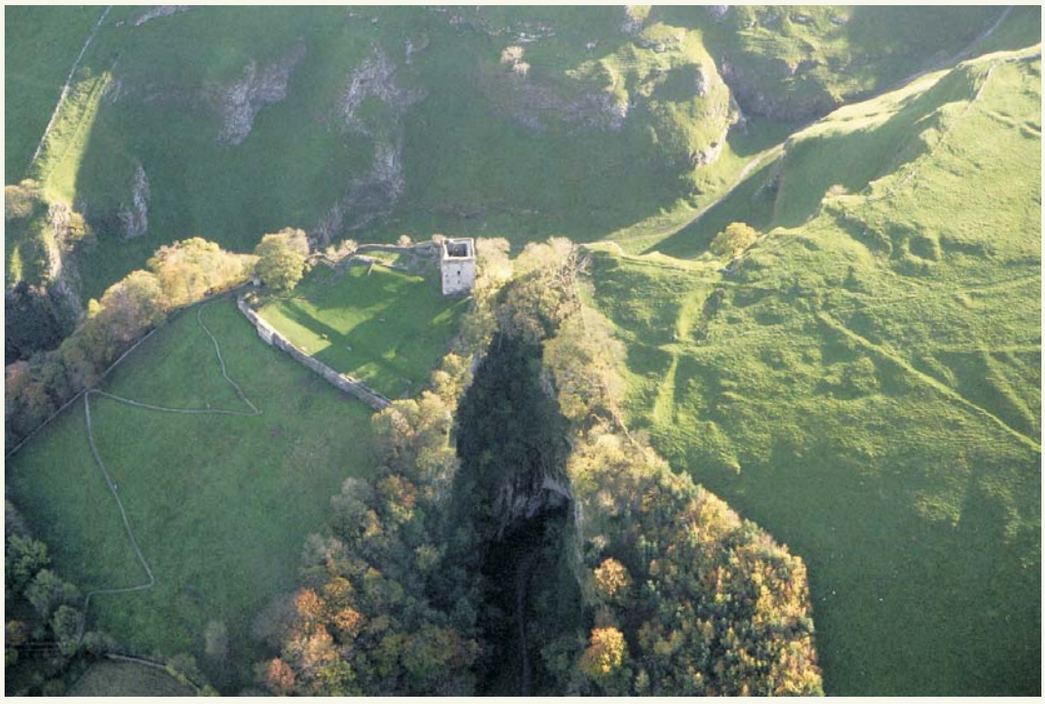


Fig. 1 The medieval remains of Peveril Castle on a Carboniferous Limestone outcrop above Castleton in the Hope Valley. NMR SK1482/39 20450-18 09-NOV-2005 © English Heritage. NMR.

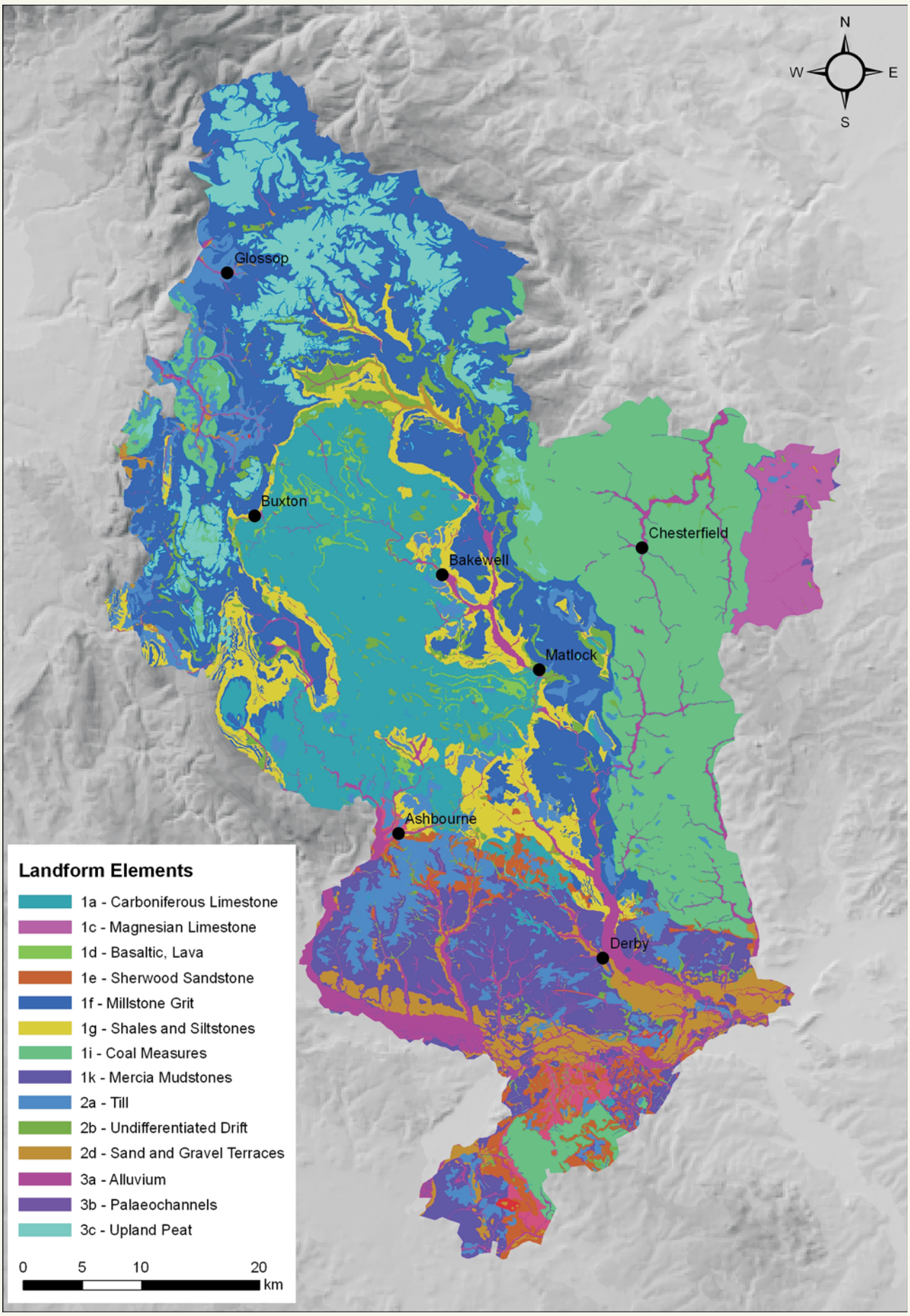



Fig. 2 Map of Derbyshire and the Peak District overlain showing constituent landform elements.

**The Landform Approach**

1. The project underlying this guidance document has synthesised the archaeological resource for all known landforms (discrete geomorphological units with specific archaeological and palaeoenvironmental associations) within Derbyshire and the Peak District and has assembled a comprehensive overview of archaeological associations for all landforms. The principal reason for this being that whilst extraction will focus on one or more particular landforms, the impact of such development can extend across many landforms, for example palaeochannels inset within sand and gravel terraces, or shallow till cover above hard rock, such as Carboniferous Limestone. There are, however, a number of key landforms which are most likely to be impacted upon by modern extractive industries, and these largely mirror the landforms targeted by the aerial photograph transcription component of this project: Carboniferous Limestone (1a), Magnesian Limestone (1c), Sherwood Sandstone (1e) and sand and gravel terraces (2d). To this list can be added the Millstone Grit (1f), especially in relation to the substantial quarrying around Stanton Moor.

2. The table below illustrates the density of archaeological and historical sites across Derbyshire and the Peak District by landform. The archaeological resource has been defined using existing databases of sites (Historic Environment Records and the National Monuments Record) along with 862 new sites identified through an aerial photograph transcription element. Whilst the densities given in Table 1 below may be a somewhat crude statistical measure, and there are a number of crucial caveats which must be considered when using this data, it nevertheless provides a quick reference as to the relative archaeological potential of each landform unit. There are a number of key points to note about this table. Firstly, the high density of sites on landform 1d is artificially inflated by the number of large sites, such as lead mining remains, which overlap both the Carboniferous Limestone and bands of igneous rock.

3. Secondly, and critically, this table only relates to currently known sites, and so as more sites are found, the densities will increase. With the Millstone Grit, for example, it is almost certain that the density in the table below is much lower than the real potential for the landform to host archaeological remains. Moorland peat and heather cover over much of this landform means that substantial numbers of archaeological features are masked, and lack of agriculture or other intrusive work means that sites can remain well-preserved yet undiscovered. The high density of sites on the Carboniferous Limestone is both a product of a genuine preference for past settlement and activity on this landform, and also a consequence of this landform being a focus for archaeological fieldwork since antiquarian times. This landform also abounds in the remains of historic lead mining which contributes significantly to the number of recorded sites, and it is also the main area for cave formations, a distinctive landscape niche that has attracted human activity since Palaeolithic times.

| | Landform Element | Area (ha) | % of Total Area | Sites per 100ha |
|---|---|---|---|---|
| 1a | Carboniferous Limestone | 44941.52 | 13.66 | 11.68 |
| 1c | Magnesian Limestone | 8232.56 | 2.50 | 7.06 |
| 1d | Lava, basaltic etc | 1990.73 | 0.61 | 16.73 |
| 1e | Sherwood Sandstone | 9302.88 | 2.83 | 7.89 |
| 1f | Millstone Grit | 64372.94 | 19.57 | 3.17 |
| 1g | Shales and Siltstone | 19242.02 | 5.85 | 7.07 |
| 1i | Coal Measures | 59464.24 | 18.08 | 4.11 |
| 1k | Mercia Mudstones | 26215.27 | 7.97 | 4.08 |
| 2a | Till | 24056.88 | 7.31 | 4.70 |
| 2b | Undifferentiated drift deposits | 14301.23 | 4.35 | 4.66 |
| 2d | Sand and Gravel Terraces | 11940.71 | 3.63 | 7.15 |
| 3a | Alluvium | 18021.87 | 5.48 | 5.85 |
| 3b | Palaeochannels | 1203.96 | 0.37 | 0.10 |
| 3c | Upland Peat | 25657.79 | 7.80 | 0.93 |
| | **Derbyshire and the Peak District** | **328944.6** | **100** | **6.54** |

Table 1 Density of archaeological and historical sites across Derbyshire and the Peak District by landform unit.

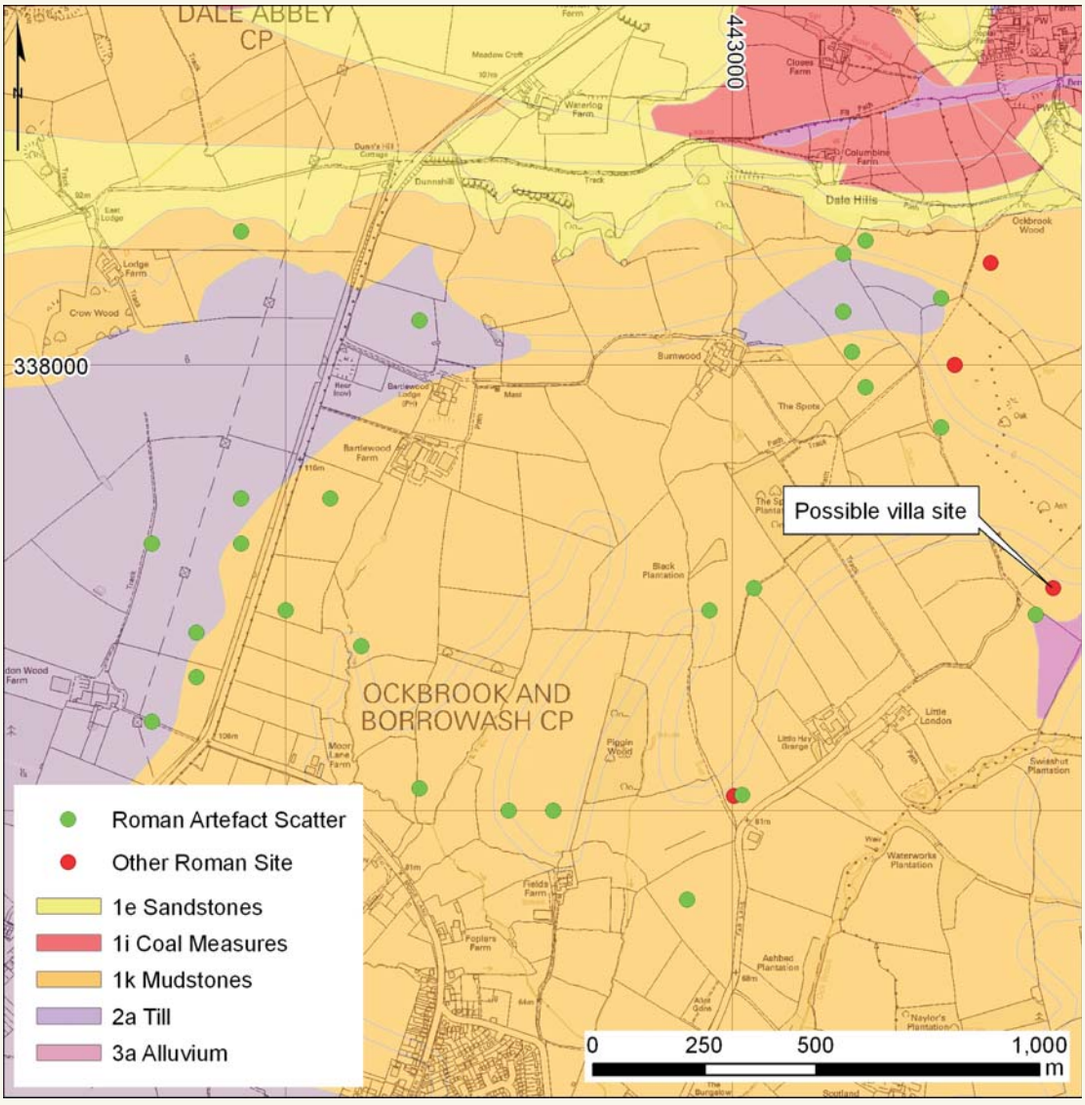



Fig. 3 Extract of GIS mapping with the landform elements defined as shaded blocks over Ordnance Survey base mapping. Here the distribution shows Roman-period sites in relation to the underlying Sherwood Sandstone, Mercia Mudstone and various drift deposits. Ordnance Survey data © Crown Copyright. All rights reserved. Licence no. 100045420.

**The Wider Region**

4. This study focuses on the historic environment within Derbyshire and the Peak District, but the landforms and heritage assets they host do not exist within a vacuum. Within the main project report it is discussed where key sites in other parts of Britain illustrate the potential of certain landforms, and this is perhaps most apposite when commenting on the archaeological associations of landforms in neighbouring counties and regions where the topographic settings can often be similar. A key example of this would be the sand and gravel terraces within the Trent Valley which span several counties across the East and West Midlands. It can be reasonably anticipated that archaeological associations are similar across county boundaries and this should be considered an important source of information when assessing the impact of development within Derbyshire and the Peak District. Attention should be drawn to the on-going aggregates resource assessments in Nottinghamshire and Leicestershire as these will provide important comparanda, as well as potentially highlighting gaps in the archaeological record for Derbyshire and the Peak District.

**Regulatory Framework**

5. This document and guidance sits below the regulatory framework governing archaeology and the historic environment within the planning system and supports the national minerals and archaeology practice guide (MHEF 2008). The regulatory framework has undergone some change in recent years, and what follows is a brief discussion of this framework and where this report sits in relation to it.

**Government's Statement on the Historic Environment for England 2010**

6. The 'Government's Statement on the Historic Environment for England 2010' (DCMS 2010), whilst not policy, sets out the aspirational vision and aims for the Historic Environment in England as well as defining terms such as 'historic environment' and exploring its inherent values. The document also incorporates a series of commitments to meet the stated overarching aims and there are a number of ways in which this project and document feed into these commitments.

- "Ensure that relevant policy, guidance, and standards across Government emphasize our responsibility to manage England's heritage for present and future generations" (DCMS 2010, 21) – The overarching aim of this project is to provide guidance and a sound evidence base for the management of heritage assets and the historic environment, specifically in relation to aggregate extraction.
- "Ensure that all heritage assets are afforded an appropriate and effective level of protection, while allowing, where appropriate, for well managed and intelligent change" (DCMS 2010, 21). The protection noted in this commitment is principally represented by Planning Policy Statement 5 which is discussed below. This document sits within the framework provided by PPS 5, while also providing guidance on evaluation and mitigation techniques, specific to Derbyshire and the Peak District, which will provide the 'appropriate and effective level of protection' noted above.
- "Encourage structures, skills and systems at a local level which: promote an early understanding of heritage in the context of development; ensure that local decision makers have access to the expertise they need" (DCMS 2010, 22). The principal aim of this project is to assemble an evidence base and provide a management framework and guidance, based on that evidence base, to allow decisions made at a local level to be as well-informed as possible.
- "Promote opportunities to place people and communities at the centre of the designation and management of their local historic environment and to make use of heritage as a focus for learning and community identity at all levels" (DCMS 2010, 22). "Seek to promote the role of historic environment within the Government's response to climate change and as part of its sustainable development agenda" (DCMS 2010, 23). Both of these commitments feed into the theme of sustainability which is a key aspect of the modern planning process, the significance of which is discussed below.

**PPS5**

7. 'Planning Policy Statement 5: Planning for the Historic Environment' (CLG 2010) is the policy statement which provides the overarching framework for conservation of the historic environment within the planning system and enshrines the historic environment as a material consideration within the planning process. This policy document draws together all historic considerations under a single unified policy and sets out the areas of responsibility for all stakeholders within the planning process.

8. There are a number of policy statements within PPS 5 to which this study directly contributes

- HE2.1 – This document forms a major synthesis of the historic environment and heritage assets within Derbyshire and the Peak District and is intended to form part of the evidence base which is "proportionate and sufficient to inform adequately the plan-making process" (CLG 2010, 4).
- HE2.2 – This sub-policy states that "Local authorities should either maintain or have access to a historic environment record" (CLG 2010). HER enhancement and aerial photograph transcription was undertaken as part of this project to augment the existing knowledge base for Derbyshire and the Peak District.
- HE2.3 – This sub-policy essentially outlines the aims of this project and is worth quoting in full as it illustrates how this document relates to the planning process: "Local-planning authorities should use the evidence 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. It should also be used to help predict the likelihood that currently unidentified heritage assets, particularly sites of historic and archaeological interest, will be discovered in the future" (CLG 2010, 4).
- HE3 – This policy states that "Regional spatial strategies and local development frameworks should set out a positive, proactive strategy for the conservation and enjoyment of the historic environment in their area" (CLG 2010). It is intended that the synthesis of data and approach outlined in this document can be used to feed into Regional Spatial Strategies (RSS), Local Development Frameworks (LDF) and Mineral Development Frameworks (MDF) as discussed below.
- HE6 – This policy sets out the key requirements of a developer in relation to projects which may impact on the historic environment. Just as the information and framework within this study serves as an evidence base for curators, so it is also intended to provide guidance and a framework for applications from the aggregates industry and feed into those areas of an Environmental Statement which deal with the historic environment.

**Guidance to PPS5**

9. Nested within the framework provided by PPS 5, there are a number of other documents, the first of which is the 'Historic Environment Planning Practice Guide' (CLG/DCMS/EH 2010) which accompanies PPS 5. This document provides guidance on the practical implementation of PPS 5 and is consequently a much more in-depth document than the policy statement itself. This practice guide "supports the implementation of national policy, but does not constitute a statement of Government policy" (CLG/DCMS/EH 2010, 6). This document has been presented by English Heritage as a 'live' document and is therefore intended to be subject to future changes as techniques and practice develop.

Fig. 4 The creation of reservoirs and the imprint of post-medieval and industrial period archaeology are a key association with some of the upland landform elements, such as at the Derwent Dams pictured here

**Mineral Extraction and Archaeology: A Practice Guide**

10. A national guidance document for England specific to mineral extraction and archaeology has recently been produced by a cross-sectoral group, the Minerals and Historic Environment Forum, that has been widely consulted upon and endorsed by the Association of Local Government Archaeological Officers: England (ALGAO: England), the British Aggregates Association (BAA), Confederation of British Industry (CBI): Minerals Group, English Heritage, the Institute for Archaeologists (IfA), the Mining Association of the UK (MAUK), the Planning Officers Society (POS), the Mineral Products Association (MPA, formerly the Quarry Products Association), and the Federation of Archaeological Managers and Employers (FAME, formerly the Standing Conference of Archaeological Unit Managers). This document is referred to in the Historic Environment Planning Practice Guide (CLG/DCMS/EH 2010) for how to deal specifically with aggregate extraction. 'Mineral Extraction and Archaeology: A Practice Guide' (MHEF 2008) provides guidance for planning authorities, mineral planners, mineral operators, archaeologists, consultants and developers on dealing with archaeological remains within the minerals planning system. The evidence base and guidance resulting from the study reported here should be considered as nested within, and complementary too, this national guidance but with specific relevance for Derbyshire and the Peak District.

**Applying the Landform Element Approach**

11. Previous research (see Passmore et al 2002; Passmore and Waddington 2009) has shown that there is a direct link between certain types of landforms and certain types of archaeological and palaeoecological remains (e.g. sand and gravel terraces were particularly favoured areas for Neolithic-Bronze Age monuments and Anglo-Saxon settlements). As landforms of different age and origin have been able to be dated this means that certain types of landforms only have the potential to host archaeological and palaeoecological remains of certain age and type. In some instances they may overlie earlier sediment units that may contain earlier remains. This is important as it means that the planning response to proposed developments on different types of landform can take this into account. It also allows areas of higher and lower sensitivity to be identified.

12. The GIS detailing the landform elements that has been used as the basis for this analysis is held by the two local planning authorities covering the study area (DCC and PDNPA) and should be consulted at the earliest opportunity in order to identify the landforms within a proposed development area. Tables 2-14 below summarise the archaeological associations for each landform unit. The tables contain three columns with one detailing geomorphological associations, another the potential archaeological associations and the last archaeological evaluation and mitigation advice. Further, more detailed, information relating to each landform can be found in the main project report, and it is from here that the tables below have been summarised.

13. Table 15 illustrates the most applicable archaeological techniques by landform followed by information on specific applicability of certain techniques in relation to Derbyshire and the Peak District. It must be stated that every site has unique factors governing the specific archaeological associations and that the tables below should be considered a general guide to the potential of a site. Understanding the potential of any given site requires both informed interpretation as well as the exercise of professional judgement linked directly to the evidence base provided by this study and existing site reports and publications. All developments require open and continuous dialogue between stakeholders from as early as possible in the planning process to ensure that the most applicable and cost-effective evaluation and mitigation works are undertaken.

14. The evidence base provided by this work is intended to help inform all stages of minerals planning. This includes the Local and Minerals Development Frameworks, and also site-specific planning strategies and responses from the screening and scoping stages, through pre-determination evaluation, archaeological responses and post-permission mitigation measures, as well as sustainability measures through the life of a development and beyond. This work follows that of 'Minerals Extraction and Archaeology: A Practice Guide' (MHEF 2008) in stressing two key themes of minerals planning: a coherent and consistent approach that engages stakeholders through all stages of the process, and a question-led targeted approach to archaeological work with clearly defined research goals keying into local, regional and national research agendas.

15. The question-led targeted approach to archaeological work is of key importance as it is this that should prevent archaeological work being undertaken as a blanket measure or as part of a 'one size fits all' approach to evaluation, but rather provides a clear focus ensuring that the correct archaeological techniques are applied so as to evaluate the potential of an area and not to sample it. The question-led and targeted approach dovetails with the need for a phased programme of work where the earlier stages inform, and lead into, later stages.

Fig. 5 Romano-British field system and post-medieval lime-kilns at Cowlow on the Carboniferous Limestone. NMR SK 1072/55 1583/36 15-SEP-1979 © Crown copyright. NMR.

Fig. 6 The Neolithic chambered cairn at Five Wells, Taddington, which overlooks Tunstead limestone quarry.

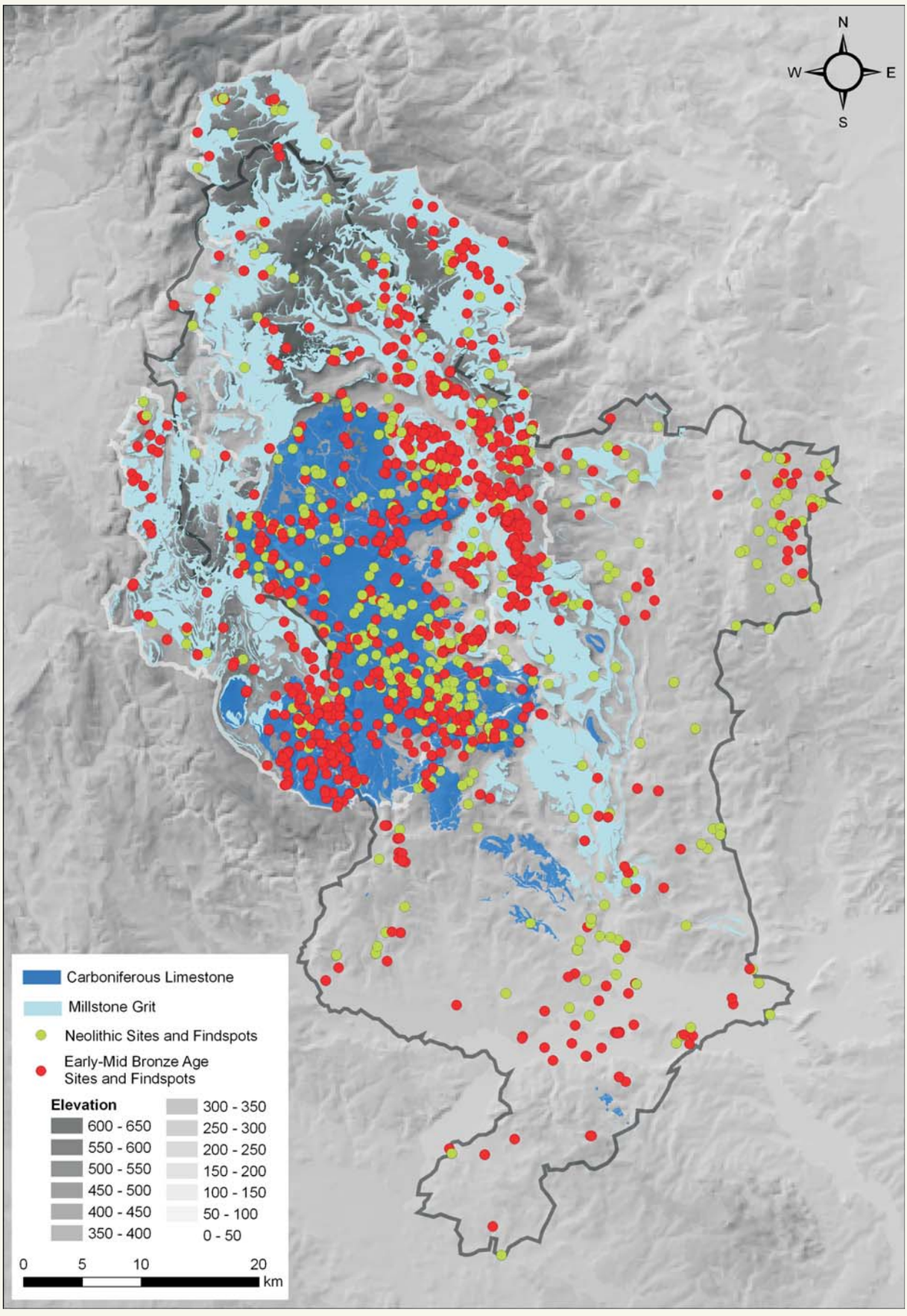



Fig. 7 Distribution of known Neolithic and Bronze Age sites and findspots across Derbyshire and the Peak District. Although these sites occur across several different landforms, the highest densities occur on the Carboniferous Limestone and Millstone Grit, demonstrating that distinctive archaeological associations exist with certain landforms.

## Table 2 - 1a - Carboniferous Limestone

| Geomorphological Processes | Archaeological Associations | Evaluation and Mitigation Issues |
|---|---|---|
| • Potential burial and(or)reworking of multiperiod archaeological deposits in cave and rock-shelter settings by Quaternary physical processes (e.g. fluvial, aeolian, slope and rock failure processes), chemical processes (e.g. calcification) and human/animal activity<br>• Potential reworking and(or) burial of Palaeolithic materials in plateau, hilltop and hillslope settings by Quaternary periglacial, hillslope and mass-movement processes<br>• Potential burial of multiperiod archaeological deposits by Quaternary rockfall and talus deposits<br>• Hilltop, hillslope and plateau settings generally stable during the Holocene, but potential for localised colluviation and mass-movement activity | • Cropmarks can be identified, but the extent of pasture and amount of visible ridge and furrow cultivation inhibits cropmark formation so it is likely that the number of currently known cropmarks are under-representative of the amount of buried archaeological remains.<br>• Soils on limestone parent material tend to have an alkaline bias which normally provides good conditions for the preservation of organic materials such as human and animal remains, snails and plant remains, as well as burnt organic material. This picture can be very localised however as the permeable nature of the rock also allows for a gradual leaching of the soil which means some upland settings can become increasingly acidic. It also means that waterlogged deposits can be rare and therefore difficult to identify sediments, from which palaeoenvironmental records based on pollens and botanical macrofossils can be obtained to reconstruct past environments. Some burial sites appear to have deliberately targeted local pockets of clay, such as Gib Hill and Liffs Low.<br>• Mixed age earthworks, upstanding remains and cave sites which represent human activity ranging from the Palaeolithic (cave sites) through to the present day. Some upstanding monuments are very rare examples such as the bank barrow of Long Low.<br>• Artefact assemblages and individual findspots from fieldwalking, test pits, cave sites and chance finds make up a large volume of the known archaeological resource for the Mesolithic and Neolithic periods<br>• Extensive tradition of burial monuments (Neolithic-Early Bronze Age, occasional Early Medieval) – Neolithic-Bronze Age is the dominant period represented in the archaeological resource on this landform. Burial monuments tend to occur on, or just off, the crest of a hill or on scarp edges where they are easily visible. The 'Great Barrows' are positioned on high crests and are intervisible. 'Beaker period' activity appears to have focused on the Limestone geologies with the majority of sites known on the Carboniferous Limestone.<br>• Bronze Age copper mining evidence can still be found in the caves and mines, as evidenced at Ecton.<br>• Two hillforts, presumably Iron Age, along with a large number of smaller enclosures which may date to the Iron Age or the Romano-British period are known on this landform.<br>• A Roman centre existed at Buxton and some sites in the Carsington area are linked by a network of roads with sites in the surrounding area. Potential for remains of Roman period mining to exist in more-recent mineworkings, as some is already known, and it is thought that the mineral wealth was a key reason for the Roman control of the area.<br>• Romano-British sites are also well attested. These can be identified as artefact scatters, or in some cases as earthworks and upstanding remains. They can be located on hilltop sites close to previous Iron Age centres, or as an expanded form of vicus near Roman sites<br>• There is evidence for early medieval activity, predominantly represented by a large body of sculpture now housed at various churches, but some of which was originally sited on moor tops by roadways; the place name evidence indicates many modern villages had early medieval origins; a number of burial monuments are known, some are Bronze Age cairns re-used in this period and others appear to be constructed during the early Anglo-Saxon pagan period. The barrows of early medieval date tend to be of earthen construction and are relatively small and low.<br>• Medieval period represented by field systems, including ridge and furrow, and deserted and shrunken villages. Large amounts of the Carboniferous Limestone is enclosed land. Field morphology can be a key interpretational tool for charting land use from pre-Conquest through to enclosure period.<br>• Lead mining and quarrying remains - multi-period industrial activity is widespread but predominantly post-medieval. Perhaps use of caves in earlier historic periods may represent industrial activity. Exploitation of natural resources normally very visible both on aerial photographs and also from ground observation. There is also documentary and archaeological evidence that lead mining was widespread through the Roman and medieval periods, though the majority of known sites today relate to the post-medieval period.<br>• Quarrying was for a number of different purposes and industries, but a great deal was focused on lime-making which has a very distinctive archaeological footprint on the Carboniferous Limestone as visible from aerial photographs.<br>• Sand extraction occurred from the 'pocket deposits' in the southern Carboniferous Limestone where the bedrock has become dolomitised in places.<br>• The impact of the railway on the Carboniferous Limestone, primarily through the early Cromford and High Peak Railway, linked the industrial centres of Sheffield and Manchester with the heart of the Peak District and its mineral wealth. | • Close-spaced fieldwalking (2m linewalking intervals) can be very informative for characterising stone age activity across a wide area based on the recovery of stone tools which are virtually indestructible. Fieldwalkng can also recover the archaeological remains of later periods, particularly Roman and medieval, based on the recovery of pottery sherds. The distribution of finds, and their freshness, can be used to understand where and whether sub-surface remains survive and where to target evaluation trenching or test pits.<br>• Any development impacting upon potential cave sites requires a very specific archaeological approach, especially given their potential to contain remains from any period including the Palaeolithic.<br>• Where upstanding remains exist, earthwork survey will provide an important baseline for understanding the monument and which can inform further fieldwork.<br>• There has not been a great deal of geophysical survey on this type of geology, although the recent use of close-spaced magnetometry and resistivity at Fin Cop suggests these techniques may yet have some merit for finding sites that had substantial cut features or areas of burning.<br>• Ridge and furrow cultivation can mask and preserve earlier remains and this should be taken into account as part of any archaeological investigation where such features are potentially impacted upon. Evaluation trenching and geophysical survey are two of the few techniques potentially suited to evaluating such areas.<br>• Given that the preservation of organic remains is likely to be quite good on this type of landform schemes of work should include provision for palaeoenvironmental analysis of both unburnt and burnt organic remains. |

## Table 3 - 1c - Magnesian Limestone

| Geomorphological Processes | Archaeological Associations | Evaluation and Mitigation Issues |
|---|---|---|
| • Potential burial and(or)reworking of multiperiod archaeological deposits in cave and rock-shelter settings by Quaternary physical processes (e.g. fluvial, aeolian, slope and rock failure processes), chemical processes (e.g. calcification) and human/animal activity<br>• Potential reworking and(or) burial of Palaeolithic materials in plateau, hilltop and hillslope settings by Quaternary periglacial, hillslope and mass-movement processes<br>• Potential burial of multiperiod archaeological deposits by Quaternary rockfall and talus deposits<br>• Hilltop, hillslope and plateau settings generally stable during the Holocene, but potential for localised colluviation and mass-movement activity | • Cropmark formation is potentially good on the Magnesian Limestone, as the lower altitude lends itself more to arable agriculture, as opposed to the more pastoral agriculture common on the Carboniferous Limestone which tends to inhibit cropmark formation. Cropmarks readily identified from aerial photograph transcription range from probable later prehistoric/Romano-British enclosures through to probable post-medieval industrial remains. Known cropmark formation on the Magnesian Limestone of neighbouring South Yorkshire and beyond into West Yorkshire is excellent with multi-period and extensive cropmark landscapes evident.<br>• Soils on a limestone parent material tend to have an alkaline bias providing good conditions for organic preservation.<br>• Mixed age earthworks, upstanding remains and cave sites which represent human activity ranging from the Palaeolithic (cave sites) through to the present day. The upstanding remains are not as extensive as on the Carboniferous Limestone, which probably reflects the differing intensity of subsequent land use on the two landforms.<br>• The cave sites of the Magnesian Limestone host internationally important cave art, and talus deposits within the caves have the potential to preserve deposits undisturbed. The formation of 'stal' within caves can seal Palaeolithic remains ensuring it is well protected but at the same time making it hard to access archaeologically without recourse to highly destructive activity. The alkali limestone means that there is also the potential for organic material to be preserved. While the cave sites host Palaeolithic remains, there are few known open sites from this period. Where ploughing has taken place on surfaces little modified by Holocene geomorphological activity, fieldwalking may be able to identify stone tool assemblages and use their distribution to locate sites.<br>• Artefact assemblages and individual findspots recovered from the ploughsoil make up a large volume of the known archaeological resource, representing the majority of known 'sites' in almost all periods, which is possibly a product of the large amount of arable cultivation and therefore exposure of artefacts in the ploughsoil.<br>• The Whitwell Long Cairn could represent a similar tradition to the 'Great Barrows' of the Carboniferous Limestone and to other known Neolithic burial monuments on the Magnesian Limestone of South and West Yorkshire and County Durham. The Long Cairn was positioned below the summit of a ridge line to the north of Creswell Crags and this mirrors the topographic position of many of the other long cairns in the aforementioned areas.<br>• Wooded areas have the potential to host upstanding remains as they have not been levelled by later agriculture. On the Magnesian Limestone in Derbyshire this is known from the remains in Scarcliffe Park which include potential Bronze Age barrows and Roman industrial features. Survey of wooded areas within largely cultivated landscapes has the potential to demonstrate the level of survival of upstanding remains and give an indication of the type and density of sub-surface deposits.<br>• The lowland landscape of the Magnesian Limestone perhaps was more accessible during the Roman period and therefore more conducive to settlement than the uplands. The promontory fort at Markland Grips is sited on a naturally defendable promontory between two gorges or 'grips'. Activity spanned from the Iron Age through to the Roman period. Hillforts such as this may exist on naturally defendable spurs of land or above scarp edges defined by the natural limestone gullies, though subsequent agriculture may have reduced any original ramparts.<br>• While the associations are broadly similar to landform 1a, the topographic setting is different, and there are other differences (e.g.the tradition of cairn/barrow burial is not as evident), though this may represent the greater level of destruction on the Magnesian Limestone through more intensive agricultural regimes.<br>• There is a major post-medieval industrialised landscape on the Magnesian Limestone due to the proximity of the mineral wealth associated with the Coal Measures. The large-scale industrial impacts on the landscape are relatively focused around individual sites. | • Any development impacting upon potential cave sites requires a very specific archaeological approach, especially given the potential to host remains from any period including the Palaeolithic.<br>• Ridge and furrow remains can mask and preserve earlier remains beneath the ridges and this should be taken into account as part of any archaeological investigation where such features are impacted upon.<br>• There has been greater agricultural and industrial impact on this landform than on the Carboniferous Limestone which means that there may be more unknown archaeological remains removed by later industrial activity or sealed beneath ridge and furrow or ploughed areas, but that now only exist in a truncated form.<br>• Given that the preservation of organic remains is likely to be quite good on this type of landform, schemes of work should include provision for palaeoenvironmental analysis of both unburnt and burnt organic remains. |

## Table 4 - 1d - Lava, basaltic and other igneous

| Geomorphological Processes | Archaeological Associations | Evaluation and Mitigation Issues |
|---|---|---|
| • Potential burial and(or)reworking of multiperiod archaeological deposits in cave and rock-shelter settings by Quaternary physical processes (e.g. fluvial, aeolian, slope and rock failure processes), chemical processes (e.g. calcification) and human/animal activity<br>• Potential reworking and(or) burial of Palaeolithic materials in plateau, hilltop and hillslope settings by Quaternary periglacial, hillslope and mass-movement processes<br>• Potential burial of multiperiod archaeological deposits by Quaternary rockfall and talus deposits<br>• Hilltop and hillslope settings generally stable during the Holocene, but potential for localised colluviation and mass-movement activity | • Very small total area represented by this landform. Exists as bands within the Carboniferous Limestone and therefore may have similar associations, however its significance archaeologically is that it provides a junction with the Carboniferous Limestone that may have been attractive for early human groups.<br>• Often found as outcrop on the steep scarp edges as at Matlock Bath. Where the basaltic lava does exist, the differences in permeability between the lava and the Carboniferous Limestone mean there is the potential for cave formation (e.g. Hob's House, Monsal Dale which produced Bronze Age and Romano-British evidence and human remains.<br>• Lava beds can sometimes form spring lines due to the difference in permeability with the Carboniferous Limestone. Potential that settlement sites may cluster near to these. The lava beds may be a good indicator of original spring lines, as it is uncertain to what level the spring lines have dropped following medieval and post-medieval lead mining activity etc.<br>• Where the lava has outcropped it has been the focus of quarrying, known as 'toadstone', as at Black Rock Corner, Ashford. | • Any development impacting upon potential cave sites requires a very specific archaeological approach, especially given their potential to host remains from any period including the Palaeolithic.<br>• Whilst only existing generally as small bands, the presence of this landform should be noted as being of importance due to the potential for old spring lines and therefore a potential attraction for past settlement. |

## Table 5 - 1e - Sherwood Sandstone and other low-lying sandstone

| Geomorphological Processes | Archaeological Associations | Evaluation and Mitigation Issues |
|---|---|---|
| • Potential burial and(or)reworking of multiperiod archaeological deposits in cave and rock-shelter settings by Quaternary physical processes (e.g. fluvial, aeolian, slope and rock failure processes), chemical processes (e.g. calcification) and human/animal activity<br>• Potential reworking and(or) burial of Palaeolithic materials in plateau, hilltop and hillslope settings by Quaternary periglacial, hillslope and mass-movement processes<br>• Potential burial of multiperiod archaeological deposits by Quaternary rockfall and talus deposits<br>• Hilltop and hillslope settings generally stable during the Holocene, but potential for localised colluviation and mass-movement activity | • No Palaeolithic and Mesolithic sites yet known and Neolithic period only represented by two findspots. It appears that the low-lying sandstones were not an attractive locale for activity during these periods. Regionally there is some early prehistoric activity known (Notts), though there is a strong fieldwork bias in the known locations.<br>• Small amount of Bronze Age activity known, generally from the more upland parts of the landform and generally burial activity very similar in form and setting to the Bronze Age funerary monuments of the Carboniferous Limestone.<br>• Potential that the sandstone 'bluffs' along the sides of major river valleys may host Iron Age activity in a similar way to the lowland hillfort of 'Borough Hill' on the Mercia Mudstones. Other Iron Age remains relate to the 'enclosed landscape' known from the sands and gravels of the Trent Valley, in particular the known pit alignments. This mirrors a pattern from Nottinghamshire where sites are known around the fringes of the sandstone 'plateau' and overlooking watercourses.<br>• Very little Roman activity known in comparison with the other landforms. The Roman road network crosses the landform, but no definite sites are known. The known Roman small finds cluster along the sandstone 'ridge' which forms the southern side of the Trent Valley in the area east of Repton and Willington. This is in stark contrast to Nottinghamshire, where there is a movement of agriculture into the higher grounds away from the Trent, with an intensification of agriculture, most notably illustrated by the extensive brickwork field systems. Potentially marginal land is brought into usage, but this does not appear to be the case from the archaeological evidence in Derbyshire.<br>• Early medieval activity is represented by a few key sites. The Anglo Saxon centre at Repton, the later Viking enclosure and mass grave on the same site, and the burial complex of the Great Army at Ingleby, all sit on the same sandstone ridge which defines the edge of the superficial valley bottom deposits, positioned to control the river.<br>• The medieval period is defined by a large number of field systems and a few known deserted medieval villages. Quarrying is also known, and was probably more widespread, but a large amount of post-medieval and modern quarrying has impacted upon large swathes of the landscape. As with many of the lowland landscapes, there are a substantial number of deer parks and parks and gardens associated with large houses. Although these areas have been 'landscaped' they also have the potential to preserve earlier features in areas divorced from post-medieval and modern industry and development.<br>• The post-medieval and modern archaeological record is dominated by the quarrying of sandstone. | • Aerial photographs have the potential to identify archaeological remains on the landform, as known from previous work, but the current aerial photograph transcription for this area emphasizes the extent of quarrying activity that has taken place on this landform.<br>• Where sandstone bluffs form the high ground above river valleys, application of fieldwalking and topographic survey may reveal early and late prehistoric remains respectively.<br>• Evaluation techniques relating to large linear features such as Roman Roads might include the following: fieldwalking if the conditions are suitable, geophysical survey to test for the presence of structures associated with the road line and also the course of the road line itself, targeted evaluation trenches to test fieldwalking and geophysical results, and targeted excavation based upon the results of the prospection techniques employed. |

## Table 6 - 1f - Millstone Grit

| Geomorphological Processes | Archaeological Associations | Evaluation and Mitigation Issues |
|---|---|---|
| • Potential reworking and(or) burial of Palaeolithic materials in plateau, hilltop and hillslope settings by Quaternary periglacial, hillslope and mass-movement processes<br>• Hilltop and hillslope settings generally stable during the Holocene, but potential for localised colluviation and mass-movement activity<br>• Potential burial of multiperiod archaeological deposits beneath localised (presently unmapped) Holocene peat deposits | • Soils tend to be acidic which leads to poor preservation of unburnt organic materials.<br>• Largely unimproved upland - leads to good preservation of upstanding stone-built remains. The low density of sites indicated in the HER and NMR is a product of the lack of development and investigation and also the masking effect of both blanket peat and heather.<br>• The quality of preservation of remains resulting from the lack of intense land use allows for a landscape-scale approach to archaeological work which is not possible on other, more heavily-developed landforms.<br>• Unimproved moorland does not indicate a lack of industry, as in the past the Millstone Grit was heavily quarried, particularly for the production of mill stones, and was also subject to coal mining, as well as hosting ore smelting sites amongst others.<br>• Large amount of Mesolithic sites are known from the gritstone uplands, both in the form of flint scatters and single finds (commonly within peat – see below), and also as excavated sites. Activity appears to focus toward the exposed edges and near springs. Some sites in adjoining areas have produced evidence for Mesolithic structural remains.<br>• Vast majority of Neolithic activity is represented by findspots and lithic scatters with a notable preponderance of stone axe heads suggestive of woodland clearance.<br>• The Millstone Grit forms the southern extent of the known focus of later prehistoric rock art, predominantly in the style of cup-and-ring marks. The heavy quarrying of so many Millstone Grit surfaces has meant that the volume of rock art is now undoubtedly under represented and this is compounded by the fact that the Millstone Grit, having an open and coarse structure, is subject to considerable weathering from wind and freeze-thaw action which has also degraded surfaces to the extent that prehistoric rock art is either eroded away or barely visible.<br>• A considerable amount of Bronze Age activity is known giving the appearance of an explosion in activity during the Later Neolithic-Early Bronze Age period. The remains predominate on the East Moors and consist of extensive farmstead settlement remains with associated field systems, and also over 200 known 'barrow' or cairn sites. The two types of site are broadly intermingled and appear to represent complete settlement landscapes.<br>• With the extensive Bronze Age remains, as well as those of other periods, there is a pattern of settlement which focuses on the 'shelves' above the gritstone edges, visible in positioning of monuments such as Gardom's Edge and also in the distribution of artefact scatters, among others.<br>• There are a number of hillforts on the gritstone which most likely date to the Late Bronze Age – Iron Age, though further investigation is needed. Carl Wark is undated but potentially dates to this period. There is a clear preference for promontory and scarp edge enclosures, often overlooking water courses, fitting in with the overall pattern of the Peak District hillforts.<br>• Roman activity is represented predominantly by the infrastructure of the Roman occupation and also smaller, probably 'native', farming settlements and also small fortlets, with none of the larger settlements known from the Carboniferous Limestone, the shale valleys or the lowland areas of south Derbyshire.<br>• Medieval remains include farming settlements – indicating the presence of post-Bronze Age agriculture on the moors, though there is definitely a contraction after the intense settlement and agriculture of the Bronze Age which mirrors the evidence from analogous areas of Britain, such as Dartmoor or the Cheviot Hills.<br>• Medieval settlement, as determined by location of known medieval structures such as churches, castles etc, tends towards the lower-lying areas of the gritstone as would be expected. Whilst there are still remains from the higher moors, the medieval usage of the uplands appears similar to that during the Roman period, where unimproved pasture land may predominate.<br>• The remains of medieval deer parks are an important landscape association, as in other landforms, but especially on the Millstone Grit where the preservation of upstanding remains is generally very good. They are important both in their own right as historical monuments, but also in the preservation they offer to earlier remains.<br>• Industry on the gritstone moors is reasonably extensive in both the medieval and post-medieval periods, with the Millstone Grit in demand for both the millstones which gave the rock its name, and also as building stone. Processing of raw materials also makes up a significant part of the 'industrial' remains of the gritstone moors including lead and lime processing.<br>• Harnessing power from the fast flowing streams that drain off the gritstone moors has created great change in the landscape, with not only the construction of mills and associated structures in the lower reaches, but most notably the reservoirs and dams which are abundant across the uplands and valleys. Linked to these are the extensive canal remains on the western gritstones which link to the industrial centres of the North West.<br>• Post-medieval remains are extensive including the industries noted above. Large numbers of shooting butts, access roads, packhorse tracks, waystone markers, clapper bridges, turnpikes and toll buildings are known<br>• The impact of the railway on the Millstone Grit is principally from the two tunnels (Totley and Woodhead) which linked the industrial centres of Sheffield and Manchester with the heart of the Peak District and its mineral wealth.<br>• Modern military remains across the eastern moors relating principally to WWI and WWII include practice trenches, gun emplacements, decoy sites. As well as these, there are a number of known plane crash sites such as those on Kinder Scout and Bleaklow. | • Landscape setting should form a key part of preliminary analysis of the site, as the preservation of features within a landscape is better on the high moors than on any other landforms.<br>• Prevalence of upstanding remains means that earthwork survey is a key tool for recording archaeological remains on this landform. This may either form the principal record where the impact is deemed to be not great against the significance of the monument, or can provide baseline data for a continuing and progressive programme of works.<br>• Where vegetation is low and light conditions are favourable, upstanding remains can be clearly visible through aerial photography, though lack of arable agriculture means that cropmark formation is poor to non-existent.<br>• In advance of development in areas with potential for Mesolithic remains, the initial survey of a site should seek to take into account the areas of known prehistoric lithics as well as, where possible, providing for further systematic location and collection of material. The stratigraphic relationship between lithic finds and the sediment or soil layers in which they occur should be carefully recorded so that such sites can be considered in relation to potential dating samples from the surrounding peat/soil matrix and also so that such occupation can be linked to palaeoenvironmental samples that may shed light on the environment contemporary with, preceding or succeeding the human occupation of these sites. The use of survey grade GPS to locate sites and finds is essential.<br>• Any development on the Millstone Grit of the East Moors may well impact upon known or unknown archaeological remains of Neolithic-Bronze Age date, and in this case, a preliminary survey should be followed with targeted investigation where a site would otherwise be impacted upon adversely. Evaluation strategies that could be usefully employed on the gritstones includes close-spaced geophysical survey, evaluation trenching, test pits and potentially ground penetrating radar depending on the type and scale of a proposed development.<br>• The preservation of upstanding remains in particular lends itself to widespread application of topographic survey as a rapid way of acquiring a large amount of data through non-invasive means. As activity locales can be identified due to the survival of upstanding remains, this allows for the targeted use of test pits and evaluation trenches around such locales. |

## Table 7 - 1g - Shales and Siltstones

| Geomorphological Processes | Archaeological Associations | Evaluation and Mitigation Issues |
|---|---|---|
| • Potential reworking and(or) burial of Palaeolithic materials in hillslope settings by Quaternary periglacial, hillslope and mass-movement processes<br>• Hillslope settings generally stable during the Holocene, but potential for localised colluviation and mass-movement activity | • The valleys sit between the two predominant upland landforms of gritstone and Carboniferous Limestone. This may be an attractive settlement locale as it is sheltered but within close distance of a number of landforms allowing for a wide variety of exploitable resources. The predominantly valley locales of the shale landform means that these will have formed natural routeways through the landscape throughout human history.<br>• The valleys were potentially heavily wooded for a long time, and clearance may have happened later in the valley bottoms than in the upland environments, suggesting that this may have been a less-heavily settled landscape in earlier periods.<br>• Due to valley bottom locales the landform hosts a great deal of industrial remains including water-powered mills, steam-powered mills and associated sites such as weirs and goits.<br>• Very few Palaeolithic or Mesolithic finds are known from the landform suggesting that the upland areas were more attractive for settlement activity at least during the hunter-gatherer periods.<br>• Substantially more Neolithic activity is known than for earlier prehistory. There is a potential long cairn near Lismore Fields, which lies adjacent to the shale landform. A very high ratio of polished stone axe heads is known from this landform, and their locations suggest a preference for activity near to water courses. A 'midden' pit found at Big Lane, Hognaston, is possibly indicative of Early Neolithic settlement activity.<br>• Continuation of the 'barrow' tradition of the Carboniferous Limestone with many burial monuments known from similar topographic settings. Also possible burial monuments known from lowland valley bottom settings, similar to the ring ditches known from the lowland areas of south Derbyshire. A large amount of Bronze Age metalwork is known as individual findspots and these are located near to water sources generally.<br>• Mam Tor represents the only major Iron Age site with a geological link to the shales.<br>• Intensification of land-use of the shale valleys during the Roman period, with substantial activity focused on the fort and vicus at Brough, and also along the lines of the Roman roads leading on to the plateau to Buxton and along the lines of the major valleys. Significant concentration of finds around the known Roman industrial sites at Lumb Brook near Hazelwood. With a lack of natural resources immediately available on other geologies, it is possible that the Roman activity on the valley shales relates to access to fresh water, processing of raw materials, control of movement and also to the agricultural underpinnings of the Roman occupation in this region.<br>• The early medieval period is poorly represented with the Grey Ditch earthwork being the major monument known.<br>• The valleys were a clear focus for settlement and agriculture during the medieval period as illustrated by the ratio of known field systems etc. Preservation of ridge and furrow is particularly good on the heavy soils of the shales, so this may account for some small bias in the data. A large number of deserted medieval villages is known, and these tend to be sited near to existing settlements, though some are known to have been flooded during the creation of reservoirs.<br>• Medieval deer parks and hunting estates represent a reasonable portion of known medieval land-use across the landform. These enclosed areas, as well as being of historic interest in their own right, have the potential to preserve archaeological remains away from post-medieval and modern industry and development.<br>• Substantial amounts of post-medieval and modern archaeological remains relate to the railway, road and canal systems which formed an integral part of the economy in this area. As well as the actual routeways themselves, there is a huge volume of associated industrial sites. | • As a relatively well-developed agricultural landscape, the shales present good opportunities for the use of fieldwalking as an evaluation technique. Almost 10% of all the known sites on the landform are single finds or artefact scatters which suggests that this would be a fruitful technique for prospecting for archaeological sites, as well as compiling a record of artefacts within the ploughzone which may otherwise go unrecorded.<br>• Evaluation and mitigation relating to large linear features such as Roman Roads might include the following: fieldwalking if the conditions are suitable, geophysical survey to test for the presence of structures associated with the road line and also the course of the road line itself, limited evaluation trenches to test fieldwalking and geophysical results, and targeted excavation based upon the results of the evaluation techniques employed.<br>• Ridge and furrow can mask and preserve earlier remains beneath the ridges and this should be taken into account as part of any archaeological investigation where such features are impacted upon. |

## Table 8 - 1i - Coal Measures

| Geomorphological Processes | Archaeological Associations | Evaluation and Mitigation Issues |
|---|---|---|
| • Potential reworking and(or) burial of Palaeolithic materials in hillslope settings by Quaternary periglacial, hillslope and mass-movement processes<br>• Hillslope settings generally stable during the Holocene, but potential for localised colluviation and mass-movement activity | • The Coal Measures are geologically very similar to the Millstone Grit, comprising interbedded sedimentary, conglomerate rocks and coal beds. Theoretically the archaeological associations should be very similar to those of the Millstone Grit, and this is demonstrably the case on the interface between the two landforms in the uplands, where there are, as an example, a large amount of Bronze Age remains.<br>• Known Mesolithic sites on the Coal Measures are few but illustrate a clear fieldwork bias. The largest concentration of known sites is around Unstone, as a direct result of the fieldwork undertaken by the North Derbyshire Archaeological Trust. While there are few Mesolithic sites known overall from the landform, where fieldwalking has been employed, early prehistoric sites have been identified, and the actual number of sites is probably far higher than currently suspected. The Mesolithic sites show a clear topographic preference for valley sides and raised points above water courses, which echoes sites in the Trent Valley, and also in the uplands such as at Deepcar on the Millstone Grit.<br>• Known Neolithic and Bronze Age sites are predominantly found on the interface with the gritstone on the Eastern Moors and the associations are almost identical to those of landform 1f. Extensive field systems and settlements occur along with funerary 'barrows'/cairns.<br>• In the lower lying areas of the Coal Measures, Bronze Age occupation has been demonstrated through the excavation of Bronze Age activity defined by a boundary ditch at Tibshelf.<br>• The Roman-period activity is centred on the remains at Chesterfield which was a short-lived fort later occupied as an industrial centre. There are also cropmark enclosure sites known, which may be Iron Age or Romano-British in origin, but illustrate the potential of the Coal Measures, where undisturbed, to host good visible cropmarks.<br>• From the medieval period onwards, the archaeological resource of the Coal Measures is dominated by the industrial remains associated with ridge and furrow, which will mask, but also protect, underlying remains<br>• The scale of post-medieval and modern industrial activity has undoubtedly had a detrimental effect on the archaeological remains of earlier periods, but the limited fieldwork undertaken on this landform has illustrated that there are surviving remains. Rapid landscape-scale prospection techniques such as fieldwalking and aerial photography have been proven to be effective on this landform. | • The application of fieldwalking at Unstone has illustrated that this is a fruitful technique for this landform, where conditions are conducive.<br>• Where arable land remains on the Coal Measures, and has not been impacted upon by later industry or development, there appears to be both good formation of cropmarks, and also reasonable survival of artefacts within the ploughsoil.<br>• As well as the industrialised landscape, there are also significant remains of medieval and post-medieval agriculture across the landform. Ridge and furrow can mask and preserve earlier remains beneath the ridges and this should be taken into account as part of any archaeological investigation where such features are potentially impacted upon.<br>• Aerial photographs have the potential to identify archaeological remains on the landform, as illustrated by the mapped cropmarks to the west of Bolsover which may be late prehistoric in date. |

## Table 9 - 1k - Mercia Mudstones

| Geomorphological Processes | Archaeological Associations | Evaluation and Mitigation Issues |
|---|---|---|
| • Potential reworking and(or) burial of Palaeolithic materials in hillslope settings by Quaternary periglacial, hillslope and mass-movement processes<br>• Hillslope settings generally stable during the Holocene, but potential for localised colluviation and mass-movement activity | • Known Mesolithic sites are represented by lithic scatters, which tend to focus on and around the river bluffs and valley sides above active water courses.<br>• Bronze Age cropmark remains are known. As with the sand and gravel terraces of the Trent Valley that overlie this landform, there is good potential for cropmark formation, and aerial photography may be a very useful prospection tool.<br>• The low yet pronounced river cliffs, which attract Mesolithic activity, also host the lowland river valley fort of Borough Hill on this landform. This is a presumably Iron Age site which is suggestive of the riverine forts of Northumberland and the Scottish borders that line the bluffs along the course of the river Tweed and may represent the continuation of the upland 'scarp edge enclosure' tradition seen in the Peak District, into the lowlands of south Derbyshire.<br>• Roman-period sites are dominated by the two clusters around Little Chester and Ockbrook/Borrowash. There is a significant fieldwork bias in this data due to the excavations and fieldwalking around Ockbrook, but this does also illustrate the effectiveness of fieldwalking, and therefore also test pitting, as a prospection and evaluation technique for Roman activity, as well as prehistoric lithic scatter sites.<br>• Significant medieval remains occur across the landform and illustrate the widespread agricultural and small-scale industrial activities that predominated. Multiple examples of ridge and furrow, deserted and shrunken medieval villages, castles with nucleated settlements, deer parks and also three of the largest monastic sites within the county are known on this landform.<br>• In the post-medieval period, industrial sites are the principal archaeological association, with mills, factories and extraction sites being more prevalent than agricultural sites. Principal industries represented are corn processing, brick production, lime-working and silk production, with many of the sites utilising water power in a similar way to the Derwent Valley Mills further up the catchment. | • Where the landform forms the high ground and bluffs above river valleys, application of fieldwalking and topographic survey may reveal early and late prehistoric remains respectively. Targeted evaluation trenching may yield useful results in such locations.<br>• Veracity of fieldwalking where conditions are suitable, illustrated by the amount of known Stone Age tools and also pottery, particularly Roman.<br>• Ridge and furrow can mask and preserve earlier remains beneath the ridges and this should be taken into account as part of any archaeological investigation where such features are potentially impacted upon. |

## Table 10 - 2a - Till

| Geomorphological Processes | Archaeological Associations | Evaluation and Mitigation Issues |
|---|---|---|
| • Hillslope settings generally stable during the Holocene, but potential for localised colluviation and mass-movement activity | • Recent work (Mills and Palmer 2007) has compiled research on clay landscapes illustrating greater potential for prospection and discovery and a greater amount of archaeological sites than previously suspected.<br>• Potentially suffers from a fieldwork bias and is underrepresented in the archaeological record due to historical view that clay landscapes are an unattractive settlement locale.<br>• For a number of the till deposits in Derbyshire and the Peak District, the associations tally well with those of the underlying hard rock landform, suggesting that in these areas, the till is not a major determinant for archaeological associations.<br>• Few Palaeolithic, Mesolithic and Neolithic finds noted other than a few scattered lithic find spots and occasional scatter, though the substantial assemblage known from Lismore Fields (see below). This is a pattern borne out elsewhere in England, whereas later periods are better represented.<br>• Lismore Fields site does not fit with the picture extrapolated from the other HER and NMR data. It is an Early Neolithic occupation site of national importance situated on the till at the junction of the Carboniferous Limestone and shale, with the Millstone Grit bordering close to the north-west. It is defined by dispersed cut features with midden pits producing artefacts and has a high potential for palaeoenvironmental remains. This locale is really a small pocket of till amongst Carboniferous Limestone, and the ability to cut foundations into the till more easily than into bedrock may be a factor in making this specific locale attractive for timber-built Neolithic buildings.<br>• Bronze Age remains appear to marry closely with the archaeological associations of the underlying landforms. Bronze Age barrows/cairns occur on visible points such as false crests, breaks in slope and local high points.<br>• Very few Iron Age archaeological remains known, with the only clearly dated site being a pit alignment similar to those known from the Trent Valley sand and gravel terraces.<br>• Where there are significant Roman remains and artefact scatters, as with the Bronze Age, the associations are similar to those of the underlying bedrock landform and distribution of sites continues across the till landform. Two significant distributions of sites are known at Ockbrook and Borrowash based on the work of the local history society, and also in the area around Carsington Water.<br>• Very few early medieval sites known, though the Anglian burial at Wyaston is the only known Anglian burial not on the Carboniferous Limestone proper.<br>• Other than the built heritage, medieval and post-medieval remains are generally represented by ridge and furrow and other relict field systems, and also upstanding remains associated with a few deserted medieval villages.<br>• The heavy clay soils over the till allow for a better level of preservation of upstanding remains such as ridge and furrow and this in turn indicates the potential for better preservation of earlier remains masked by medieval and post-medieval farming. | • Aerial photography has been demonstrated to be a viable technique on clay geologies.<br>• Type site of Lismore Fields illustrates the occurrence of dispersed cut-feature archaeological remains. Due to the ephemeral and dispersed nature of the archaeological remains of post-built timber structures and various types of pits, conventional evaluation techniques are generally unsuitable as they are barely detectable by geophysical survey, are rarely seen on aerial photographs and are a chance discovery if they occur in evaluation trenches. These types of site are very important in terms of the archaeological information they can yield and they are typically discovered and recorded during fairly large-scale surface stripping, as at Lismore Fields, but this is also the case for Neolithic settlement sites on other landforms. Close-spaced fieldwalking or test pits, particularly targeted on areas of level ground, may be useful evaluation techniques dependent on current land-use.<br>• Where upstanding remains are preserved due to the heavy soils, earthwork survey can be usefully employed. |

## Table 11 - 2d - Sand and Gravel Terraces

| Geomorphological Processes | Archaeological Associations | Evaluation and Mitigation Issues |
|---|---|---|
| • Potential reworking and(or) burial of Palaeolithic materials by fluvial and periglacial processes<br>• Pre-Holocene fluvial terrace surfaces largely stable during the Holocene, but potential for localised colluviation and alluviation at valley margins<br>• Localised burial of Late Quaternary (Devensian) fluvial deposits and associated archaeological material by Holocene alluvium in valley floor localities. | • Truncated cut features are often the principle expression of archaeological sites. Such features can often be ephemeral in nature and where small, such as with posthole-defined structures or pit features, difficult to prospect for. Open area excavation (strip, map and sample) has been demonstrated to be a more satisfactory method of recording remains of this type.<br>• On the gravel terraces there is the likelihood that remains may be masked and preserved beneath an alluvial veneer.<br>• Positioned along natural routeways, the free draining land, light, fertile, tractable soils and proximity to fresh water make the sand and gravel terraces attractive settlement locales through many periods of prehistory and history – see period notes below - and are particularly favoured in the Neolithic, Bronze Age and early medieval periods.<br>• Gravel deposits are a secondary context for Palaeolithic artefactual evidence which may occur as derived material from further up the river catchment. Though such artefacts could potentially be found as in-situ remains, this would be exceptionally rare.<br>• Though few Mesolithic remains are noted within the HER and NMR, Mesolithic tools and debitage are often present within excavated site assemblages, and this stresses the need for more close-spaced fieldwalking on these surfaces in advance of invasive evaluation.<br>• Neolithic and Bronze Age settlement is well attested on the sand and gravel terraces with many site and monument types present in Derbyshire including cursuses, midden pits, ring ditches, enclosures, burnt mounds, post-built structures and cremation pits.<br>• Localised high points can be a focus for ring ditches, burnt mounds and other monuments. High points may be visible on the surface today, or have existed in the past but the current ground surface appears level due to the effects of subsequent alluviation. Where alluvial veneers exist, a programme of sub-surface terrain modeling can be employed to map the sand and gravel terrace topography and this can aid in targeting evaluation works.<br>• Neolithic settlement remains generally on the higher gravel terraces, with the later remains tending towards the lower, and younger, terraces.<br>• Later prehistoric remains also well-attested with extensive linear boundary features and pit alignments ascribed a tentative Iron Age date. Recent evidence has shown that pit alignments have a much longer currency of use stretching from the Neolithic up to the post-medieval period.<br>• Less Roman and Romano-British period sites known from the sands and gravels as a proportion of all sites than for other landforms. The majority of entries within the HER and NMR refer to the road networks. This pattern has been borne out in those large areas that have been subjected to strip, map and sample conditions.<br>• The most significant early medieval remains within Derbyshire cluster to the south in the Trent Valley with the extensive remains at Willington Quarry representing the largest known single site in the county.<br>• Whilst still the majority, the remains for the medieval and post-medieval to modern periods represent less of the overall percentage than for other landforms, with the majority comprising field systems and other remnants of the agricultural landscape.<br>• In the post-medieval period, the extractive industries have had a significant impact on the landscape in both loss of sand and gravel terraces, but also in the impetus for archaeological work (e.g. Willington Quarry, Hill Farm, Willington). | • Due to the ephemeral and dispersed nature of the archaeological remains of post-built timber structures and various types of pits, conventional prospection techniques are generally unsuitable as such features are virtually impossible to detect by geophysical survey, are rarely seen on aerial photographs and are a chance discovery if they come up in evaluation trenches.<br>• Close-spaced fieldwalking (linewalking at 2m intervals) can produce highly informative results in respect of the potential location of sub-surface Mesolithic, Neolithic and Early Bronze Age sites, as well as for those periods that produce robust ceramic material. Targeting evaluation trenches or test pits according to the results of fieldwalking provides a means of assessing these surfaces prior to determination. Large-scale evaluation trenching is a blunt tool for locating the above-mentioned types of remains and if they fail to land on archaeological deposits that may very well survive in the area of investigation it can potentially result in large areas being considered archaeologically sterile when this is not the case. Establishing the potential of such sites rather than the distribution of remains across the entire site is key at the pre-determination phase for this landform. This allows the back loading of works that could include strip, map and sample as a robust but economic post-permission mitigation method that ensures all archaeological remains, whether small, dispersed or post-built, are fully recorded in plan.<br>• Ridge and furrow can mask and preserve earlier remains beneath the ridges and this should be taken into account as part of any archaeological investigation where such features are impacted upon.<br>• There is significant potential for cropmark formation on this landform illustrating the great applicability of aerial photography. Future programmes of aerial photography could be commissioned during dry summers, focusing on areas included within the mineral plan or where future commercial interests lay. |

## Table 12 - 3a - Alluvium

| Geomorphological Processes | Archaeological Associations | Evaluation and Mitigation Issues |
|---|---|---|
| • Potential for reworking and(or) burial of Holocene landsurfaces and sediments, including associated archaeological deposits and organic-rich deposits<br>• Potential for localised erosion of archaeological deposits in alluvial settings | • Very few Palaeolithic-Mesolithic finds known from the alluvial surfaces, though it is likely that material of this age is sealed within the sediment body due to more-recent alluviation. Material of this age may also occur as secondary deposits from further up catchment.<br>• Neolithic period is represented by a distribution of stone axe heads on the higher, and therefore older, alluvial terraces. In the county as a whole the distribution of these items tends towards rivers and is an indication of a preference for settlement during the Neolithic expanding along river valleys and streams.<br>• Earliest cropmarks so far recorded on the alluvium are probable Iron Age pit alignments and field boundaries. Reasonably extensive cropmarks known from the alluvium are suggestive of an intensification and extension of farming land partitioning some of these terraces during later prehistory.<br>• Known Roman sites cluster around major centres such as Derby, Melandra Castle near Glossop and a few in the vicinity of Bakewell, but few others so far known.<br>• Anglian period cemetery at Derby suggests continuity of use from the Roman period through the early medieval but little else known.<br>• Substantial amount of ridge and furrow agricultural remains known form both medieval and post-medieval periods.<br>• Valley floor setting means there are many water-powered industrial and mill sites known.<br>• Substantial numbers of undated cropmarks which are most-likely to date to the late prehistoric or Romano-British periods. | • Aerial photography a useful technique as large and/or contiguous features show well on this geology. Many of the cropmarks remain poorly understood and undated but most thought to date to late prehistory and the Roman period.<br>• There is the potential for palaeochannels to exist within or below the alluvium and sometimes these can only be identified by a systematic sediment coring programme across a potential development area, although aerial photographs and field survey are the most common technique for mapping such deposits.<br>• Where deeper excavations will take place, archaeological work should investigate a significant depth of the sediment body due to the potential for alluvium to contain deposits and finds of different ages and to conceal earlier land surfaces or structures<br>• Fieldwalking is not a suitable technique on young, low alluvial terraces, although it could be very useful on old, usually high, alluvial terraces that have not experienced further alluviation since early-mid Holocene times. It may also be of some utility on low, young terraces on those areas where earlier landforms protrude above them as small 'islands', although in such cases fieldwalking only need be targeted to such features and their immediate environs.<br>• Ridge and furrow can mask and preserve earlier remains and this should be taken into account as part of any investigation where such features are impacted upon. |

## Table 13 - 3b - Palaeochannels

| Geomorphological Processes | Archaeological Associations | Evaluation and Mitigation Issues |
|---|---|---|
| • Hilltop and hillslope settings generally stable during the Holocene, but potential for localised colluviation and mass-movement activity | • Considerable potential to preserve organic remains from throughout the Holocene and may also contain structures and/or artefacts lost or deposited within the original waterway (e.g. the Shardlow Log Boat) and the remains of a wharfs or piers as well as artefacts such as bronze objects or faunal remains such as bones or wetland burials | • Palaeoenvironmental sampling and coring can provide an invaluable means of recreating past environments and dating sediment sequences.<br>• Excavation of palaeochannel deposits has the potential to recover well-preserved structures and artefacts though this may be achieved by careful machine excavation under strict archaeological supervision.<br>• Use of a metal detector may be apposite given the wealth of bronze objects known to have been deposited in wetlands, and particularly along the course of the Trent |

## Table 14 - 3d - Upland Peat

| Geomorphological Processes | Archaeological Associations | Evaluation and Mitigation Issues |
|---|---|---|
| • Hilltop and hillslope settings generally stable during the Holocene, but potential for localised colluviation and mass-movement activity | • Substantial potential for preservation of remains beneath and pre-dating the formation of blanket peat.<br>• Large volume of Mesolithic and some Neolithic chipped flint from erosion scars within the peat. These tend to be found near the gritstone edges, though this may be more a product of increased erosion and greater accessibility. | • Preliminary evaluation should take account of the potential of erosion scars to expose significant remains, for example the large volumes of Mesolithic flint. Site survey on this landform will require survey-grade GPS due to the lack of other extant features and survey control given the remote nature of the moorlands. This is especially important so that an exact site or findspot can be returned to on subsequent occasions.<br>• Other areas where peat and the underlying mineral soil may be exposed include footpaths, groughs, dried streambeds, areas where the peat grades down to bedrock as at rock torrs and edges, and areas that have experienced moorland fires.<br>• To gain a satisfactory level of evaluation and recording in and below blanket peat, there is a significant amount of extra manpower and time required than for accessible landforms with little drift cover.<br>• Upstanding remains occasionally occur, such as the turf barrow known as Margery Hill, and such features require detailed field survey prior to further investigative works such as geophysics, test pits or evaluation trenching.<br>• Where linear developments may run across this landform a combination of fieldwalking the area followed by test pitting may be appropriate for evaluation purposes. Although evaluation trenching may be useful this should be tempered by the practicality of getting heavy machines onto and across wet and boggy moorlands. |

16. Table 15 provides a score out of three for each technique in terms of general applicability for use on each landform. This score is expressed in three different shades of blue for ease of visualisation with the darker the shade, the more applicable the technique on a given landform. This table and the further explanatory text below cross-references to the guidance within 'Mineral Extraction and Archaeology: A Practice Guide' (MHEF 2008) and the two documents should be used in conjunction. This table is based on the assessment within the main report and the summarised information in Tables 2-14 and provides a general indication of technique applicability. Any scheme of archaeological evaluation or mitigation should be targeted and directed to the specific needs and expectations of a given site. In some cases several techniques may be highly applicable on a given landform but it does not always follow that all such techniques should necessarily be employed. The purpose of evaluation is to retrieve sufficient information to inform a planning decision, not necessarily to systematically sample a site.

17. The table below will continue to be modified in the light of advances in archaeological methodologies, techniques and the accumulation of knowledge of the different types of archaeological remains present on any given landform and its preservation potential.

| Technique | 1a | 1c | 1d | 1e | 1f | 1g | 1i | 1k | 2a | 2b | 2d | 3a | 3b | 3c |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Desk-Based Assessment | | | | | | | | | | | | | | |
| Geomorphological Mapping | | | | | | | | | | | | | | |
| Pre-Determination Evaluation | | | | | | | | | | | | | | |
| Aerial Photograph Transcription | | | | | | | | | | | | | | |
| Archaeological Survey | | | | | | | | | | | | | | |
| Evaluation Trenching | | | | | | | | | | | | | | |
| Fieldwalking | | | | | | | | | | | | | | |
| Geophysical Survey | | | | | | | | | | | | | | |
| Sediment Coring | | | | | | | | | | | | | | |
| Test Pits | | | | | | | | | | | | | | |
| Post-Permission Mitigation | | | | | | | | | | | | | | |
| Targeted Excavation | | | | | | | | | | | | | | |
| Palaeoenvironmental Analysis | | | | | | | | | | | | | | |
| Strip, Map and Sample | | | | | | | | | | | | | | |
| Watching Brief | | | | | | | | | | | | | | |
| Post-Fieldwork | | | | | | | | | | | | | | |
| Post-Excavation Archive and Dissemination | | | | | | | | | | | | | | |

Table 15 Suitability of archaeological and palaeoenvironmental techniques in relation to different landforms.

18. A full synopsis of all the archaeological and palaeoenvironmental techniques available is given in 'Mineral Extraction and Archaeology: A Practice Guide (MHEF 2008). The section below details some specific areas where certain techniques relate to the aggregate-bearing landforms of Derbyshire and the Peak District.

19. The transcription of photographed sites on to Ordnance Survey base mapping allows for an accurate location to be plotted and the resultant mapping can be quickly analysed to identify areas of particular sensitivity in and around a development area. Aerial photography can identify large features and enclosures generally very well, dependent on soil conditions, but smaller features such as pits and postholes are less easy to identify. The extensive remains on the Trent Valley sand and gravel terraces illustrate this well, as many enclosures and linear features are known, but small pit and posthole features, for example like those excavated at Mercia Marina, Willington (Brightman and Waddington in press) were not visible on previous aerial photography.

20. Many archaeological sites have characteristic forms allowing for the classification of sites identified through aerial photography and in many cases a broad date can also be ascribed. As part of this project four blocks of aerial photograph transcription were undertaken focusing on four key aggregate producing landforms. This part of the project has identified 862 new sites and enhanced the records for a further 256.

21. Archaeological survey is a non-intrusive technique for recording upstanding remains and can be useful for understanding constructional relationships. Survey is typically applied to earthwork sites and those sites where standing buildings or masonry form one or more of the heritage assets. If upstanding remains are to be excavated it is standard practice to accurately survey the site in advance of excavation. For example, a development which impacted upon the Millstone Grit may well encounter upstanding remains due to the quality of preservation on this landform, and in such a case, archaeological survey would provide an invaluable record upon which any further archaeological works could be based.

22. Linear evaluation trenching is not always the best evaluation technique to identify the survival of archaeological remains on a given site. However, targeted trenching can be an effective tool to sample potential remains identified by aerial photography, geophysics or fieldwalking for example. It can also be an effective tool for prospecting for large or linear features such as Roman roads, prehistoric field boundaries or enclosure ditches. Conversely, it is less well suited to assessing landforms which may yield small, dispersed features such as Neolithic pits, hearths or the postholes of timber-built structures. In certain circumstances, however, it may be the only technique that can be employed. When planning an evaluation trenching

Fig. 8 Extensive post-medieval lead and lime working at Hopton on the southern Carboniferous Limestone.
NMR SK 2657/32 17919/5 24-JUL-2003 © English Heritage. NMR.

Fig. 9 Multi-period remains on the sand and gravel terraces at Aston in the Trent Valley: Iron Age square barrows, a Neolithic cursus and undated circular enclosure.
CUCAP AFY45 07-JUl-1962 © ULM.

Fig. 10 The Roman fort of *Navio* at Brough-on-Noe sitting predominantly on the shale landform that forms many of the principal valley floors in the Peak District.
NMR SK1882/15 17200/17 16- NOV-1998 © Crown copyright. NMR

Fig. 11 An excavated ring ditch monument at Mercia Marina, Willington, on the Trent Valley sand and gravel terraces. This monument was identified through aerial photography and investigated as part of a strip, map and sample approach.

Fig. 12 Upstanding remains of a Bronze Age ring cairn on the Millstone Grit at Barbrook, Big Moor. Upstanding monuments such as this can be effectively recorded by detailed field survey.

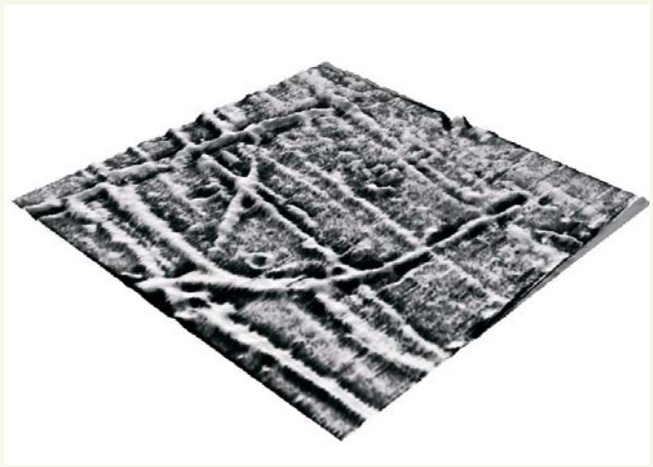


Fig. 13 Magnetometer plot showing the arc of a Romano-British enclosure and later ridge and furrow remains at Captain's Pingle on the Trent Valley sand and gravel terraces. © University of Leicester Archaeological Services and Lafarge Associates Ltd.

strategy it should be borne in mind that the purpose of evaluating a site is to provide adequate information to inform a planning decision and not to necessarily sample systematically across a site.

23. Fieldwalking involves walking in a straight line across ploughed surfaces collecting any artefacts observed. The closer together the walkers are placed the greater the coverage achieved. Finds are bagged, numbered and surveyed so that each find can be accurately located on a map. The most common finds within the archaeological record for the county are stone tools, though the programme of work around Little Hay Grange, Ockbrook (Palfreyman 2001) among others, has illustrated the effectiveness of fieldwalking in the recovery of pottery. Therefore, it is particularly useful for identifying Stone Age (Mesolithic, Neolithic and Early Bronze Age) sites, as well as Roman, medieval and post-medieval sites that sometimes produce large quantities of well-fired pottery.

24. The applicability of fieldwalking and targeted test-pitting as a viable, cost-effective and rapid prospection and evaluation technique is a theme which has been touched on in the main project report. Nearly 18% of all entries within the HER and NMR for Derbyshire and the Peak District represent lithic scatters and individual findspots, and where conditions are conducive to surface collection, fieldwalking can provide a key record of the distribution of finds, as well as being one of the few ways to sample the archaeological remains within the overburden, which are likely to be lost once any invasive techniques are employed. Where dedicated fieldwalking has been employed, regardless of bedrock geology (landforms 1a-1i), finds have been recovered, for example at the Unstone sites on the Coal Measures (Hart 1981), a landform which otherwise has not yielded substantial quantities of pre-industrial archaeological remains.

25. Geophysical survey can offer a fairly inexpensive means of examining large areas for sub-surface remains. However, the results of geophysical survey can vary depending on the type of geology and soil-moisture conditions, and whether modern services, underground pipes and other disturbance cross the site, which then affect the signal. Sandy soils, clays and alluvium can all return good results and recent work has suggested that the Millstone Grit may also represent a landform which is conducive to geophysical survey. The quality of results can also depend on the form, size and fill of archaeological features. Small features such as post holes and small pits are unlikely to be revealed and for those features with fills similar to their surrounding geology recognition is also hindered.

26. One of the key points relating to post-permission mitigation is the application of strip, map and sample approaches on certain landforms. Where large areas have been opened, especially relating to

sand and gravel landforms, these have generally revealed multi-period sites hitherto unsuspected. A substantial amount of the archaeological remains from sites such as Willington Quarry (Wheeler 1979; Beamish 2009) or Mercia Marina (Brightman and Waddington in press) were dispersed, individual, cut features or post-built structures defined by postholes. Such archaeological deposits can be virtually impossible to detect remotely and are very unlikely to be encountered by employing linear evaluation trenching. In cases where there will be a significant impact across the whole area of a development, as with mineral extraction, a strip, map and sample approach may be appropriate as topsoil has to be removed anyway. This technique ensures a record of all archaeological features and allows for a considered, question-led approach to excavation with a coordinated specification for works. A further advantage of this technique is that once the initial strip is complete and all heritage assets on the site are identified, the archaeological mitigation becomes a 'known cost', resources can be most effectively targeted and if large blank areas are encountered the technique could be potentially downgraded to a watching brief or vice versa.

**Sustainability**

27. Sustainable outcomes against which a development can be measured are a key component of the planning process. All three of the overarching objectives of PPS 5 enshrine sustainability as a major issue for development affecting the historic environment. The “wider social, cultural, economic and environmental benefits of heritage conservation” (CLG 2010, 2) are flagged early in the document, along with ensuring that “heritage assets are put to an appropriate and viable use” (CLG 2010, 2) and that “the positive contribution of…heritage assets to local character and sense of place is recognised and valued” (CLG 2010, 2). The final stated objective within PPS 5, stresses the importance of dissemination, which is arguably the single greatest factor which can feed into the sustainability of a given site as only through imparting the story of any archaeological discovery can a sense of ownership and value in the historic environment be engendered. The objective states that development should seek to “contribute to our knowledge and understanding of our past by ensuring that opportunities are taken to capture evidence from the historic environment and to make this publicly available, particularly where a heritage asset is to be lost” (CLG 2010, 2).

28. Adopting an integrated and question-led approach throughout a programme of archaeological works means that a coherent story can be told about the archaeology of a given site, and this is key in both engaging people and also in the ways that archaeology can feed into a development providing additional value and, ultimately, additional sustainability.

29. Sustainability of a development does not necessarily just include restoration of a site. Archaeological work offers opportunites to engage local communities in a way which is sometimes not otherwise possible. Archaeological and palaeoenvironmental work can provide information for later development and interpretation of a site, and such information can also be made widely accessible through traditional and new media.

Fig. 13 Schoolchildren from Longstone School involved in a national award-winning excavation on the Carboniferous Limestone plateau.

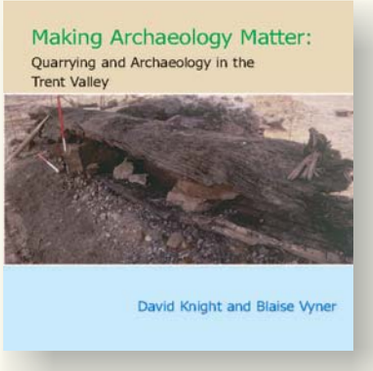



Fig. 14 ‘Making Archaeology Matter’ is a booklet published by Trent Valley GeoArchaeology which aims to provide an introduction to the archaeology and palaeoenvironment of the Trent Valley, and the issues associated with sand and gravel extraction in this landscape.

**References**


Beamish, M.G. 2009. Island Visits: Neolithic and Bronze Age Activity on the Trent Valley Floor. Excavations at Egginton and Willington, Derbyshire, 1998-1999. *Derbyshire Archaeological Journal* 129: 17-172.

Brightman, J. and Waddington, C. In press. Archaeological Excavations at Mercia Marina, Willington. *Derbyshire Archaeological Journal*.

Department for Communities and Local Government (CLG). 2010. *Planning Policy Statement 5: Planning for the Historic Environment*. London, The Stationery Office.

Department for Communities and Local Government (CLG), Department of Culture, Media and Sport (DCMS) and English Heritage (EH). 2010. *PPS 5 Planning for the Historic Environment: Historic Environment Planning Practice Guide*. London, English Heritage.

Department for Culture, Media and Sport (DCMS). 2010. *The Government's Statement on the Historic Environment for England 2010*. London, The Stationery Office.

Department for Culture, Media and Sport (DCMS). 2010a. *Scheduled Monuments: Identifying, protecting, conserving and investigating nationally important archaeological sites under the Ancient Monuments and Archaeological Areas Act 1979*. London, The Stationery Office.

English Heritage (EH). 2006. *Management of Research Projects in the Historic Environment: the MoRPHE Project Managers' Guide*. London, English Heritage.

Institute for Archaeologists (IfA). 2001. *Standard and Guidance for Archaeological Excavation*. Reading, Institute for Archaeologists.

Minerals and Historic Environment Forum (MHEF). 2008. *Mineral Extraction and Archaeology: A Practice Guide*. London, Minerals and Historic Environment Forum and English Heritage.

Palfreyman, A. 2001. Report on the excavation of a Romano-British aisled building at Little Hay Grange Farm, Ockbrook, Derbyshire 1994-7. *Derbyshire Archaeological Journal* 121: 70-161.

Passmore, D. and Waddington, C. 2009. *Managing Archaeological Landscapes in Northumberland. Till-Tweed Studies Volume I*. Oxford, Oxbow.

Passmore, D., Waddington, C. and Houghton, S.J. 2002. Geoarchaeology of the Milfield Basin, northern England; towards an integrated archaeological prospection, research and management framework. *Archaeological Prospection* 9: 71-91.

Wheeler, H. 1979. Excavations at Willington, Derbyshire, 1970-1972. *Derbyshire Archaeological Journal* 99: 58-220.


**Useful Sources of Information**

Aggregates Levy Sustainability Fund (ALSF) - **www.sustainableaggregates.com**
Association of Local Government Archaeological Officers: UK (ALGAO:UK) - **www.algao.org.uk**
British Aggregates Association (BAA) - **www.british-aggregates.co.uk**
British Geological Survey: Centre for Sustainable Mineral Development - **www.bgs.ac.uk/mineralsuk**
English Heritage - **www.english-heritage.org.uk**
Goodquarry (Resource guide created by the Mineral Industry Research Organisation) - **www.goodquarry.com**
Historic Environment Local Management (HELM) - **www.helm.org.uk**
Heritage Gateway - **www.heritagegateway.org.uk**
Institute for Archaeologists (IfA) - **www.archaeologists.net**
MAGIC (web-based mapping of environmental and land designations) - **www.magic.gov.uk**
Mineral Products Association - **www.mineralproducts.org**
National Mapping Programme - **www.english-heritage.org.uk/server/show/nav.1186**
National Monuments Record - **www.english-heritage.org.uk/server/show/nav.1530**
Online Access to the Index of Archaeological Sites (OASIS) - **www.oasis.ac.uk**
Planarch (integration of archaeology within the planning system) - **www.planarch.org**

Archaeological Research Services Ltd

PEAK DISTRICT NATIONAL PARK AUTHORITY

DERBYSHIRE County Council
Improving life for local people

ENGLISH HERITAGE

alsf Sustainable Aggregates