The Nottinghamshire Aggregates Resource Assessment

An Assessment of the Archaeological Resource of the Aggregates-producing Areas of Nottinghamshire

David Knight and Ursilla Spence, with contributions by Virginia Baddeley, David Budge and Andy Gaunt

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Cover image: Iron Age boundary ditch preserved beneath alluvial deposits masking river terrace gravels of the Trent at Hoveringham Quarry. The ditch is flanked by the remains of a sandy clay and gravel bank sealing a buried soil of dark brown silty clay loam above a clayey peat. © Trent & Peak Archaeology, on behalf of Tarmac

Fig. 1 (above) Early Bronze Age ring-ditch excavated in advance of quarrying at East Leake. The ring-ditch demarcated a funerary barrow, which served later as the focus of an Anglo-Saxon inhumation and cremation cemetery. © Trent and Peak Archaeology, on behalf of Cemex

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PREFACE

The Nottinghamshire Aggregates Resource Assessment was undertaken between 2009 and 2014 with the aim of characterising the archaeological resource of those areas of Nottinghamshire which are potentially available for aggregates extraction, assisting thereby future management of the County's cultural heritage. It was conducted by staff of Nottinghamshire County Council and Trent & Peak Archaeology (a regional office of York Archaeological Trust) with funding from the Aggregates Levy Sustainability Fund, distributed by English Heritage on behalf of the Department for Environment, Food and Rural Affairs (Defra). It forms part of a package of archaeological resource assessments relating to mineral-producing areas in England[1] and has generated a published guidance document and this archive report; both reports have been deposited with the Nottinghamshire Historic Environment Record (HER)[2] and the Archaeology Data Service[3]. A first draft of this report was submitted to English Heritage in 2011 and provided the basis of the published guidance document (Knight and Spence 2013). The GIS was updated during compilation of the guidance document and the text of this final report is based upon site distributions generated from the updated GIS and information relating to site investigations that was available to the authors in December 2014. Comments on the national and local planning frameworks also relate to the situation in December 2014. All of the site distribution maps prepared during this project may be viewed on the ADS website, while the underlying data may be consulted by application to the Nottinghamshire HER Team. Nottinghamshire County Council requires that this document be consulted by developers, consultants and contractors prior to and during the development of archaeological schemes of treatment for sites that may be impacted by aggregates extraction. It is requested also that close liaison be maintained with NCC archaeology staff in order that they may be able to advise on advances in assessment, evaluation and mitigation methodologies. Readers should note that the data sets available on the Heritage Gateway are incomplete and are not to be used for planning purposes. NCC HER staff should be consulted directly for up to date HER data.

Three Aggregate Character Areas (ACAs) are defined in this report on the basis of variations in bedrock and superficial geology and the character of the derived aggregate resource, corresponding with the Permian Magnesian Limestone, Triassic Sherwood Sandstone and Superficial (Quaternary) Sands and Gravels. Within each ACA, a series of discrete geomorphological units (landform elements) is identified, following the methodology employed in the Derbyshire and Peak District Aggregates Resource Assessment.[4] It is intended that use of this common methodology will contribute towards the development of more consistent archaeological responses to proposals for mineral extraction in the East Midlands and beyond. A concise summary is provided of the archaeological resource of Nottinghamshire's aggregates-producing areas, together with tabular summaries by period of the key monument types in each ACA that lie in areas potentially available for aggregates extraction. For each landform element, summaries are provided of the principal geomorphological processes that have moulded the landscape, specific archaeological associations and the assessment, evaluation and mitigation techniques that should be considered when preparing archaeological schemes of investigation. The key research questions that should be taken into account when developing schemes of treatment for each ACA are also highlighted, with consideration of their significance for advancing understanding of the questions raised in the East Midlands Historic Environment Research Framework (Knight, Vyner and Allen 2012).

This report is the product of a collaborative project between Nottinghamshire County Council and Trent & Peak Archaeology and was written principally by David Knight (TPA) and Ursilla Spence (NCC), with contributions from Virginia Baddeley, David Budge and Andy Gaunt (all formerly of NCC). VB advised on the HER data that form the foundation of this study. AG and DB enhanced the HER by the addition of new data from developer-funded investigations, compiled the distribution maps accompanying the 2012 archive report and assisted in the extraction and analysis of HER data. Lesley Collett (YAT), Glen McCormack (TPA) and Rachel Townsend (TPA) prepared the final versions of the maps included in this revised report, while LC prepared final versions of the graphs accompanying this report.

Thanks are extended to Paddy O'Hara (English Heritage Project Assurance Officer) and Buzz Busby (English Heritage National Terrestrial Aggregates Advisor) for their help and advice during the course of this project. The project was guided by a Steering Group comprising Wayne Allum (Minerals and Waste, Nottinghamshire County Council), Neil Beards (Tarmac), Dr Tom Bide (British Geological Survey), Lee Elliott (Trent & Peak Archaeology), Jon Humble (English Heritage) and Dr Mark Pearce (University of Nottingham). We are grateful to Steering Group members for ensuring appropriate representation of stakeholder concerns and for

[1] Listed on ADS website: https://archaeologydataservice.ac.uk/archives/view/alsf/
[2] https://www.nottinghamshire.gov.uk/culture-leisure/heritage/historic-environment-record
[3] https://archaeologydataservice.ac.uk/archives/view/nottsaggs_eh_2013/
[4] https://archaeologydataservice.ac.uk/archives/view/derbyaggs_eh_2011/index.cfm

commenting on draft versions of the text. Dr Tom Bide, together with Drs John Carney and Andy J Howard, also provided much helpful advice on the complexities of Nottinghamshire geology and geomorphology. The project has also benefited from discussions with Dr Clive Waddington, Jim Brightman and Dr Dave Passmore on the landform element approach employed in the Derbyshire and Peak District Aggregates Resource Assessment. We have also liaised extensively with other colleagues, and would like to extend particular thanks to Dr Dave Barrett, Mark Bennet, Suzy Blake, Richard Clark, Steve Dean, Dr Howard Jones, Dr Jonathan Last, Beryl Lott, John Robinson, Ken Smith and Dr Jim Williams for their input to this project and assistance with the development of appropriate assessment, evaluation and mitigation strategies. Thanks are due finally to all those who attended a Stakeholder Seminar that we organised in June 2010 at Rufford Abbey for their support and for their comments on work conducted as part of this project.

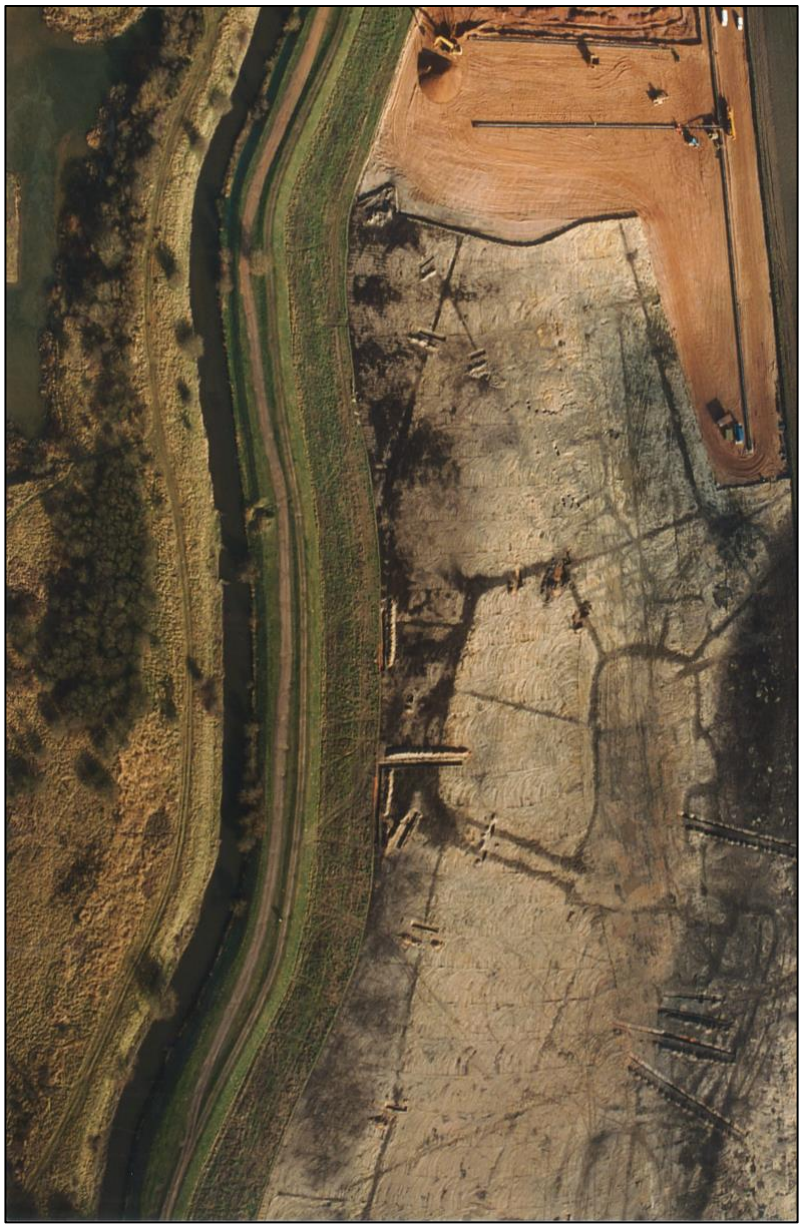

Fig. 2. Excavations in progress adjacent to the River Idle at Tiln, showing a complex network of ditched enclosures and other features associated with Iron Age and Roman settlement of the river terraces and floodplain. Photograph: Skycam Aerial Photography (Negative CCN) on behalf of Trent & Peak Archaeology and Tarmac

1. INTRODUCTION

1.1 BACKGROUND

The research that underpins this report was conducted with funding from the Aggregates Levy Sustainability Fund, distributed by English Heritage on behalf of the Department of Environment, Food and Rural Affairs (Defra). It is supported by a GIS, curated by Nottinghamshire County Council, that may be consulted by application to the Nottinghamshire Historic Environment Team[5].

From the national perspective, the project forms part of a package of Aggregates Resource Assessments that together provide a valuable resource for assessing the archaeological potential of the aggregates-producing areas of England. We have liaised closely with colleagues working in neighbouring areas of the Midlands with the aim of achieving compatible end products, and with this in mind have employed the landform element methodology that was pioneered in the Till-Tweed catchment (Passmore and Waddington 2009) and extended subsequently to Derbyshire and the Peak District (Brightman and Waddington 2010; 2011). The research agenda and strategy proposed in this document builds upon the research framework published in the East Midlands Historic Environment Research Framework (Knight, Vyner and Allen 2012) and several recent syntheses that include consideration of aggregates-rich landscapes of Nottinghamshire. These include *Trent Valley Landscapes* (Knight and Howard 2004) and *Making Archaeology Matter* (Knight and Vyner 2006), the Quaternary Research Association's field guide to the Trent Valley and adjoining regions (White *et al* eds 2007), an assessment of Pleistocene archaeological resources preserved in quarries along the Trent and beyond (Buteux ed. 2009), a major monograph dealing with the Quaternary of the Trent Valley (Bridgland *et al* eds 2014) and synthetic reviews of the cropmark landscapes of the Magnesian Limestone escarpment (Roberts *et al* 2010) and lower Trent Valley (Whimster 1989). These provide valuable foundations for assessment of the archaeological resource of the aggregates-producing areas of Nottinghamshire and for the development of appropriate assessment, evaluation and mitigation strategies.

1.2 AIMS AND OBJECTIVES

The principal aims of the Aggregates Resource Assessment were to assess the archaeological resource of those areas of Nottinghamshire that are potentially available for aggregates extraction, provide guidelines for assessment, evaluation and mitigation in advance of mineral extraction and define the key priorities for research. It should be emphasised that archaeological monument types located in urban and other areas that are unavailable for aggregates extraction fall beyond the scope of this study and have been excluded from consideration (including, for example, the caves that were dug into the sandstone bedrock of Nottingham from at least the medieval period: Waltham 2008). The built environment resource has also been excluded from consideration, although we have reviewed in detail the archaeological evidence for standing buildings that might be encountered during quarrying. It is hoped that opportunities will arise in the future to integrate more closely the diverse range of archaeological and built environment assets that survive within Nottinghamshire's aggregates-producing areas.

It is hoped that this document will provide a useful synthesis of the archaeological resource for the aggregates industry, planners, curators, consultants, contracting units and other historic environment stakeholders, facilitate decisions on strategic planning, management and the preservation of archaeological remains and historic landscapes, and increase general awareness of Nottinghamshire's archaeological resource. For this purpose, we have compiled tabular summaries of the archaeological evidence by period, with the aim of creating a user-friendly resource that may be easily updated as new discoveries emerge. These tables are presented in Section 6.2, together with a concise summary by period of the data contained in these tables (Section 6.3). The resource assessment tables provide the springboard for tabular summaries of assessment, evaluation and mitigation techniques that should be considered when developing archaeological schemes of investigation (Tables 7.2.1–7.2.7) and a research agenda and strategy for each archaeological period (Tables 8.1–8.8). These tables should be viewed as works in progress, to be revised on a regular basis as new information emerges, investigative strategies develop and research priorities change.

Attention is focused upon areas where British Geological Survey data indicate bedrock or superficial deposits suitable for use as aggregates (Harrison *et al* 2002). This has restricted the survey to assessments of the archaeological resource of the Triassic Sherwood Sandstone Group, the Permian Magnesian Limestone escarpment and the Superficial Sands and Gravels (principally of the Trent and its tributaries). Within these

[5] https://www.nottinghamshire.gov.uk/culture-leisure/heritage/historic-environment-record

zones, we have focused upon areas beyond established settlements that are potentially available for mineral extraction. References to sites outside the aggregates-producing areas have been made where appropriate, but a systematic survey of the archaeological resource of Nottinghamshire beyond the areas potentially available for aggregates extraction has not been attempted.

The key objectives of the project underpinning this document were to:

1. Define the total aggregates resource of Nottinghamshire and identify, from data held by Nottinghamshire County Council as the County Minerals Planning Authority (MPA), areas of past, present and potential extraction. This embraces all sources of fine to coarse rock particles used in construction, which for the Nottinghamshire minerals industry comprises sand, gravel and crushed limestone (Harrison *et al* 2002).

2. Define a series of **Aggregate Character Areas** (Section 4.2) by reference to variations in the character of the superficial and bedrock deposits that may be utilised for aggregates production, bearing in mind that superficial aggregates deposits may sometimes overlie bedrock resources. These areas, of Magnesian Limestone, Sherwood Sandstone and Superficial Sands and Gravels, form the foundation of this assessment, and it is hoped will provide a clear framework for decision-making by mineral planners, developers, heritage professionals and other stakeholders.

3. Assess from Historic Environment Record (HER) data and other sources the archaeological resource of each Aggregate Character Area (ACA) and of the **landform elements** within these. Details are provided in Section 6, together with a concise synthesis for each period, and in Section 7 we provide tabulated summaries of the archaeological resource of each landform. The Nottinghamshire HER was enhanced for this purpose, and all available data were incorporated into a Geographic Information System (GIS) tailored to the needs of this assessment. Interpretation of the GIS data has been facilitated by the sub-division of each ACA into landform elements, following the terminology proposed by Passmore and Waddington (2009, 5–7; Section 4.3 below). Landform elements may be defined simply as geomorphologically and topographically distinct landform units and, as demonstrated by Passmore and Waddington in the Till-Tweed basin, provide a valuable framework for assessing spatial variability in the archaeological and environmental resource and for identifying appropriate assessment, evaluation and mitigation techniques. The landform element approach forms the foundation of the Derbyshire and Peak District Resource Assessment (Brightman and Waddington 2011) and was employed in this study with the aim of ensuring compatibility between the Derbyshire and Nottinghamshire resource assessments.

4. Develop recommendations for the most appropriate assessment, evaluation and mitigation techniques to be adopted for the identification and study of particular categories of site within each landform element (Section 7).

5. Develop a period-based archaeological research agenda and strategy tailored to the needs of each Character Area (Section 8), taking into account the research priorities identified in the East Midlands Historic Environment Research Framework (Knight, Vyner and Allen 2012).

6. Increase the awareness of the minerals industry, planners and other historic environment stakeholders of the archaeological resource preserved within the aggregates-producing areas of Nottinghamshire.

It is anticipated that assessment, evaluation and mitigation strategies will evolve as knowledge accumulates and techniques of investigation develop. This assessment should be seen, therefore, as a living document requiring periodic updating as our understanding of the archaeology of aggregates-producing areas in Nottinghamshire grows and the effectiveness of particular investigative strategies develops.

Fig.3. Late prehistoric palaeochannel at Girton: one of many landform elements contributing to the topographic diversity of the Superficial Sands and Gravels. © Trent & Peak Archaeology, on behalf of Tarmac

2. THE NOTTINGHAMSHIRE AGGREGATES RESOURCE

The history of aggregates extraction in Nottinghamshire may be traced back to at least the Roman period, when sand and gravel was excavated from quarry pits or roadside ditches to provide metalled road surfaces – as demonstrated, for example, by archaeological excavations along the Fosse Way at Langford, near the Romano-British small town of *Crococalana* (Table 6.2.5.12). In addition, it has been suggested that some small pits of this period may have provided raw materials for use in the making of mortar (Cooper and Symonds 2014, 236; Johnson 1967). Documentary and cartographic sources provide clear evidence for the use of aggregates from the medieval period for purposes such as land improvement and road construction, but the large-scale mechanical extraction of aggregates dates only from the mid-20th century (Cooper 2008; Cooper and Symonds 2014, 238–42).

The extent of past quarrying and its impact upon the landscape can be judged from Map 1, which shows past as well as current extraction areas in Nottinghamshire. This demonstrates a strong focus upon the Superficial Sands and Gravels of the Trent and Idle Valleys, but also the significant impact of quarrying upon the historic environment of the Sherwood Sandstone and Magnesian Limestone.

Nottinghamshire is currently one of the leading UK producers of sand and gravel, for use principally in concrete, mortar and asphalt production. By far the greatest volume of material derives from the **Superficial Sands and Gravels**, and in particular the river terrace and sub-alluvial sands and gravels of the Rivers Trent and Idle. Key quarries, each encompassing a variety of landforms with rich archaeological resources, include Besthorpe and Langford Lowfields along the Trent to the north of Newark and Finningley in the extreme north of the County. Glaciofluvial deposits are worked at East Leake in south Nottinghamshire and around Retford in the north-west of the County, but in terms of volume are comparatively minor sources of aggregates. Coversands, which occur intermittently as dunes or as sheets of sand in the Idle and lower Trent Valleys, are also exploited (notably at Besthorpe and Girton). Again, however, they provide a small volume of material by comparison with the river terrace and sub-alluvial sands and gravels.

The bedrock Sandstone and conglomerates of the Triassic **Sherwood Sandstone Group**, especially those of the Nottingham Castle Formation, are quarried for aggregates at quarries from Scrooby and Bawtry in the north of the County to just north of Nottingham. This geological formation is largely composed of fine sand and is generally more suitable for uses such as building sand and asphalting. The landform is also notable for its importance as a source of silica sand, especially from weakly cemented parts of the sequence, and fine-grained and weakly cemented Sherwood Sandstone is worked for silica sand near Mansfield at Ratcher Hill and Oakfield Lane. This provides a source of fine aggregates, which are employed for specialist uses such as foundry sands and sands for shotblasting, block paving and asphalt.

Nottinghamshire is also a minor supplier of crushed rock for purposes such as sub-base roadstone, drainage media and constructional fill. This is derived from the Cadeby Formation of the Permian **Magnesian Limestone** escarpment that extends northwards from Nottingham into Derbyshire and Yorkshire. Large-scale production of crushed aggregates ceased in the early 1990s, but significant extraction continues at Linby, between Nottingham and Mansfield, and has recently started again at Steetley, near Worksop.

Attention should be drawn finally to a scatter of historic quarries along the **Jurassic Limestone** escarpment of SE Nottinghamshire. This landform is no longer exploited for crushed rock aggregates, and hence was excluded from this assessment.

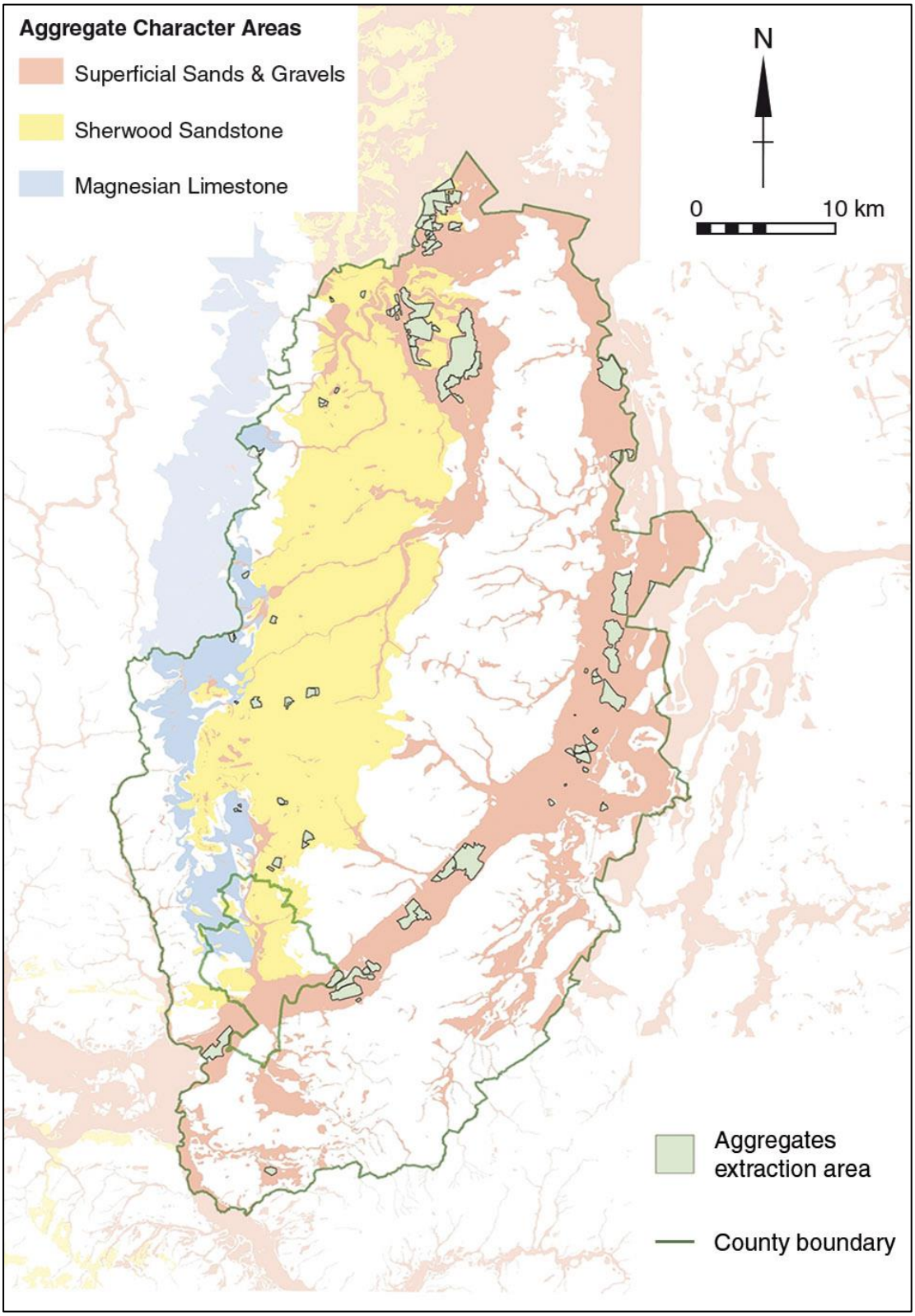

Fig.4. Distribution of aggregates extraction areas in Nottinghamshire

3. THE CURRENT PLANNING FRAMEWORK

3.1 THE NATIONAL CONTEXT

Planning policy and practice in England have undergone some major changes during the life of this project. In March 2012, the *National Planning Policy Framework* (NPPF) was published by the Department for Communities and Local Government (DCLG 2012)[6]. This replaced most of the existing Minerals Planning Guidance and Minerals Planning Statements, with the notable exceptions of the guidance documents accompanying *Minerals Policy Statement 1: Planning and Minerals* (DCLG 2006a), *Minerals Policy Statement 2: Controlling and Mitigating the Environmental Effects of Minerals Extraction in England* (ODPM 2005) and *Planning Policy Statement 5: Planning for the Historic Environment* (DCLG 2010).

Although the documents that they were intended to support have been replaced, the guidance documents accompanying MPS1, MPS2 and PPS5 remain valid pending completion of a review of the guidance underpinning national planning policy. Thus, in a revision note introducing the *PPS 5 Practice Guide* in June 2012, it was noted that 'the references to PPS5 policies in this document are obviously now redundant, but the policies in the NPPF are very similar and the intent is the same, so the Practice Guide remains almost entirely relevant and useful in the application of the NPPF.'

The correspondence between the NPPF and PPS5 derives from the direction of travel provided in 2010 by *The Government's Statement on the Historic Environment for England* (DCMS 2010a)[7]. As with PPS5, which was also published in 2010, this document emphasised the importance of informed decision-making on the basis of proportionality and made explicit the need for high-quality information and advice to be made available to decision-makers.

In its 2010 Statement, the Government outlined its strategic aims for the historic environment under the headings of 1. strategic leadership, 2. protective framework, 3. local capacity, 4. public involvement, 5. direct ownership and 6. sustainable future. Strategic Aims 2, 3 and 6 are particularly relevant in the context of this Resource Assessment, and are summarised below:

Strategic Aim 2 (protective framework): ensure that all heritage assets are afforded an appropriate and effective level of protection, while allowing, where appropriate, for well-managed and intelligent change.

Strategic Aim 3 (local capacity): encourage at a local level structures, skills and systems which:

- promote early consideration of the historic environment.
- ensure that local decision-makers have access to the expertise they need.
- provide sufficiently skilled people to execute proposed changes to heritage assets sensitively and sympathetically.

Strategic Aim 6 (sustainable future): seek to promote the role of the historic environment within the Government's response to climate change and as part of its sustainable development agenda.

The strategic aims are presented in the Government's Statement in the context of caring for the historic environment. They are restated and consolidated across all aspects of planning in the NPPF, demonstrating thereby the Government's direction of travel and the continuing validity of the Statement.

Sections 12 and 13 of the NPPF deal respectively with 'conserving and enhancing the historic environment' and 'facilitating the sustainable use of minerals', effectively covering the two subjects in a total of 24 paragraphs over seven pages.

NPPF Section 12 stresses proportionality, information and expert advice as the keys to good planning policies and decisions on the historic environment. In particular, great emphasis is placed upon the need to balance the conservation of heritage assets with information about their significance. It is noted that 'a balanced judgement will be required, having regard to the scale of any harm or loss and the significance of the heritage asset[8] [while] substantial harm to or loss of designated heritage assets of the highest significance, notably scheduled monuments, should be wholly exceptional.'[9]

[6] https://www.gov.uk/guidance/national-planning-policy-framework/
[7] https://www.gov.uk/government/publications/the-governments-statement-on-the-historic-environment-for-england
[8] *NPPF*, paragraph 135
[9] *NPPF*, paragraph 132

Appropriate consideration of the settings of heritage assets is also covered. However, where the loss of assets is acceptable, it is stated that local planning authorities 'should also require developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence publicly accessible.'[10]

NPPF Section 13 restates the axiom that minerals are finite natural resources, which can only be worked where they are found, before setting out the sustainability principles that should be adhered to during the preparation of strategic plans by local authorities. This includes the specification of environmental criteria against which planning applications will be assessed. These should ensure that there are no 'unacceptable adverse effects on the natural and historic environment' arising from either the direct or indirect impacts of minerals extraction in terms, for example, of increasing surface water flow and flood risks (paragraph 143). In addition, it is argued that policies should ensure that high-quality restoration takes place for 'agriculture (safeguarding the potential of the best and most versatile agricultural land and conserving soil resources), geodiversity, biodiversity, native woodland, the historic environment and recreation' (paragraph 143).

Although not specifically relevant to aggregates extraction, paragraph 144 of NPPF Section 13 includes consideration of the need to meet demands for small-scale extraction of building stone for the repair of heritage assets. This demonstrates that, while a very concise document, care has been taken in its preparation to highlight a wide range of issues.

For minerals planning, the advice of PPS 5, which is reiterated in the NPPF and in the Government's Statement, had been anticipated by *Mineral Extraction and Archaeology: A Practice Guide* (MHEF 2008). The Minerals and Historic Environment Forum (MHEF) represents the full range of stakeholders in the minerals planning process and is an essential discussion forum for all involved in that process. The stated purpose of the MHEF Practice Guide is 'to provide clear and practical guidance on the archaeological evaluation of mineral development sites [and to] ensure that adequate information is acquired in a cost-effective way so that an informed planning decision can be made'.[11]

The MHEF *Practice Guide* is a practical document, which helps explain the vision, aims and practice of the suite of policy and guidance documents referred to above. Its strength is that it is a consensual document, endorsed by the Forum membership, and given that it is referred to in paragraph 101 of the PPS5 *Practice Guide* is thus a material consideration in the planning process. This Resource Assessment is intended to complement the MHEF *Practice Guide* by detailing the known archaeological resource of Nottinghamshire's aggregates-producing areas and by recommending the most appropriate assessment, evaluation and mitigation techniques to be conducted in advance of and during extraction in particular landforms.

3.2 THE NOTTINGHAMSHIRE CONTEXT

Nottinghamshire County Council acts as the Minerals Planning Authority (MPA) for the whole of the County. The **Nottinghamshire Minerals Local Plan** (NMLP), published by the County Council in 2005, provides the current policy document and will remain in place until adoption of the **Minerals Core Strategy**.

Most of the policies in the NMLP were saved by the Secretary of State in December 2008, but the following policies, which repeat national guidance or relate to used mineral allocations, were deleted from the document:

M3.2: Planning obligations
M3.21: Protected Sites
M6.5: Hoveringham (Bleasby) Allocation
M6.9: Lound Allocation
M6.10: Misson (Finningley) Allocation
M7.4: Scrooby Top Allocation
M11.1: Kirton Allocation.

The NMLP will be replaced in due course by the **Minerals Core Strategy**. This will provide guidance on how much mineral will be needed over the next ten to twenty years and in broad terms the preferred areas for extraction. It will also provide an indication of the potential impact of quarrying upon the archaeological resource of the aggregates-producing areas of the County.

Work is currently being undertaken on a **Site-Specific Document**, aimed at identifying sites with the potential to be allocated for mineral extraction, but this document cannot progress far until the Minerals Core Strategy

[10] *NPPF*, paragraph 141
[11] *MHEF* 2008,1

has been adopted. The results of this Aggregates Resource Assessment have clear potential, therefore, to feed directly into the on-going assessment of potential mineral allocations.

The MPA is currently defining **Minerals Safeguarding Areas**. These represent areas with proven mineral resources, within which districts and developers must pay due attention to the potential of alternative developments to sterilise the mineral resource. A draft consultation document has been considered by districts and developers. However, until the Minerals Core Strategy and allocation documents are completed, it is not possible to elaborate further on the potential scale of future aggregates extraction or, therefore, the impact of future quarrying upon the archaeological and built environment resource.

This Resource Assessment provides a valuable addition to each of the above documents. It provides a strategic overview of aggregates deposits and their archaeological resource, which will assist future decision-making on the protection, management and investigation of archaeological sites and historic landscapes through the planning process. It is hoped that resources will be made available for periodic updating of this document, bearing in mind the steady accumulation of new data as a result principally of developer-funded archaeological investigations, advances in prospection techniques and changing research priorities.

Fig.5. View towards the Nottinghamshire side of the Magnesian Limestone gorge at Creswell Crags, showing the mouth of Church Hole Cave. Caves and rock shelters preserving important evidence for Palaeolithic and later activity have been recorded in many of the limestone gorges that dissect the Magnesian Limestone escarpment. Subterranean features may be clearly visible, as here, but caves and rock shelters preserving significant cultural and environmental remains are often buried beneath thick slope deposits. © Trent & Peak Archaeology, December 2012

4. METHODOLOGY

4.1 DEFINING THE AGGREGATES RESOURCE

A valuable overview of the County's mineral resources is provided in a report prepared for the Department of Transport, Local Government and the Regions' research project *Mineral Resource Information in Support of National, Regional and Local Planning* (Harrison *et al.* 2002). The map accompanying this report distinguished all mineral resources that at the time were viewed as potentially of economic interest, sites of active and past mineral extraction that had been the subject of planning permissions and locations where aggregates were extracted without permission (either illegally or from historic quarries). The map was derived from British Geological Survey geological data, with refinements to take account of the potential depth of overburden and the possible quantity of the mineral resource, and it was added as a layer to the project GIS.

Although a useful guide to the County's mineral resources, it became apparent from discussions with Steering Group members that some areas that would now be considered as commercially viable for extraction had been excluded from consideration. In view of this, it was decided to broaden the current assessment to include the full extent of each of the aggregates-producing geologies, regardless of current economic viability. This has ensured that the study area will not need to be extended in the future. BGS map data were employed for this purpose and are available as a layer on the project GIS.

BGS base map data also provide a more precise record of the spatial extent of each Aggregate Character Area and landform element than the report published in 2002. Use of BGS data has assisted studies of associations between monument types and landform elements, although the boundaries between landforms are often difficult to locate precisely on the basis of existing information. Locational analyses are also complicated by the exclusion from the BGS database of information on the spatial distribution of important masking deposits such as talus and colluvium, and thus many subtleties in the spatial distribution of archaeological sites may elude analyses based solely upon current GIS data.

4.2 AGGREGATE CHARACTER AREAS

The minerals information derived from BGS sources has permitted definition of three **Aggregate Character Areas**, differentiated on the basis of variations in bedrock and superficial geology and the character of the derived aggregates resource. This simple division stems from Steering Group recommendations that the Character Areas should be readily recognisable by minerals industry planners and other historic environment stakeholders; it was devised in consultation with colleagues in the British Geological Survey, Nottinghamshire County Council and the minerals industry. It is hoped that this will provide a useful framework for assessing spatial variability in the archaeological resource between aggregates-producing areas – and hence will contribute towards the development of assessment, evaluation and mitigation strategies tailored specifically to the requirements of particular aggregates environments.

Nottinghamshire is a major producer of sands and gravels, which are derived principally from river terrace deposits and to a significantly lesser extent from glaciofluvial sands and gravels, coversands and Sherwood Sandstone Group bedrock. The County is also a minor supplier of crushed rock derived from bedrock sources on the Cadeby Formation of the Magnesian Limestone escarpment. These drift and bedrock sources have been grouped for the purposes of this study into three Aggregate Character Areas, which are defined below.

Superficial (Quaternary) Sands and Gravels

British Geological Survey base mapping permits a basic distinction between a) river terrace sands and gravels, particularly of the Idle Valley, Middle and Lower Trent Valleys, Soar Valley and Vale of Belvoir, b) glaciofluvial deposits formed in close association with Pleistocene glaciers, and (c) the Lateglacial and Early Holocene coversands that are distributed intermittently along the eastern edge of the lower Trent Valley.

Feedback from the Steering Group made it clear that these divisions of the Superficial Sands and Gravels were not necessarily recognised by the industry, which would tend to differentiate aggregates by their commercial end-use rather than geomorphological processes. It was agreed, however, that significant archaeological differences could emerge from assessments of coversands, river terraces and glaciofluvial deposits, which might require the use of different techniques for assessment and evaluation of their archaeological resources. This basic threefold distinction was therefore retained and forms a key element of the analyses presented below.

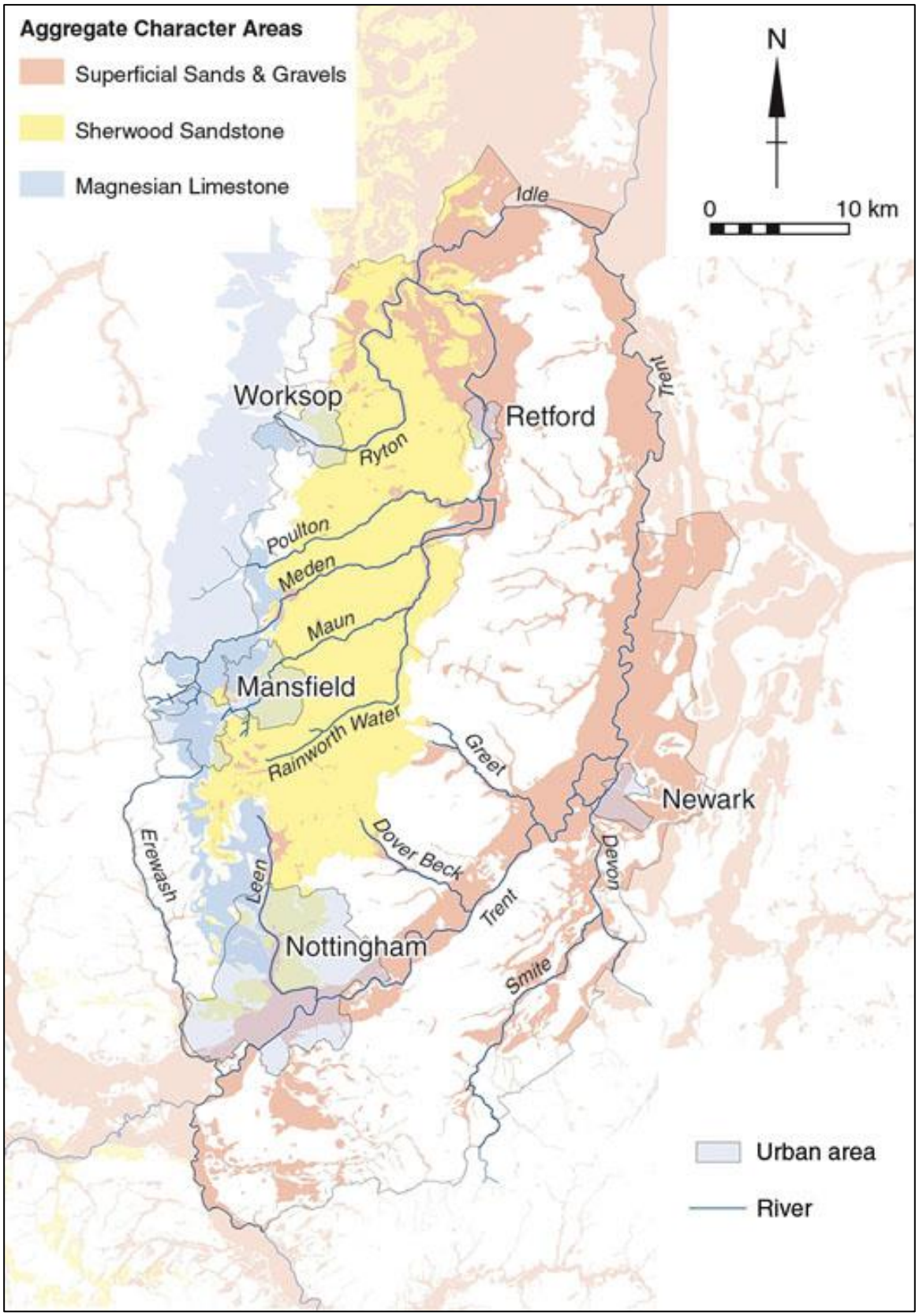

Fig. 6. Nottinghamshire Aggregate Character Areas, main urban areas and rivers

Triassic Sherwood Sandstone Group

The Nottingham Castle Sandstone Formation provides aggregates that are mainly friable, loosely consolidated and easily worked. It is extracted at several sites from Nottingham northwards to Scrooby and Serlby in the extreme north of the County. It is predominantly a fine sand with sparse (<2%) gravel and is particularly useful for building sand and asphalting.

Permian Magnesian Limestone

Dolomites and dolomitic limestones of Lower Magnesian Limestone (Cadeby Formation) crop out on the western edge of the County. A small outcrop of the Upper Magnesian Limestone (Brotherton Formation) also exists to the north of Worksop, but has not been exploited commercially in Nottinghamshire due to it being very thin. These limestones are mostly porous, weak and friable, but, although of insufficient strength to yield good quality crushed rock aggregates, are generally suitable for sub-base roadstone, drainage media and fill. Large-scale production of crushed aggregates ceased in the early 1990s, following the exhaustion of reserves at a quarry near Mansfield Woodhouse. Since 2000, production of crushed stone has occurred intermittently at a quarry near Nether Langwith, which serves as a satellite to a quarry at Whitwell in Derbyshire. Small-scale extraction of building stone occurs near Linby, where aggregates can be produced from reject stone.

4.3 LANDFORM ELEMENTS

Landform elements have been differentiated within each Aggregate Character Area on the basis of their age and geomorphology (compare Passmore and Waddington 2009, 5–7; Brightman and Waddington 2010, 4) and provide a useful framework for assessing spatial variability in the archaeological and environmental resource and for understanding processes of landscape evolution. The range of landforms that may be recognised within each Aggregate Character Area was determined in consultation with colleagues working on the Derbyshire and Peak District Aggregates Resource Assessment. Many landform elements occur in both areas, with the notable exception of the coversands of eastern Nottinghamshire. Use of this common methodology aids, therefore, archaeological comparisons between Counties and the development of a consistent approach to assessment, evaluation and mitigation.

A full list of Nottinghamshire landform elements is provided in Table 4.3.1 below. Correlations are noted in this table between landforms identified in Derbyshire and the Peak District (Brightman and Waddington 2011) and those characterising the Aggregate Character Areas of Nottinghamshire. The mode of formation of each landform, their physical characteristics and the geomorphological processes that may have impacted upon the archaeological resource of each are summarised in the tables that form the core of Section 7. The impact of colluviation and other slope processes upon site visibility and preservation is also considered, but assessment of the full impact of these processes is limited by the paucity of detailed information on the spatial distribution of colluvial and other deposits that might mask archaeological features and deposits.

Fig.7. Girton Quarry: section through the Holocene coversands that extend along the eastern side of the Trent Valley, showing a pair of dunes cross-cutting horizontally bedded sands. The dunes display steeply dipping slipfaces (down which sand grains would have tumbled) and gentle dip slopes formed by the lateral creep of sand grains blown by the prevailing wind. © Trent & Peak Archaeology, on behalf of Tarmac

Geological period	Nottinghamshire Landform Element	Notts ACA	Derbys Land-form
Permian *c.*299–51 mya (million years ago)	**Magnesian Limestone bedrock**. This landform element corresponds to areas of the Magnesian Limestone escarpment that are not cloaked by superficial drift deposits, although determination of the actual extent of this landform element is complicated by the existence of colluvium, talus (scree) and other masking deposits that have yet to be mapped systematically. In addition, some thin till deposits may not have been recognised in the field, and the extent of till may be significantly underestimated.	ML	**1c**
Triassic *c.*251–200 mya	**Sherwood Sandstone bedrock**. This landform element corresponds to areas of the Sherwood Sandstone exposure that are not buried beneath superficial drift deposits, although determination of the actual extent of this landform is complicated by the existence of colluvium and other slope deposits that have yet to be mapped systematically. In addition, some thin till deposits may not have been recognised in the field, and as with the Magnesian Limestone the extent of glacial till across this geological zone may be significantly underestimated.	SS	**1e**
Pleistocene *c*. 1.8mya–*c*.9500 cal BC	**Middle Pleistocene Tills**, deposited by Anglian (MIS 12) glaciers, occur as eroded deposits on higher ground, and may mask Magnesian Limestone or Sherwood Sandstone. It remains unclear how far the region that is now Nottinghamshire was affected by the recently identified MIS 8 glacial incursion (Carney 2007; White et al 2007a, 13; Bridgland *et al* eds 2014, 313–8, fig.6.5) but the County lay beyond the limit of the Late Devensian (MIS 2) glaciation.	ML SS	**2a**
	Undifferentiated deposits (including head and talus, formed by freeze-thaw of rocky outcrops in periglacial conditions, colluvium and alluvial fans). These deposits are shown on BGS maps and are indicated on the base map utilised for this project. Deposits may vary significantly in character, however, as also may their archaeological associations. As in Derbyshire and the Peak District, such deposits are excluded from the tables of archaeological associations.	ML SS SSG	**2b**
	Glaciofluvial sands and gravels, formed in close association with Pleistocene glaciers (e.g. sub-glacial stream deposits). These superficial deposits may mask Magnesian Limestone and Sherwood Sandstone aggregates resources.	SSG ML SS	**2c**
	River terrace sands and gravels, formed by the downcutting of floodplain surfaces by meltwater-enriched streams during glacial-interglacial transitions. The Holme Pierrepont Terrace, formed by downcutting of the floodplain during late MIS 2, has been vigorously reworked by **Holocene fluvial activity**, creating scroll bars, levees and a variety of other features that may stand above the general level of the modern floodplain (Howard 2007, 46; White *et al* 2007a, 20). These reworked sands and gravels may incorporate a rich range of redeposited and *in situ* cultural remains.	SSG	**2d**
	Coversands. Wind erosion of exposed surfaces across the sparsely vegetated landscapes that prevailed during cold periglacial stages of the Devensian Glaciation caused the deposition of extensive coversands along the eastern edge of the lower Trent Valley and in the Idle Valley (Howard and Knight 2004a, 22). These blown sands may seal or be interleaved with significant Palaeolithic archaeological remains. Recent archaeological discoveries, notably at Farndon Fields near Newark, indicate that coversands are more widely distributed along the Trent Valley than may be deduced from current BGS records.	SSG	Absent
Holocene *c*.9500 cal BC to present	**Alluvium:** modern floodplain deposits and alluvial veneers spilling from the modern floodplain across late Pleistocene terraces or other geological deposits. Alluvium may cover *in situ* Pleistocene deposits or fluvially redeposited sands and gravels and may be interstratified with or underlie **peat**. Alluvial deposits overlying the MIS2 Holme Pierrepont Terrace at Farndon Fields have been dated by OSL techniques to the **Late Pleistocene**, indicating a rather earlier genesis for some deposits (Table 7.2.5), but this is principally a Holocene deposit.	ML SS SSG	**3a**
	Palaeochannels and carrlands. Old river channels are often incised into Holme Pierrepont (MIS2) Sands and Gravels and may underlie alluvial deposits. They may also preserve rich organic deposits, artefacts and associated structural remains such as fishweirs. The Lower Trent in particular preserves extensive Holocene peat deposits, stratified above alluvium and associated with pollen and other organic remains. This distinctive **carrland** environment forms part of the Humberhead Levels (Van de Noort and Ellis eds 1997) and in recent times has been modified significantly by extensive peat-cutting.	SSG	**3b**
	Alluvial fans and colluvial spreads. Some deposits have been mapped by the BGS and during other site investigations (e.g. Shelford: Hill ed. 2008) but further field survey is required to map comprehensively these and other slope deposits that might seal archaeological remains. As in Derbyshire and the Peak, such deposits are excluded from the tables of archaeological associations.	ML SS SSG	**3d**
	Coversands may have been reworked at various stages of the Holocene in response to human interference with vegetation and/or climatic change, notably around Tiln and Girton in the lower Trent and Idle Valleys in the Mesolithic, Roman and Early Medieval periods (e.g. Baker and Bateman 2010; Howard 2007, 44; Howard and Knight 2004a, 32–3, 120). There is significant potential, therefore, for the burial of Holocene as well as earlier sites.	SSG	Absent

Table 4.3.1. Landform elements of the aggregates-producing areas of Nottinghamshire, showing correlations with Aggregate Character Areas and Derbyshire/Peak District landform elements (ML: Magnesian Limestone; SS: Sherwood Sandstone Group; SSG: Superficial Sands and Gravels. MIS: Marine Isotope Stage: see Table 5.1 for more details)

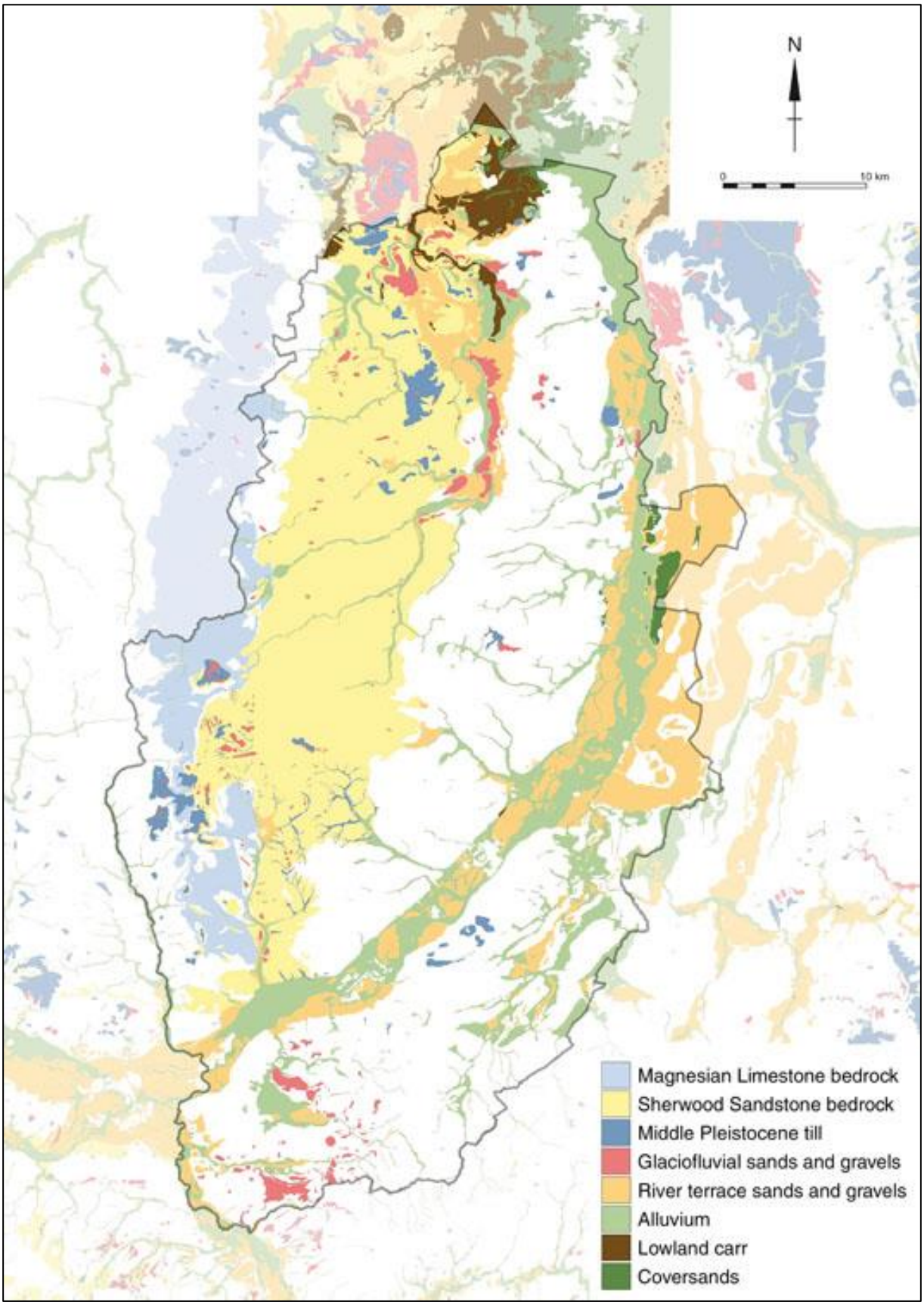

Fig. 8 Nottinghamshire landform elements

4.4 THE PROJECT GIS

The Geographic Information System was created in MapInfo in a format that permitted a simple transfer to ArcGIS. This enabled translation of most data from the Nottinghamshire County Council Historic Environment Record GIS to the ArcView 9.3 software used by Trent & Peak Archaeology.

The GIS comprises the following base data layers:

- Ordnance Survey Mastermap (2009) and OS 1:25000 map.
- Old Ordnance Survey base maps, including the 1st edition 25 inches to 1 mile (1881).
- Chapman's 1774 map of Nottinghamshire and Sanderson's 1835 map *Twenty Miles around Mansfiel*d. Both maps were digitised and georeferenced. The Sanderson map was translated to ArcView 9.3 and included in the ArcGIS, but the Chapman map could not be translated to ArcView software.
- Vertical aerial photography (copyright Bluesky 2007). This was compiled within the MapInfo GIS for analysis but was not transferred to ArcView due to file size.
- Solid and drift geological data (copyright of British Geological Survey).

The project also utilised several datasets derived from the Nottinghamshire HER. These are based upon interpretations of information derived from a range of sources, and include the following:

4.4.1 National Mapping Project data

NMP data comprise a digitised version of hand-drawn transcriptions of crop-and soil-marks interpreted as archaeological in origin and have been fully integrated into the HER. These features were identified on vertical and oblique aerial photographs taken over a range of years. More information on the methodology employed during mapping of the Nottinghamshire aerial photographic data may be obtained from the project report compiled by Deegan (1999). There has been no systematic programme of interpretation since the MORPH2 database was compiled as part of the NMP project in the early 1990s. Since then, fieldwork has served to answer questions of function and date on a number of important cropmark sites, allowing the possibility that sites of analogous form might now be more confidently interpreted and dated. Existing cropmarks within the Aggregate Character Areas that were recorded as of unknown date were re-examined as part of this project, permitting assignation of a tentative date to many of these on the basis of their morphology. The revised provisional dating was added to the GIS layer.

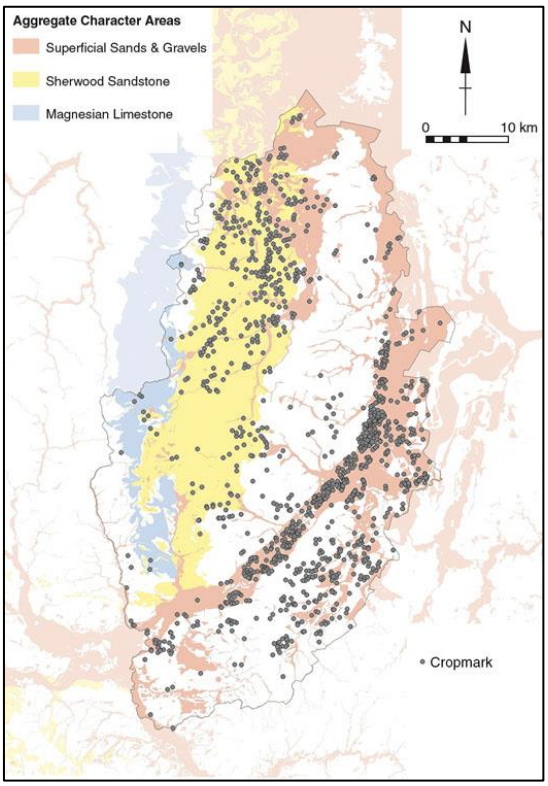

Fig.9. Distribution of recorded cropmarks in Nottinghamshire

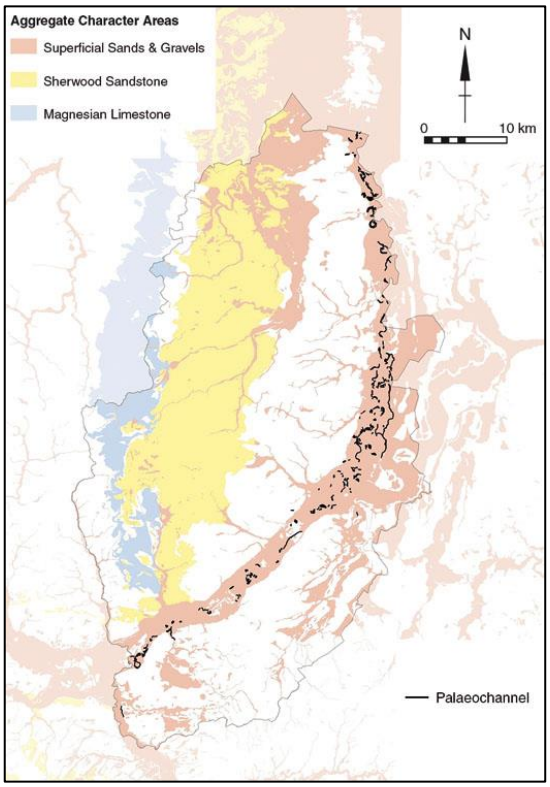

Fig.10. Distribution of recorded palaeochannels in Nottinghamshire

4.4.2 Historic Landscape Characterisation data

HLC data derive from an English Heritage and Nottinghamshire County Council partnership project begun in 1998. It was one of the first such projects to be undertaken, predating development of the methodology that is now consistently employed for HLC surveys. It has limited value, therefore, for some phases of landscape development, but is a particularly valuable tool for understanding medieval and later agrarian landscapes. Most of the HLC data have been added to the project GIS, but particular use has been made of the categories associated with medieval open field systems and Parliamentary enclosures.

4.4.3 Holocene Palaeochannels

Plots of Holocene palaeochannels, generated from a survey of Nottinghamshire air photographic sources conducted in 1994, have been incorporated into the GIS. This information could usefully be enhanced by the addition of lidar data and further targeted documentary, cartographic and field research, but provides a valuable foundation for studies of the County's palaeochannel resource.

4.4.4 Archaeological Sites and Finds

Data layers for each archaeological period were created by querying the HER database and extracting layers of information as MapInfo table files. These were converted to ESRI shapefiles for use in ArcGIS. The ArcGIS layers were separated by period, and for each period maps are provided of **Elements** and **Monuments.**

Elements represent the physical components of Monuments, which cannot on their own describe the form or function of the site of which they formed part, and include individual features such as pits, findspots (single finds) and finds scatters. Element records have been subject to minimal interpretation, describing only the information as found, observed and recorded, and depending upon the extent of work may or may not be linked to Monuments. Some Elements may form parts of two or more Monument records, either because they have been re-used (for example, an Iron Age linear bank that was followed subsequently by a parish boundary) or because they may be interpreted in a variety of ways (for example, a ditch that may form part of either an Iron Age or a Romano-British settlement or field system).

Monuments represent sites that can be defined in terms of their function or form, and records of these represent interpretations based on the physical evidence of Elements. In the Nottinghamshire HER, a Monument record must have at least one associated Element Record. Monuments Records may be linked to Scheduled Ancient Monument Records and/or to one or more Building Records.

For the Neolithic and later periods, monument types were grouped in the GIS into functional classes, employing the hierarchical classification devised for the Monument Type Thesaurus [12]. This provided an effective method for examining the distribution of the increasingly diverse range of archaeological sites and expedited assessment of the archaeological resource.

4.5 HER ENHANCEMENT

The Nottinghamshire Historic Environment Record was enhanced for this project by the incorporation of new data from the HER Documents Register and by consideration of hitherto unrecorded data derived from backlog projects conducted in advance of aggregates extraction.

Maps showing the distribution of archaeological investigations in the County were updated by a search of the Documents Register, which is a list of all archaeological reports received by the Nottinghamshire HER. This assisted the creation for each of the Aggregate Character Areas of an up to date map of archaeological interventions, and provided a useful indication of variations in the level of archaeological knowledge between the intensively studied river valleys of the Trent, Soar and Idle and the comparatively poorly researched Sherwood Sandstone and Magnesian Limestone outcrops.

A study was also conducted of archaeological investigations undertaken as a result of aggregates extraction but not yet available as archive or published reports. This work made use of the guidance and task-specific database developed by ARCUS[13] (2007) on behalf of English Heritage. All relevant archaeological contracting organisations were contacted and were requested to supply copies of reports that had not yet been deposited in the HER. Information contained in newly submitted reports was incorporated into the HER, further enhancing

[12] http://www.heritage-standards.org.uk/fish-vocabularies/
[13] Archaeological Research and Consultancy at the University of Sheffield

this record, and the list of archaeological investigations conducted in advance of and during aggregates extraction that have yet to be reported and disseminated was augmented.

In total, nearly 100 documents were added to the HER as a result of these tasks, which in turn resulted in the generation of 99 Event records, 206 Element records and 25 Monument records. Lists of HER entries that were created or modified are preserved in the project archive maintained by the Nottinghamshire HER.

4.6 ARCHAEOLOGICAL RESOURCE ASSESSMENT

Tabular summaries of the archaeological resource of each Aggregate Character Area were compiled from information contained in published syntheses and site reports, unpublished archive reports and HER data up December 2012, and may be consulted in Section 6. Separate tables were prepared for each period. For the Neolithic and later periods, information on the archaeological resource was grouped under headings correlating with the functional class categories defined in the Monument Type Thesaurus[14].This provides a valuable link with the HER database, which utilises these monument types, and with the site distribution maps. The archaeological resource for each Aggregate Character Area is presented side by side in each table, permitting easy comparison of the data available for each area.

Details are also provided in these tables of assessment, evaluation and mitigation techniques that should be considered for each of the monument classes occurring within Aggregate Character Areas. These recommendations, alongside those proposed for particular landforms (Section 7), have been developed with the aim of refining further the schemes of investigation developed in support of extraction proposals.

Computer-generated maps have been compiled for each period, showing the total distribution of Monuments (which may contain many Elements) and of Elements that cannot be linked to a Monument type (e.g. single pits and ditches). Together, these provide a picture of the distribution of known sites for each period. Additional maps, plotting particular Monument or Element types, have also been prepared.

4.7 ARCHAEOLOGICAL ASSOCIATIONS WITH LANDFORMS

Tabular summaries are provided in Section 7 of the geomorphological processes operating within each landform, together with observed archaeological associations and landform-specific assessment, evaluation and mitigation techniques. This has been developed with reference to the tabular format devised for the Derbyshire and Peak District Aggregates Resource Assessment, with the aims of ensuring compatible end products and of summarising succinctly the key conclusions of this project.

4.8 RESEARCH AGENDA AND STRATEGY

A Research Agenda and Strategy has been developed for each archaeological period, employing an innovative tabular format permitting easy comparison between each of the Aggregate Character Areas (Section 8). Agenda priorities have been defined by reference to the research priorities outlined in the East Midlands Historic Environment Research Framework (Knight, Vyner and Allen 2012) but with due regard to research questions that are of particular relevance to Nottinghamshire. As an example, attention has been drawn to the pressing need for further work on the origins of the brickwork-plan field systems of the Sherwood Sandstone. This is particularly critical for understanding changes in the agrarian economy of Late Iron Age and Roman Nottinghamshire and the impact of these changes upon settlement patterns and the wider landscape.

Correlations have been noted between each Agenda Topic and the Agenda priorities identified in the East Midlands Historic Environment Research Framework, with the aim of highlighting links with regional research priorities and topics identified in other period- and subject-based research frameworks. Agenda and Strategy priorities for each archaeological period have been summarised in a single table, permitting easy identification of correlations between Agenda Topics and proposed Strategies. In addition, a distinction has been drawn between Strategies that may be applied broadly and those that are specific to particular Aggregate Character Areas. From the Palaeolithic perspective, for example, prospection for caves sealed by talus deposits is clearly only relevant in the context of the Magnesian Limestone, while prospection for pre-Anglian river deposits must necessarily be restricted to the Superficial Sands and Gravels. Searches for Upper Palaeolithic open-air sites, by contrast, are prioritised for each of the Aggregate Character Areas. It was judged appropriate, given the significant overlap of research priorities between the Post-Medieval and Modern periods, to combine these periods in a single table, but otherwise the period divisions in these tables echo those of the East Midlands regional research framework.

[14] http://www.heritage-standards.org.uk/fish-vocabularies/

5. THE CHRONOLOGICAL FRAMEWORK

The chronological framework employed here follows the period divisions of the East Midlands Historic Environment Research Framework (Knight, Vyner and Allen 2012) in order to ensure compatibility between the research frameworks proposed for the aggregates-producing areas of Nottinghamshire and the wider East Midlands region. Details of the nine periods that form the framework of this document are provided in the table below.

PERIOD	DATE RANGE kya: thousand years ago (period beyond the limits of radiocarbon calibration) [15]; cal BC: calibrated years BC (periods where radiocarbon dates may be calibrated to acceptable levels of accuracy)[16]	COMMENTS
PLEISTOCENE		
Palaeolithic (Old Stone Age)	Archaeological Period 1 (Cromerian and early Intra-Anglian): *c.*950/850–*c.*450kya (MIS 25/21–MIS12)	Pleistocene hunter-gatherer communities: intermittent occupation, correlating with periods of warmer climate. Periods 1 to 5 follow the scheme of archaeological periods outlined by McNabb[17] and are dated broadly by correlations with Marine Isotope Stages (MIS)[18]. In Britain, the earliest cultural remains of Period 1 may be correlated currently with either MIS 25 (970–936kya) or 21 (866–814kya)[19]. Period 1 activity is known in the East Midlands but cannot yet be closely dated. The Notts. HER distinguishes Lower, Middle and Upper Palaeolithic periods, which correlate respectively with Archaeological Periods 1–2, 3–4 and 5.
	Archaeological Period 2 (Pre-Levallois Lower Palaeolithic): *c.*450–*c.*250kya (MIS12–Early MIS8)	
	Archaeological Period 3 (Levallois Lower Palaeolithic): *c.*250–*c.*150kya (Late MIS8–Early MIS6)	
	Archaeological Period 4 (Mousterian): *c.*60–c.40kya (MIS3)	
	Archaeological Period 5a (Early Upper Palaeolithic): *c.*40–*c.*27kya (Late MIS3–Early MIS2)[20]	
	Archaeological Period 5b (Late Upper Palaeolithic): *c.*13,000–*c.*9,500 cal BC (Late MIS 2)[21]	
HOLOCENE		
Mesolithic (Middle Stone Age)	*c.*9500–*c.*4000 cal BC.	Post-glacial (Early Holocene) hunter-gatherer communities, characterised archaeologically by distinctive lithic artefact kits. Typological developments in lithic tool technology permit a distinction between an Earlier and Later Mesolithic, divided at *c.*8000 cal BC[22].
Neolithic (New Stone Age) to Middle Bronze Age	Neolithic: *c.*4000–*c.*2200 cal BC.	Further changes in lithic artefact technology, coinciding with a gradual shift from a hunter-gatherer to agricultural subsistence base and other key changes (e.g. pottery production and later Neolithic copper metallurgy
	Early Bronze Age: *c.*2200–c.1500 cal BC	Expansion of bronze-working technology. Technological & typological developments in bronze artefact assemblages differentiate the Early & Middle Bronze Ages
	Middle Bronze Age: *c.*1500–*c.*1150 cal BC	
Late Bronze Age and Iron Age	Late Bronze Age: *c.*1150–*c.*800 cal BC	Further developments of bronze-working technology and artefact typology.
	Iron Age: *c.*800 cal BC–AD 43	Replacement of bronze by iron as the principal metal for tools and weapons (developing from LBA roots).
Romano-British	AD 43–*c.*410	From the Claudian conquest to the collapse of Roman administration and the withdrawal of Roman political and financial support in early 5th century. The conventional date of *c.*AD 410 is employed here, but the chronology of the ending of Roman Britain remains unclear.[23]
Early Medieval	*c.* 410–1066	From the withdrawal of Rome to the defeat of Harold by William I. This embraces a 'sub-Roman' period preceding settlement from the 5th century of Germanic migrants, Viking raids culminating in establishment of the Danelaw (793–1042) and re-establishment of the Anglo-Saxon monarchy after Cnut's defeat in 1042.
High Medieval	1066–1485	From the Norman Conquest to the Battle of Bosworth. This crucial battle saw the defeat of Richard III by Henry Tudor and the beginning of the Tudor dynasty.
Post-Medieval	1485–1750	From the Battle of Bosworth to the beginning of the Industrial Revolution.
Modern	1750 to present	The Industrial Revolution, driven by developments from the 18th century in the Derwent Valley, Ironbridge Gorge and elsewhere, heralds the beginning of the Modern era.

Table 5.1 Chronological framework

[15] As employed by McNabb, J. 2006.'The Palaeolithic', in Cooper, N (ed) 2006, 11-49
[16] For radiocarbon conventions, see e.g. Buteux, S (ed) 2009, 107–8
[17] McNabb 2006, 13–17
[18] McNabb 2006, fig.11; see also Bridgland, D R *et al* eds 2014, Section 1.4, 14–20 for useful summary of MIS scheme
[19] Parfitt, S A, Ashton, N M and Lewis, S C *et al* 2010; see also Parfitt, Ashton and Lewis in *British Archaeology* **114**,15–23
[20] See also Pettitt, P B 2008, Table 2.1
[21] See also Pettitt, P B 2008, Table 2.1
[22] Myers, A M 2006. 'The Mesolithic', in Cooper, N (ed) 2006, 53.
[23] Moorhead, S 2010 '410–2010: Rome and Britain' *British Archaeology* **111**, 17–21

6. THE ARCHAEOLOGICAL RESOURCE

6.1 INTRODUCTION

In common with the rest of the County, the aggregates-producing areas of Nottinghamshire have enjoyed a long history of antiquarian attention. This may be traced back to the 17th and 18th centuries with the investigations of antiquarians such as Robert Thoroton (1677; Henstock and Train 1977), Hayman Rooke (Sherratt 1965; Sloane 2008) and William Stukeley (1724) and, into the Victorian period and beyond, the work of scholars such as William Boyd Dawkins. The last of these was particularly fascinated by the caves at Creswell Crags which, along with other caves and rock shelters across the Magnesian Limestone escarpment, harbour a Palaeolithic resource of international importance (Jenkinson 1984; Pettitt and Jacobi 2009).

Explorations of Trent Valley quarries may be traced back to the late 19th and early to mid-20th centuries with discoveries around Nottingham and Derby by Fred Davey, Alfred Armstrong and George Turton (Bridgland *et al* eds 2014, 241–2, 246–8; Cooper 2008, 95–6). Excavations of sand and gravel quarries such as Stoney Street and Tottle Brook in Beeston uncovered Palaeolithic handaxes, flake tools and debitage which, although small in quantity by comparison with the Thames Valley or East Anglia, permitted new insights into the early settlement of Nottinghamshire. The first synthesis of this evidence was provided by Merrick Posnansky (1963), since when the pace of archaeological discovery has accelerated enormously. More recent reviews have provided updated syntheses of the archaeological and environmental resource of the Trent catchment (Bridgland *et al* eds 2014; Knight and Howard 2004) and along with the Derbyshire Aggregates Resource Assessment (Brightman and Waddington 2011) provide valuable companions to this report.

From the 1980s onwards, planning legislation and government guidance placed increasing emphasis on the need to consider archaeological issues in the planning process. In consequence, significant programmes of archaeological work, particularly on sand and gravel sites, were secured as a matter of course in Nottinghamshire even before the publication of *Planning Policy Guide Note 16* (Dept of the Environment 1990). The increasingly close liaison between archaeological curators and aggregates planners has transformed our understanding of the archaeology of the aggregates-producing areas of Nottinghamshire, and as shown in the tables below has enhanced significantly the HER resource. These tables provide succinct summaries of the HER records for each Aggregate Character Area and the County as a whole, together with a breakdown by period. The period divisions employed by the HER do not correlate precisely with the chronological scheme employed in this report (Table 5.1) but the benefits of synchronising the chronological frameworks employed in this study and the regional research framework (Cooper ed. 2006; Knight *et al* 2012) were thought by the authors to outweigh the benefits of adhering strictly to the HER scheme.

	Hectares	Km²	% of Notts area	Total sites	% of Notts sites	Sites per ha	Sites per km²
County	215,500	2155.0		15812		0.07	7.34
Sands and Gravels	68,310	683.10	31.7	5122	32.4	0.07	7.50
Magnesian Limestone	9453	94.53	4.4	805	5.1	0.08	8.51
Sherwood Sandstone	58,940	589.4	27.3	2471	15.6	0.04	4.19
All ACAs	136,703	1367.03	63.4	8398	53.1	0.06	6.14
Other areas of Notts	78,797	787.97	36.6	7414	46.9	0.09	9.41

Table 6.1.1. Frequency of archaeological sites in ACAs, non-aggregates-producing areas and Nottinghamshire generally

	Sands and Gravels		Mag. Limestone		Sherwood Sandstone		All ACAs		County	
	Sites recorded in HER									
Period	Total	Per km²	Total	Per km²	Total	Per km²	Total	Per km²	Total	Per km²
Palaeolithic	22	0.03	14	0.15	3	0.01	39	0.02	48	0.02
Mesolithic	27	0.04	8	0.08	12	0.02	47	0.03	50	0.02
Neolithic	55	0.08	6	0.06	10	0.01	71	0.05	229	0.11
Bronze Age	333	0.49	87	0.92	107	0.18	527	0.38	699	0.32
Iron Age	81	0.12	2	0.02	19	0.03	102	0.07	132	0.06
Roman	219	0.32	29	0.31	75	0.13	323	0.23	1204	0.56
Early Med	102	0.15	0	0	12	0.02	114	0.08	174	0.08
High Med	672	0.98	90	0.95	325	0.55	1087	0.79	1764	0.82
Post-Med	538	0.79	80	0.85	260	0.44	878	0.64	1227	0.57
Modern	1337	1.96	244	2.58	658	1.12	2239	1.63	5776	2.68
Undated	1736	2.54	245	2.59	990	1.68	2971	2.17	4509	2.09
Total	5122	7.50	805	8.51	2471	4.19	8398	6.14	15812	7.34

Table 6.1.2. Frequency of archaeological sites in each ACA and in Nottinghamshire by period

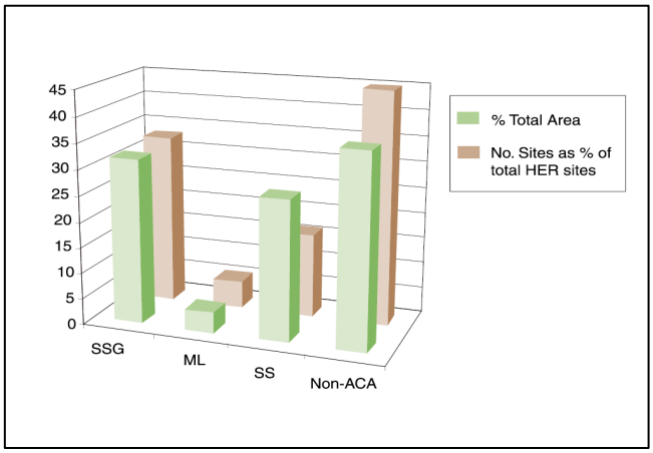

Fig. 11. Comparison of the frequencies of sites inside and outside Aggregate Character Areas, showing the proportion of the County occupied by each ACA and the percentage of total HER sites recorded in each ACA

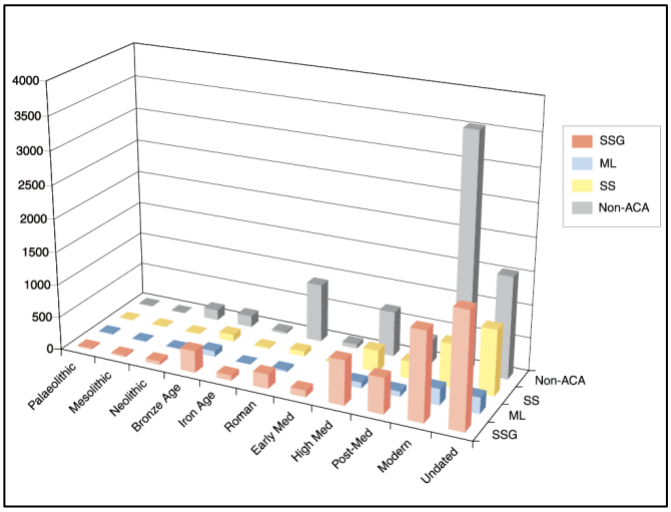

Fig.12. Comparison of variations in site frequencies by period in each Aggregate Character Area and in the non-aggregates-producing areas of Nottinghamshire

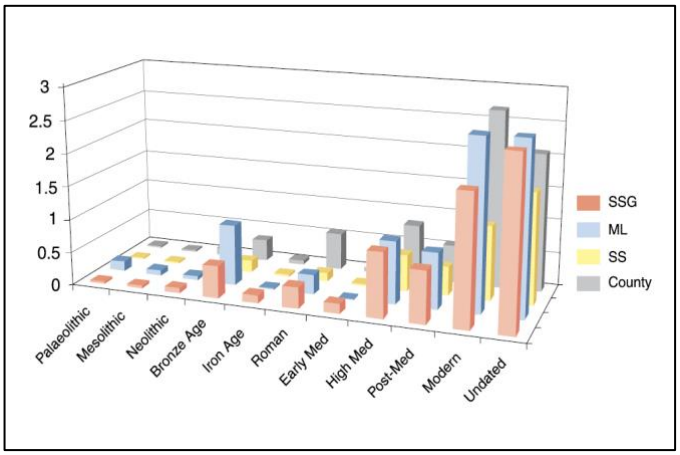

Fig.13. Comparison of variations in site densities (per km²) in each Aggregate Character Area and in Nottinghamshire generally

Tabular Period Summaries

Tabular summaries of the known archaeological resource of each Aggregate Character Area are presented below by period. These have been compiled from information contained in the Nottinghamshire HER in 2012, supplemented by information contained in reports submitted to the HER and in published sources. In each table, the archaeological resource of the Character Areas is presented side by side to permit easy comparison and facilitate future updating. Attention is focused wholly upon the archaeological resource of areas that are potentially available for aggregates extraction. Archaeological monument types that are located wholly in urban and other areas unavailable for aggregates extraction fall beyond the scope of this study and have been excluded from consideration. Standing buildings have also been excluded, although full consideration is given to earthworks, cropmarks and other indicators of archaeological remains relating to standing buildings (such as hunting lodges, field chapels and post-mills: Tables 6.2.7 and 6.2.8).

The Palaeolithic table has been devised in a format designed to facilitate assessment of temporal developments and the significant contrasts between each ACA. Details are provided of correlations with Marine Isotope Stages (MIS) and current estimates of their date ranges (for further information relating to the Trent catchment, see Bridgland *et al* eds 2014, Section 1.4). The archaeological sub-divisions of the period follow those employed in the East Midlands Archaeological Resource Assessment and Research Agenda (McNabb 2006, fig.11), permitting thereby easy correlation with the regional research framework.

The Mesolithic is represented archaeologically by a very restricted range of evidence, obtained principally from natural caves and rock shelters, pits and lithic scatters. These categories of evidence provide an effective descriptive framework for assessment of the archaeological resource of each Aggregate Character Area and have been employed in preference to the classificatory scheme employed for the Neolithic and later periods.

The quantity and range of evidence increases significantly from the Neolithic, and by the modern period we are faced with an enormous variety of archaeological remains. To facilitate assessment of the archaeological resource of the Neolithic and later periods, we have grouped sites and finds in each table under the functional class categories defined in the Monument Type Thesaurus[24]. This procedure has been extended to the maps that accompany this volume, permitting close linkage between tables and maps. The Thesaurus definitions of functional classes and monument types form the basis of the Nottinghamshire HER, and hence this approach also permits direct correlation with the HER. Further querying of the HER database is facilitated by the inclusion in these tables of HER alphanumeric codes for sites which are listed in that resource.

Assessment, Evaluation and Mitigation Strategies

We have summarised for each period the key assessment, evaluation and mitigation strategies that should be considered when investigating the monument types recorded in the HER and the sites of finds scatters, hoards and single finds. These summaries complement the discussion in Section 7 of the investigative strategies recommended for each landform element (Table 4.3.1) and it is hoped will facilitate the development of schemes of investigation for areas threatened by aggregates extraction.

It should be emphasised that the archaeological and paleoenvironmental potential of a site can only be gauged following the construction of a deposit model aimed at determining the sub-surface stratigraphy (e.g. by augering or test-pitting: Table 6.2.1). Detailed discussion of these methodologies lies beyond the scope of the present document and we recommend, therefore, early liaison with the archaeological curator and a qualified geoarchaeologist to determine a strategy for establishing the sub-surface stratigraphy and palaeoenvironmental potential of a proposed aggregates extraction site. Preliminary consultations with the archaeological curator should also include consideration of the strategies to be employed to ensure that prehistoric remains, which on many sites may survive only in the ploughsoil, are not lost without record during future mitigation. All sites threatened by aggregates extraction require a bespoke programme of investigation, including techniques such as systematic fieldwalking and test-pitting, to ensure that the evidence of prehistoric activity is not lost during strip, map and sample mitigation. In addition, early consultation with the archaeological curator is essential to ensure that archaeological remains, particularly of the early prehistoric period, are located and recorded satisfactorily. Useful additional guidance, including recommendations on geoarchaeological techniques, may be found in several guidance documents, notably *Identifying and Protecting Palaeolithic Remains* (English Heritage 1998); *Managing Lithic Scatters* (English Heritage 2000); *Geoarchaeology* (English Heritage 2007); and *Mineral Extraction and Archaeology* (Minerals & Historic Environment Forum 2008).

[24] http://www.heritage-standards.org.uk/fish-vocabularies/

6.2. ARCHAEOLOGICAL RESOURCE BY PERIOD

TABLE 6.2.1. PALAEOLITHIC ARCHAEOLOGICAL RESOURCE (c.950/850, 000 YEARS AGO[3] TO *c.*9500 cal BC[4])

ARCH. PERIOD[1]	MIS[2]	KYA[3]	YEARS cal BC[4]	AGGREGATE CHARACTER AREAS		
				SUPERFICIAL SANDS AND GRAVELS	MAGNESIAN LIMESTONE	SHERWOOD SANDSTONE
Period 1 Cromerian and early Intra-Anglian	MIS 25/21 –MIS 12	*c.*950/ 850– *c.*450	–	At least four Pre-Anglian interglacials and several periods within the Anglian glaciation enjoyed climatic conditions suitable for hominin settlement, and hence deposits of these periods have potential for the preservation of evidence for very early hunter-gatherer communities. Erosion and deposition by Anglian glaciers would have impacted seriously upon surface archaeological remains derived from intra-Anglian or earlier activity, but artefacts and environmental remains might survive in the fills of natural caves, other subterranean features and fissures on the Magnesian Limestone. Redeposited Period 1 artefacts might also survive in MIS 12 or earlier sands and gravels, as suggested originally at East Leake (Bridgland *et al* eds 2014, 88–90; but see p.89 below). Priority should be given, therefore, to the archaeological monitoring of superficial sands and gravels thought to date from these early periods (e.g. Wilford Hill Gravels: ibid. 60–2), with close attention to the recovery of artefacts manufactured from quartzite and other lithologies that are less easily identified than artefacts of flint.		
				Two cores and a hard-hammer flake, all heavily rolled and made from fine-grained quartzite cobbles, were recovered from sands and gravels during Trent Valley Palaeolithic Project fieldwork at East Leake (Bridgland et al eds 271–3; fig.5.16; plate 13). It was suggested originally that the deposits from which they derived might represent a very early (MIS12) terrace of the Trent (White and White 2007, 73; White, Bridgland and Howard 2007b). However, a more recent assessment suggests that the formation from which they derive more likely represents a downstream continuation of the Knighton Terrace deposits of the Soar, probably dating from MIS 8 (Bridgland et al eds 2014, 88–90, 271–3, 288).	No finds have currently been recorded, but artefacts and environmental remains could be preserved in the fills of limestone caves, dolines and other karst features protected from the impacts of ice action (see Walsh *et al* 1972).	No finds have currently been recorded.
Period 2 Pre-Levallois Lower Palaeolithic	MIS 12– Early MIS 8	*c.*450 – *c.*250	–	The climate was unfavourable for hominin settlement for much of this period, but temperate interludes with congenial climatic conditions have been identified (e.g. MIS 11 and MIS 9). There is currently no evidence for hominin activity in Britain north of the Nene Valley during this period, but the rich sequence of Clactonian and Acheulian industries that developed from the Hoxnian in the Thames Valley and East Anglia (e.g. at Swanscombe in Kent) emphasises the suitability of this period for hominin activity (compare Howard and Knight 2004a, 14–15).		
				No known finds.	No finds have currently been recorded.	No finds have currently been recorded.
Period 3 Levallois	Late MIS 8		–	MIS7 and the warmer phases of the MIS8 and MIS6 glaciations would have provided congenial conditions for settlement in Nottinghamshire and adjoining areas, as demonstrated in areas such as the Lower Thames and East Anglia by the discovery of sites yielding collections of artefacts		

Lower Palaeolithic	–Early MIS 6	*c.*250 – *c.*150		attributable on typological grounds to the Levallois Lower Palaeolithic (McNabb 2006, 24–7). These collections provide evidence for the enrichment of Acheulian traditions by the Levallois prepared core technique (*ibid*. 25), which is the diagnostic feature of collections attributed to this period. For many scholars, the introduction of Levallois technique is seen as the beginning of the Middle Palaeolithic (*ibid*. 24), but to ensure harmony with the East Midlands Resource Assessment and Agenda we employ here the scheme recommended in that document by McNabb (2006).		
				Artefact concentrations in Late MIS8 and MIS6 Trent terrace deposits, notably from the Etwall (MIS 8) and Egginton Common (MIS 6) Sands and Gravels of Derbyshire (Howard and Knight 2004a, 17), may signify the manufacture and use of lithic artefacts in the Trent Valley and neighbouring areas. However, the very rolled and worn character of many artefacts suggests that much material could have been redeposited from earlier phases of the Pleistocene. Significant quantities of heavily rolled flint and quartzite handaxes, flakes and cores from MIS 5d–2 Beeston Terrace deposits (*ibid*. 17; Bridgland et al eds 2014, 267–71, Plate 2), including rare pieces identified as of Levallois technique, may also imply redeposition from earlier periods.	No finds have currently been recorded.	No finds have currently been recorded.
Hominin absence?	Late MIS 6 –MIS 4	*c.*150 – *c.*60		Apparent hiatus in occupation in Britain between late MIS6 and MIS4. As noted for Period 3, significant quantities of heavily rolled handaxes and other artefacts, including rare Levallois pieces, from MIS 5d–2 Beeston Terrace deposits at sites such as Stoney Street and Tottle Brook, Beeston (Posnansky 1963, 379, figs 11–12) may imply redeposition from earlier periods (Bridgland et al eds 2014, 267–71, Plate 2).		
Period 4 Mousterian	MIS 3	*c.*60– *c.*40	-	The warmer conditions of early MIS 3 witnessed renewed colonisation of Britain by Neanderthal groups employing Mousterian technology, although occupation may have been sporadic in view of the frequent alternations of cooler and warmer conditions within what appears generally to have been a cool and dry environment. The area that is now Nottinghamshire would have provided a favourable environment for early hominines for much of this period, with extensive dry open grasslands suitable for grazing by large mammals. Currently the only undoubted evidence for Mousterian activity in the County derives from limestone caves at Creswell Crags, and the extent of activity beyond this limestone gorge is unknown. Many open-air sites may have been destroyed by later activity, but examples could yet survive, particularly on valley-side/floor sites sealed by colluvium or talus.		
				No diagnostic finds currently reported.	Evidence for Mousterian activity from around 50,000 years ago has been obtained from caves flanking the gorge at Creswell Crags (Bridgland et al eds, 255–6; Jenkinson 1984; Pettitt and Jacobi 2009; HER M4373). Small numbers of handaxes and flake tools from Church Hole (Notts) and Pin Hole Cave, Robin Hoods Cave and Mother Grundy's Parlour (Derbys.) suggest repeated visits by mobile hunter-gatherer groups, none of which may have stayed for any length of time (HER M4373; L8692). This recalls the evidence from Mousterian caves beyond the East Midlands, including Kent's Cavern in Devon and Coygan Cave in South Wales, which may	No diagnostic finds have currently been reported.

					have been settled by small, widely ranging hunter-gatherer bands occupying preferred locations on a seasonal basis (McNabb 2006, 30).	
Period 5a Early Upper Palaeolithic	Late MIS 3 –Early MIS 2	*c.*40–*c.*27	–	Upper Palaeolithic activity has been identified either side of the Dimlington Stadial (MIS 2) and correlates with the first appearance of anatomically modern humans (*Homo sapiens sapiens*); debate continues on the longevity of the Neanderthal communities who preceded them (McNabb 2006, 33). All Character Areas have the potential to contain material of Upper Palaeolithic date, and the current bias towards the Magnesian Limestone in the EUP and towards the Limestone and Sands and Gravels in the LUP is unlikely to reflect the true extent of activity during these periods. Discoveries elsewhere in the East Midlands, notably of an EUP open-air campsite at Glaston in Rutland (Cooper *et al* 2011), emphasise the likelihood of open-air as well as cave sites from the earliest phase of the Upper Palaeolithic.		
				No diagnostic finds currently reported.	Evidence for EUP activity derives exclusively from Creswell Crags, where caves have yielded typologically diagnostic leaf-points and Gravettian Font-Robert points (Bridgland et al eds, 256; Howard and Knight 2004a, 23). Finds derive currently from the Derbyshire side of the gorge, but activity may be expected to have spread more extensively across the gorge.	No diagnostic finds have currently been reported.
Human absence	MIS 2			**Dimlington Stadial:** human abandonment of Britain, coinciding with the return of full glacial conditions and ice-sheets. This was accompanied by a regression in mean sea level, with ice sheets reaching their maximum extent between *c.*22,000 and 18,000 years ago.		
Period 5b Late Upper Palaeolithic	Late MIS 2	–	*c.*13000 – *c.*9500 cal BC	An important LUP open site has been revealed during fieldwalking and subsequently by test-pitting at Farndon Fields near Newark (HER M357; Garton 2009). Associated Creswellian lithic artefacts suggest that hunter-gatherers may have migrated between Trent Valley sites such as this and the Creswell cave sites. Scattered surface finds of diagnostic LUP lithic artefacts have been recorded during fieldwalking elsewhere, including Cheddar Points near Lound (HER L11179) and East Stoke (HER L1642) and during excavations at Gonalston (Howard and Knight 2004a, 24), where a Creswell Point and a burin made on a long blade had been redeposited in later prehistoric features (see Jacobi *et al* 2001).	Extensive evidence of activity has been obtained from Creswell Crags, including Creswell, Cheddar and Penknife Points, together with bone, antler and ivory artefacts (Jenkinson 1984; Pettitt and Jacobi 2009). Activity may have extended to other gorges (e.g. Yew Tree Cave, Pleasley Vale: HER L5345). Mobile hunter-gatherer groups are implied, procuring some flint and perhaps amber from distant sources. Associated bones suggest the trapping and processing of arctic hares (Robin Hood's Cave, Derbys.) and the hunting of wild horses (Mother Grundy's Parlour, Derbys.). Church Hole Cave, Notts (HER M4373) preserves internationally significant figurative rock carvings, including a stag and anthropomorphic designs, dated stylistically to c.12,500–12,000 BP[5] (Bahn and Pettitt 2009). LUP lithic artefacts have also been reported during fieldwalking at several locations on the limestone escarpment (e.g. Scratta Wood, Shireoaks, Notts.: Jacobi *et al* 2001, 17).	No typologically diagnostic artefacts have been recorded, but artefacts may well have been deposited along the migration routes of hunter-gatherers moving between the Trent Valley and Creswell Crags. Searches could usefully be focused upon the NW–SE aligned river valleys of this Character Area, as these would have provided convenient migration routes. The possibility of preservation beneath colluvium or other masking deposits should also be taken fully into account during site investigations.

Palaeolithic Assessment, Evaluation and Mitigation Strategies

Strategies should follow current guidelines for Palaeolithic research, outlined by Collcutt (2006) and Buteux (ed) 2009, 111–20). Valuable guidance for work on Palaeolithic sites is also contained in the following documents: *Identifying and Protecting Palaeolithic Remains: Archaeological Guidance for Planning Authorities and Developers* (English Heritage (1998); *Managing Lithic scatters. Archaeological Guidance for Planning Authorities and Developers.* (English Heritage 2000); *Research and Conservation Framework for the British Palaeolithic* (English Heritage 2008); and Bridgland, D.R., Howard, A.J., White, M.J. and White, T.S. (eds) 2014. Q*uaternary of the Trent*. Oxford: Oxbow Books.

Assessments and evaluations of potential extraction sites must assess routinely the potential for preserved Palaeolithic remains, and must include where appropriate**:**

- Synthesis of past discoveries of Palaeolithic stone, bone, antler and other artefacts. Appropriate advice on dating and interpretation should be sought where necessary, ensuring input from a specialist with expertise in the appropriate Palaeolithic time period.
- Preliminary work may identify a requirement for a more detailed stage of artefact assessment to establish the date, cultural affinities and research potential of the collection. This must be conducted by an appropriate finds specialist, and will include consideration of the variables itemised by Collcutt (2006, 47–8).
- Synthesis of existing environmental data (Collcutt 2006, 48–9), with appropriate specialist input.
- Assessment from BGS and other sources of the site geology (Collcutt 2006, 46–7). This should include a walkover survey and should identify landforms with potential for preserving Palaeolithic artefacts or environmental data (e.g. river terraces, limestone caves and masking deposits such as talus, colluvium or coversands).
- In the Magnesian Limestone, any fissures, caves or rock shelters proposed for quarrying must be identified (e.g. by walkover surveys, aerial photography, radar or other geophysical techniques) and investigated for material indicative of hominin activity and/or environmental remains as part of the assessment process. On the Sands and Gravels, proposals for extraction must establish as part of the assessment process the likely origin of the gravel bodies affected and hence their potential for the preservation of archaeological and environmental remains (based on BGS or other data as appropriate).
- Non-intrusive geophysical methods, particularly resistivity, are developing rapidly, and will assist studies of sub-surface stratigraphy. Their usefulness in differentiating to depths of 30m workable bodies of gravel from non-mineral deposits, as well as deposits with archaeological potential, will also have value to gravel companies.
- In arable areas across each of the ACAs, systematic fieldwalking provides an effective form of evaluation for this as for other periods. This technique has been shown to be particularly effective for the location of Upper Palaeolithic open sites (e.g. Farndon Fields: Garton 2009) but open sites of earlier periods might survive in favourable circumstances.
- Augering or other intrusive investigation methods aimed at characterising the sub-surface stratigraphy and locating organic deposits with potential for environmental analysis are valuable at the assessment stage – especially where masking deposits of alluvium, colluvium, coversands or talus may be demonstrated or suspected. Where organic deposits of environmental potential and sands and gravels that may yield associated artefacts are identified, proposals for sampling strategies must be devised in liaison with appropriate specialists. Particularly in such areas, geotechnical investigations will need to ensure appropriate geomorphological input, including on-site support by an appropriately qualified geoarchaeologist.
- Where activity foci associated with lithic artefacts are anticipated, test pitting may be appropriate. This will provide a useful guide to finds densities and clarify the sub-surface stratigraphy.

Mitigation strategies should be tailored to the circumstances of particular sites and be developed in close consultation with appropriate period specialists.

- Sites yielding evidence for hominin activity may warrant preservation *in situ* in view of their national or international significance.
- Where fissures, caves and rock shelters are deemed appropriate for minerals extraction, sampling strategies involving the full range of relevant specialist scientific support must be devised and implemented (including lithic artefact analyses, palaeoenvironmental studies and scientific dating). *In situ* remains of Palaeolithic date recorded during this work are likely to be of at least national importance and may warrant preservation *in situ*; if associated with palaeoenvironmental remains, their importance will be enhanced. *In situ* remains found as part of the mitigation strategy for a minerals extraction site, if not recommended for preservation, will require an appropriate level of excavation, recording and specialist input. Excavations of *in situ* material should pay particular regard to the recording of xyz coordinates, angles of dip, slope and orientation, the presence/absence of micro-debitage, and the use of Optically Stimulated Luminescence (OSL), radiocarbon and other dating techniques. Provision must be included for appropriate post-excavation analysis by a lithic artefact specialist (including refitting of artefacts, raw material sourcing, *etc*.).
- Sites near known artefact concentrations and within the same artefact-bearing geological unit will be subject to particularly rigorous inspection as part of the mitigation strategy. Current mitigation strategies frequently specify drawn recording of long sections of quarry faces to record the depositional history of the site; increasingly, this may be replaced by laser scanning.

Notes: [1] **Archaeological periods** follow the chronological framework proposed in McNabb, J. 2006. The Palaeolithic, in N. Cooper (ed.) *The Archaeology of the East Midlands,* University of Leicester Archaeology Monograph 13, 11–43. The **Nottinghamshire HER** employs a threefold division into the **Early, Middle and Upper Palaeolithic periods**, which correlate respectively with Periods 1 and 2, Periods 3 and 4, and Period 5. [2] **MIS**: Marine Isotope Stage; [3] **kya**: approximate date in units of thousand years ago (employed for the Early Upper Palaeolithic and preceding periods, all of which lie beyond the limit of agreed radiocarbon calibration); [4]**cal BC**: calibrated years BC (for periods where radiocarbon dates may be calibrated to an acceptable level of accuracy). For background information, see McNabb 2006, 13–16; Howard and Knight 2004a, 9–11; Pettitt 2008, Table 2.1); [5]**BP:** uncalibrated years before present (i.e. AD1950; see for example Pettitt 2008, 51: note 1; Buteux (ed) 2009,127).

TABLE 6.2.2 MESOLITHIC ARCHAEOLOGICAL RESOURCE (*c*.9500 cal BC – c.4000 cal BC)			
ARCHAEOL-OGICAL ASSOCIATIONS	**AGGREGATE CHARACTER AREAS**		
	SUPERFICIAL SANDS AND GRAVELS	**MAGNESIAN LIMESTONE**	**SHERWOOD SANDSTONE**
1.Caves and rock shelters	Natural caves and rock shelters are not a feature of this geological formation	Numerous caves and rock shelters are known along the flanks of gorges incised into the plateau surface, most notably at Creswell Crags. Some have yielded Mesolithic lithic artefacts (Myers 2006, 59) and even where subjected to antiquarian investigations could preserve undisturbed cultural remains and pollen, fauna and other environmental data. Many more caves/rock shelters might lie beneath talus (scree) or other slope deposits (as demonstrated by the recent discovery of a cave with *in situ* Late Upper Palaeolithic archaeology, buried by talus that had accumulated in front of Church Hole Cave at Creswell Crags: Pettitt *et al* 2009).	Although artificially dug caves are an important feature of medieval and later settlements established upon the Sherwood Sandstone (Waltham 2009), natural caves are not a feature of this geological formation. Eroded cliff faces, such as characterise the Nottingham Castle Sandstone along the northern floodplain margin of the River Trent at Nottingham (*ibid*. 5–7), may have provided attractive shelters for hunter-gatherers. However, there is currently no convincing evidence for utilisation of such potentially attractive locations in this period.
	Assessment, evaluation and mitigation: any fissures, caves or rock shelters proposed for quarrying must be identified (e.g. by walkover surveys, aerial photography, lidar, radar or other geophysical techniques) and investigated for material indicative of Mesolithic activity or contemporary environmental remains as part of the assessment process (compare Collcutt 2006). Particular attention should be focused upon areas where these features might be sealed by talus or colluvium. Sites yielding evidence for Mesolithic activity may warrant preservation *in situ*. Where fissures, caves and rock shelters are deemed appropriate for minerals extraction, sampling strategies involving the full range of relevant specialist scientific support must be devised and implemented (as proposed for Palaeolithic cave sites: Table 6.2.1). *In situ* Mesolithic remains recorded during this work may be of national importance and deposits yielding these may warrant preservation *in situ*; if associated with palaeoenvironmental remains, their importance is likely to be enhanced. *In situ* remains found as part of the mitigation strategy for a minerals extraction site, if not recommended for preservation, will require an appropriate level of excavation, recording and specialist input (as proposed for the Palaeolithic period: Table 6.2.1).		
2. Pits	Rare pits yielding lithic artefacts of this period have been recorded on the river terraces, notably at Gonalston and, just outside our area in the Lincolnshire Trent Valley, at Newton Cliffs (Howard and Knight 2004b, 38–9; Garton *et al* 1989). More features might lie preserved beneath alluvium or below other masking deposits such as coversands and colluvium; these, however, are likely to elude discovery in small evaluation trenches.	No features are currently known	No features are currently known.
	Assessment, evaluation and mitigation: the small, dispersed features that might relate to Mesolithic activity are unlikely to be recovered in trial trenches or by other evaluation techniques, even on sites which have yielded surface finds of Mesolithic activity and have been assessed and evaluated appropriately (see 3 and 4 below), and are most likely to be recorded during the mitigation stage by strip, map and sample. Dating is often problematic, and resources should be provided for the dating of associated organics by radiocarbon techniques and/or of sediments by OSL (Optically Stimulated Luminescence).		

3.Lithic scatters	Variable densities of lithic artefacts have been recorded across this landform, particularly in intensively fieldwalked areas such as the Fosse Way to the SW of Newark: HER L3570 & L1645) or around South Muskham (Garton 2002). Earlier Mesolithic sites (*c.*9500–*c.*8000 cal BC) are rather less common than Later Mesolithic sites (*c.*8000–*c.*4000 cal BC), as might be expected given the significantly longer duration of the later period and a trend towards greater group mobility (which might have impacted in turn upon the density of contemporary activity foci: Howard and Knight 2004b, 38). Known scatters focus in both periods upon the river terraces and may be observed in some areas to continue beneath colluvium or alluvium (e.g. Collingham: HER M18293). Earlier and Late Mesolithic lithic scatters have been recorded on the edges of the peaty carrlands of north Nottinghamshire, most notably at Misterton Carr (Buckland and Dolby 1973; HER L5102; L5104) suggesting that the well-wooded wetland environments of this landscape zone may have provided particularly attractive environments for Mesolithic hunter-gatherers. The coversands of the Lower Trent Valley also attracted hunter-gatherer activity, as demonstrated for example around Misterton (HER L5771) and Besthorpe (HER L5845), and many more scatters may lie concealed beneath coversands reworked during the Holocene.	Moderate densities of sites yielding Mesolithic lithic artefacts have been recorded in intensively walked areas across the plateau surface, particularly in areas walked by the Sherwood Archaeological Society around Mansfield, but otherwise sites yielding identified Mesolithic artefacts are very sparsely distributed. These include one site attributed to the Later Mesolithic (HER L12184) but few sites have been differentiated by period. Some scatters are likely to be buried beneath alluvium, colluvium or other masking deposits.	A very sparse distribution of identified Mesolithic artefacts has been recorded across the Sherwood Sandstone, even within the intensively fieldwalked areas of the north Nottinghamshire brickwork-plan fields. These include rare sites attributed to the Earlier (e.g. HER L12193) and Later (e.g. HER L12177) Mesolithic, but few finds have been differentiated by period. Colluviated river valleys may preserve important Mesolithic sites, and the location of sites in these areas should be prioritised during assessment and evaluation.
	Assessment, evaluation and mitigation: a synthesis of past discoveries of Mesolithic artefacts should be conducted, with specialist advice on dating and interpretation where appropriate. Preliminary assessment may identify a requirement for a more detailed stage of artefact analysis to establish the date, cultural affinities and research potential of the collection (compare Collcutt 2006, 47–8). This must be conducted by a finds specialist with expertise in the identification and analysis of Mesolithic artefacts. Systematic fieldwalking and/or test-pitting should be undertaken to clarify the spatial distribution of Mesolithic finds and the character and date of the material, and to guide the location of further non-intrusive evaluation (e.g. by geophysical survey) and/or evaluation trenching prior to mitigation. Investigations should aim to establish whether Mesolithic deposits might be preserved beneath alluvium, colluvium and other masking deposits. Particular attention should be paid to sites close to palaeochannels and other wetland contexts likely to preserve associated organic finds; appropriate provision should be made in such cases for scientific dating and analyses of associated organic finds (e.g. isotope analysis of human bone).		
4.Single finds	Sparse single finds of typologically diagnostic lithic artefacts have been recorded on field surfaces during fieldwalking or by casual discovery, plus rare examples of antler artefacts such as a bilaterally barbed harpoon from the Trent at either Thrumpton or Long Eaton (HER L578: Howard and Knight 2004b, 38, fig.3.8). Palaeochannels may also yield important associated finds, as demonstrated by the discovery of a human female femur dated by radiocarbon to 6790±40BP (Beta-144016; 5740–5620 cal BC) and bones of aurochs and red deer (including red deer antler with cut marks) in a later Mesolithic palaeochannel at Staythorpe (HER L12287; Davies 2001; Howard and Knight 2004b, 39). Stable isotope analysis of the human femur demonstrated	Sparse surface finds of typologically diagnostic lithic artefacts add to the known pattern of Mesolithic activity.	As on the Magnesian Limestone, sparse surface finds of typologically diagnostic lithic artefacts add to the known pattern of Mesolithic activity.

	reliance upon animal protein, implying a wholly terrestrial range for the last ten years of life, a dearth of plant foods and no influence of coastal dietary resources. This find has major implications for our understanding of the balance between plant and animal foods and the contribution of freshwater and marine resources to Mesolithic food procurement strategies; it emphasises the importance not only of palaeochannel investigations but also of stable isotope analysis for furthering our understanding of the Mesolithic.		
	Assessment, evaluation and mitigation: work impacting upon sites known to have yielded single finds should be preceded by appropriate specialist analysis to elucidate further the character and possible date of the find. Single finds may flag more extensive artefact scatters, and hence systematic fieldwalking and/or test-pitting should be undertaken to establish whether other finds might survive. If so, further evaluation and mitigation should follow the guidelines proposed for finds scatters (see Table 6.2.2.3). As noted above, particular attention should be paid to sites close to palaeochannels and other wetland contexts likely to preserve associated organic finds, with appropriate provision for scientific dating and analyses of associated organic finds (e.g. isotope analysis of human bone).		

Fig.14. Bilaterally barbed later Mesolithic antler harpoon from the Trent riverbank at Thrumpton, Nottinghamshire or Long Eaton, Derbyshire; length 98mm; reproduced by permission of Ann Inscker, Nottingham City Museums and Galleries

TABLE 6.2.3. NEOLITHIC TO MIDDLE BRONZE AGE ARCHAEOLOGICAL RESOURCE (*c.*4000 cal BC – *c.*1150 cal BC)			
ARCHAEOL-OGICAL ASSOCIATIONS	**AGGREGATE CHARACTER AREAS**		
	SUPERFICIAL SANDS AND GRAVELS	**MAGNESIAN LIMESTONE**	**SHERWOOD SANDSTONE**
As many monuments of this period may be expected to leave no structural traces other than sparse scatters of pits, post-holes and other cut features (e.g. unenclosed occupation sites and flat-grave inhumation or cremation cemeteries/single graves) and as robust predictive models for their siting have yet to be developed, evaluation trenching may fail to locate many foci of Neolithic or earlier Bronze Age activity. Systematic fieldwalking and/or test-pitting should be undertaken regularly, therefore, to prospect for sites of these periods (many of which might survive only as finds in the ploughsoil) and to guide the location of further evaluation (e.g. by geophysical survey and/or evaluation trenching prior to mitigation). Particular attention should be focused upon the location of sites preserved beneath alluvium, colluvium, coversands and other masking deposits (targeting, for example, river terrace-floodplain interfaces), while investigations of sites near palaeochannels and other landforms with the potential for preserving waterlogged remains should aim to establish whether associated organic finds survive; appropriate provision should be made in such cases for scientific dating and analyses of associated organic finds (e.g. isotope analyses of human bone). Given the likelihood that many sites will comprise thin scatters of features that are difficult to locate during evaluation, mitigation strategies are expected to include provision for strip, map and sample investigations.			
AGRICULTURE AND SUBSISTENCE			
1.Fields and field systems	No evidence has been retrieved from the Sands and Gravels or from the other Character Areas for linear features indicative of fields or other boundary works prior to the mid-first millennium BC (Section 6.3.4). This is in striking contrast to some neighbouring areas – notably the Lincolnshire Fen Margin, where extensive rectilinear ditched field systems may be demonstrated from the Middle Bronze Age, and the Derbyshire East Moors, where field systems may be demonstrated archaeologically from at least the Early Bronze Age (Knight and Howard 2004c, 100–6). This might indicate significant interregional contrasts in the agricultural economy and the organisation of the agrarian landscape, and investigations of the evidence for systems of land allotment in this period should be accorded a high priority in archaeological schemes of treatment.	In common with the other ACAs, linear features indicative of fields or other boundary works of this period have yet to be recovered. Location of evidence for landscape organisation in this period should be accorded a high priority during assessment and evaluation, and investigations of boundaries that might date from these periods should be prioritised in the development of mitigation strategies.	In common with the other ACAs, evidence for linear features indicative of fields or other boundary works of this period have yet to be recovered. Location of evidence for landscape organisation should be accorded a high priority during assessment and evaluation, and investigations of boundaries that might date from these periods should be prioritised in the development of mitigation strategies.
	Assessment, evaluation and mitigation: strip, map and sample techniques, which it is recommended below should be employed routinely after assessment and evaluation to locate the elusive settlements of this period, provide an excellent strategy for testing the hypothesis that fields were genuinely a late development in Nottinghamshire (with the caveat of course that field boundaries may not always have been marked by features that can be detected archaeologically: for example, hedgerows without ditches). This is consistent with the methodology recommended for study of the Late Bronze Age and Iron Age landscape, and in particular the relationship between settlements and field systems that is manifested most clearly by cropmark plots of the Trent and Idle Valleys.		

DOMESTIC			
2.Unenclosed occupation foci	Domestic sites are poorly known in this landscape zone, and where recorded are represented archaeologically by seemingly random, low-density scatters of pits, post-holes and gullies dispersed over the gravel terraces and potentially sealed beneath alluvium, colluvium or (in the Lower Trent) coversand deposits. No evidence has been recovered to indicate that domestic occupation foci were enclosed prior to the later first millennium BC, when the presence of substantial enclosing ditches renders settlement sites far more visible (Section 6.3.4). Neolithic and earlier Bronze Age settlements have generally been located by chance during the excavation of later sites - for example, on sites of Iron Age and Roman enclosure complexes that are readily identifiable from air photographic and/or geophysical survey (e.g. at Hoveringham Quarry: Knight and Howard 2004b, 66-69; HER M18317) or beneath later earthworks (such as a Roman agger at Langford, near Newark (Holt *et al* 2001; HER M18427). Extensive lithic scatters, discussed in greater detail below, provide plentiful examples of potential occupation sites or specialised activity foci, and from their relationship to alluvial deposits provide opportunities for the identification of sites sealed beneath alluvium (e.g. around South Muskham: Garton 2002, 32).	No structural remains dating from this period have been recorded so far. However, extensive lithic artefact scatters in intensively walked areas of both Nottinghamshire and Derbyshire provide evidence of thin background scatters with occasional larger concentrations of lithic artefacts (e.g. in Elmton parish, just over the Nottinghamshire border: Knight *et al* 1998). The latter might signify occupation sites or specialised activity foci and would merit further survey and excavation work to establish their character and refine our knowledge of date.	No structural remains that may definitely be attributed to this period have currently been recorded, despite quite extensive excavations of later prehistoric and Roman sites. Lithic artefact scatters recorded during fieldwalking, particularly of the brickwork-plan field systems in the north of the County (Garton 2007), provide evidence for activity in this period, but evidence for major activity foci is currently lacking.
	Assessment, evaluation and mitigation: sites of this kind may be expected to leave no structural traces other than sparse scatters of pits, post-holes and other cut features (or might survive only as finds in the ploughsoil) and may escape discovery during programmes of evaluation trenching. Systematic fieldwalking and/or test-pitting should be undertaken to prospect for potential occupation foci and to guide the location of further evaluation (e.g. geophysical survey and trenching focusing upon lithic artefact concentrations). Particular efforts should be focused upon locating sites which may include features and deposits preserved beneath alluvium, colluvium, coversands and other masking deposits (e.g. river terrace-floodplain interfaces) and where organic remains might be preserved (e.g. adjacent to palaeochannels preserving waterlogged remains), with appropriate provision for scientific dating and analyses of associated organic remains. It must be assumed that many sites will still elude discovery prior during assessment and evaluation, and in consequence mitigation strategies are expected to include provision for strip, map and sample investigations.		
3.Burnt mounds	This monument class, represented by concentrations of heat-shattered stones in association sometimes with troughs for holding water and hearths for heating the stones, has been recorded on a small number of Neolithic and Bronze Age sites along the Trent Valley (Knight and Howard 2004b, 56–7) and farther afield (e.g. East Leake: Jordan 2004, 3; HER M18370 & M18332), close to contemporary water sources. The functions of these monuments remain unclear, but evidence suggests an association with cooking, possibly specialised industrial activities and/or bathing. These are grouped here with domestic sites, but may have performed a wider role,	Examples may well have existed along watercourses in this and other geological zones and should be anticipated in valley-bottom or other watery contexts. As yet, however, the distribution of burnt mounds cannot be shown to extend into this Character Area.	None has currently been recorded in this Character Area, but as on the Magnesian Limestone examples should be anticipated in valley-bottom and other locations close to water – and hence should be included amongst the target sites to be located during assessment and evaluation.

	possibly as foci for dispersed communities (Knight and Howard 2004c, 87).		
	Assessment, evaluation and mitigation: although the current distribution of burnt mounds is biased heavily towards the Sands and Gravels, structural remains should be anticipated in all valley-bottom and other locations with ready access to water. Schemes of investigation should include, therefore, fieldwalking and/or test-pit surveys aimed at identifying surface concentrations of burnt stones or layers of burnt material in test-pits; the sides of drainage ditches and other dug features should also be checked for exposures of burnt stones and other material (as, for example, at Hoveringham Quarry: Knight and Elliott 2008). It is likely, however, that most structures will be masked by alluvial deposits, and hence strip, map and sample techniques may be flagged as the most reliable methodology for the identification of burnt mounds and associated features. As with settlements, particular emphasis should be placed upon provisions for scientific dating and for the location, recovery and analysis of environmental remains to elucidate the functions of burnt mounds, the changing environment and the developing agrarian economy.		
4.Caves and rock shelters	Caves and rock shelters are not a feature of this geological formation.	Activity may have continued into the Neolithic and Bronze Ages in some of the many caves and rock shelters that flank the deep gorges incised into the plateau surface, but in Nottinghamshire evidence for activity in these periods is currently restricted to Cave C22 (HER L8701) and Church Hole Cave (Pettitt *et al* 2009) at Creswell Crags. Evidence for Neolithic or Bronze Age activity is more widespread in caves along the Derbyshire Magnesian Limestone escarpment, notably at Ashtree (Armstrong 1956) and Pin Hole Caves (Gilks 1974), and the paucity of evidence from Nottinghamshire should be viewed, therefore, with some caution. Some of the Derbyshire finds signify the use of caves for funerary or other ritual purposes (e.g. Hart 1981, 36–7) and we should not assume, therefore, that discoveries necessarily relate to occupation.	Although artificially dug caves are an important feature of some medieval and later settlements of the Sherwood Sandstone, most notably at Nottingham (Waltham 2009), natural caves are not a feature of this Character Area. Eroded cliff faces, such as characterise the Nottingham Castle Sandstone along the northern floodplain margin of the River Trent at Nottingham (Waltham 2009, 5–7), may have provided attractive shelters for hunter-gatherers and may possibly have continued to attract activity in the Neolithic and Bronze Age. There is, however, currently no convincing evidence for utilisation of such sites in this period.
	Assessment, evaluation and mitigation: any fissures, caves or rock shelters proposed for quarrying must be identified (e.g. by walkover surveys, aerial photography, radar or other geophysical techniques) and investigated for material indicative of Neolithic/Bronze Age as well as earlier or later activity (compare Tables 6.2.1 and 6.2.2). Particular attention should be focused upon areas where these features might be sealed by talus or colluvium. Sites yielding evidence for Neolithic or Bronze Age activity may warrant preservation *in situ*. Where fissures, caves and rock shelters are deemed appropriate for minerals extraction, sampling strategies involving the full range of relevant specialist scientific support must be devised and implemented (compare Tables 6.2.1 and 6.2.2). *In situ* remains of Neolithic or Bronze Age date may be of national importance, and deposits yielding these may warrant preservation *in situ*; if associated with palaeoenvironmental remains, their importance is likely to be enhanced. *In situ* remains found as part of the mitigation strategy for a minerals extraction site, if not recommended for preservation, will require an appropriate level of excavation, recording and specialist input.		
RELIGIOUS, RITUAL AND FUNERARY			
5.Long mounds	No mounds are known to survive, but rare cropmarks of elongated, quadrilateral, single-ditched enclosures with rounded corners might represent vestiges of such monuments (e.g. Cromwell: HER M8623; Whimster 1989, 68, fig.39: E, F; Winthorpe, Newark: HER M3612; John Samuels Archaeological Consultants 1995 and 1997; compare Knight and Howard 2004b, 62).	None has currently been recorded. However, the discovery and subsequent excavation of a nationally important early Neolithic long cairn on the Magnesian Limestone at Whitwell, Derbyshire (Vyner and Wall 2011), just beyond the Nottinghamshire County boundary, emphasises that related cairn structures could survive at other locations along the limestone escarpment.	None has currently been recorded, despite the impressive cropmark record of the Sherwood Sandstone.

6.Ring-ditches and round barrows	Ring-ditches, represented by single or sometimes multiple annular ditches enclosing areas averaging 10-25m in diameter, are densely distributed along the river terraces of the major river valleys (Knight and Howard 2004b, 59–61) and on other exposures of Sand and Gravel (e.g. East Leake: Howard 2012). Comparatively few have been excavated, but there is evidence that many had demarcated Neolithic and Early Bronze Age burial areas (Knight and Howard 2004b, 60–1). Excavations have demonstrated a wide variety of inhumation and cremation rites and associated grave goods and, from origins in the fourth millennium BC (e.g. Great Briggs: Guilbert 2009), a date range spanning principally the later Neolithic and earlier Bronze Age periods. Associated barrows may occasionally be postulated from denuded earthworks or ditch silting patterns (e.g. Cromwell: Dauncey and Hurrell 1951; HER M8624), but some ring-ditches may have demarcated open arenas, encircled perhaps by banks derived from ditch spoil, that had been reserved for funerary or ceremonial activities.	There are currently no records of ring-ditch cropmarks that might indicate Neolithic or Bronze Age funerary sites or of earthworks that might represent round barrows, and no funerary sites of this period have been recorded during excavation. This contrasts with neighbouring areas of Derbyshire, where barrows of this period have been identified on the Magnesian Limestone escarpment in woodland environments (e.g. Scarcliffe Park: Hart 1981, 53; Lane 1973), and woodland areas should be searched thoroughly for potential monuments. A thin scatter of ring-ditches along the Magnesian Limestone of South Yorkshire and northwards (Roberts *et al* 2010, fig.19) also points to the possibility of Nottinghamshire monuments awaiting discovery.	Rare circular mounds, possibly representing Neolithic or Bronze Age barrows, have been recorded in parkland and woodland environments protected from damage by ploughing: for example, at Rainworth Water, Blidworth, where excavations revealed cremated bones but no grave goods (HER M2586; *Archaeologia* 1789, 201–2), and a possible 'bowl barrow' at Perlethorpe (HER M2586). None of the known examples may be closely dated. Scattered ring-ditch cropmarks, some possibly indicating Neolithic/Bronze Age funerary sites, have also been recorded on air photographs (e.g. Riley 1980, 53–5), but are significantly less abundant than on the Sands and Gravels.
7.Henges	Rare examples have been recorded on the river terraces, specifically at Gunthorpe (HER M8259), where a substantial circular earthwork with an outer bank and internal ditch survives close to the Trent (Knight and Howard 2004b, 63) and near Cromwell, where a hengiform enclosure may be represented by an enclosure demarcated by a massive penannular ditch that has been identified from cropmark evidence (Whimster 1989, 69, fig.39:B; Knight and Howard 2004b, 63–4).	None has currently been recorded.	None has currently been recorded.
8.Pit circles	A cropmark preserving traces of two concentric rings of pits, possibly marking the foundations of a circular arrangement of timber posts, has been recorded near East Stoke (HER M1438; Knight and Howard 2004b, 64). Such monuments might represent a translation into timber of the stone circles that are distributed widely over neighbouring areas of Derbyshire (Brightman and Waddington 2011).	None has currently been recorded.	None has currently been recorded.
9.Timber avenues	One possible example, surviving as a pair of widely spaced rows of very substantial pits, has been recorded near South Muskham (HER M8363; Knight and Howard 2004b, 65–6). The rows of pits bear a superficial resemblance to pit alignments (Table 6.2.4.1), but the pits appear significantly more substantial than the features that characterise the many examples of pit alignment that have been recorded elsewhere in Nottinghamshire.	None has currently been recorded.	None has currently been recorded.

	Assessment, evaluation and mitigation*:* for all of the above monuments, which are currently known principally from cropmark data, assessment should include investigation of the air photographic and lidar resources, combined with walkover surveys to locate earthwork remains. Useful evaluation techniques to be considered include geophysical surveys to locate buried features, fieldwalking to determine possible associations with surface artefacts, test-pitting to investigate the sub-surface stratigraphy and artefact densities, and targeted trial trenches to establish the level of preservation, date, *etc*. of cropmark features. Sites with well-preserved structural remains and/or of high rarity value (e.g. monuments away from the Sands and Gravels) should be considered as candidates for preservation *in situ*. If not recommended for preservation, monuments should be fully excavated as part of the mitigation strategy. Sites that are revealed unexpectedly during the course of extraction should be fully excavated, with appropriate consideration of the structural, artefactual and environmental evidence (following the example of the long cairn that was revealed unexpectedly during limestone quarrying at Whitwell, Derbyshire: Vyner and Wall 2011).		
10.Flat-grave cremation or inhumation burials: cemeteries and single graves	Some Neolithic and Bronze Age burials have preserved no evidence of associated ring-ditches or mounds, and hence are not easily located in advance of quarrying. Such sites are obviously difficult to interpret, as mounds and ditches could have been erased by later activity, but the possibility of isolated graves or cemeteries with no monumental expression emphasises the importance of strip, map and sample techniques for the location and investigation of sepulchral and related monuments of this period. The problem of identification is exemplified at Hoveringham (Allen *et al* 1987), where gravel extraction revealed an extensive Middle Bronze Age cemetery preserving 31 cremations in urns of the Deverel-Rimbury ceramic tradition, six cremations in cists made from skerry slabs and 14 un-urned cremations; no evidence was revealed of ring-ditches or of burial mounds, although several vertically set or flattened skerry slabs found near some of the cremation urns may have served as grave markers. Another example of a burial site preserving no traces of ring-ditches or associated mounds was found at East Leake, where quarrying revealed a linear scatter of six pits, one yielding an un-urned cremation and two others incorporating fragments of Early Bronze Age collared urns and cremated human bone, that may have formed part of a more extensive cemetery denuded by ploughing (HER M18368; Guildhouse Consultancy 2010,16–17; Jordan 2004).	No examples have been recorded.	No examples have been recorded.
	Assessment, evaluation and mitigation: features associated with small flat-grave cremation/inhumation cemeteries or single burials may easily elude evaluation trenching, but adoption of the strategy proposed for the location of cut features associated with dispersed and unenclosed occupation foci (Table 6.2.3.2) might reveal evidence of features associated with burial – especially of course in the case of larger cemeteries such as that recorded at Hoveringham. It must be assumed, however, that many sites will still elude discovery during trenching, and thus a mitigation strategy including provision for strip, map and sample investigation is recommended.		
11.Riverine burials	Finds of human skulls and other human and animal bones dating from the later Neolithic in a palaeochannel at Langford Lowfields Quarry have provided a rare insight into the burial and ceremonial practices that may have been practiced at riverside locations during the later Neolithic (Knight and Howard 2004b, 55–6; HER L11251). Several hundred animal and human bones were found	None has currently been recorded, but quarrying of riverine locations should prioritise the search for human remains (and potential associations with metalwork, *etc.).*	None has currently been recorded, but as on the Magnesian Limestone quarrying of riverine locations should prioritise the search for human remains (and potential associations with metalwork, *etc.*).

	with timbers and brushwood in what was interpreted as a logjam besides a gravel bar in an abandoned channel of the Trent (Garton *et al.* 1996; 1997). This may signify disturbance by flood of a riverside mortuary site, which from studies of the skeletal material could have included excarnation with a ritual emphasis upon human and animal skulls. Some riverine metalwork may also have accompanied burials (Knight and Howard 2004c, 83; compare Bradley 1998, 97–154) - as conceivably at Clifton, where dredging uncovered an outstanding collection of Middle and Late Bronze Age metalwork and human skulls (Phillips 1941), but unfortunately a direct association between the skulls and metalwork cannot be demonstrated. Indisputable associations between Bronze Age metalwork and human remains have yet to be recovered from other riverine or watery contexts in the County, and this interesting possibility remains, therefore, a matter for further investigation.		
	Assessment, evaluation and mitigation: such finds are difficult to predict in advance and the most appropriate strategy is a continuous watching brief with contingency provisions for detailed archaeological investigation. Appropriate contingency resources will be needed for scientific dating and appropriate specialist analysis (e.g. of associated environmental remains).		
12.Caves and rock shelters	Caves are not a feature of this geological formation.	Discoveries in Derbyshire, notably at Creswell Crags, raise the possibility that some caves may have acted as foci for funerary activities (e.g. Hart 1981, 36–7). Investigations of caves should take into account, therefore, the possibility of an association with burials and/or other ritual activities.	Natural caves are not a feature of this geological formation (but see discussion of caves and rock shelters above: Table 6.2.3.4).
	Assessment, evaluation and mitigation: any fissures, caves or rock shelters proposed for quarrying must be identified (e.g. by walkover surveys, aerial photography, radar or other geophysical techniques) and investigated for material indicative of Neolithic/Bronze Age as well as earlier or later activity. Particular attention should be focused upon areas where these features might be sealed by talus or colluvium. Sites yielding evidence for Neolithic or Bronze Age activity may warrant preservation *in situ*. Where fissures, caves and rock shelters are deemed appropriate for minerals extraction, sampling strategies involving the full range of relevant specialist scientific support must be devised and implemented (compare Tables 6.2.1 and 6.2.2). *In situ* remains of Neolithic or Bronze Age date may be of national importance, and deposits yielding these may warrant preservation *in situ*; if associated with palaeoenvironmental remains, their importance is likely to be enhanced. *In situ* remains found as part of the mitigation strategy for a minerals extraction site, if not recommended for preservation, will require an appropriate level of excavation, recording and specialist input.		
TRANSPORT			
13.Trackways and boats	Movements of people and stock across wet and boggy areas of river floodplains may have been facilitated by the construction of wooden or brushwood trackways linking higher sand and gravel islands (as, for example, at Argosy Washolme, Aston-upon-Trent, Derbyshire: Knight and Howard 2004b, 58–9). Rare discoveries have been made in Nottinghamshire of possible brushwood trackways that might date from the Bronze Age, but none has yet been	No recorded examples. Desk-based assessments and field surveys may identify potential locations for the preservation of boats, trackways or other riverine/wetland structures, but identification prior to extraction by evaluation trenching or other means is difficult.	No recorded examples. As in other areas, desk-based assessments and field surveys may identify potential locations for the preservation of boats, trackways or other riverine/wetland structures.

	dated firmly to this period. At Holme Pierrepont (HER M869), for example, four Late Bronze Age weapons were found close to an undated linear brushwood feature through which timber piles had been driven. In addition, oak stakes discovered during dredging of the Trent at Clifton and interpreted as part of Bronze Age 'pile structure' (Phillips 1941, 134; HER L1011) might have formed part of a timber trackway. The Clifton stakes were recovered alongside abundant Middle and Late Bronze Age metalwork and three logboats, two of which have been dated by radiocarbon to the Iron Age (Switsur, in *Radiocarbon* 1989, 1010–18. McGrail 1978, 178–83, figs 12–13, 40–1, 87), but the date of the timber structure is unknown. Bronze Age boats have been recovered from other sites in the Trent Valley (e.g. Argosy Washolme: Knight and Howard 2004b, 58–9) and Bronze Age or Iron Age examples should be anticipated during extraction.		
	Assessment, evaluation and mitigation. Such remains are likely to be concealed beneath substantial depths of alluvium, and perhaps buried within fluvially redeposited sands and gravels. The most effective strategy for their discovery is a continuous watching brief with appropriate contingency provisions, including environmental sampling and analysis, as such contexts are likely to yield important associated environmental remains.		
MISCELLANEOUS: LITHIC ARTEFACTS AND METALWORK			
14.Lithic scatters	HER distributions of Neolithic and Bronze Age lithic scatters and findspots show extensive spreads of material along the Trent Valley and thin scatters across the Magnesian Limestone and Sherwood Sandstone (with localised concentrations in intensively walked areas of the Limestone around Mansfield and Shireoaks). Interpretation is complicated by the uneven coverage by fieldwalking, the use of different collection methodologies and the burial of finds in some areas beneath alluvium, colluvium and other masking deposits. Other problems arise from the imprecise dating of lithic artefacts, which prevents accurate determination of the duration of the activity represented by surface scatters and hence the number of sites that may have been in use at any one time – although consideration of the results of several systematic surveys of the Aggregate Character Areas suggest that the density of activity may have increased significantly in some areas from the earlier Neolithic (Section 6.3.3). Particular difficulties arise from the problem of disentangling later Mesolithic from earlier Neolithic sites and of separating Neolithic from Early Bronze Age collections – especially where only small numbers of tools have been recovered. The character, date and duration of the activities represented by lithic scatters are also difficult to establish. Many concentrations could preserve sub-ploughsoil features indicative of settlement or task-specific activities, but unfortunately very few finds scatters have been sampled by excavation. Valuable guidance recording, interpreting and managing lithic artefact scatters is contained in *Managing Lithic scatters. Archaeological Guidance for Planning Authorities and Developers (*English Heritage 2000).		
	Extensive spreads of Neolithic and Bronze Age lithic tools and waste material, including finds concentrations that may indicate occupation sites or specialised activity foci, have been recorded across the river terraces in areas that have been systematically fieldwalked (e.g. Fosse Way from Newark to East Stoke: Kinsley and Knight 1992; South Muskham: Garton 2002). This contrasts sharply with the alluvial floodplain, where finds may be buried beneath later alluvium (Garton 2002, 26–7, 32, fig.5) – particularly in the lower reaches of the Trent, where deep alluvium extends far beyond the modern river channel. In addition, quarrying has demonstrated extensive sub-alluvial spreads of Neolithic and Early Bronze finds in some areas and the	The distribution of known surface scatters is biased towards areas around Mansfield and Shireoaks that have been intensively walked by local societies and individuals, with comparatively little information from other areas. A systematic survey of Elmton parish, immediately adjoining Nottinghamshire, has demonstrated an extensive distribution of Neolithic and Bronze Age lithic artefacts, with a number of major concentrations that may correlate with occupation foci (Knight *et al* 1998). More surveys of this kind are required to investigate the character and extent of activity in these periods and contrasts with other Character Areas.	A sparse distribution is recorded across the Sherwood Sandstone, even within the walked areas of the brickwork-plan field systems (Garton 2007). On current evidence, this may signify a real contrast with the Sands and Gravels in terms of the density and character of activity.

	remains of structures such as burnt mounds, providing convincing evidence for the extension of Neolithic and Bronze Age activity into valley-bottom locations.		
15.Stone axes and other single finds	Stone axes and other single lithic finds that may be dated typologically to the Neolithic and earlier Bronze Age periods are scattered across the river terraces and may derive from contemporary activity foci. The distribution of stone axes has particular potential for elucidating patterns of exchange and movement, although due regard should be given to the possibility that some objects might have been collected in later periods and redeposited.	A thin scatter of stone axes and other typologically diagnostic lithic artefacts has been recorded across the limestone escarpment, with a notable concentration in areas around Mansfield that have been intensively fieldwalked. More artefacts may lie concealed beneath masking deposits such as talus and colluvium.	Stone axes and other typologically diagnostic lithic artefacts are scattered thinly across this landform, principally on interfluve areas where the finds distribution is not distorted by burial beneath alluvium, colluvium and other masking deposits. A notable concentration may be observed around Worksop in more intensively fieldwalked areas.
16.Metalwork	A dense distribution of Bronze Age tools and weapons has been recorded, particularly along the Trent and principally of the Middle to Late Bronze Ages. These artefacts have been recovered mainly during dredging or other activities along the Trent and other rivers and during quarrying of the river gravels. At Clifton, for example, one of the finest collections of Middle and Late Bronze Age metalwork from Nottinghamshire was retrieved during dredging of the Trent (including ten socketed spearheads, two rapiers, a dirk, two swords and two knives: Phillips 1941). Other finds included three logboats, two of which were dated subsequently to the Iron Age, six human skulls and many oak stakes interpreted at the time as part of a Bronze Age 'pile structure', but it remains unclear what other material might also date from the Bronze Age. Interpretation of metalwork distributions is complicated by imprecise details of the locations and contexts of most finds, but many artefacts appear to have been deposited originally in riverine, marshy or other watery contexts, possibly during funerary or other ceremonies. Other depositional mechanisms may include casual loss, erosion from bankside settlements and loss during conflict (Bradley 1998). Portable Antiquities Scheme (PAS) data have augmented the record. Searching on the PAS database emphasises the Trent focus and demonstrates a scatter of finds elsewhere, but the value of this information is limited by the absence of detailed locational or contextual data.	A sparse scatter of Early and Middle Bronze Age metalwork has been recorded across the limestone plateau, and more may lie concealed beneath talus or colluvial accumulations. No examples of Bronze Age hoards have been recorded.	A thin scatter of EBA to MBA metalwork is recorded in the HER. The distribution of known finds displays a riverine emphasis, recalling in this respect the distribution recorded on the Sands and Gravels. Many more finds may be buried below alluvium, colluvium or wind-blown deposits and should be sought during quarrying. No examples of hoards have been recorded.
	Assessment, evaluation and mitigation Desk-based assessments need to collate and assess all existing information on finds scatters and single finds as a prelude to further work, given that this may identify potential activity foci meriting further evaluation and mitigation work. Arable areas proposed for development are likely to require systematic fieldwalking and/or test-pitting as a matter of routine, with appropriate provision for conservation work and X-radiography of metalwork. Activity foci identified during fieldwalking are likely to require further evaluation by geophysical survey and/or trial trenching to establish whether sub-surface remains might survive, while test-pitting should be considered as a means of investigating the spatial extent of activity on sites where lithic scatters might be sealed beneath alluvium, colluvium, coversands or peat (e.g. Garton 2002, 26–7, 32, fig.5). To improve retrieval rates for metalwork, it is recommended that a metal detector be attached to quarry conveyor belts as routine practice.		

TABLE 6.2.4. LATE BRONZE AGE AND IRON AGE ARCHAEOLOGICAL RESOURCE (*c.*1150 cal BC – AD43)			
ARCHAEOL-OGICAL ASSOCIATIONS	**AGGREGATE CHARACTER AREAS**		
	SUPERFICIAL SANDS AND GRAVELS	**MAGNESIAN LIMESTONE**	**SHERWOOD SANDSTONE**
AGRICULTURE AND SUBSISTENCE			
1.Ditched field systems and pit alignments	The earliest datable field systems in this Character Area may be attributed currently to the mid-first millennium BC, significantly later than some other areas of the East Midlands (e.g. the Nene valley; Knight and Howard 2004c, 100–2). The earliest datable field system, at Gonalston, appears to have followed partition of the valley bottom by pit alignments, and comprised a rectilinear system of substantial land parcels demarcated by ditches (flanked rarely by low sub-alluvial earthworks); these were integrated with enclosures demarcating occupation foci or areas reserved for specialised purposes such as stock corralling (Knight and Elliott 2008). Much work remains to be done on the origins and development of Iron Age field systems, the balance between pastoral and arable usage, and regional variability in the layout and functions of field system – and in particular the genesis of the remarkable coaxial systems that extend across the Trent terraces immediately downstream of Newark. These systems comprise an elaborate network of rectilinear fields, pit alignments and trackways, aligned principally on a NW–SE axis, which were integrated closely with enclosures for domestic or specialised use (e.g. as stock corrals). Limited excavations have been conducted, but current evidence suggests development from the Late Iron Age, followed by a major expansion in the Roman period (Garton 2002).	No evidence has been obtained so far for extensive field systems. This contrasts particularly with the well-developed 'brickwork-plan' field systems of the Sherwood Sandstone, which curiously appear not to extend westwards to the Magnesian Limestone. Occasional linear features are recorded on cropmark plots of sites on the limestone plateau, away from areas with significant masking deposits of alluvium and colluvium, but interpretation of these features remains problematic. The limited cropmark data from Nottinghamshire contrasts with the more extensive evidence obtained from Derbyshire and South and West Yorkshire (Brightman and Waddington 2011; Roberts *et al* 2010). There is a crucial need for further air photographic survey and analysis in Nottinghamshire to test the validity of this contrast.	Extensive co-axial field systems, forming a pattern reminiscent of brickwork, cover broad interfluves of the well-drained Sandstone escarpment, away from areas with significant alluvial or colluvial masking deposits (Garton 2008; Riley 1980). These field systems appear to date principally from the Roman period, but excavations and fieldwalking data provide persuasive evidence for an origin in the Late Iron Age (e.g. Dunston's Clump: HER M8751; Garton 1987). The rectilinear fields are closely integrated with trackways and domestic or specialised enclosures, but pit alignments are conspicuous by their absence (in striking contrast, therefore, to the Sands and Gravels). Significantly more research is required to establish the development and functions of these field systems, which in the Roman period might indicate an emphasis upon livestock, and in particular sheep (see Section 6.3.5).
	Assessment, evaluation and mitigation: aerial photographic and lidar searches may identify potential field and boundary systems of this period, while plotting of these will guide the development of evaluation and mitigation strategies. Geophysical survey may be employed in appropriate circumstances to elucidate further the spatial arrangement of field boundaries and their relationship to occupation sites. Targeted trial trenching may provide valuable information on their character and the degree of preservation, and potentially their date (although field boundaries generally produce few if any associated finds) and will assist in the development of a mitigation strategy. Strip, map and sample will generally be the preferred mitigation methodology, as only through the stripping of large areas and investigations focused upon ditch intersections can we hope to unravel the development of these boundary systems and locate features of particular interest such as toolmarks (see, for example, East Carr, Mattersey: Morris and Garton 1998; HER 11687).		
2.Cultivation features	Excavations of an Early Iron Age midden on a river terrace at Girton Quarry revealed multiple intersecting linear soil marks which have been interpreted as plough or ard marks	None has currently been recorded, but traces should be anticipated in circumstances where significant colluvial,	None has currently been recorded. Again, traces should be anticipated in circumstances where masking deposits may have preserved traces of early cultivation.

	associated with arable agriculture (HER L11964; Kinsley 1998). These features were concealed beneath a layer of wind-blown sand that had accumulated adjacent to an ancient channel of the Trent. This channel had silted up from the Later Mesolithic period, but may still have been visible in the Early Iron Age as a marshy depression. The cultivation features appeared at the same stratigraphic level as the Iron Age midden, and possibly overlapped the period of its use. No associated field boundaries were identified.	alluvial or other masking deposits may have preserved traces of early ploughing.	
	Assessment, evaluation and mitigation: the Girton ard or plough marks were located by chance during archaeological inspection of the surface revealed after machine-stripping during quarrying of a layer of wind-blown sand. Areas with the potential for preserving such features might be identified during trial trenching (by the plotting, for example, of colluvial deposits or coversands that might conceal features and/or deposits indicative of human activity) but such remains are likely to be revealed only by skilful monitoring by a qualified archaeologist of topsoil/subsoil stripping over large areas and careful manual cleaning of the exposed surface. Once revealed, potential cultivation marks should be carefully excavated, with particular regard to establishing their spatial extent, stratigraphic context and dating.		
DEFENCE			
3. Hillforts and analogous sites	No hillforts or analogous sites are known in the major river valleys, but a possible defended enclosure with evidence for intensive Iron Age and Roman occupation has been recorded on the fringe of the Vale of Belvoir at Aslockton, atop a broad and gentle interfluve mantled by glaciofluvial sands and gravels (HER M1513; Palmer-Brown and Knight 1992). Evaluation excavations in advance of pipeline construction revealed a complex structural sequence spanning the Iron Age and Roman periods, but more extensive excavation and survey would be required to establish satisfactorily the morphology, functions and chronological development of the site. Slight earthworks of uncertain origin on the slopes of Beacon Hill, Gringley on the Hill (HER M5110) have been interpreted by some as possibly the remains of hillfort defences encircling this prominent hilltop (of glaciofluvial sands and gravels). Others, however, have suggested that these might be associated with its occupation by Prince Rupert in 1644 during his rout of the Parliamentarian army (Table 6.2.8.7). Further archaeological investigations are required to establish the extent, character and date of these remains.	An Iron Age promontory fort has been postulated at Strawberry Bank, near Sutton-in-Ashfield (HER M2472), overlooking the Coal Measures on a spur of the Magnesian Limestone escarpment. Slight earthworks of uncertain extent and character survive at the tip of the spur. A trench by the Sherwood Archaeological Society uncovered charcoal and a late Iron Age brooch from deposits interpreted as the fill of a ditch flanking the outer edge of a rampart, but more extensive excavations and survey are required to verify this interpretation and to establish the extent, character and date of the earthworks.	A possible 'marsh-fort', recalling an Iron Age site at Sutton Common in South Yorkshire (Van de Noort *et al* 2007), has been identified following investigations of a large sub-oval earthwork enclosure preserved in woodland at Crow Wood, Styrrup (Badcock and Symonds 1994; HER M18271). The enclosure is bounded by a pronounced internal bank and flanking ditch, encompassing an area of slightly raised ground in alluvial farmland. Limited excavations and survey uncovered no evidence of date or function, and interpretation remains problematic.
	Assessment, evaluation and mitigation: such sites, due to their rarity and their potential significance for understanding the development of Iron Age settlement in the East Midlands, may be considered as candidates for preservation *in situ.* Any development work that impacted upon them would need to be preceded by appropriate assessment and evaluation, including where necessary a full assessment of air photographic and lidar evidence, walkover surveys to identify earthwork remains (which at Aslockton survive, remarkably, in arable land) and non-intrusive surveys, including measured surveys of extant earthworks and geophysical survey to locate features inside and outside the enclosure. Evaluation trenching would be required to establish the degree of preservation and the character and date of any surviving remains, following which a detailed mitigation strategy would need to be developed if preservation *in situ* is not recommended.		

DOMESTIC			
4.Unenclosed occupation foci and caves/rock shelters	LBA and Early Iron Age domestic sites are typified in this Character Area by scatters of pits, post-holes and gullies, with rare examples of unenclosed roundhouses (Knight 2007). These are dispersed widely over the gravel terraces, and in certain topographic locations may be preserved beneath alluvium, colluvium or coversands (e.g. Girton: HER L11963; Kinsley 1998). These spreads of features typically form no recognisably coherent plan, and in contrast to enclosed settlements are difficult to recognise without large-scale area stripping. 'Open' settlements of this kind persisted into the later Iron Age, but as noted below the emphasis in the second half of the first millennium BC shifted firmly towards enclosure.	The extent and character of LBA and Iron Age settlement in this Character Area remain to be established. Only routine large-scale strip, map and sample exercises can hope to shed light upon settlement morphology and functions, and in particular to establish whether the progression from open to enclosed settlement that has been demonstrated on the Sands and Gravels may also be observed across the Magnesian Limestone escarpment. It is also possible that domestic activity of some kind might have continued in some of the many caves and rock shelters that flank the deep gorges incised into the plateau surface (compare Table 6.2.3.4).	Excavations of some Romano-British enclosures have demonstrated origins in the Late Iron Age, notably at Dunston's Clump near Retford (HER M8751; Garton 1987), but the extent and character of first millennium BC settlement in this Character Area remain priorities for research. Large-scale strip, map and sample exercises are recommended as the most appropriate methodology for locating and investigating settlement of this period, and in particular for establishing whether a progression from open to enclosed settlement may be identified.
	Assessment, evaluation and mitigation: as for the Neolithic to MBA period, evaluation trenches are unlikely to locate unenclosed settlements in view of the insubstantial nature and low density of the structural remains that may be expected to survive. Systematic fieldwalking or test-pitting should be conducted with the aim of identifying finds concentrations that might indicate unenclosed settlement foci of this period, but it is likely that better-preserved sites will lie concealed beneath alluvium, colluvium or (in the Lower Trent) coversands, and hence be invisible prior to extraction. Most sites of this type are likely to be uncovered during the application of strip, map and sample techniques, which it is expected would have appropriate provision for scientific dating and environmental analysis (as for other settlement evidence, described below). Fissures, caves or rock shelters that might yield evidence for activity of this period should also be sought and investigated in advance of development, as described in Table 6.2.4.		
5.Enclosures: habitation foci, stock compounds, *etc*	Unenclosed settlements may be shown to continue into the Iron Age, but from the mid-first millennium BC domestic sites and specialised activity foci were increasingly enclosed by single or multiple ditches that may have been flanked by earth banks and/or by fences or hedges (Knight 2007). In some areas, these characteristically subrectangular enclosures were integrated with field systems, pit alignments and trackways indicating an orderly partition of the landscape between neighbouring communities. The mechanisms of enclosure have been widely debated and may relate in large part to increasing pressures upon land resources in response to population growth and environmental deterioration. Much remains to be done to clarify the progress from an essentially open to enclosed landscape, and to elucidate the functions and socio-economic interrelationships of enclosures.	A stone-walled enclosure recorded in woodland at Scratta Wood near Worksop was shown by excavation to originate in the Late Iron Age (HER M4352; Challis and Harding 1975, i, 136–7). Extensive structural and material evidence was obtained for domestic occupation, principally of the Late Iron Age and Roman periods, including several circular, stone-walled buildings and pits for storage or other purposes and a wide variety of ceramic and other artefacts. Earthworks that might represent enclosures of comparable type have been recorded in woodland nearby, both in Nottinghamshire near Church Warsop (HER 12177) and Derbyshire (e.g. Whitwell Wood: Brightman and Waddington 2011, 68), but further investigation of these is required to establish their date and character. There is currently no evidence for the form or function of settlement attributable to the earlier Iron Age or Late Bronze Age, and elucidation of settlement in these periods remains a key research priority.	As noted above (Table 6.2.4.4), the extent and character of first millennium BC settlement in this Character Area remain unclear. Large-scale strip, map and sample exercises are recommended as the most appropriate methodology for locating and investigating settlement of this period, and in particular for establishing whether a progression from open to enclosed settlement may be identified.
	Assessment, evaluation and mitigation: detailed analysis of the available air photographic evidence, combined with walkover surveys to check for vestiges of earthwork enclosures (e.g. in woodland or parkland undisturbed by modern ploughing) and measured surveys of extant earthworks will need to be covered by assessments. Fieldwalking of arable sites and geophysical survey to locate buried remains will also need to be considered during the evaluation stage, together with targeted trial trenching to establish the level of preservation and the character and date of the surviving remains. Sites deemed acceptable for extraction, and the areas around them, will require appropriate excavation. Mitigation techniques will vary depending upon the nature of the surviving remains, but in the case of ploughed-out cropmark sites, which will form the majority of the evidence, strip, map and sample techniques		

	provide an effective strategy. Sites with the potential for scientific dating and for the location, recovery and analysis of well-preserved environmental samples, particularly faunal assemblages, will require provision for an appropriate level of specialist input.		
6.Burnt mounds and associated features	This monument class, represented by concentrations of heat-shattered stones in association sometimes with troughs for holding water and hearths for heating the stones, may have continued in use into the Late Bronze Age by analogy with other Trent Valley examples (e.g. Willington, Derbyshire: Beamish 2009, 68), but none of the Nottinghamshire monuments has yet been dated conclusively to this period. Their functions remain unclear, but evidence suggests an association with cooking, possibly specialised industrial activities and/or bathing. Known examples are located close to contemporary water sources, and as they are commonly preserved beneath alluvium are not easily located prior to topsoil- or subsoil-stripping. Burnt mounds are currently focused on the Sands and Gravels (Knight and Howard 2004b, 56–7) but examples should be anticipated in other geological zones at locations close to sources of water.	Examples may well have existed along watercourses in this and other geological zones and should be anticipated in valley-bottom or other watery contexts. As yet, however, the distribution of burnt mounds cannot be shown to extend into this Character Area.	None has currently been recorded in this Character Area, but as on the Magnesian Limestone examples should be anticipated in valley-bottom and other locations close to water – and hence should be included amongst the target sites to be located during assessment and evaluation.
	Assessment, evaluation and mitigation: although the current distribution of burnt mounds is biased heavily towards the Sands and Gravels, structural remains should be anticipated in all valley-bottom and other locations with ready access to water. Schemes of investigation should include, therefore, fieldwalking and/or test-pit surveys aimed at identifying surface concentrations of burnt stones or layers of burnt material in test-pits; the sides of drainage ditches and other dug features should also be checked for exposures of burnt stones and other material (as, for example, at Hoveringham Quarry: Knight and Elliott 2008; HER M18394). It is likely, however, that most structures will be masked by alluvial deposits, and hence strip, map and sample techniques may be flagged as the most reliable methodology for the identification of burnt mounds and associated features. As with settlements, particular emphasis should be placed upon provisions for scientific dating and for the location, recovery and analysis of environmental remains to elucidate the functions of burnt mounds, the changing environment and the developing agrarian economy.		
7.Middens	Excavations at Girton revealed a tight concentration of burnt stones, charcoal and animal bone, together with an unusually rich collection of Early Iron Age pottery (Kinsley 1998; HER L11964). This was located adjacent to a spread of pits and post-holes that may indicate a contemporary unenclosed settlement. The midden was located on a river terrace, stratified beneath wind-blown sand and adjacent to an ancient channel of Trent. The channel appears to have silted up from the Later Mesolithic, but may still have been visible in the Iron Age as a marshy depression.	None has currently been recorded. More examples could well survive in favourable circumstances (e.g. below colluvium or coversands). Further examples should be sought in view of the potential of such finds-rich deposits for elucidating the material culture of this period. Studies of associated faunal and other environmental remains may also shed important light upon the contemporary environment and agrarian economy.	None has yet been recorded. As in the Magnesian Limestone, examples could survive in favourable circumstances (e.g. below colluvium) and should be sought and investigated as a priority.
	Assessment, evaluation and mitigation: middens might be revealed as pronounced concentrations of artefacts during fieldwalking survey and/or test-pitting or as anomalies recorded during geophysical survey. They could also survive as finds-rich layers in the sides of drainage ditches or other features, and it is recommended that a qualified archaeologist examine the sides of dug features prior to extraction with the aim of locating exposed deposits that might indicative middens (or, as noted above, other archaeological sites such as burnt mounds). Middens are most likely, however, to be revealed during soil stripping, and hence are best investigated by strip, map and sample techniques. Particular emphasis should be placed upon provisions for scientific dating and for the location, recovery and analysis of palaeoenvironmental remains**.**		

RELIGIOUS, RITUAL AND FUNERARY			
8.Square-ditched barrow cemeteries (Arras tradition?)	Rare clusters of square-ditched enclosures, recalling the classic barrows of the East Yorkshire Arras complex, have been revealed in cropmark plots of the river terraces, notably at North Muskham (HER M4287) and Gonalston (HER M18614; Knight and Elliott 2008) and upstream in Derbyshire (e.g. Aston-upon-Trent: May 1970). Limited excavations have so far failed to elucidate their functions, and clarification of their date and functions remains a key priority for the County.	No examples have been reported from cropmark plots of either the Nottinghamshire or Derbyshire portions of the Magnesian Limestone (compare Brightman and Waddington 2010, 60, 67–8). However, the discovery of an Iron Age chariot burial in a pit inside a small square ditched enclosure at Ferry Fryston, near Ferrybridge in West Yorkshire (Roberts *et al* 2010, 52) emphasises that Arras tradition burials had occasionally penetrated westwards from their focus on the Yorkshire Wolds to the Magnesian Limestone.	None may be observed in cropmark plots, despite extensive cropmark evidence over much of this Character Area, and such monuments may have been extremely rare or entirely absent from this geological zone.
	Assessment, evaluation and mitigation: further examples may be located on aerial photographs, and desk-based assessment should include a thorough investigation of extant cropmark records to establish whether additional examples of this monument class may be located. Useful evaluation techniques include geophysical survey to locate buried features, field walking to determine possible associations with surface artefacts, and trial trenches to establish the level of preservation, date, *etc*. Sites identified as possibly Iron Age square barrows represent a very rare resource in the East Midlands, and in view of their rarity and potential significance preservation *in situ* must be considered as an option.		
9.Riverine deposits: metalwork and other finds retrieved from rivers and other watery contexts	Significant quantities of Late Bronze Age and Iron Age tools, weapons and prestige goods have been retrieved from riverine and other watery locations, reflecting a pattern observed in the Early and Middle Bronze Ages (Table 6.2.3.16; e.g. Iron Age shield boss from Trent at Ratcliffe on Soar: HER L616; Watkin *et al* 1996). This material may have been deposited deliberately as ritual or ceremonial offerings, and may in some cases have accompanied burials, although the precise location of the finds and the circumstances of discovery are often unclear. No direct associations with human remains have been recorded, but these are unlikely to be detected in view of the vigorous fluvial redeposition of many terrace and channel deposits.	No evidence for the deliberate placement of material for ritual or ceremonial purposes has yet been recovered from riverine contexts, but finds should be anticipated where quarrying extends across riverine or other watery locations.	Bronze Age metalwork is scattered thinly across this Character Area, both along the river valleys and in other topographic locations. The precise locations of the finds and the circumstances of discovery are generally obscure, although riverine locations appear to have been favoured in at least some cases. A similar ritual or ceremonial explanation to that suggested for the Sands and Gravels may be appropriate in such cases.
	Assessment, evaluation and mitigation: assessments must take full account of current plots of palaeochannels and ensure that checks of lidar, air photographic, cartographic and other sources are combined with a walkover survey to check the surface evidence for ancient river channels. This will assist identification of high-risk areas and the location of other potential wetlands, but it is obviously impossible to predict exactly where material might have been deposited. A continuous watching brief during extraction may provide appropriate mitigation (both for material of this and other periods) and consideration should be given to the use of metal detectors on conveyor belts as standard practice.		
10.Other placed deposits and burials on settlements and in caves or rock shelters	Other intentionally placed objects, including prestigious metalwork such as a complete Late Iron Age electrum torc recovered from an Iron Age pit near Newark (*Treasure Annual Report 2005/6*, 55: no.82) have sometimes been recorded in dry-land pits and ditches on and around settlements. Iron Age features on occupation sites along the Trent Valley have very occasionally yielded whole or	No evidence for the structured deposition of artefacts or other material for ritual/ceremonial purposes in dry-land contexts has yet been recovered, but such finds and other evidence for human burial should be anticipated during quarrying of settlement sites and their environs. As discussed for the Neolithic and earlier Bronze Age (Table 6.2.3.12), investigations of caves or rock shelters should	No evidence for the structured deposition of artefacts or other material for ritual/ceremonial purposes in dry-land contexts has yet been recovered, although several examples have been observed on Roman settlements such as Raymoth Lane, near Worksop (Palmer-Brown and Munford 2004, 30-31; HER M18390). As in the other Character Areas, such finds dry-land contexts has yet

	incomplete animal skeletons that appear to have been deliberately placed as part of a burial or other ritual ceremony (e.g. Barrow-upon-Trent, Derbys.: Knight and Howard 2004c, 93), but currently this practice has only been recorded on Roman sites in Nottinghamshire (e.g. Chainbridge Lane, Lound: Eccles *et al* 1988, 17). Human remains in pits, ditches, *etc*. might also be anticipated from discoveries on Iron Age sites elsewhere in the East Midlands (Willis 2006, 125–6).	investigate the possibility of an association with human burials and/or other ritual activities.	been recovered, but such finds and other evidence for human burial should be anticipated during quarrying of settlement sites and their environs.
	Assessment, evaluation and mitigation: such finds are difficult to predict in advance, and a strip, map and sample mitigation strategy may provide an adequate framework for identification and recording of such remains during quarrying. Sufficient contingency resources should be available for scientific dating and appropriate specialist analysis in the event that human burials are retrieved during the investigation of open settlements, caves, etc (e.g. for isotope analysis of human bone).		
TRANSPORT			
11.Trackways	Some of the many trackways recorded in air photographs of the river terraces may relate to late prehistoric activity. Discoveries at Holme Pierrepont (HER M869), where four Late Bronze Age weapons were found close to an undated linear brushwood feature through which timber piles had been driven, and Clifton (Table 6.2.4.12) raise the possibility of preserved trackways across the extensive wetland areas that developed in some of the floodplain areas associated with the Trent and its tributaries (comparable, for example, to the Iron Age causeway excavated at Fiskerton, Lincs.: Field and Parker-Pearson 2003).	Some of the rare trackways recorded in air photographs might relate to late prehistoric activity, but no examples dating from this period have yet been recorded by excavation. Extensive wetlands are not characteristic of this geological formation, in contrast to the Sands and Gravels, and currently no evidence has been obtained for trackways across wetland environments.	Many ditched trackways may be observed on air photographs of the brickwork plan field systems (e.g. Riley 1980). Most probably relate to Roman activity, but the evidence from sites such as Dunston's Clump for the Late Iron Age origin of some settlements (Garton 1987) suggests that a proportion could relate to earlier activity. No wetland locations with associated timber trackways have been recorded, but traces of such structures might survive in the floodplains of some of the major rivers that drain the Sherwood Sandstone escarpment.
	Assessment, evaluation and mitigation: timber trackways are likely to be concealed beneath substantial depths of alluvium, and perhaps buried within fluvially redeposited sands and gravels. Assessment will need to identify palaeochannels and potential wetlands with high risks of associated structural remains, but the most effective strategy for their discovery will be a continuous watching brief with appropriate contingency provisions. This will need to include resources for scientific dating of preserved structural remains and environmental sampling/analysis, as such contexts may yield other important environmental remains. Other trackways, as revealed for example on air photographs, may be recorded most effectively during routine strip, map and sample exercises.		
12.Logboats	Logboats may be expected in waterlogged contexts, as at Clifton where dredging of the Trent revealed a substantial collection of Middle and Late Bronze Age metalwork and three logboats, two which have been dated by radiocarbon to the later Iron Age (McGrail 1978, 178–83, figs 12–13, 40–41, 87; Phillips 1941; Switsur, in *Radiocarbon* 1989, 1010–18; HER M1011). Stakes recorded on the riverbed could indicate an associated causeway, but these are currently undated. Three logboats recorded in gravels at Holme Pierrepont appear to have been rapidly buried, possibly during flood, and subsequently incorporated in a	None has currently been recorded, and it is debatable whether the streams that characterise this limestone landscape would have been appropriate for navigation.	None has currently been recorded. Apart perhaps from the lower reaches of some major tributaries such as the Idle, Ryton or Erewash, which flow partially through the Sandstone, it is questionable whether navigation would have been an option for many of the streams draining this Character Area.

	southwards-migrating point bar (HER L795, L797 & L798; MacCormick *et al* 1968; McGrail 1978). A radiocarbon date of 410 cal BC–cal AD 60 (at two sigma) was obtained from Boat 1 (Switsur, in *Radiocarbon* 1989, 1010–18). In view of the potential significance of Trent as a communication and exchange route, more boats should be anticipated in waterlogged contexts.		
	Assessment, evaluation and mitigation: boats may be concealed beneath substantial depths of alluvium and may perhaps be buried within fluvially redeposited sands and gravels. Assessment should identify high-risk areas from plots of palaeochannels, *etc*., and extraction in such areas should be accompanied by a continuous watching brief with an appropriate allocation for unexpected discoveries. Resources must be made available for scientific dating, environmental sampling and analysis, as such contexts are likely to yield important associated environmental remains. Discoveries of logboats may involve significant costs (both for excavation and for sampling and analysis of associated environmental remains) and every effort should be made to identify high-risk locations in advance of quarrying.		
WATER SUPPLY AND DRAINAGE			
13.Ponds and waterholes	Ponds and waterholes make their first appearance in the archaeological record of this Character Area during the Late Bronze Age, notably at Girton Grange (HER L11963; Guilbert and Garton 2007). Many of the large, irregular pits occurring on river terraces may also have served as waterholes or ponds and may have been linked in part to more intensive animal husbandry. Such features may show on air photographs, but may be sealed beneath colluvium, alluvium or other masking deposits that hinder discovery in advance of extraction (as demonstrated by their discovery in terrace-edge sand deposits during quarrying at Girton Grange).	None has been recorded yet in a Late Bronze Age or Iron Age context, but examples should be anticipated in excavations of settlement sites in appropriate topographic locations.	None has been recorded yet in a Late Bronze Age or Iron Age context, but as on the Magnesian Limestone examples should be anticipated in excavations of settlement sites in appropriate topographic locations.
	Assessment, evaluation and mitigation: Strip, map and sample is the most effective technique for the identification of ponds or waterholes of this period, although large features may be visible on aerial photographs. Water-related features are likely to yield well-preserved organic remains, and the location, collection and analysis of organic deposits should be accorded a high priority in the development of mitigation strategies.		
MISCELLANEOUS: FINDS SCATTERS AND SINGLE FINDS			
14.Lithic and pottery scatters	Some of the many lithic artefact scatters that have been recorded in intensively fieldwalked areas and have been attributed to the Neolithic and earlier Bronze Age periods might incorporate material of this later period. Interpretation is complicated by uncertainty regarding the extent and character of lithic artefact industries in the first millennium BC, but assessments of archaeological potential should consider the possibility that some lithic collections might signal activity during this period. The Notts HER also records surface discoveries of querns in	Lithic concentrations have been recorded in intensively walked areas across the limestone plateau around Mansfield and Shireoaks, but finds in this Character Area are otherwise sparse. As elsewhere, some lithic collections might signal first millennium BC activity, and assessments of archaeological potential should note that some lithic collections might indicate activity during this period. No querns are listed in the HER, while recorded surface finds of Iron Age pottery are virtually absent (e.g. Iron Age and Roman pottery from near Shireoaks: HER L4354),	Thinly spread lithic artefacts have been recorded in systematically walked areas of the brickwork-plan fields, with evidence of some potential activity foci, but limited fieldwalking has been carried out elsewhere. As in the other Character Areas, some lithic concentrations might relate in part to first millennium BC activity. Other surface finds that might signify activity foci of this period include rare querns of uncertain date (e.g. Babworth beehive quern: HER L12170) and extremely rare pottery scatters (e.g. Farnsfield: HER L8300). Pottery scatters are rare

	the list of potential Iron Age sites, but it is impossible without a full review of the character and contexts of this material to assess what proportion of finds might genuinely relate to LBA or Iron Age activity. Scatters of pottery that have been attributed the Iron Age are rather more useful as indicators of late prehistoric activity, but the distribution of these is remarkably sparse in comparison to some other East Midlands counties such as Northamptonshire. A review of this material is required to provide a reliable distribution map, including differentiation where possible between pottery attributable to successive ceramic traditions of the first millennium BC. Interpretation of potential Iron Age pottery scatters is complicated further by the problem in Nottinghamshire of distinguishing Iron Age from Anglo-Saxon plain wares on the grounds solely of fabric. There is, therefore, a need for systematic reassessment of 'Anglo-Saxon' and 'Iron Age' pottery finds to clarify their chronology and to refine the spatial distribution of material that may be assigned with confidence to these periods.	Specialist examination of extant surface collections might reveal more material of this period, but on present evidence the distribution contrasts quite starkly with that observed on the Sands and Gravels.	even in intensively fieldwalked areas (e.g. Garton 2007; 2008) and currently can add little to our understanding of first millennium BC activity in this area.
15.Metalwork	A moderately dense distribution of Late Bronze Age and Iron Age tools and weapons is indicated, with a perceptible bias towards riverine and other watery locations (notably along the Trent between Attenborough and Holme Pierrepont: Scurfield 1997). The circumstances of deposition of these items are unclear, but as noted in the preceding table many artefacts could have been deliberately deposited during riverside funerary and other ceremonies or alternatively could represent processes such as casual loss, erosion from bankside settlements or loss during conflict (Bradley 1998). Deliberately placed deposits have also been recorded in dry-land contexts, including a Late Bronze Age hoard from Newark (HER L3644) and an Iron Age torc of electrum that had been deposited deliberately in a pit on settlement near Newark (*Treasure Annual Report 2005/6*, 55: no.82). Attention should also be drawn to a thin scatter of coin finds that may be attributed to the Late Iron Age period.	Rare surface finds have been made of LBA and Iron Age metalwork (e.g. LBA socketed spearhead from Mansfield Woodhouse: HER L4003; Iron Age linchpin from Mansfield Woodhouse Roman villa: HER L8569), but currently the distribution contrasts strongly with the comparatively dense pattern of finds across the Sands and Gravels. Too few finds are available for general trends to be observed, but it is worth noting that none of the few recorded finds show any relationship to water.	A thin scatter of LBA metalwork is recorded in the HER, including several finds from river valleys, but further typological study is required to refine the chronology of the Bronze Age metalwork recovered from this area and assess locational preferences or temporal changes in distribution patterns. Most finds occur in isolation, but an important Late Bronze Age hoard (of the Wilburton tradition) has been recorded at Great Freeman Street in Nottingham (HER L2261; Dixon *et al* 2006, 16, Plate 1). Rare Iron Age coins have been reported (e.g. Blidworth: HER L5323), but currently no other items of Iron Age metalwork are recorded in the HER.
	Assessment, evaluation and mitigation: Desk-based assessments will need to collate and assess existing information on all categories of surface find as a prelude to further work, given that this may identify potential activity foci meriting further evaluation and mitigation. Particular attention should be focused upon finds logged by the Portable Antiquities Scheme, which may enhance the spatial distribution of known surface finds. Systematic fieldwalking has poor track record for the location of LBA and Iron Age sites in Nottinghamshire, due largely to the comparative paucity of surface finds of pottery of these periods, although some lithic artefact concentrations may well relate to LBA or Iron Age activity. Further systematic fieldwalking and/or test-pitting (especially where lithic scatters might be sealed beneath alluvium and other masking deposits) should be encouraged as part of a prospection strategy for sites of all periods, with appropriate provision for conservation work and X-radiography of metalwork. Activity foci identified during fieldwalking and test-pitting are likely to require further evaluation by geophysical survey and/or trial trenching to establish whether sub-surface remains might survive. To improve retrieval rates for LBA and Iron age metalwork, it is recommended that a metal detector be attached to quarry conveyor belts as routine practice.		

TABLE 6.2.5. ROMANO-BRITISH ARCHAEOLOGICAL RESOURCE (AD43 – *c.* AD410)			
ARCHAEOL-OGICAL ASSOCIATIONS	**AGGREGATE CHARACTER AREAS**		
	SUPERFICIAL SANDS AND GRAVELS	**MAGNESIAN LIMESTONE**	**SHERWOOD SANDSTONE**
AGRICULTURE AND SUBSISTENCE			
1.Fields and field systems	Ditched boundaries indicating Roman field systems are common features of the river terraces, particularly along the Trent and Idle. They are best developed in the lower Trent, immediately downstream of Newark (Garton 2002; Whimster 1989). In that area, coaxial ditched field boundaries, developing from LIA roots, occur in association with pit alignments, trackways and enclosures for domestic or specialised use (see also Table 6.2.4.1). Some field boundaries may be seen to dip beneath alluvium or peat fringing the terrace edge (e.g. East Carr, Mattersey: HER 11687; Morris and Garton 1998) and even on very gentle slopes may be concealed beneath protective colluvium. Many questions remain regarding the development of these systems, their purpose, and spatial variations in their layout and functions. Current evidence, particularly from around Newark, suggests a greater emphasis upon arable than the brickwork-plan fields of the Sherwood Sandstone, but significantly more environmental data needs to be obtained before these spatial contrasts may be clarified.	There is currently no evidence for extensive field systems on the Magnesian Limestone of Nottinghamshire, in contrast particularly to the well-developed 'brickwork-plan' field systems of the neighbouring Sherwood Sandstone. Occasional linear features visible in cropmark plots may represent fragments of associated field systems, but further work is required to characterise these. Assessment of the evidence for landscape organisation remains a major research priority – and in particular, the stark contrast between the low densities of plotted cropmarks in Nottinghamshire and the comparatively dense cropmark palimpsests of Derbyshire and South and West Yorkshire (e.g. Brightman and Waddington 2011; Roberts *et al* 2010).	Extensive co-axial field systems, forming a pattern reminiscent of brickwork, extend across the broad, well-drained interfluves that characterise the Sherwood Sandstone, continuing in some areas beneath alluvium and colluvium (Riley 1980; Garton 2008). These fields seem to date principally from the Roman period, but a Late Iron Age origin may be postulated from the results of excavation and fieldwalking and the spatial relationship of some fields to Roman roads cutting obliquely across rectilinear land parcels. The rectilinear fields are closely integrated with trackways and domestic or specialised enclosures, some probably originating in the LIA (e.g. Dunston's Clump: Garton 1987; HER M8751). Further work is required to establish the development and functions of these field systems, which might signify colonisation of comparatively marginal areas in response to increasing pressures upon land resources in areas such as the Trent Valley. Environmental data suggest an emphasis upon livestock (most probably sheep in view of the paucity of good water supplies) but interpretation is hindered by the poor preservation of bone in the acidic soils of this landscape zone (see Section 6.3.5).
	Assessment, evaluation and mitigation: aerial photographic and lidar searches may identify potential field and boundary systems of this period, while plotting of these will guide the development of evaluation and mitigation strategies. Geophysical survey might be appropriate to elucidate the spatial arrangement of field boundaries and their relationship to occupation sites. Targeted trial trenching may provide information on their character, the level of preservation and their date (although field boundaries generally produce few if any associated finds) and will assist in the development of mitigation strategies. Strip, map and sample will generally be the preferred mitigation methodology, as only through the stripping of large areas and investigations focused upon ditch intersections can we hope to unravel the development of these boundary systems and locate features of particular interest such as toolmarks (see, for example, East Carr, Mattersey: Morris and Garton 1998; HER 11687).		
DEFENCE			
2.Fortifications	Some Roman towns located on the river terraces may have developed from forts constructed by the advancing Roman army (notably at *Ad Pontem* [near Thorpe] and possibly also *at Crococalana* [Brough] and *Segelocum*	Just one Roman fort has been positively identified on the Magnesian Limestone escarpment, at Broxtowe on the outskirts of Nottingham (HER M2054).	An extensive network of early forts and marching camps, constructed by the Roman army during its advance NW into Brigantia, may be identified in Nottinghamshire to the north and west of the Fosse Way (Knight, Howard and

	[Littleborough]: HER M3012, M3625 and M5033). Remains have also been identified of marching camps, notably on a low gravel island at Holme (HER M3600), commanding a key crossing point of the Trent, in the Idle Valley on coversands at Misterton (HER M18165) and on river terrace deposits at Hayton (HER M18156). A triple-ditched rectilinear enclosure on terrace deposits near the Idle at Scaftworth (HER M5050) has conventionally been interpreted as a Roman fort, although investigations by staff of the Humber Wetlands Project have raised the possibility of a domestic rather than military function (Van de Noort and Ellis 1997, 291). Some earlier defended sites might have continued in use into the Roman period, as demonstrated by the discovery inside the possible defended enclosure at Aslockton of extensive evidence for substantial Roman occupation (HER M1513; Palmer-Brown and Knight 1992).		Leary 2004, 131), including on the Sherwood Sandstone a partially excavated site at Farnsfield (HER M2782) and forts recognised from cropmarks at Calverton (HER M2768) and Warsop (HER M8709).
	Assessment, evaluation and mitigation: fortifications associated with the Roman Conquest, due to their rarity and potential national importance, are likely to be considered as candidates for preservation *in situ.* Pre-determination work will need to include full assessments of the air photographic and lidar evidence and walkover surveys to identify earthwork remains (which at Aslockton survive in arable land). Non-intrusive surveys, including measured surveys of extant earthworks and geophysical survey to locate features inside and outside enclosures, should also be undertaken where appropriate. Evaluation trenching will be required on all sites to establish the degree of preservation and the character and date of the surviving remains. A detailed mitigation strategy, including full excavation of areas threatened by extraction and associated works, may then be developed if a clear case for preservation *in situ* has not been demonstrated.		
DOMESTIC			
3.Rural settlements	Rural settlements are densely distributed across the Sands and Gravels, especially along the Trent Valley (Knight, Howard and Leary 2004, 128–40). They are generally characterised by discrete or multiple enclosures, some serving as foci for occupation and others possibly performing functions such as stock enclosures or small garden plots. This class of settlement embraces a broad range of sites indicating a developing settlement hierarchy. These range from small farmsteads at sites such as Scrooby Top (HER M18341; Davies *et al* 2000) or Gonalston (Knight and Elliott 2008), which from cropmark plots could be mistaken for Iron Age enclosure complexes, to major nucleated 'villages' such as Rampton (HER M4698) and Besthorpe (HER M4291), with large collections of pottery and other material indicative of extensive trading links (Knight, Howard and Leary 2004, 139–40). These rural settlements were often integrated with extensive systems of fields, paddocks, ponds, trackways and pit alignments, which as noted above are particularly well developed in the Trent Valley downstream of Newark.	Known examples of Roman settlements are rare across the Magnesian Limestone of Nottinghamshire. Excavations of a stone-walled enclosure at Scratta Wood near Worksop revealed evidence for extensive Late Iron Age and Roman occupation (HER M4352; Challis and Harding 1975, i, 136–7) and further enclosures of comparable type may lie concealed in woodland (e.g. undated D-shaped earthwork enclosure near Church Warsop: HER M12177) or may be indicated by rare cropmark enclosures. Further limited evidence for the character of Roman rural settlement has been obtained from Mansfield Woodhouse, where a ditched enclosure containing pits and several post-built huts was observed to precede construction of the villa (HER M8942; Oswald 1949). In addition, small-scale excavations near Mansfield at Moorhaigh have revealed evidence of occupation in the form of pits yielding Roman pottery and heat-affected stones (HER M8566).	The 'brickwork-plan' field systems described briefly above were integrated with a dense network of generally rectilinear ditched enclosures, many of which are likely to date from the Roman period. Comparatively few enclosures have been excavated, but several have revealed important data on enclosure morphology and the range of internal structures (notably Dunston's Clump and Menagerie Wood: HER M8751 and M17461; Garton 1987; Garton *et al* 1988). Environmental data suggest an emphasis upon pastoral agriculture, although arable farming was also practiced. Further large-scale excavation is essential to clarify the nature of these sites and in particular the agrarian economy.

	Assessment, evaluation and mitigation: assessment will require a detailed analysis of the available air photographic and lidar evidence, combined with walkover surveys to check for vestiges of earthwork enclosures that might date from this period (e.g. in woodland or parkland undisturbed by modern ploughing) and measured surveys of extant earthworks. Some earthworks will warrant preservation *in situ*. Systematic fieldwalking/test-pitting of arable sites and geophysical survey to locate buried remains will need to be considered during the evaluation stage, while targeted trial trenching may be required to establish the level of preservation and the character and date of the surviving remains. In the case of ploughed-out cropmark sites, which will form the majority of the evidence, strip, map and sample techniques will provide an effective methodology for the investigation of sites deemed acceptable for development. Adequate provision will be required for scientific dating and for the location, recovery and analysis of environmental samples (particularly faunal assemblages) to elucidate the changing environment and developing agrarian economy.		
4.Villas	A thin scatter of high-status Romanised dwellings, which in accordance with convention may be categorised as 'villas', has been recorded, concentrated mainly in southern and eastern Nottinghamshire. Many of these have been investigated archaeologically, demonstrating in some cases Iron Age origins, but the small scale of most interventions has left many questions of morphology and functions unanswered. A small number of sites may be identified in valley bottom (e.g. Barton in Fabis: HER M441) or terrace locations (notably Cromwell and Styrrup: HER M4282; M4750). Many villa-builders, however, sought higher areas of land – for example, along the Fosse Way where it crosses the Mercia Mudstones (e.g. Newton. near *Margidunum:* HER M1827; Todd 1969, 12) and north of the Trent at Southwell (HER M3069; Daniels 1966). There is significant scope around many low-lying villas for the preservation beneath alluvium and colluvium of associated field systems and other features (e.g. Barton in Fabis), and the environs of villas should be monitored closely if affected by aggregates extraction.	Villas appear to have been rare on the limestone, and in Nottinghamshire are represented currently only by the rich, partially excavated villa complex with associated cemetery at Mansfield Woodhouse (HER M4001; Oswald 1949) and at Oldcotes (HER M4750) with its high-status mosaics. A hypocaust near Broxtowe suggests a high-status Romanised building, possibly forming part of a villa, but the character of the structure with which it was associated remains unclear (HER M5265).	No villas are currently known to have been constructed in this area, in stark contrast to the more Romanised Trent Valley and areas farther south. This recalls the distribution of Roman small towns, which curiously are also absent from the Sherwood Sandstone, and implies the development of real distinctions in settlement patterns between the Aggregate Character Areas during this period.
	Assessment, evaluation and mitigation: the villas of Nottinghamshire provide a valuable archaeological resource, potentially of national importance, and in common with certain other classes of Roman site are likely candidates for preservation *in situ.* Pre-determination work will include full assessment of the air photographic and lidar evidence, walkovers to identify surface remains, and non-intrusive surveys, including geophysical surveys to locate features associated with the villa complex and its landscape. Systematic fieldwalking may help to define the extent of the main building focus, although the associated field systems and estate could spread over a considerable distance. Evaluation trenching will be required to establish the degree of preservation and the character and date of the surviving remains. This might reveal remains of sufficient importance to merit preservation *in situ*. Otherwise a detailed mitigation strategy involving appropriate archaeological excavation will need to be developed.		
5.Small towns	Important urban centres are spaced at regular intervals along the Fosse Way between the major public towns of Leicester and Lincoln (Knight, Howard and Leary 2004, 131–4). These include *Ad Pontem* (Thorpe; HER M3012) and *Crococalana* (Brough; HER M3625), located on river terrace deposits SW and NE of Newark, together with a roadside settlement at Northgate in Newark (HER M18366; Kinsley *et al* 1997) that may represent another important urban complex. Farther downstream on river terrace deposits at Littleborough (HER M5033), the small town of *Segelocum* was sited on the Lincoln to Doncaster road at an important crossing point of the Trent (Riley *et al*	Small towns are unknown in this area, emphasising the significant socio-economic and political contrasts with south and east Nottinghamshire.	No urban centres have been recorded on the Sherwood Sandstone, despite the dense pattern of enclosures implied by the cropmark plots of the brickwork-plan field systems, emphasising the strong contrast with the Trent Valley during this period.

	1995). All of these sites have been investigated by limited excavation, and from the evidence that is currently available are likely to have performed a wide variety of administrative, religious, industrial and trading functions. This wide array of functions distinguishes them from the primarily agricultural nucleated settlements and enclosed farmsteads that were distributed over their hinterlands and represent a lower tier of the settlement hierarchy.		
	Assessment, evaluation and mitigation: the roadside settlement at Northgate lies within the urban area of Newark and hence falls outside the available aggregates resource. The remaining sites preserve archaeological remains of potentially national importance, and preservation *in situ* will be the preferred strategy other than in exceptional circumstances. The full extent of known towns will not always be obvious and may extend significantly beyond scheduled or designated areas. Any proposals for work impacting upon the towns and their immediate environs will need to be preceded by a detailed assessment of the air photographic and lidar evidence and by non-intrusive surveys aimed at elucidating further the character of the remains that might be affected by development (including measured surveys of extant earthworks and geophysical surveys to locate features associated with the urban core and suburban development). Systematic fieldwalking may help to define the extent of settlement, which from the evidence of Fosse Way sites such as *Margidunum* could extend over a very considerable area. Associated field systems are likely to extend over an even wider area, as demonstrated by air photographic study of land around Brough, and development some distance from these sites could impact significantly upon their agricultural territories. Evaluation trenching is likely to be required to establish the level of preservation and the character and date of the surviving remains, and for areas not preserved *in situ* will inform the development of a detailed mitigation strategy aimed at minimising the impacts of development upon the archaeological resource.		
INDUSTRIAL			
6.Corn-drying kilns	Rare examples have been recorded in settlement contexts, notably at Bulcote (HER M14), but examples are currently rare. Significantly more sites need to be excavated, however, to establish the extent of this and other industrial activities in each of the Character Areas.	None recorded at present.	None recorded at present.
7.Pottery and tile kilns	A cluster of 4th century pottery kilns is recorded in the lower Trent, mainly in Lincolnshire at Torksey, Knaith, Lea, Newton-on-Trent and Little London, but also possibly at Meering in Nottinghamshire (Knight, Howard and Leary 2004, 121–2). Elsewhere in Nottinghamshire, work on urban and rural sites has yielded further evidence for pottery production, notably at Newark (Kinsley *et al* 1997) and kilns should be anticipated during excavations of both rural and urban settlements.	A single example of a tile kiln has been recorded at Sookholme Bath (HER M3396).	A pottery kiln was constructed in the top of an infilled enclosure ditch recorded during excavations of a settlement at Raymoth Lane, Worksop (HER M18390; Palmer-Brown and Munford 2004), but currently no further discoveries have been reported.
8.Smelting/ smithing structures	Small-scale iron smithing and smelting is indicated at a number of excavated rural settlements by finds of slag and hammerscale (e.g. Rampton: Knight, Howard and Leary 2004, 139–40; HER M4698).	An iron smelting furnace and iron slag was reported at Mansfield Woodhouse villa (HER M4001; Oswald 1949), and 'iron slag' at Scratta Wood (HER M4532; Challis and Harding 1975 i, 136–7).	Small-scale smithing activity is indicated by discoveries of hammerscale at several excavated rural settlements (e.g. Menagerie Wood, Worksop: Garton *et al* 1988; Raymoth Lane, Worksop: Palmer-Brown and Munford 2004; HER M18390).

	Assessment, evaluation and mitigation: industrial structures (and their waste materials) should be anticipated during the excavation of rural and urban settlements, but isolated rural examples will be less easy to predict. Investigation of these structures needs to be prioritised in view of the significant information they can provide about the developing agrarian and industrial economy, and full archaeological excavation of such sites is recommended. Appropriate resources need also to be allocated for specialist analyses of associated artefacts and environmental remains, which in many cases may be considerable.		
9.Quarries	Unequivocal evidence for quarries during this period is lacking, but large, irregular pits that might have served as quarries for sands and gravels have been recorded on and around a variety of rural and urban settlements, as at *Ad Pontem* (HER M3012; Burnham and Wacher 1990, 272). These could have provided raw materials for purposes such as road metalling and other construction activities.	A finely made wall revealed during recent excavations at Southwell was made from rock derived from a source near Mansfield Woodhouse, close to a high-status villa (Oswald 1949; report by Pre-Construct Archaeology in prep.). The quarry is likely to have been erased by later activity, but schemes of investigation should take into account the possibility of preserved quarries for building stone (which if located would be of major significance).	Unequivocal evidence for quarries during this period is lacking, but sands from the Sherwood Sandstone may well have been extracted for purposes such as road metalling.
	Assessment, evaluation and mitigation: petrographic and other studies of quarried materials may permit more precise location of potential raw material sources, but the location of Roman quarries is complicated by the likelihood of destruction during later episodes of quarrying and by the problem of dating closely any dug features that might relate to early quarrying. Strip, map and sample techniques may provide an appropriate methodology for locating potential quarry sites, but dating will depend upon chance discoveries of associated material attributable to Roman activity.		
RELIGIOUS, RITUAL AND FUNERARY SITES			
10.Inhumation or cremation burials and structured deposition of animal remains	Human cremations and inhumations, occurring singly or in cemeteries, are not common, but have been recorded occasionally on urban and rural settlements (e.g. Littleborough and Northgate, Newark: HER M18200 and M18190; Riley *et al* 1995; Kinsley *et al* 1997). Human remains have also been retrieved from pits and ditches ion settlements, particularly from boundaries (e.g. Aslockton: HER M1513; Palmer-Brown and Knight 1993). Deposits of animal bones have also been recorded occasionally, notably at Lound, where pig burials were recorded in two pits (HER M5023; Eccles *et al* 1998). Together, these discoveries provide useful insights into ritual behaviour.	A small inhumation cemetery was recorded during excavations by Oswald (1949) at Mansfield Woodhouse villa (HER M3941). Other burials are currently rare, and include a skeleton associated with a Roman brooch at Hucknall (HER L2247) and a probable cremation (HER L2247) to the south of Broxtowe fort. As in the other Character Areas, settlement features may also have been utilised for burial.	Excavations at Raymoth Lane, Worksop, retrieved ten inhumation burials from the enclosure ditch, pits and the backfill of a pottery kiln stokehole (Palmer-Brown and Munford 2003, 30–1; HER M18390). Further examples should be anticipated during excavations of settlement features, particularly boundary ditches, which to judge by evidence from elsewhere in the East Midlands may often have been selected for the burial of human or animal remains (e.g. Taylor 2006, 159).
	Assessment, evaluation and mitigation: such finds are difficult to predict in advance, but a strip, map and sample mitigation strategy may provide an adequate framework for identifying and recording such remains during quarrying. Ditches or other features yielding such remains need to be excavated on a sufficiently large scale to ensure that all remains are retrieved. Sufficient contingency resources must be available for scientific dating and appropriate specialist analysis (e.g. for isotope or DNA analyses of human remains).		
11.Temples and shrines	No structural remains have been recorded so far, although a stone relief from near A*d Pontem,* probably representing the Celtic deities Sucellus and Nantousuelta, suggests a shrine or temple, possibly outside the town (Burnham and	None recorded at present.	None recorded at present.

	Wacher 1990, 276). Discoveries of temples or shrines elsewhere in Nottinghamshire, notably at Red Hill (HER M542; Elsdon 1982), and the retrieval from *Margidunum* of Central Gaulish votive pipe-clay figurines that may signify an associated temple or shrine (Todd 1969, 93, Plate 5) emphasise that such structures may yet await discovery on the Sands and Gravels or in the other Character Areas. There has been speculation that some Roman shrines or temples may have Iron Age antecedents, notably at Red Hill, but the evidence is currently inconclusive.		
	Assessment, evaluation and mitigation: it is likely that temples or shrines will only emerge during soil stripping, although desk-based assessments and systematic fieldwalking/test-pitting might highlight artefacts suggestive of temples or shrines (e.g. the stone relief from *Ad Pontem*), while air photographic and geophysical survey could reveal ground plans suggesting monuments of this type. Evaluation trenching of the sites of suspected temples or shrines may clarify the character, degree of preservation and date of surviving structural remains, but even poorly preserved sites are likely to be of such significance that preservation *in situ* will be recommended. Even without prior evidence, such structures should be anticipated during the excavation of rural and urban settlements, especially those of higher status. Strip, map and sample techniques may provide an appropriate framework for their location. If preservation *in situ* is not recommended, any remains uncovered during this work must be fully excavated with appropriate provision for a range of specialist analyses.		
TRANSPORT			
12.Major roads	The terraces and floodplain of the Trent are traversed by the Fosse Way (HER M6000), several roads linked to this route and the Lincoln to Doncaster road (HER M17737). Structural remains may survive in certain circumstances and should be sought during excavation. At Langford, for example, a substantial length of the Fosse Way, surviving as a cambered embankment (agger), was excavated prior to dualling of the A46 (HER L12212; Barley 1950). At Scaftworth, excavations in the Idle floodplain revealed a metalled surface supported on a timber raft (HER L9477 & L12293; Van de Noort and Ellis 1997, 409–11).	No undoubted roads have been recorded, but a possible length of road has been postulated at Calladine Lane west of Mansfield (HER M2473). In addition, a Roman road heading SW from Doncaster across the Sherwood Sandstone is likely to have traversed Magnesian Limestone for some of its course. Structural remains may survive where the road surfaces have not been disturbed by later activity.	The Sherwood Sandstone was traversed in Nottinghamshire by roads heading south-west and south-east from Doncaster and by a north-west continuation of Bridgford Street, joining with the Fosse Way at *Margidunum* near East Bridgford. Structural remains may survive in favourable circumstances and should be sought where the road line may be affected by development.
	Assessment, evaluation and mitigation: desk-based assessments should collate the existing documentary, place-name, archaeological and landscape evidence for the roads constructed during the Roman Conquest and later in the Roman period, and should be accompanied by walkover surveys to establish if traces survive of an agger. Additiional non-intrusive geophysical survey and air photographic study may be necessary, followed by trial trenching to locate and characterise any surviving remains (with particular regard to the location of buried land surfaces and earlier structural remains preserved beneath the road surface). Well-preserved lengths of Roman road may warrant preservation *in situ*. Otherwise, detailed planning of the route and further targeted excavation to investigate variations in construction methods or repair should form elements of a mitigation strategy.		
13.Minor roads and trackways	Some of the many trackways recorded in air photographs of the river terraces may relate to Roman activity. Some trackways may survive as timber or brushwood constructions across wetlands or may preserve metalled surfaces (as revealed on the Mercia Mudstones at Belle Eau Park, Bilsthorpe: HER M5485; Challis *et al* 2002), and in common with the major roads may seal earlier features and important evidence of pre-Roman land surfaces.	Some of the rare trackways recorded in air photographs might have been used in the Roman period, but no examples that may definitely be dated to this period have yet been recorded by excavation.	Many ditched trackways may be observed on air photographs of the brickwork plan field systems (Riley 1980). Most probably relate to activity in this period, but some could originate in the late prehistoric period.

	Assessment, evaluation and mitigation: well-preserved timber structures may be concealed beneath substantial depths of alluvium (and may perhaps be buried within fluvially redeposited sands and gravels) and assessment should identify palaeochannels and potential wetlands with high risks of associated structural remains. The most effective strategy for the discovery and investigation of trackways in such wetland contexts may be a continuous watching brief with a contingency allocation in the event of unexpected discoveries; resources should also be set aside for environmental sampling and analysis, as such contexts may yield other important environmental remains. Evaluation trenching should be considered across minor roads or trackways revealed by air photographic, geophysical or other remote sensing techniques to establish evidence of date, character and level of preservation, and features should be recorded systematically during strip, map and sample exercises. Any work on such trackways should focus particularly upon the identification of features sealed by the road surface, pre-Roman land surfaces, methods of construction and repairs.		
14.Canals	Both Bycarrs Dyke (HER M18173) and Carr Dyke (HER M18173) might have originated as canals constructed during the Roman period with the aim of expediting the transportation of bulky and other traded goods. Dating, however, is extremely problematic, and there is a pressing need for further investigation of linear features that might signify Roman canals with the aim of characterising and dating these.	No examples have been recorded at present.	The stretch of Bycarrs Dyke between the Trent at Stockwith and the Idle at Idletop traversed the Sherwood Sandstone, but otherwise no examples have been recorded.
	Assessment, evaluation and mitigation: desk-based assessments should collate the existing documentary, place-name, archaeological and landscape evidence for canals that might have been constructed during the Roman period, and should be accompanied by walkover surveys to investigate any surviving field evidence. Further non-intrusive geophysical survey and air photographic/lidar study may be necessary, followed by trial trenching to locate and characterise any surviving remains. Well-preserved lengths of Roman canal may warrant preservation *in situ*. Otherwise, a continuous watching brief with provision for further targeted excavation to characterise the remains and appropriate contingency allocation in the event of unexpected discoveries may provide a suitable approach to mitigation.		
15.Bridges and fords	A stone-paved ford across the Trent at Littleborough may date from the Roman period (HER M18201; Riley *et al* 1995). The town of *Ad Pontem*, near Thorpe (HER M3012), whose name 'at the bridge' may refer to a structure destroyed by lateral migration of the river, may have developed at a bridging point of the Trent. In addition, further river crossings may be postulated where roads intersected rivers – for example, the Trent at Gunthorpe, the Trent below Red Hill (Ratcliffe-on-Soar) and the Idle near Scaftworth.	No examples have been recorded at present.	No examples have been recorded at present.
	Assessment, evaluation and mitigation: desk-based assessments may locate documentary or place name evidence for former bridges or fords (e.g. *Ad Pontem*), while assessment should focus upon the identification of palaeochannels with the potential for crossing points and associated structural remains. A continuous watching brief with an appropriate contingency allocation in the event of unexpected discoveries may provide a suitable approach to mitigation. Well-preserved bridges, particularly those surviving in waterlogged environments, will involve significant costs (both for excavation and for sampling and analysis of associated environmental remains), and hence every effort should be made to identify high-risk locations in advance of extraction.		
16.Logboats	Logboats may be expected in waterlogged contexts: as at Holme Pierrepont, where one of three logboats recorded in gravels was radiocarbon-dated to the later Iron Age or early Roman period (Table 6.2.4.12). In view of the	None has currently been recorded, and it is debatable whether the streams that characterise this limestone landscape would have been appropriate for navigation.	None has been recorded at present. Apart perhaps from the lower reaches of major tributaries such as the Idle, Ryton or Erewash, which flow partially through the Sandstone, it is questionable whether navigation would

	importance of the Trent as a trading/exchange route, more boats may await discovery in waterlogged contexts.		have been an option for many of the streams draining this Character Area**.**
	Assessment, evaluation and mitigation: boats may be concealed beneath substantial depths of alluvium and may perhaps be buried within fluvially redeposited sands and gravels. Assessment should identify high-risk areas from plots of palaeochannels, *etc*., and extraction in such areas should be accompanied by a continuous watching brief with an appropriate allocation for unexpected discoveries. Resources must be made available for scientific dating, environmental sampling and analysis, as such contexts are likely to yield important associated environmental remains. As with bridges, discoveries of logboats may involve significant costs (both for excavation and for sampling and analysis of associated environmental remains), and every effort should be made to identify high-risk locations in advance of quarrying.		
WATER SUPPLY AND DRAINAGE			
17.Ponds, waterholes and wells	Ponds and waterholes are common elements of rural settlements across the river terraces (e.g. Gonalston: Knight and Elliott 2008) and would have been integral to the more intensive animal husbandry that seems to have developed in the Roman period. Rare examples have been recorded of wells, notably at Sibthorpe (HER M1546) and Wildgoose Cottage, Lound (HER M6219), at the latter site with a well-preserved plank lining. Together with ponds and waterholes, wells should be accorded high priority in view of the potential for preserved environmental remains and (from analyses of wood linings) evidence of woodland management strategies.	None recorded at present.	None recorded at present.
	Assessment, evaluation and mitigation: strip, map and sample is the most effective strategy for the discovery of ponds, water-holes or wells, although large features may be clearly visible on air photographs. Such features are likely to yield well-preserved organic remains, and the location, collection and analysis of associated organic material should be accorded a high priority in the development of mitigation strategies.		
MISCELLANEOUS: FINDS SCATTERS AND SINGLE FINDS			
18.Coins and coin hoards	Scattered single coins and occasional coin hoards have been recorded (e.g. Meering and Thurgarton: HER L4268 and L1406). Occasional associations have been noted with burials (notably at Upton on the edge of the Sands and Gravels: HER L3101).	Two coin hoards in the vicinity of Mansfield (HER L5309) and Sutton-in-Ashfield (HER L5898) and a scatter of single coins have been recorded.	17 coin hoards have been recorded across the Sandstone, in striking contrast to the sparse distributions in other Character Areas, together with a scatter of single coins. The high density of hoards is surprising in view of the absence of known high status villas or towns in this ACA and highlights an interesting contrast between this and the other Character Areas that would merit further study.
19.Other metalwork	Scattered surface finds.	Scattered surface finds.	Scattered surface finds.
20.Other finds	Extensive (but generally low-density) scatters of pottery, heat-affected stones, quern fragments and other material	Pottery scatters have been recorded principally in areas fieldwalked in the Mansfield area by the Sherwood	Scatters of pottery and other material have been recorded regularly during fieldwalking, particularly across the

	have been recorded during fieldwalking, particularly in intensively fieldwalked areas such as the Trent Valley around South Muskham. Investigations in that area revealed concentrations of pottery and other Roman finds in the fields around enclosures, possibly indicating manuring of arable fields (Garton 2002, 31–7). This contrasts strongly with the pattern recorded during fieldwalking of the 'brickwork plan' fields and may imply a greater emphasis upon arable farming in parts of this ACA.	Archaeological Society. The current distribution may be interpreted mainly as an artefact of the intensity of fieldwalking, and further work on the spatial distribution of recorded finds is required to discern any significant patterning. In addition, fieldwalking could usefully be extended to areas that have so far not been extensively investigated.	brickwork plan field systems of north Nottinghamshire (Garton 2008, 86–93). Finds densities are generally low, but show concentrations around enclosures rather than field areas (and hence possibly a reduced emphasis upon manuring associated with arable agriculture).
	Assessment, evaluation and mitigation: desk-based assessments should collate existing information on surface finds, as this may identify activity foci meriting further evaluation. Particular attention should be focused upon finds logged by the Portable Antiquities Scheme, which are currently underrepresented in the HER. Further fieldwalking and/or test-pitting will be encouraged as part of a site prospection strategy, with appropriate provision for conservation work and X-radiography of metalwork. This work may elucidate further the character of the activity represented on these sites, and may be followed by geophysical survey, trial trenching and other evaluation work before formulation of a mitigation strategy.		

Fig.15. This stone-lined Roman well forms one element of an extensive Romano-British settlement that was excavated in the Trent Valley at Langford, downstream of Newark. It preserved a humic silty fill with associated animal bone and leather, emphasising the potential of settlements located on the Superficial Sands and Gravels of the Trent Valley for the preservation of significant palaeoenvironmental remains. The cut for the well through terrace sands is clearly visible either side of the stone lining. © Trent & Peak Archaeology, on behalf of Tarmac

TABLE 6.2.6. EARLY MEDIEVAL ARCHAEOLOGICAL RESOURCE (*c.*410-–1066)			
ARCHAEOL-OGICAL ASSOCIATIONS	**AGGREGATE CHARACTER AREAS**		
	SUPERFICIAL SANDS AND GRAVELS	**MAGNESIAN LIMESTONE**	**SHERWOOD SANDSTONE**
AGRICULTURE AND SUBSISTENCE			
1.Fields and field system	Little is known of the development of fields and field systems between the end of the Roman period and the early growth, from as early perhaps as the ninth and tenth centuries, of the open field system (Table 6.2.7.1). It has been suggested that some of the rectilinear Roman field systems that extend widely over the river terraces (Table 6.2.5.1) may have continued in use in modified form into the sub-Roman and Anglo-Saxon periods (e.g. at Brough: HER M3625) and may in some cases have influenced the spatial patterning of ridge and furrow associated with the open fields *(*as discussed in Elliott *et al* 2004, 168–9, 174). Similar relationships between Romano-British field boundaries and traces of medieval ridge and furrow have been observed elsewhere on the Sands and Gravels of the Trent Valley (notably at Willington, Derbyshire: *ibid.* fig.7.8) and would support suggestions that the layout of the open fields may in some cases have been influenced by earlier systems of land allotment. The origins of ridge and furrow earthworks, which are widespread in this Character Area and are closely associated with the open field system, have also been traced by some to pre-Conquest times (*ibid*. 174); systematic collection during excavation of pottery and other finds from furrow fills may help to clarify its date range.	No field systems that may be dated to the Early Medieval period have so far been recorded. As on the Sands and Gravels, observations wherever possible of relationships between open field arrangements and earlier field systems and the consistent collection of finds stratified in furrow fills may add usefully to the growing evidence for the development of the open field system.	No field systems of Early Medieval date have yet been recorded, although some components of the Roman 'brickwork-plan' field systems that characterise the Sherwood Sandstone (Riley 1980; Garton 2008) may have continued in use beyond the fourth and fifth centuries. Records of the relationships between open field arrangements and 'brickwork' field systems and the consistent collection of finds stratified in furrow fills may add usefully to the evidence for the development of the open field system.
	Assessment, evaluation and mitigation: development should be preceded routinely by walkover surveys aimed at locating and recording ridge and furrow and other earthworks indicative of Open Field agriculture. Any subsequent excavations should include provision for work to establish the extent and layout of ridge and furrow, with the aim of elucidating stratigraphic and spatial relationships with other features (e.g. Roman field ditches) and changes in layout over time. Associated finds should be collected systematically from furrow fill, with the aim of shedding light upon the chronology of ridge and furrow and identifying potentially early examples. Strip, map and sample exercises may provide the most effective frameworks for the identification of Early Medieval field systems and settlements (see below) and for observations of relationships with ridge and furrow. Excavation should focus upon ditch intersections to investigate the development of any field systems that are identified, and upon the retrieval of datable Anglo-Saxon pottery and other finds that might indicate continuity of use into the medieval period (with the proviso that field ditches rarely yield significant quantities of material). Early Medieval ponds, flax retting pits and other features indicative of continuity of use should also be anticipated.		

2.Fishweirs	At Colwick, a holly post and part of a holly hurdle deriving from a substantial V-shaped timber fishweir comparing with examples recorded upstream in Derbyshire and Leicestershire (e.g. at Hemington, Leics: Cooper 2003) were dated by radiocarbon to between the seventh and tenth centuries cal AD (HER M784; Salisbury 1981). These remains, which were revealed only after machining had removed the overlying alluvial deposits, provide a graphic illustration of the important structural remains that might mark the courses of old river channels preserved beneath alluvium.	None has so far been recorded, but alluvial and terrace deposits associated with tributary streams traversing or fringing the limestone escarpment should be monitored during extraction in case associated riverine structures comparable to those recorded in the Trent are recorded during extraction.	None has so far been recorded, but alluvial and terrace deposits associated with tributary streams traversing or fringing the sandstone escarpment should be monitored during extraction in case associated riverine structures emerge.
	Assessment, evaluation and mitigation: As at Colwick, fishweirs and associated structural remains (such as armouring of the riverbed with stone rubble) may be preserved in valley bottom locations beneath substantial deposits of alluvium - and hence are not easily predicted in advance of extraction. Desk-based assessments may be able to identify from palaeochannel plots and other sources areas with the potential for preserving riverine structures, and these high-risk areas should be monitored continuously during extraction to ensure that associated remains are identified and recorded. A contingency allocation is recommended in the event that significant structural and environmental remains are recovered and to provide for scientific dating.		
CIVIL			
3.Moots: open-air assembly sites	Moot sites performed significant roles in law-making and the settling of disputes in Early Medieval society, but may leave few if any archaeological traces relating to their original function as open-air assembly places (Mallett *et al* 2012, 64–5). Several potential moot sites are known, notably at Aslockton (HER L5627) and Normanton-on-Trent (Gover, Mawer and Stenton 1979,154) but significant further research is required to clarify the distribution of moot sites. By Domesday, the County is known to have been divided into seven wapentakes, some of which were in turn subdivided, but the known moot sites across each ACA do not correlate closely with what is known of this Wapentake system; it may be, therefore, that some sites relate to an earlier system of administration, and in consequence other examples are likely to await discovery.	No moot sites are currently known on the Magnesian Limestone escarpment, but as in the other Character Areas currently unknown sites may await discovery.	Moot sites may also be expected on the Sherwood Sandstone, as demonstrated by discoveries of examples at Blyth Law (HER M17673), adjacent to the A1 near Blyth, and Thynghowe (HER M26893) in Birklands Forest to the north of Mansfield (Mallett *et al* 2012; Gaunt 2013). Blyth Law is known to have been used as a place of execution by the Prior of Blyth Abbey in the fourteenth century and has revealed remains of human burials. Thynghowe has been investigated recently by walkover, earthwork and geophysical surveys, combined with evaluation trenching of an undated circular earthwork adjacent to the mound marking the open-air assembly place. The mound was topped originally by three boundary stones (of which two remain *in situ*) and is located in an area of complex earthworks, including the above-mentioned enclosure and features relating to quarrying and routes of movement.
	Assessment, evaluation and mitigation: documentary and place name evidence may assist in the identification of some moot sites. Many moots are located close to the meeting points of several parishes. Known sites tend to occupy low hills with a commanding view of the surrounding area. There is some evidence from Blyth (and possibly Thynghowe) that natural mounds have been enhanced and built up. In addition, some mounds may have acted as foci for routeways and have attracted later burials (e.g. Blyth Law) or quarrying activity (e.g. Thynghowe). Although difficult to identify and preserving limited archaeological remains (e.g. pits; post-holes; shallow grave cuts) this is an important and poorly understood class of monument that is essential to an understanding of developing forms of local government from the sub-Roman to later medieval periods. Well-preserved earthworks are likely to be recommended for preservation *in situ*. Where development is agreed, earthwork and geophysical surveys and evaluation trenching to establish the character and level of preservation of the remains should be conducted prior to devising an appropriate mitigation strategy.		

4 Linear boundaries	The parish system appears to have been well advanced by the Domesday Survey of 1086 (Elliott *et al* 2004, 166). It has been suggested that some parish or wapentake boundaries might have been marked originally by the linear ditches or banks that from ground survey, cropmark evidence and targeted trenching are known to follow the lines of some parish and County boundaries. Some boundaries might even predate the parochial system: for example, at Gallows Nooking Common, Collingham (HER L12216) where a ditch following the County boundary was dated to the Late Iron Age on the basis of associated pottery; and at Sheep Walk Lodge, where a linear earthwork following the County boundary appears to be truncated by the Roman Fosse Way (Knight 2007, 213–4). Further research is required, but it seems that prehistoric boundaries may sometimes have been appropriated by later communities when defining parish and other administrative boundaries.	A double-ditched cropmark at Steetley (HER L5993), following closely the County boundary, might date from the medieval period, and merits further investigation to establish its date and character. Further examples of linear boundaries that could relate to this period may survive as cropmarks or earthworks, and systematic surveys of parish boundaries, especially in woodland, may reveal more examples of potentially early boundaries.	Some earthwork boundaries that might relate to Early Medieval administrative boundaries have been recorded on the Sherwood Sandstone. These include the substantial bank and flanking ditch of the so-called 'Roman Bank' between Blyth and Scrooby (HER M5048), which is followed for most of its recorded course (across Sherwood Sandstone and the Sands and Gravels) by a parish boundary, Bycarrs Dyke (HER M18173) and the Miclandic (Garton forthcoming): a long linear feature, marked by a cropmark, that may be observed running obliquely across the Romano-British brickwork-plan fields from Barnby Moor to the River Ryton. As in the other Character Areas, systematic surveys of parish boundaries, especially in woodland and parkland, may be expected to reveal more examples of potentially early boundaries.
	Assessment, evaluation and mitigation: walkover surveys should be conducted to identify earthwork boundaries and, where possible, correlate these with parish, wapentake or county boundaries. Linear boundaries will need to be surveyed where threatened by quarrying, and trenches should be excavated across them to establish their date and character and to determine if buried land surfaces remain. Soils buried beneath standing earthworks may preserve palaeobotanical, molluscan and other environmental remains with potential for elucidating the environment prior to construction of the bank, and resources must be provided for the recording, sampling and analysis of any pre-bank soils located during excavation.		
DOMESTIC			
5.Rural settlements	Occupation may have continued into the post-Roman period on and around some Roman settlements, as demonstrated by recent excavations on the outskirts of *Crococalana* at Brough (Elliott *et al* 2004, 168–70), and many more settlements of this period might lie concealed on the edges of other Roman small towns or within the dense cropmark palimpsests of the river terraces. Many other settlements might lie buried in medieval village cores, or perhaps in the pasture fields that occur around the edges of modern rural settlements, and any development in the vicinity of known medieval villages should be closely monitored. Comparatively few Early Medieval settlements have been recorded so far. These are represented archaeologically mainly by scatters of rectilinear post-pit buildings, sunken-floored structures (*grubenhäuser*) and pits that are difficult to locate except in large-scale excavations or soil-stripping under archaeological supervision (e.g. Girton: HER M18374; Kinsley 1998; Holme Pierrepont: HER M18377; Guilbert 2006, 36–7). Known examples are thinly distributed across the river terraces, seemingly forming part of a dispersed settlement pattern contrasting with the pattern of parish-	No rural settlements of this period have been recorded by excavation, and in contrast to the other Character Areas there are few clues from the meagre cropmark evidence of areas where settlements might be sought. In common with other areas, some settlements probably lie concealed beneath later medieval village cores or in the pasture fields that occur around the edges of most modern rural settlements. The location of settlements in these or other locations remains a critical priority.	An early focus of Anglo-Saxon settlement may be demonstrated at Nottingham (Young 1982), but rural settlement on the Sherwood Sandstone otherwise remains elusive. Some of the many settlements associated with the Roman brickwork plan field systems (Table 6.2.5.1) might have continued in use into the sub-Roman period (and beyond), while many settlements may underlie later medieval village cores or lie in pasture fields on the fringes of modern settlements. Location of settlement in these or other locations remains a key priority.

	based nucleated villages that characterised many parts of the County in the High Medieval period (Elliott *et al* 2004, 170–4). Significantly more settlements may lie beneath colluvial or alluvial deposits and (in the Lower Trent) by coversands (e.g. Girton: HER M18374) and these should be actively sought during aggregates extraction. Rural settlements associated with Scandinavian activity have yet to be distinguished archaeologically, despite the extensive evidence for Viking place names in Nottinghamshire (Lewis 2006, 191), and identification and characterisation of these may be flagged as a key priority for each of the Character Areas.		
	Assessment, evaluation and mitigation: assessment needs to include detailed study of the available cropmark data, which might reveal possible sunken-floored buildings (e.g. Normanton-on-Trent: Whimster 1989, 73, Cluster G), a review of finds obtained by fieldwalking or casual discovery, and consideration of documentary and place-name evidence. Fieldwalking and geophysical survey to locate sub-surface features should be considered during evaluation, together with targeted trenching to establish the level of preservation and character of any potential sites. Strip, map and sample techniques may provide the most effective methodology for mitigation, as sites may be expected to comprise scatters of features that may only be identified during large-scale stripping (and may sometimes be buried beneath alluvium, colluvium or coversands). Particular emphasis should be placed upon provision for scientific dating and the location, recovery and analysis of environmental samples in order to elucidate the changing environment and developing agrarian economy.		
RELIGIOUS, RITUAL AND FUNERARY			
6.Anglo-Saxon cemeteries and isolated burials	Cemeteries, dating mainly from the 5th to early 7th centuries and containing inhumations, cremations and mixed rites, are distributed fairly widely across the river terraces, notably at Brough (HER M18181), Collingham (HER M4320), East Leake (HER M18373; Jones 2012), Newark (HER M3042; Kinsley 1989) and Holme Pierrepont (HER M18377; Guilbert 2006). In common with settlements, the distribution reveals a pronounced bias towards SE Notts, especially the Trent Valley, providing further evidence that the river might have served as a social and political divide (Vince 2006, 163–4). Cemeteries also display a significant bias towards areas of dense Roman activity. Seemingly isolated burials have been recorded on glaciofluvial sands and gravels near Aslockton (HER L1518), where an inhumation was accompanied by an iron spearhead, and bordering terrace deposits on Mercia Mudstone at Winthorpe Road, Newark (HER 18359). Excavations by John Samuels Archaeological Consultants at the latter site revealed a female inhumation, placed in a grave inside an elongated, oval, ditched enclosure. It yielded a rich assemblage of grave goods, including beads, wrist clasps, gilded circular mount, ivory purse ring, wooden bucket, Roman coins and decorated pottery urn, and emphasises the potential richness of the burials that might be encountered during aggregates extraction.	The HER notes the discovery of a 'Saxon funeral urn' during fieldwalking by Sherwood Archaeological Society at Church Warsop (HER L5329), but further work would be required to establish the character of this site. No other evidence that might indicate funerary sites is recorded in the HER. Any cemeteries or other burials preserved in development areas are potentially of major regional significance, as bone survives well in the alkaline soils developed upon Magnesian Limestone (in contrast to the other ACAs).	A rich barrow burial, dated to the seventh or eighth centuries on the basis of its grave goods, was excavated by Rooke at Oxton (HER 5490; Rooke 1792), but as yet no other burials of this period have been identified. The Oxton mound yielded an exceptional variety of grave goods, including an iron umbo (shield boss), sword and dagger (both weapons in wooden scabbards), several other iron artefacts and fifteen glass beads. No bones were found, but this could reflect only the poor preservation potential of bone on soils developed upon Sherwood Sandstone.

	Assessment, evaluation and mitigation: cemeteries and other burial sites are not easily detected in advance, but potential locations may possibly be identified by assessment of available finds data (particularly that obtained from the Portable Antiquities Scheme), documentary sources, air photographs (e.g. of enclosures comparable to that recorded at Winthorpe Road) and walkover surveys aimed at identifying earthwork traces. Potential sites may be investigated further by fieldwalking, metal detecting or geophysical survey, combined where appropriate with trial trenching. Some sites will warrant preservation *in situ*, but otherwise an appropriate level of archaeological excavation may provide a suitable mitigation strategy. Generally, given the difficulty of identifying funerary sites in advance of development, strip, map and sample techniques provide the most effective mitigation strategy for the identification and recording of burials ahead of extraction. Sufficient contingency resources need to be available for scientific dating and appropriate specialist analyses in the event that human burials are retrieved (e.g. isotope analysis of bone).		
TRANSPORT			
7.Roads and trackways	The Fosse Way and other Roman roads crossing the alluvial floodplain and river terraces may have continued in use into sub-Roman and later periods, but it is doubtful whether any had remained as major thoroughfares (as demonstrated by the placement of barrows along the Fosse Way and the cutting of Anglo-Saxon graves into the road surface: Elliott *et al* 2004, 163; Kinsley 1993, 73–4). Close correlations between the Fosse Way and parish boundaries suggest an important boundary function, which may have extended to other major roads. Some of the many minor trackways that linked Roman rural settlements to each other and to adjacent fields may have continued in use into the sub-Roman period and later, including for example many of the trackways shown on cropmarks of the coaxial field systems near Newark (Table 6.2.5).	The two possible Roman roads that have been identified (Table 6.2.5.12) may possibly have continued in use into this period, while some of the few undated trackways that have been recorded as cropmarks might also have been in use. Currently, however, the evidence is equivocal.	The Sherwood Sandstone is traversed by several Roman roads (Table 6.2.5.12), some of which may have continued in use into the medieval period. In addition, evidence is preserved in the brickwork-plan field systems for an extensive network of Roman trackways (Table 6.2.5.13), some of which might also have continued in use beyond the Roman period.
	Assessment, evaluation and mitigation: historic maps provide an important source of evidence for former roads and should be investigated with aerial photographs, lidar and other documentation during desk-based assessments. Provision should be made for excavation to clarify the character and spatial arrangement of tracks and roads, including the investigation of any land surface preserved beneath roads. By analogy with other periods, timber trackways could be concealed beneath substantial depths of alluvium, and perhaps buried within fluvially redeposited sands and gravels; assessment should therefore identify palaeochannels and potential wetlands with high risks of associated structural remains. High-risk wetland locations should be monitored archaeologically, with a contingency allocation in the event of unexpected discoveries; resources should also be set aside for environmental sampling/analysis and scientific dating, as waterlogged contexts may yield important environmental remains.		
8.Bridges	An elaborate 8th century cal AD timber bridge (originally interpreted as Roman) has been identified across the Trent near Cromwell (HER M4286; Salisbury 1995) and would presumably have linked trackways either side of the river. Another wooden bridge may be postulated across the Trent at Nottingham, based upon documentary references to the wooden Hethbethebrigg, built in AD 920 (HER M8924: Roffe 2006, 28). No archaeological traces of this structure, however, have been recorded.	None has currently been recorded.	None has so far been recorded.
	Assessment, evaluation and mitigation: documentary and cartographic sources must be reviewed during assessment, which should also include a walkover survey and an examination of air photographic, lidar and other remote sensing records with the aim of identifying palaeochannels which might have been spanned by bridges (e.g. linking roads/trackways either side of the channel). Where identified in advance of quarrying, remains of timber or stone bridges might warrant preservation *in situ*. Many sructures, however,		

	may be buried in redeposited sands and gravels and may only emerge during the course of quarrying. A continuous watching brief with a contingency for full excavation should be conducted in high-risk zones, with appropriate provision for sampling, scientific dating and analysis in case significant organic deposits are unearthed during extraction.		
9.Boats	The Trent and its major tributaries such as the Idle or Soar are likely to have played important roles in the movement of heavier and bulkier goods such as lead from the Peak and possibly commodities such as pottery (e.g. Vince 2006. 174–80). A logboat dredged from the Idle near Mattersey Thorpe has been dated by radiocarbon to the fifth century cal AD (HER L5101), but no other boats of this period are known at present.	None has currently been recorded.	None has currently been recorded.
	Assessment, evaluation and mitigation: boats may be concealed beneath alluvium and buried in old channels or fluvially redeposited sands and gravels. Assessment should identify high-risk zone from plots of palaeochannels, but the most effective strategy for their discovery may be a continuous watching brief with an appropriate allocation for unexpected discoveries. Resources must also be made available for scientific dating plus environmental sampling and analysis, as such contexts are likely to yield important associated environmental remains.		
MISCELLANEOUS: FINDS SCATTERS AND SINGLE FINDS			
10.Finds scatters and single finds	Thin spread of single finds and artefact scatters have been recorded during fieldwalking and by casual discovery. These comprise mainly pottery and metalwork, together with rare fragments of sculptured stone (including the decorated collar of a cross, retrieved during gravel extraction near South Muskham, that may have marked a crossing of the Trent (Everson and Stocker 2015). Interpretation of surface pottery scatters is complicated by the difficulty of differentiating local Iron Age and Anglo-Saxon plain wares on fabric grounds alone. Early Medieval pottery may lie unidentified in unpublished fieldwalking collections, and there is a pressing need for systematic reassessment of 'Anglo-Saxon' and 'Iron Age' pottery finds to clarify their chronology and distribution. There is a pronounced south-easterly bias in the distribution of Early Medieval artefacts, which could support the argument that, as perhaps in the Roman period, the Trent may have defined a cultural boundary between communities either side of the river (see Vince 2006, 163–4; Elliott *et al* 2004, 159–60, 163).	No single finds or finds scatters that may be dated with certainty to this period have been recorded in the HER in areas falling within the scope of this study (but see Table 6.2.6.6 for funerary urn from Church Warsop: HER L5329).	No single finds or finds scatters that may be dated with certainty to this period have been recorded in the HER in areas falling within the scope of this study.
	Assessment, evaluation and mitigation: further detailed fieldwalking and/or test-pitting should be encouraged as part of a systematic site prospection strategy, with appropriate provision for conservation work and X-radiography of metalwork. This work would complement studies of existing collections and might locate foci of domestic, industrial or other activities. This would provide a valuable basis for further evaluation, including geophysical survey and evaluation trenching, which in turn would assist the development of suitable mitigation strategies in advance of extraction. It is recommended that a metal detector be attached to the conveyor belt to improve the retrieval rare of metalwork during the course of quarrying operations.		

TABLE 6.2.7. HIGH MEDIEVAL ARCHAEOLOGICAL RESOURCE (1066 – 1485)			
ARCHAEOL-OGICAL ASSSOCIATIONS	**AGGREGATE CHARACTER AREAS**		
	SUPERFICIAL SANDS AND GRAVELS	**MAGNESIAN LIMESTONE**	**SHERWOOD SANDSTONE**
AGRICULTURE AND SUBSISTENCE			
1.Field systems: ridge and furrow and field shapes reflecting Open Field layouts	Upstanding or plough-truncated remains of ridge and furrow and other earthworks associated with Open Field agriculture (e.g. plough headlands), together with field shapes reflecting Open Fields (e.g. elongated, S-shaped fields indicative of medieval cultivation strips), are distributed widely but not densely across the Sands and Gravels. Landscape evidence of Open Fields is focused upon the river terraces, but some expanses of ridge and furrow and other evidence of Open Fields have been recorded in floodplain environments. The current distribution contrasts especially sharply with plots of ridge and furrow on the Mercia Mudstone claylands, where traces of open fields are more densely scattered, although the frequent discovery of truncated furrows on excavated sites across the river terraces indicates that much evidence may have been destroyed in this ACA by modern ploughing.	Sparse traces of ridge and furrow have been recorded, either as earthworks or as linear features visible on National Mapping Programme (NMP) air photograph plots, while cartographic and air photographic searches have revealed a wide but not dense scatter of field shapes indicative of Open Fields. As in other areas, much of the evidence for Open Fields may have been ploughed out or destroyed by later enclosure and field amalgamations, while some earthwork remains could lie concealed in woodland. The air photographic record for the Nottinghamshire Magnesian Limestone has not been studied as comprehensively as that for the other Character Areas. Air photographic searches should therefore be accorded special priority during assessment, together with scrutiny of lidar data where available.	Large blocks of the Sherwood Sandstone escarpment have yet to yield evidence for ridge and furrow or field shapes indicative of former Open Fields. This may reflect in part the significantly higher proportion of woodland in this Character Area, which in some cases could conceal surface traces of ridge and furrow, but the comparative paucity of evidence might also signal important contrasts between geological zones within the County. There is archaeological and historical evidence that pasture, particularly for sheep, may have prevailed over much of the Sherwood Sandstone during the medieval period, together with woodland, heath and warrens, which would account for the poor representation of ridge and furrow.
	Assessment, evaluation and mitigation: walkover surveys aimed at establishing the extent of ridge and furrow and other earthworks indicative of Open Field agriculture and the survival of field shapes indicating the enclosure of medieval cultivation strips form an essential part of the assessment process. Field survey should be accompanied by an assessment of the available documentary, cartographic, place-name and (especially) air photographic/lidar evidence, with the aim of elucidating wherever possible the layout of the medieval Open Fields for the relevant settlement. Lidar data, if available, are particularly valuable for revealing features otherwise concealed in woodland. Any subsequent excavations should include provision for work to establish the extent and layout of ridge and furrow, with the aim of elucidating stratigraphic and spatial relationships to other features (e.g. Roman field ditches) and changes in layout over time. Associated finds should be collected systematically from furrow fill, with the aim of shedding light upon the chronology of ridge and furrow.		
2.Fishweirs	Gravel extraction at Colwick revealed a V-shaped arrangement of posts and wattles, radiocarbon-dated to between the 11th and 13th centuries cal AD, which was interpreted as the remains of a fishweir with associated fishing platform (HER M961; Losco-Bradley and Salisbury 1979). This was deeply stratified in sands and gravels, below a substantial depth of alluvium, and provides important evidence for the kinds of structure that may be expected during gravel extraction along the Trent and other major river valleys. A wide variety of other riverine structures should also be anticipated, including bankside revetments (Table 6.2.7.24) and watermills (Table 6.2.7.15).	No examples of fishweirs have been recorded so far, but structural remains could survive along the Erewash and some of the other rivers that drain this outcrop. Alluvial and terrace deposits associated with tributary streams traversing or fringing the limestone outcrop should be closely monitored in case these or other riverine structures are exposed during extraction.	None has been recorded so far, but examples could survive along the Maun, Meden, Ryton and some of the other rivers draining the Sherwood Sandstone. As on the Magnesian Limestone, alluvial and terrace deposits associated with tributary streams traversing or fringing this Character Area should be closely monitored in case these or other riverine structures are exposed during extraction.

	Assessment, evaluation and mitigation: As at Colwick, fishweirs and associated structural remains (such as armouring of the riverbed with stone rubble) may be preserved beneath substantial deposits of alluvium, within significant depths of redeposited sand and gravel – and hence are not easily predicted in advance of extraction. Desk-based assessments should seek to identify from air photographic, lidar and other sources (e.g. borehole surveys contributing to the development of deposit models) areas where palaeochannels with the potential for preserving riverine structures are likely to be disturbed by excavation; these high-risk areas should be monitored closely during extraction to ensure that associated remains are identified and recorded. A contingency allocation is recommended in case significant structural and paleoenvironmental remains are recovered (as, for example, at Colwick or farther upstream near Hemington in Leicestershire: Cooper 2003).		
3.Fishponds	Fishponds are scattered thinly across the Sands and Gravels, with a notable concentration in and on the fringes of the Vale of Belvoir (e.g. Whatton: HER M1201) and provide important but little studied components of manorial and monastic sites in particular. Remains preserved in deserted or shrunken villages in open country may be especially vulnerable to the impacts of extraction, and merit particular attention. Dating is problematic in view of the continued use of fishponds into the Post-Medieval period.	Rare examples of High Medieval or Post-Medieval fishponds have been recorded on manorial sites (e.g. Strelley: HER M2059) and on monastic estates located at the interface between the Limestone and Coal Measures (notably Felley and Beauvale: HER M2419 and M8870). As elsewhere, sites in open country may be vulnerable to extraction and should be accorded high priority in pre-determination work.	Fishponds are scattered widely but sparsely across the Sandstone, with notable examples in the ecclesiastical estates focused upon Newstead and Rufford and at high status sites such as hunting lodges and manorial complexes (e.g. the King's Houses, Clipstone: HER M17224). All are poorly studied and, as in other ACAs, should be accorded a high priority in view particularly of their potential for elucidating the organisation and economy of monastic and manorial estates.
	Assessment, evaluation and mitigation: In view of their comparative rarity, and their potential for the preservation of environmental remains, fishponds and associated features represent important archaeological and paleoenvironmental resources. Desk-based assessments and walkover surveys should seek to identify preserved earthworks or ploughed-out examples. Some sites may be deemed worthy of preservation *in situ*, but others will require survey and excavation according to an agreed scheme of treatment prior to extraction, with appropriate provision for environmental sampling. Assessment and evaluation strategies should prioritise dating in view of the longevity of this monument type.		
4.Water meadows	There is some evidence from this ACA for the construction of water management systems designed to control water flows, including perhaps early examples of water meadows. The range of features that might be expected is illustrated by discoveries near Hoveringham Quarry, where excavations of a cropmark complex adjacent to two water courses revealed a rectilinear pattern of drainage ditches; one of these features had been lined with riven willow planks dated by radiocarbon to cal AD 1220–1490 (HER M18315; Elliott *et al* 2004, 161). These remains were interpreted as possibly the vestiges of an early water meadow complex, or alternatively as evidence for a system of drainage ditches associated with osier beds or warping. Whatever their precise functions, the timber-lined ditches emphasise the potential of wet valley bottoms for the survival of well-preserved water management systems that can shed significant light on medieval land usage – and the need for detailed archaeological investigations of features that might be associated with these.	The rivers valleys of this Character Area have potential for the preservation of medieval or later features associated with water meadows or osier beds. Examples may await discovery and, in view of the potential preservation of significant water management features, recognition and investigation of these should be accorded a high priority during archaeological investigations in advance of development.	Extensive unenclosed river valley meadows are known along the Rivers Maun and Meden and may have existed along the courses of other tributaries crossing the Sherwood Sandstone. All have the potential for the preservation of water management features of medieval and later date. As in the other Character Areas, such features should be accorded a high priority during archaeological investigations in advance of development.
	Assessment, evaluation and mitigation: desk-based assessments and walkover surveys should seek to identify potential water meadow complexes or osier beds. Further evaluation may be required to establish their palaeoenvironmental potential and the character, level of preservation and date of any associated structural remains (e.g. timber linings of drains) and to permit development of an appropriate mitigation strategy. Some sites may be deemed worthy of preservation *in situ*, as agreed following evaluation excavations at Hoveringham Quarry. Others, however, will require further survey and excavation according to an agreed scheme of treatment prior to extraction. Appropriate provision should be made during evaluation and mitigation for environmental sampling, bearing in mind the likelihood of associated organic remains, and for appropriate scientific dating of preserved organic remains.		

5.Rabbit warrens	Plentiful documentary evidence is available for rabbit warrens (e.g. Coneygre Farm, Thurgarton: HER M17558; Conery Fields, Holme Pierrepont: HER M18380; Guilbert 2006, 38–41), although dating is problematic in view of their continuity into post-medieval times. Limited field investigations have been undertaken, but features such as pillow mounds or enclosures for rabbit rearing might survive as earthworks in favourable circumstances. Traces of these structures might also survive in heavily ploughed areas - for example as small, rectilinear ditched enclosures or arrangements of slots marking artificial burrows for coneys (see Guilbert 2006, 40).	No examples are recorded in the HER, but place name and documentary data suggest that rabbit warrens may once have been widespread.	No examples are recorded in the HER, but place name and documentary data suggest that rabbit warrens may once have been widespread.
	Assessment, evaluation and mitigation: Desk-based assessments should seek to identify sites from documentary, cartographic, air photographic and place name evidence. Walkover surveys, particularly in woodland and parkland, may identify pillow mounds and/or enclosures indicative of rabbit warrens that merit further evaluation to establish their character and date. Well-preserved earthworks might be judged suitable for preservation *in situ,* but other examples would warrant an appropriate level of excavation in order to clarify the archaeological signature of this neglected class of field monument.		
CIVIL			
6.Gallows, gallows mounds and gallows cemeteries	No examples are currently recorded, but potential examples with surviving field evidence may be revealed during desk-based assessments and walkover surveys. Dating may be problematic, bearing in mind the High Medieval to Modern date range of this monument type.	No examples are currently recorded, but potential examples may be revealed during desk-based assessments and walkover surveys.	Documentary or cartographic evidence is available for a gallows at Worksop (HER M6097) a gallows mound at Hodsock (HER M17673) and another mound in Thieves Wood (noted on historic maps as “Gallow tre hil”; HER L2558). In addition, unpublished excavations at Kilton, Worksop, revealed an inhumation cemetery interpreted as probably a Post-Medieval or Modern gallows cemetery, possibly with earlier origins (HER M6096). Other as yet unknown examples may be revealed during desk-based assessments and walkover surveys or may be exposed by chance during extraction.
	Assessment, evaluation and mitigation: Desk-based assessments should seek to identify sites from documentary, cartographic and place name evidence, while walkover surveys, particularly in woodland and parkland, might identify potential gallows mounds. Any mounds, if threatened by extraction, should be surveyed and evaluated archaeologically in view of the wide range of alternative functions that might be postulated (see also, for example, moot sites below). The results of this work would inform future mitigation, which might involve preservation *in situ* or an appropriate level of excavation in advance of quarrying. Any cemetery sites revealed during extraction would require full and detailed excavation, with appropriate recording and scientific analyses of the exposed human remains.		
7.Moot sites	These open-air assembly sites performed significant roles in law-making and the settling of disputes in Early Medieval society (Table 6.2.6.3) but archaeological investigations should also seek to establish whether these might have been re-used in later periods: for example, as places of execution or as sites for burials (as suggested for some Sherwood Sandstone sites).	No sites have been identified in this Character Area, but further documentary, cartographic and place-name research may highlight potential moot locations.	Re-use of early moot sites is illustrated by the site of Blyth Law (HER M17673), adjacent to the A1 near Blyth. This was used as a place of execution by the Prior of Blyth Abbey in the fourteenth century and has revealed remains of human burials. Further evidence for the complex life histories of some moot sites is provided by the wide variety of features revealed by topographic earthwork survey, geophysical investigations and trial

			trenching at Thynghowe (M26893; Mallett *et al* 2012; Gaunt 2013; see Table 6.2.6.3 for further details).
	Assessment, evaluation and mitigation: desk-based assessments should seek to identify surviving moot sites from place-name, documentary and cartographic evidence, while walkover surveys should be conducted to locate earthwork remains (see also Table 6.2.6.3). Well-preserved earthwork sites are likely to be recommended for preservation *in situ*. Where development is agreed, any disturbance should be preceded by surveys of extant earthworks, geophysical survey to locate buried remains, and evaluation trenching to establish the level of preservation and character of the remains prior to devising an appropriate mitigation strategy.		
8.Parish/county boundaries: earthworks and boundary markers	Boundaries between parishes, wapentakes and counties are occasionally marked by linear earthworks of unknown age, but potentially dating from the High Medieval or earlier periods (see Table 6.2.6.4). It has been suggested that some earthworks might even predate the parochial system: for example, at Gallows Nooking Common, Collingham (HER L12216), where a ditch following the County boundary was dated to the Late Iron Age on the basis of associated pottery, suggesting re-use of an earlier boundary as a county/parish boundary. Other boundaries might also be of great antiquity, but unfortunately most excavations of banks and flanking ditches have produced few, if any, finds that may assist dating (e.g. East Leake: HER L11403).	A double-ditched cropmark at Steetley, following closely the County boundary, might date from the medieval period (HER L5993), and merits further investigation to establish its date and character. Further examples of medieval linear boundaries may survive as cropmarks or earthworks, and systematic surveys of parish boundaries, especially in woodland, should be encouraged.	Linear earthworks that might represent High Medieval or earlier medieval territorial boundaries have been recorded at several sites, including the 'Roman Bank' between Blyth and Scrooby (HER M5048), which is followed for most of its recorded course (across Sherwood Sandstone and the Sands and Gravels) by a parish boundary, ByCarr Dyke (HER M18173) and the Miclandic (Garton forthcoming): a long linear feature, marked by a cropmark, that may be observed running obliquely across the Romano-British brickwork-plan fields from Barnby Moor to the River Ryton. As in the other Character Areas, systematic surveys of parish boundaries, especially in woodland and parkland, may be expected to reveal more examples of potentially early boundaries, together perhaps with boundary markers.
	Assessment, evaluation and mitigation: desk-based assessments should seek to identify sites from air photographic/lidar, documentary and cartographic evidence. Assessment should include walkover surveys aimed at identifying earthwork boundaries, together with evidence for associated boundary markers, and where possible correlate these with parish, wapentake or county boundaries. Linear boundaries will need to be surveyed where threatened by quarrying, and trenches should be excavated across them to establish their date and character and to seek buried land surfaces or other remains. Buried soils may be preserved beneath standing earthworks, and may preserve palaeobotanical, molluscan and other environmental remains with potential for elucidating the environment prior to construction of the bank. Resources must be made available for the recording, sampling and analysis of any buried soils located during excavation.		
DOMESTIC			
9.Isolated moated enclosures	Moated enclosures set some distance from known medieval villages, and potentially vulnerable to aggregates extraction, are scattered across the river terraces (e.g. Fleet Plantation, Rampton: subrectangular moated enclosure surviving as an earthwork in woodland; HER M46097). These could preserve archaeological remains of buildings, but some might have demarcated orchards or areas reserved for other specialised activities. Every opportunity should be taken to investigate the functions of these monuments, which represent one of the more enigmatic classes of medieval site in the County. Some of these monuments may have been ploughed out, and air photographs should be scrutinised closely for cropmarks indicative of other moated enclosures.	No isolated moated enclosures are currently recorded in the HER, but as elsewhere in the County examples without clearly discernible earthwork remains may await discovery.	Rare examples of isolated moated enclosures are known, including one surviving as a cropmark close to the River Ryton in an alluvial valley crossing the Sandstone escarpment (HER M5527). As elsewhere in the County, other examples may so far have eluded discovery.

	Assessment, evaluation and mitigation: examples of this important class of site may have eluded discovery, and desk-based assessments and walkover surveys should seek to identify additional sites from surviving earthworks, air photographic/lidar and other remote sensing sources, documents and historic maps (e.g. on sites of isolated farms shown on Sanderson's 1835 map of the area twenty miles around Mansfield). Well-preserved earthwork sites may be recommended for preservation *in situ*. Where development is acceptable, any disturbance should be preceded by surveys of surviving earthworks, geophysical survey to locate buried remains, and evaluation trenching to establish the level of preservation and character of the remains in order to devise an appropriate mitigation strategy.		
10.Shrunken and deserted villages	Shrunken and deserted villages, some surviving as earthworks and potentially preserving important structural, artefactual and environmental remains, are moderately densely distributed across the Sands and Gravels, principally on river terrace deposits (e.g. Adbolton and Thurgarton: HER M777 & M1407). A few have been subjected to small-scale excavations and have yielded stratified remains with significant concentrations of finds (e.g. Adbolton). Many lie in or near to areas vulnerable to aggregates extraction, and full consideration needs to be given to the impact of extraction upon archaeological remains relating to the former settlement and its associated field system. These sites may preserve archaeological traces of manorial and ecclesiastical structures and a wide variety of domestic, agricultural and industrial structures, including pottery, tile, lime, corn-drying and malt kilns, bloomeries and bronze-working sites, and have major potential for studies of changes in village morphology and functions.	Few examples have been recorded in this Character Area, but this may reflect in part the comparatively limited evidence of air photography. Known examples are distributed along the southernmost exposure of the escarpment and may be expected to have similar archaeological potential to those identified on the Sands and Gravels.	Known sites of deserted and shrunken settlements are densely distributed across the northern part of the Sandstone escarpment, within the parkland environments of the Dukeries, but are very thinly distributed in the agricultural lands to the south. These may be expected to have similar archaeological potential to those identified on the Sands and Gravels.
	Assessment, evaluation and mitigation: desk-based assessments should seek to identify surviving sites from place-name, documentary, cartographic and air photographic/lidar evidence, while walkover surveys should seek to locate earthwork remains indicative of shrunken or deserted settlements. Well-preserved earthwork sites are likely to be recommended for preservation *in situ*. Where development is agreed, any disturbance should be preceded by surveys of surviving earthworks, geophysical survey to locate buried remains, and evaluation trenching to establish the level of preservation and character of the remains in order to devise an appropriate mitigation strategy. It should be anticipated that mitigation will involve extensive excavation of the threatened area of the site, combined with appropriate environmental analysis.		
GARDENS AND PARKS			
11.Deer parks	Deer parks are principally a feature of the Sherwood Sandstone, but evidence of a deer park at Kingshaugh (HER M4639) indicates that associated archaeological remains might be impacted by aggregates extraction on this landform Such monuments could preserve boundary earthworks marking the position of deer leaps and park pales (wooden stake fences) associated with deer management. Usage on the Sands and Gravels and elsewhere in Nottinghamshire may have continued from the High Medieval into the Post-Medieval period.	Documentary evidence is available for a deer park at Newhagge (HER M5398), close to suburban development on the SW outskirts of Worksop. Deer parks are otherwise unknown at present along the limestone escarpment of Nottinghamshire, although examples are rather more common along the limestone escarpment in neighbouring Derbyshire (e.g. at Hardwick).	Deer parks are widely scattered across the Sherwood Sandstone escarpment, from Scrooby (HER M5576) and Hodsock (HER M5552) in the north of the County to Clipstone (Gaunt and Wright 2013; HER M5352), Thoresby (HER 5534) and Rufford (HER M5523) in central Nottinghamshire. These occur together with hunting lodges and other indicators of the dominance of hunting in the extensive woodlands and heathlands that would have extended across the Sherwood Sandstone in the medieval period.
	Assessment, evaluation and mitigation: possible park boundaries and other features should be located by the examination of documentary, cartographic and air photographic/lidar evidence during desk-based assessments, including walkover surveys to identify extant remains. Some well-preserved earthworks will merit preservation *in situ*. If not recommended		

	for preservation, linear earthwork boundaries will need to be surveyed where threatened by quarrying; trenches should be excavated across them to establish their date and character and to seek buried land surfaces or other remains. Buried soils may be preserved beneath standing earthworks, and may preserve palaeobotanical, molluscan and other environmental remains with potential for elucidating the environment prior to construction of the bank. Resources must be made available for the recording, sampling and analysis of any buried soils located during excavation.		
HEALTH AND WELFARE			
12.Hospitals and infirmaries	Remains of hospitals have been recorded at several locations in the Trent and Idle Valleys, sometimes in urban locations (e.g. Newark: HER M307 & M3691) but occasionally in rural contexts with potential for disturbance during quarrying, notably near Lound (HER M5543) and Gonalston (Hospital of St Mary Magdalene: HER M1768).	Infirmaries, forming components of abbey or priory complexes, are known at Newstead Abbey (HER M5292) and Worksop Priory (HER M6100), although in neither case at locations vulnerable to extraction.	A hospital recorded near Blyth (HER M5544) emphasises the possibility of preserved remains in rural contexts.
	Assessment, evaluation and mitigation: these monuments may preserve significant structural, artefactual and other archaeological remains, including perhaps associated cemeteries with potential for elucidating medieval demography. Sites may be recommended for preservation *in situ,* but otherwise a detailed desk-based assessment would be required prior to further evaluation (e.g. trial trenching) and the development of a design for further excavation. Mitigation should include appropriate provision for scientific analyses of human remains (e.g. isotope analyses of bone), together with scientific dating.		
INDUSTRIAL			
13.Kilns	Archaeological remains of limekilns have been identified during excavations at Middle Gate, Newark (HER M18289), but otherwise no examples of medieval date have been recorded in this Character Area.	No examples of medieval date have currently been recorded in this Character Area.	Malt- and corn-drying kilns dated securely to this period have been recorded so far only during excavations at Nottingham (e.g. Young 1982), but in these cases in urban contexts not threatened by aggregates extraction.
	Assessment, evaluation and mitigation: examples are difficult to predicted in advance of quarrying, but kilns for the production of malt, pottery, *etc*. or for activities such as corn drying should be anticipated as a potential element of medieval settlements surviving in rural locations vulnerable to aggregates extraction. Desk-based assessments might highlight potential kiln sites, and in such cases these should be investigated further by fieldwalking, geophysical survey and trial trenching prior to the formulation of an appropriate mitigation strategy. Structural remains recorded during extraction would require full excavation, including provision for appropriate recording and analysis of associated artefacts and environmental remains.		
14.Post-mills	Windmills, which in the medieval period would have taken the form of post-mills, may be represented archaeologically by traces of mill mounds (perhaps preserving traces of trenches for the cross-beams into which the post supporting the sails had been set) or by annular cropmarks preserving traces of a central cross marking the cross-beam trenches (e.g.Cromwell HER M8624; Kelham: M18020; Shelford: M8243; Holme: M3744). Dating is problematic, as some post-mills might have continued in use into the early post-medieval period.	Few examples of mill mounds have been recorded on the limestone (e.g. Kirby-in-Ashfield: HER L5307) but archaeological remains should be anticipated in appropriate topographic locations.	As for the Magnesian Limestone, archaeological remains of post-mills have rarely been recorded (e.g. HER L5517) but surviving remains should be anticipated in appropriate topographic locations.
	Assessment, evaluation and mitigation: searches of air photographic/lidar and place-name, documentary and cartographic records should be undertaken to locate cropmarks and/or earthworks that might indicate the sites of medieval windmills. Unless sufficiently well preserved to justify preservation *in situ*, threatened sites should be surveyed and excavated to an		

	appropriate level in advance of development, with particular focus upon verifying the attribution as a medieval mill site. Mitigation strategies should bear in mind the possibility that some mills might preserve evidence for multiple rebuildings. In addition, some might have been sited on pre-existing mounds: as perhaps at Thorpe (HER M8382), where a post-mill might have been erected on the site of a denuded Neolithic/Bronze Age barrow, located on raised ground overlooking the Trent river terraces and floodplain (Oswald 1938, 2,11).		
15.Watermills and associated structures	Mills and associated features such as millponds and dams are likely to have been widespread along the Trent and its major tributaries to judge by the many references to mills in Domesday Book and other documentary sources (Elliott *et al* 2004, 159), although currently few of the watermills noted in the HER may be assigned securely to this period. Finds in neighbouring counties demonstrate the range of archaeological evidence to be expected – notably at Hemington, Leicestershire, where a 12th century structure incorporating part of a wheel breasting in which a vertical water wheel would have turned was found in redeposited river gravels, along with a mill dam structure dated to the late 12th century (Clay and Salisbury 1990).	A small number of riverside mills of medieval origin may be deduced from documentary, excavation and survey data (e.g. HER M7515), but most of the mills listed in the HER are attributed currently to the Post-Medieval or Modern periods.	In common with the Magnesian Limestone, a scatter of Medieval to Modern mills is known along the river valleys from documentary, excavation and survey evidence. Again, most of the mills listed in the HER are attributed to the Post-Medieval or Modern periods.
	Assessment, evaluation and mitigation: traces of mills and associated structural remains should be anticipated in excavations of valley gravels, and in fluvially dynamic sections of the river could lie beneath redeposited sands and gravels. Extraction in such areas will need to be accompanied by a continuous watching brief, with provision for full excavation and appropriate post-excavation analyses if structural remains are observed.		
RECREATIONAL			
16.Hunting lodges	No examples are known at present, but archaeological remains may be revealed by documentary/cartographic research and field survey.	An earthwork above Pleasley Vale near Mansfield, provides currently the only archaeological evidence for hunting lodges (HER M5332).	A moderately dense scatter of hunting lodges has been recorded, focused in central and southern areas of the sandstone outcrop at locations within the royal forest of Sherwood. Some sites preserve standing remains (notably King John's Palace, Clipstone: HER M17224; Gaunt and Wright 2013). Others, however, are indicated only by earthwork remains (e.g. Fountain Dale, Lyndhurst: HER M2560). Extraction in parkland areas is especially likely to disturb traces of these structures and associated archaeological features, which will need to be appropriately recorded if not preserved *in situ*.
	Assessment, evaluation and mitigation: desk-based assessments should seek to identify surviving moot sites from documentary and cartographic evidence, while walkover surveys should be conducted to locate earthwork remains. Well-preserved earthwork sites are likely to be recommended for preservation *in situ*. Where development is agreed, any disturbance should be preceded by surveys of extant earthworks, geophysical survey to locate buried remains, and evaluation trenching to establish the level of preservation and character of the remains prior to devising an appropriate mitigation strategy.		
17.Tournament fields	No examples are known at present.	No examples are known at present.	An extensive and nationally important (but undesignated) tournament field is known from documentary sources and from associated finds to have been located in the vicinity of Raker Field, near Styrrup (HER M5584). The site was

			one of five locations licenced for public tournaments during the reign of Richard I (1189–99) and was the site of the Blyth Tournaments.
	Assessment, evaluation and mitigation: desk-based assessments should seek to identify potential sites from documentary sources. Fieldwalking, metal detecting and geophysical surveys may identify potential foci of activity within sites identified from documentary searches and should assist in establishing appropriate evaluation and mitigation strategies.		
RELIGIOUS, RITUAL AND FUNERARY			
18.Monastic foundations	Post–Conquest monastic foundations are known in rural locations where aggregates extraction might impact upon outlying structural remains associated with their estates – for example, at Thurgarton (HER M1775) and Shelford (HER M1814) in the Trent Valley and Mattersey (HER M4938) in the Idle Valley. Extraction close to these establishments could impact upon outlying fishponds, field systems and other contemporary landscape features, and should be closely monitored in view of the potential importance of these areas for elucidating activity in the vicinity of monastic foundations and their agrarian landscapes.	No monasteries have been recorded on the Magnesian Limestone escarpment, although several monastic foundations were located close to this outcrop immediately north of Nottingham (at Newstead on the Sherwood Sandstone [HER M8939] and, immediately west of the outcrop on the Coal Measures, at Beauvale [HER M2284] and Felley [HER M2418]). The archaeological footprints of these sites may extend well beyond the monastic buildings (into areas preserving the remains of fishponds, water management systems and other monuments) and the potential impact upon the monastic estate of quarrying in the vicinity of these sites should be fully assessed prior to the formulation of detailed schemes of treatment.	The Sherwood Sandstone preserves several important monastic foundations, and parts of the monastic estates could potentially provide opportunities for aggregates extraction, specifically at Rufford (HER M4101), Newstead (HER M8939) and Welbeck (HER M4375). Quarrying could impact, therefore, upon a variety of related structures.
	Assessment, evaluation and mitigation: desk-based assessments should collate all available documentary, cartographic and air photographic/lidar evidence, and should be accompanied by walkover surveys aimed at locating earthwork remains that might relate to monastic buildings and other structures. These monuments may preserve significant structural, artefactual and other archaeological remains, including perhaps outlying structures such as fishponds, vestiges of associated field systems and associated cemeteries with potential for elucidating medieval demography. Well-preserved earthwork sites are likely to be recommended for preservation *in situ.* Where development is agreed, any disturbance should be preceded by an evaluation programme including surveys of surviving earthworks, geophysical survey and evaluation trenching to establish the level of preservation and character of the remains and to guide the development of an appropriate mitigation strategy. It should be anticipated that mitigation will involve extensive excavation of the threatened area of the site, combined with appropriate environmental analyses. Burials should be anticipated, and provision should also be made for scientific analyses of human remains (e.g. isotope analyses of bone) and scientific dating.		
19.Chapels, churches, crosses and graves/grave markers	Archaeological remains of churches or chapels, including traces of building foundations, gravestones and cross fragments are only likely to be threatened on the sites of deserted or shrunken villages (see above), although field chapels may also be vulnerable to development.	Archaeological remains of churches or chapels on the sites of deserted or shrunken villages in open country and outlying field chapels may fall within areas vulnerable to aggregates extraction.	Archaeological remains of churches or chapels, on the sites of deserted or shrunken villages, and outlying field chapels such as St Edwin's, Clipstone (HER M3998) may be threatened by aggregates extraction.
	Assessment, evaluation and mitigation: as with deserted or shrunken villages, desk-based assessments should seek to identify the structural remains of chapels, churches and any associated remains from place-name, documentary, cartographic and air photographic/lidar evidence, while walkover surveys should seek to locate any surviving archaeological remains. Well-preserved earthwork sites are likely to be recommended for preservation *in situ*. Where development is agreed, any disturbance should be preceded by surveys of surviving earthworks, geophysical survey to locate buried remains, and evaluation trenching to establish the level of preservation and character of the remains in order to devise an appropriate mitigation strategy. It should be anticipated that mitigation will involve extensive excavation of the threatened area of the site, including appropriate environmental analysis.		

20.Granges	A thin scatter of granges, run as economic concerns by lay brethren of the monastic houses, may be postulated from documentary references (e.g. Flawford: HER M3709) and surviving earthworks (e.g. Costock: HER M32).	At least one grange may be identified, at Shireoaks (HER M8791).	Granges are currently recorded at Gleadthorpe (HER M18365), Newstead (HER M5305) and Osberton, Worksop (HER M5528).
	Assessment, evaluation and mitigation: sites should be identified and researched further during desk-based assessments, with particular attention to documentary, cartographic and place name evidence. Surviving structural remains should be identified during walkover surveys. If not recommended for preservation *in situ*, any recorded remains will require survey and an appropriate level of excavation prior to destruction (as recommended above for chapels and churches). Attention should also be focused upon the identification of associated fields and outlying structures and appropriate mitigation strategies devised (bearing in mind that some outlying sites may also merit preservation *in situ*).		
TRANSPORT			
21.Roads and tracks	Roads or tracks no longer in use are rarely identified in the HER, but are likely to be represented abundantly in cropmark plots (e.g. South Muskham: HER M18282), as elements of deserted or shrunken villages, or as linear earthworks away from village cores in woodland or pasture. Examples may also be identified from detailed investigations of documentary, cartographic, air photographic and lidar sources.	None has been noted in the HER, but examples may survive as elements of deserted or shrunken villages or as linear earthworks in woodland, pasture *etc.,* and are likely to be identified from detailed investigations of documentary, cartographic and air photographic sources.	The HER notes just two possible medieval roads, preserved as linear earthworks in Thieves Wood near Sutton in Ashfield (HER M2559 & M2575), but as in the other Character Areas walkover surveys and detailed documentary, cartographic and air photographic investigations may be expected to yield further examples.
	Assessment, evaluation and mitigation: historic maps provide an important source of evidence for former roads and should be investigated, together with aerial photographs, lidar plots and other documentation, during desk-based assessments. Provision should also be made for a walkover survey to locate associated earthworks and for targeted excavations to investigate the date, character and spatial arrangement of any tracks and roads that are identified (including provision for the investigation of old land surfaces preserved beneath them and the sampling and analysis of associated environmental remains).		
22.Bridges	Numerous bridges of medieval origin are recorded along the Trent, Idle and other tributary streams. Some survive today, but a significant number are known only from documentary or cartographic sources and could preserve important remains stratified in sub-alluvial sands and gravels. Bridging points may preserve traces of several phases of construction, not necessarily at precisely the same location, and areas either side of recorded structures should also be checked for structural remains.	Former bridges are noted in perambulations of Sherwood Forest, both on the Magnesian Limestone and the Sherwood Sandstone, and may preserve archaeologically significant remains that might be disturbed by extraction.	There are documentary references to former bridges of this period along some of the rivers crossing and fringing the Sherwood Sandstone (e.g. at Blyth: HER M5548), and as elsewhere significant archaeological remains might be disturbed by extraction.
	Assessment, evaluation and mitigation: documentary, place-name, cartographic and air photographic/lidar sources should be checked, while walkover surveys should be conducted to investigate whether structural remains might survive. Assessment should place particular emphasis upon the identification of palaeochannels with the potential for crossing points and associated structural remains. Timber or stone bridges might be buried in redeposited sand and gravel deposits, as at Hemington Quarry in Leicestershire (Ripper and Cooper 2009), and a continuous watching brief may provide a suitable approach to mitigation (with provision for full excavation, environmental sampling and analysis, and radiocarbon or dendrochronological dating of associated timbers). Well-preserved bridges, particularly those surviving in waterlogged environments, will involve significant costs (both for excavation and for sampling and analysis of associated palaeoenvironmental remains) while archaeological excavations may require adjustments to the programme for overburden-stripping. For these reasons, every effort should be made to identify high-risk locations during the assessment stage.		

23.Ferries and fords	Documentary evidence for ferries is available for several locations along the Trent, including Gunthorpe (HER M5472) and Thrumpton (HER M757), and points to the possible survival of riverside structures that should be sought during extraction. Other ferries, for which no documentary evidence is available, may have existed, not only along the Trent but also on major tributaries such as the Soar and Idle.	No examples of ferries or fords have been recorded in the HER, but undocumented examples may well exist and should be sought during assessment.	Medieval/post-medieval fords are noted at several locations, notably across the Maun near its confluence with the Meden (HER M7464), and further examples of crossing points may be expected to emerge during the compilation of detailed desk-based assessments.
	Assessment, evaluation and mitigation: examples of early crossing points might emerge from studies of relevant documentary, place-name and cartographic sources during desk-based assessments and during field surveys focusing upon the identification of structural remains visible in riverbanks. A continuous watching brief may provide a suitable approach to mitigation (with provision for full excavation and recording if remains are revealed during extraction). Investigations of waterlogged environments may yield deposits with significant palaeoenvironmental potential, and provision should be made for environmental sampling and associated scientific dating. Environmental analyses and scientific dating may involve significant costs and hence every effort should be made to identify high-risk locations during the assessment stage.		
WATER SUPPLY AND DRAINAGE			
24.Dams and other water-control features.	Such structures, together with wells, are currently under-represented in the HER. The HER currently lists only the flood defences at Barton in Fabis (HER M476) as possibly of medieval origin, but these could date from significantly later. There is, however, a high likelihood of disturbance of medieval structural remains during extraction close to contemporary river channels: as, for example, at Hemington, Leicestershire, where a mill dam structure dated to the late 12th century was found in redeposited river gravels, together with the remains of a 12th century mill (Clay and Salisbury 1990). Other riverine structures associated with water control, such as bankside revetments and weirs, should also be anticipated.	No traces of dams, bankside revetments or other water control features have been recorded so far in the HER.	A dam, possibly originating in the medieval period, has been identified near Salterford Farm, Calverton (HER M2873), upstream of Oxton Bogs, but as yet no other early water-control features are noted in the HER.
	Assessment, evaluation and mitigation: desk-based assessments should focus upon the identification from documentary study or field survey of sites that might preserve vestiges of dams, bankside revetments and other water management features. Unexpected discoveries of riverine structures, such as bankside timber revetments, should be anticipated in schemes of treatment, and a continuous watching brief may provide the most effective mitigation strategy. Appropriate provision will need to be made for the excavation of any structural remains recorded during archaeological monitoring of extraction. Due regard should be given to the potential longevity of water-control systems, and Post-Medieval/Modern structures should always be dismantled with the possibility of earlier structural remains in mind. In addition, investigations of waterlogged environments may yield deposits with significant palaeoenvironmental potential, and provision should be made for environmental sampling and scientific dating during mitigation.		
25.Wells	Wells, sometimes associated with well houses or other structures, survive in rural locations that could be impacted by aggregates extraction (e.g. Thurgarton: HER M17599), but such sites are extremely difficult to date. None may be dated securely to the medieval period, but many well which are known to have been in use in later periods might have earlier origins.	A medieval well was recorded during excavations at Moorhaigh Farm, Mansfield (HER M8943), together with a possible early well at Greasley (HER M2336). As in the other Character Areas, many Post-Medieval or later wells may have earlier origins and should be investigated with that possibility in mind.	Rare medieval examples are recorded in the HER, including two wells at Annesley deserted medieval village (HER M8936 & 8937) and possibly wells in parkland at Newstead (HER M2688) and in woodland at Blidworth (HER M5317); neither of the latter two examples, however, may be closely dated.

	Assessment, evaluation and mitigation: examples should be sought during desk-based assessments and walkover surveys, with full consideration of relevant documentary, place-name and cartographic sources, and should be recorded fully prior to destruction. It is worth emphasising that Post-Medieval or Modern wells may have earlier origins and should be dismantled carefully with this in mind. Appropriate provision should be made for sampling and analysis of associated environmental remains, bearing in mind that wells might yield waterlogged deposits with excellent preservation of organic remains.		
MISCELLANEOUS: SURFACE FINDS			
26.Finds scatters and single finds	Examination of the HER database for this area reveals a significantly higher density of medieval finds scatters and single finds, principally of pottery, than in the other ACAs. The distribution is distorted by spatial variability in the intensity of fieldwalking, with perceptible concentrations in intensively walked areas such as South Muskham (Garton 2002). Detailed study of the quantity, character and spatial distribution of material in extant collections could contribute significantly to studies of spatial and temporal variations in agricultural practice - as demonstrated by comparison of the fieldwalking finds from the Fosse Way near Newark and around South Muskham with material obtained during walking of the brickwork-plan field systems of the Sherwood Sandstone (Garton 2007). These surveys have demonstrated a generally higher background density of medieval pottery on the Sands and Gravels and, given that this material probably derived from manure spreads, may reflect significant differences in the extent of arable. The lower density of surface finds on the Sandstone would support the documentary evidence for an emphasis in that area upon hunting, warrens and sheepwalks, and emphasises the potential value of fieldwalking as an indicator of agricultural practices. It may also provide valuable clues to the presence of domestic or industrial activity foci, and hence assist in the formulation of mitigation strategies in advance of quarrying.	Comparatively few surface finds are noted in HER records of the limestone escarpment, with the exception of an area focused upon Mansfield that has been intensively walked over many years by members of the Sherwood Archaeological Society. Further detailed study of extant collections, aimed at elucidating contrasts with systematically walked areas of the other Character Areas, would contribute significantly to studies of spatial variability in land-use. The results of intensive fieldwalking by the Sherwood Archaeological Society emphasise the value of investment in further site prospection by means of systematic fieldwalking of arable areas.	Medieval finds scatters and single finds recorded in the HER are unevenly distributed across the Sherwood Sandstone, with a predictably poor representation in the woodland and parkland areas that are such a distinctive feature of this landscape zone. Systematic fieldwalking of the brickwork-plan field systems that were identified originally by aerial survey has revealed a thin scatter of material, spread significantly less densely than in the several areas of the Sands and Gravels that have been systematically fieldwalked (Garton 2007). This correlates interestingly with the documentary evidence for an emphasis in the medieval period upon waste, woodland, pasture, warrens and hunting, and emphasises the potential of fieldwalking as a guide to past land use. Additional systematic fieldwalking, employing a collection methodology including retrieval of medieval and post-medieval material, should be encouraged within and beyond the area characterised by brickwork-plan field systems to investigate in more detail finds patterning across the Sherwood Sandstone and permit more detailed comparison of the patterns observed in other Character Areas.
	Assessment, evaluation and mitigation: systematic fieldwalking and/or test-pitting should be employed regularly during site prospection, with appropriate provision for conservation work and X-radiography of metalwork. Such work would complement further studies of existing collections and help to locate foci of domestic, industrial and other activities. It would also provide a valuable foundation for geophysical survey, trial trenching and other evaluation strategies and for the development of mitigation strategies in advance of extraction.		

TABLE 6.2.8. POST-MEDIEVAL AND MODERN ARCHAEOLOGICAL RESOURCE (1485 TO PRESENT)			
ARCHAEOL-OGICAL ASSOCIATIONS	**AGGREGATE CHARACTER AREAS**		
	SUPERFICIAL SANDS AND GRAVELS	**MAGNESIAN LIMESTONE**	**SHERWOOD SANDSTONE**
AGRICULTURE AND SUBSISTENCE			
1.Field systems and associated archaeological remains	This period sees the transition from Open Field to enclosed landscapes across the Sands and Gravels and in other parts of the County where the Open Field system had prevailed (with the notable exception of Laxton on the Mercia Mudstones, which remains the only English parish where this system of farming is still conducted under the guidance of a court leet: Beckett 1989). The modern rural landscape preserves vital field evidence for this process, which commenced with the enclosure of strip-holdings (and their withdrawal from the open fields) and culminated in the geometric field patterns characteristic of 18th to 19th Century Parliamentary Enclosure and the modified field patterns of the 20th and 21st centuries. Aggregates extraction will impact significantly upon this landscape resource. A full record of field shapes, boundary forms, ridge and furrow and plough headlands should be compiled before extraction. Information should also be obtained on outlying sheepfolds, sheep washes, troughs and other farm furniture, together with earthwork or other remains suggesting isolated farmhouses, field barns and other structures (including the flimsy, short-lived and poorly known dwellings associated with the landless rural poor).	Open Field systems also spread extensively across this Character Area, which saw a similar progression to enclosed agrarian landscapes during this period. As in the other Character Areas, a full record of field shapes, boundary forms, ridge and furrow and plough headlands should be compiled before extraction, together with information on farm furniture and archaeological remains that may provide evidence of deserted farmhouses, field barns and other outlying structures.	There is archaeological and historical evidence that pasture, particularly for sheep, may have prevailed over much of the Sherwood Sandstone during the medieval period, together with woodland, heath and parkland. Evidence for the progression from Open Field to enclosed agrarian landscapes is nonetheless still preserved and should be sought during assessment and in all subsequent stages of investigation. As in the other Character Areas, therefore, a full record of field shapes, boundary forms, ridge and furrow and plough headlands should be compiled, together with information on farm furniture and archaeological remains suggesting deserted farmhouses, field barns and other outlying structures.
	Assessment, evaluation and mitigation: desk-based assessments of the available documentary, cartographic and air photographic evidence should aim to investigate the development of field systems, and in particular the process of enclosure. Lidar data, if available, would be invaluable for revealing features concealed in woodland. Desk-based work ought to be accompanied by walkover surveys to assess the character of the field evidence, including the extent and survival of ridge and furrow and other earthworks indicative of Open Field agriculture, their relationship with existing field boundaries, the presence of straight ridge and furrow indicative of nineteenth century steam ploughing, and the survival of field shapes indicating the enclosure of medieval cultivation strips. Subsequent excavations may be able to refine the dating of ridge and furrow and its relationship to later field boundaries, which in turn should assist interpretation of the progress of enclosure. Where restoration proposals include returning land to agriculture, consideration should be given to restoring pre-existing field boundaries, or at least to ensuring that fields are of a size and shape appropriate to the area.		
2.Fishponds	Fishponds are scattered thinly across the Sands and Gravels, with a notable concentration in and on the fringes of the Vale of Belvoir (e.g. Whatton: HER M1201), and although a significant component of medieval manorial and	Rare examples of medieval or Post-Medieval date have been recorded on manorial sites such as Strelley (HER M2059) and on monastic estates located at the interface between the Limestone and Coal Measures (notably Felley	Fishponds of medieval or Post-Medieval date are scattered widely but sparsely across the Sherwood Sandstone, with notable examples in the ecclesiastical estates focused upon Newstead and Rufford and at high

	monastic sites, form important elements of some later sites. Remains preserved in open country away from modern villages, perhaps in or close to deserted and shrunken villages or in parkland locations, are especially vulnerable to the impacts of aggregates extraction and merit detailed consideration during pre-determination investigations.	and Beauvale: HER M2419 & M8870). As in the other Character Areas, sites in open country may be vulnerable to extraction and should be accorded a high priority during assessment and evaluation.	status sites such as hunting lodges and manorial complexes (e.g. King John's Palace, Clipstone: HER M17224; Gaunt and Wright 2013). All are poorly studied and should be accorded a high priority in pre-determination work.
	Assessment, evaluation and mitigation: In view of their comparative rarity, and their potential for the preservation of waterlogged remains, fishponds provide important archaeological and palaeoenvironmental resources. Desk-based assessments and walkover surveys should seek to identify preserved earthworks and ploughed-out examples. Some sites may be deemed worthy of preservation *in situ*, but others will require survey and excavation according to an agreed scheme of treatment prior to extraction, with appropriate provision for environmental sampling and associated scientific dating.		
3.Water meadows	There is an increasing body of evidence for the development of water management systems along the River Trent and its tributaries, including the discovery of features and deposits that may provide evidence for water meadows, osier beds and possibly warping (compare Table 6.2.7.4). These developments are closely associated with the agricultural improvements of the Post-Medieval and Modern periods, which witnessed the development in the lower Trent catchment of extensive drainage schemes designed to improve the agricultural potential of the marshy wetland areas flanking the Trent, Idle and other water courses, including the Fleet to the north of Newark (see, for example, Van de Noort 2004, 154–63).	No examples of water meadows have been recorded in the HER, but further investigations may show these to have been constructed along some of the water courses traversing the escarpment.	Extensive water meadows are noted in the HER along the Rivers Maun and Meden, notably around Edwinstowe and Clipstone, while other systems are likely to have existed along the courses of other rivers draining the Sherwood Sandstone. Some have the potential for the preservation of water management features of medieval or later date. As in the other Character Areas, the identification of water meadows and other evidence for water management strategies should be accorded a high priority during archaeological investigations in advance of proposed development, with particular emphasis upon their potential for preserving significant environmental evidence.
	Assessment, evaluation and mitigation: walk-over surveys and desk-based assessments of the available documentary, cartographic and air photographic/lidar evidence should seek to identify potential water meadow complexes, which in this period of rapid agricultural innovation are known to vary significantly in character. Evaluation may be required to establish their palaeoenvironmental potential and the character, level of preservation and date of any associated structural remains (e.g. timber linings of drains) and to permit development of an appropriate mitigation strategy. Some sites may be deemed worthy of preservation *in situ,* but others will warrant survey and excavation according to an agreed scheme of treatment prior to extraction. Appropriate provision should be made during evaluation and mitigation for environmental sampling, bearing in mind the likelihood of associated organic remains, and for appropriate scientific dating of preserved organic remains.		
4.Rabbit warrens	Plentiful documentary evidence is available for rabbit warrens (e.g. Coneygre Farm, Thurgarton: HER M17558; Conery Fields, Holme Pierrepont: HER M18380), but dating is problematic given their broad date range. Limited field investigations have been undertaken, but features such as pillow mounds or enclosures for rabbit rearing might survive as earthworks in favourable circumstances. Traces of these structures might also survive in heavily ploughed areas: for example, as small, rectilinear ditched enclosures or as arrangements of slots marking artificial burrows for coneys (as suggested at Holme Pierrepont: Guilbert 2006, 40).	No examples have been recorded in the HER, but future desk-based assessments and walkover surveys may be expected to reveal examples of a class of monument that from place name and documentary evidence is known to have been widespread in Nottinghamshire.	No examples are recorded currently in the HER, but there is substantial documentary evidence for the presence of warrens across the Sherwood Sandstone from the High Medieval to early Modern periods. As in the other Character Areas, desk-based assessments and walkover surveys should focus upon the identification of a class of monument that from place name and documentary evidence is known to have been widespread in Nottinghamshire.

	Assessment, evaluation and mitigation: desk-based assessments should seek to identify potential warrens from documentary, cartographic, air photographic, lidar, place name and field evidence. Walkover surveys, particularly in woodland and parkland, may identify pillow mounds and/or enclosures indicative of rabbit warrens; these would merit further evaluation to establish their character and date and to guide further mitigation. Well-preserved earthworks might be judged suitable for preservation *in situ,* but other examples would warrant an appropriate level of excavation in order to clarify the archaeological signature of this neglected class of field monument.		
CIVIL			
5.Parish/county boundaries and boundary stones	Boundaries between parishes, wapentakes and counties are occasionally marked by linear earthworks of unknown date. Some boundaries could have very ancient origins, including an example at Gallows Nooking Common, Collingham, which could have originated in the Late Iron Age and have been re-used as a county/parish boundary (HER L12216; Knight and Howard 2004a, 105), while others could be of medieval or later date. All should be investigated archaeologically to assess their character and date and to seek buried land surfaces that may preserve palaeobotanical, molluscan and other environmental remains with potential for elucidating the environment prior to construction of the bank.	Some earthwork boundaries in this Character Area have been identified as possibly of medieval or even earlier origin (Table 6.2.7.8; e.g. HER L5993) but dating of these remains problematic. All should be investigated archaeologically to assess their character and date and to seek buried land surfaces that may preserve significant palaeoenvironmental remains.	Occasional earthwork boundaries that might relate to medieval or possibly earlier territorial boundaries have been recorded, notably the so-called 'Roman Bank' near Scrooby (HER M5048; Table 6.2.7.8), but further investigative work is required to establish the origins of these monuments. All should be investigated archaeologically to assess their character and date and to seek buried land surfaces that may preserve significant palaeoenvironmental remains. Boundary stones depicted on historic maps (e.g. Sanderson 1835) have been identified at a number of locations (e.g. along the parish boundary between Warsop and Edwinstowe: HER M4899, M4900, M4901 & M4902). Systematic surveys of parish boundaries, especially in woodland and parkland, may reveal more examples of boundary earthworks, together perhaps with associated boundary markers.
	Assessment, evaluation and mitigation: desk-based assessments should seek to identify sites from air photographic/lidar, documentary and cartographic evidence. Assessment should include walkover surveys aimed at identifying earthwork boundaries, together with evidence for associated boundary markers, and where possible correlate these with parish, wapentake or county boundaries. Linear boundaries will need to be surveyed where threatened by quarrying, and trenches should be excavated across them to establish their date and character and to seek buried land surfaces or other remains. Buried soils may be preserved beneath standing earthworks, and may preserve palaeobotanical, molluscan and other environmental remains with potential for elucidating the environment prior to construction of the bank. Resources must be made available for the recording, sampling and analysis of any buried soils located during excavation.		
6.Gallows, gallows mounds and associated cemeteries	No examples have been recorded in the HER.	No examples have been recorded in the HER.	Documentary or cartographic evidence is available for a gallows at Worksop (HER M6097) a gallows mound at Hodsock (HER M17673) and another mound in Thieves Wood (noted on historic maps as 'Gallow tre hil'). In addition, unpublished excavations at Kilton, Worksop revealed an inhumation cemetery interpreted as probably a Post-Medieval/Modern gallows cemetery (HER M6096).
	Assessment, evaluation and mitigation: desk-based assessments should seek to identify possible gallows sites from documentary, cartographic and place name evidence, while walkover surveys of identified sites, particularly if preserved in woodland and parkland, might identify potential gallows mounds. Any mounds threatened by extraction should be surveyed as a prelude to further work, which might involve geophysical survey, trial trenching and, if preservation *in situ* is not recommended during assessment or evaluation, full excavation. Any cemetery sites revealed during extraction would require full and detailed excavation, with appropriate recording and scientific analysis of the exposed human remains.		

DEFENCE			
7.Civil War Fortifications	A remarkable range of Civil War offensive and defensive earthworks was constructed around Newark and neighbouring settlements during the sieges of this key royalist garrison between 1642 and 1646 (RCHME 1964). Many of these structures have survived until today, and as the finest remaining collection of Civil War works in England represent a complex of national significance. It has been suggested that slight earthworks on fluvioglacial sands and gravels at Beacon Hill, Gringley on the Hill (HER M5110) might be associated with occupation of the hill by Prince Rupert in 1644 during his rout of the Parliamentarian army. Further archaeological investigations are required to establish the character and date of the remains on this prominent hilltop, which have been interpreted by some as evidence of a former hillfort (Table 6.2.4.3), and interpretation remains problematic.	No archaeological remains that may be attributed with certainty to the Civil War period have been recorded, but as in the other ACAs remains may be suspected around the sites of houses of the gentry.	No archaeological remains that may be attributed with certainty to the Civil War period have been recorded, but as in the other ACAs remains may be suspected around the sites of houses of the gentry.
	Assessment, evaluation and mitigation: any development proposals will need to be accompanied by a desk-based assessment of the available documentary, cartographic and air photographic evidence, together with a walkover survey to establish the current level of preservation of the archaeological remains. Systematic fieldwalking and metal-detecting should also be undertaken to investigate the distribution of artefacts associated with these monuments. Preservation *in situ* is expected for most of the sites around Newark, bearing in mind their national importance. Other monuments, for which preservation by record might be appropriate, would require further evaluation (for example, by geophysical survey, fieldwalking and trial trenching) to establish an acceptable mitigation strategy.		
8.Battlefield and skirmish sites	The final battle of the War of the Roses was fought in 1487 at Stoke Fields near East Stoke and has preserved a variety of evidence including artefact scatters and burials (Bishop 1987). The battle extended widely, over a variety of geologies, and additional remains might be located in nearby river terrace deposits. Three Civil War battlefields have also been identified on or close to superficial sand and gravel deposits – in the south of the County at Costock (HER M5196) and Willoughby Field (HER M282), and at Beacon Hill, Newark (HER M3638). In addition, many houses and estates of the gentry may have been the scenes of Civil War skirmishes that could have left some archaeological traces (e.g. Shelford Priory: HER M8251).	No sites have currently been recorded, but as in the other Character Areas some houses and estates of the gentry may have been the scenes of Civil War skirmishes that could have left some archaeological traces.	No sites have currently been recorded, but as in the other Character Areas some houses and estates of the gentry may have been the scenes of Civil War skirmishes that could have left some archaeological traces.
	Assessment, evaluation and mitigation: desk-based assessments, including walkover surveys and studies of the available documentary, cartographic and air photographic evidence, should be conducted to identify potential battle and skirmish sites. Further evaluation could include systematic fieldwalking and metal detecting, geophysical survey, test-pitting and trial trenching, following which an appropriate mitigation strategy may be devised. All work should take account of the strong likelihood of buried human remains, and appropriate resources should be provided for their full excavation and analysis, including provision for scientific dating.		

9.Twentieth century military remains	A wide range of monuments relating to 20th century military activity has been identified. Sites that might be threatened by aggregates extraction in rural areas include the remains of airfields dating from World Wars I and II and the Cold War, pillboxes, communal bunkers, anti-aircraft batteries, searchlight emplacements and trenches associated with military training areas.	A comparable range of monuments to those surviving on the Sands and Gravels should be expected	A comparable range of monuments to those surviving on the Sands and Gravels should be expected. Particular attention should be drawn to the extensive 20th century military remains that survive in Sherwood Forest. This includes significant unexploded ordnance, the presence of which poses serious problems in archaeological survey.
	Assessment, evaluation and mitigation: desk-based assessment should seek to identify military remains from documentary, cartographic and air photographic sources. This should be accompanied by a walkover survey to identify surviving archaeological remains, such as the foundations of pillboxes or earthworks indicative of searchlight emplacements. Certain structures might merit preservation *in situ,* but any examples threatened by destruction should be evaluated (e.g. by geophysical survey of potential searchlight emplacements) prior to formulation of an appropriate mitigation strategy.		
DOMESTIC			
10.Shrunken and deserted villages	Shrunken and deserted villages, some surviving as earthworks and potentially preserving important structural, artefactual and environmental remains, are moderately densely distributed across the Sands and Gravels, principally on river terrace deposits (e.g. Adbolton and West Burton: HER M777 & M4946). A few have been investigated by small-scale excavations and have yielded stratified remains with significant concentrations of Post-Medieval and Modern as well as earlier finds (e.g. Adbolton). Many lie close to areas vulnerable to aggregates extraction, and full consideration needs to be given to the impact of extraction upon archaeological remains relating to habitation foci and adjoining field systems. These sites may preserve archaeological traces of manorial and ecclesiastical structures, a wide variety of domestic, agricultural and industrial structures and a rich artefact and environmental record. They have major potential, therefore, for studies of changes in village morphology and functions from the medieval to later periods.	Few examples have been identified on the Magnesian Limestone of Nottinghamshire, but it is unclear how far this might reflect variations in the intensity of air photographic and ground survey rather than genuine contrasts in the archaeological resource. Currently, known examples are distributed towards the south of the exposure, and may be expected to have similar potential to those identified on the Sands and Gravels.	Deserted and shrunken settlements are fairly densely distributed across the northern part of the Sandstone escarpment, within the parkland environments of the Dukeries, but are very thinly distributed in the agricultural lands to the south. Sites may be expected to have similar potential to those identified on the other Character Areas.
	Assessment, evaluation and mitigation: Desk-based assessments should seek to identify surviving sites from place-name, documentary, cartographic and air photographic/lidar evidence, while walkover surveys should locate earthwork remains indicative of shrunken or deserted settlements. Well-preserved earthwork sites are likely to be recommended for preservation *in situ*. Where development is agreed, any disturbance should be preceded by surveys of surviving earthworks, geophysical surveys to locate buried remains and evaluation trenching to establish the level of preservation and character of the remains in order to devise an appropriate mitigation strategy. It should be anticipated that mitigation will involve extensive excavation of the threatened area of the site, combined with appropriate palaeoenvironmental analysis.		
11.Isolated moated enclosures	Moated enclosures located some distance from modern settlements, and thus potentially vulnerable to aggregates extraction, are scattered across the river terraces (e.g. Fleet Plantation, Rampton: subrectangular moated	No isolated moated enclosures are currently recorded in the HER but, as in the other ACAs, more examples without extant earthwork remains may await discovery.	Rare examples of isolated moated enclosures are known, including an undated cropmark site close to the River Ryton in an alluvial valley crossing the Sandstone

	enclosure surviving as earthwork in woodland adjacent to quarry: HER M46097; moat at Dog Island, Beckingham: HER M5031). These may be attributed a broad date range, and although many may have originated in the medieval period a significant proportion could have been in use during this later period. Limited excavations have been carried out on moated enclosures in the East Midlands, and although unexcavated examples could preserve building foundations, some might have demarcated orchards or areas reserved for other specialised activities. Every opportunity should be taken to investigate the chronology and functions of these monuments, which represent one of the more enigmatic classes of site in the County. It should be noted, finally, that some monuments of this class may have been ploughed out, and air photographs should be scrutinised closely for cropmarks indicative of other moated enclosures.		escarpment (HER M5527). As in the other ACAs, more examples may have eluded discovery.
	Assessment, evaluation and mitigation: more examples of this important class of site may have eluded discovery, and desk-based assessments and walkover surveys should seek to identify additional sites from earthworks, cropmarks, documents and historic maps (e.g. on sites of isolated farms shown on Sanderson's 1835 map of the area 20 miles around Mansfield). Lidar data, if available, would be invaluable for revealing features concealed in woodland. Well-preserved earthwork sites are likely to be recommended for preservation *in situ*. Where development is agreed, any disturbance should be preceded by surveys of surviving earthworks, geophysical surveys to locate buried remains and evaluation trenching to establish the level of preservation and character of the remains in order to devise an appropriate mitigation strategy. It should be anticipated that mitigation will involve extensive excavation of the threatened area of the site, combined with appropriate palaeoenvironmental analysis.		
12.Isolated farms and associated structures	Farmhouses with associated barns and other agricultural structures are scattered across rural areas away from established settlements, and archaeological remains indicative of these may be vulnerable to aggregates extraction. These rural areas may also preserve traces of the flimsy, short-lived and poorly known dwellings associated with the landless rural poor which have been flagged as important subjects for further research across the East Midlands (Knight *et al* 2012, 110).	Archaeological remains of farmhouses and associated structures may survive in rural areas away from established settlements, together with traces of the flimsy dwellings associated with the landless rural poor. Such remains should be fully investigated prior to development.	Archaeological remains of farmhouses and associated structures may survive in rural areas away from established settlements, together with traces of the flimsy dwellings associated with the landless rural poor. Such remains should be fully investigated prior to development.
	Assessment, evaluation and mitigation. Many dispersed farmhouses and associated structures survive as substantial buildings, and we focus here upon the assessment, evaluation and mitigation strategies that should be employed for locating and investigating archaeological remains of these. Desk-based assessment of the available documentary, cartographic and air photographic evidence should help to identify such remains, although the flimsy and short-lived dwellings associated with the landless rural poor may well elude discovery by such means. Lidar data, if available, would be invaluable for revealing features concealed in woodland. Desk-based work should be accompanied by walkover surveys to locate and characterise any surviving earthwork remains, including for example the identification of small, irregular enclosures on the edges of pasture, wood or road, depicted but not remarked upon by surveyors of tithe or enclosure maps, and worth surveying for insubstantial earthworks or particular colonies of plants that might betray flimsy dwellings and other structures. Well-preserved earthwork sites are likely to be recommended for preservation *in situ*. Where development is agreed, any disturbance should be preceded by surveys of surviving earthworks, geophysical surveys to locate buried remains and evaluation trenching to establish the level of preservation and character of the remains in order to devise an appropriate mitigation strategy. It should be anticipated that mitigation will involve excavation of the threatened area of the site, combined with appropriate palaeoenvironmental analysis.		

GARDENS AND PARKS			
14.Country parks and gardens	Nottinghamshire preserves numerous estates where a grand mansion sits at the centre of a tract of private land. This is best exemplified on the Sherwood Sandstone, but may be illustrated on a smaller scale in this Character Area by the parks and gardens associated with such elite houses as Holme Pierrepont Hall (HER M872), Stoke Hall (HER M224) and Flintham Hall (HER M121). Landscaping fashions changed significantly over the period, and evidence of these may be enshrined in a host of park and garden features that would merit an appropriate level of recording if threatened by extraction. Only a few may be mentioned here, but features to be considered when assessing park and garden landscapes in each of the Character Areas include ha-has, tree avenues, artificial terraces, gazebos, ice houses and a host of features associated with water management.	Extensive parkland and gardens with significant landscape features are preserved at Newstead Abbey, the grounds of which were remodelled dramatically after the dissolution of the monasteries between 1536 and 1539 (HER M8293). Much of the estate lies on the Sherwood Sandstone, but parkland extends westwards to the Magnesian Limestone and the River Leen (which provided the water source for the park's' remarkable variety of water features). Other garden and parkland features are preserved at Shireoaks Hall (HER M5393), although its associated parkland has been sadly diminished over the years.	In addition to Newstead Abbey, the Sherwood Sandstone includes the extensive parklands and gardens that are associated with the historic houses of the Dukeries. These are exemplified by the remodelled landscapes of Clumber (HER M4572), Thoresby (HER M17809) and Rufford (HER M8589) Parks and preserve a remarkable variety of well-preserved landscape features and garden or parkland structures that together provide a vital resource for studies of estate development subsequent to the Dissolution. No less importantly, preservation from the ravages of modern ploughing has created environments favourable to the preservation of far more ancient landscapes. In common with estate landscapes in the other Character Areas, any developments may expect to encounter well-preserved features predating significantly the estate landscapes of the post-medieval and modern periods.
	Assessment, evaluation and mitigation: Desk-based assessments should collate information from documentary, cartographic and air photographic/lidar evidence, while walkover surveys should aim to locate earthworks, landscape features such as tree avenues and other park or garden features that might be disturbed by development. Well-preserved earthwork sites and other important park or garden features will warrant preservation *in situ*. Otherwise, a full survey of visible earthworks and other park or garden features, geophysical surveys to locate buried remains and, where appropriate, evaluation trenching to establish the level of preservation and character of the remains, is likely to be required before developing an appropriate mitigation strategy.		
15.Deer parks	Rare examples of deer parks have been recorded on the Sands and Gravels, notably at Kingshaugh (HER M4639). Such monuments may preserve boundary earthworks marking the position of deer leaps and park pales (wooden stake fences) associated with deer management. Usage, on the Sands and Gravels and elsewhere in Nottinghamshire, may have continued from the medieval into the Post-Medieval period.	Documentary evidence is available for a medieval deer park at Newhagge (HER M5398), which may have continued in use into the Post-Medieval period. Deer parks are currently unknown elsewhere along the limestone escarpment of Nottinghamshire, but further examples may be noted in neighbouring areas of Derbyshire (e.g. at Hardwick).	Deer parks are widely scattered across the Sherwood Sandstone escarpment, with notable examples at Clipstone (Gaunt and Wright 2013; HER M5352), Welbeck (HER M5376), Newstead (HER M5298) and Annesley (HER M2564). As in other areas, deer parks have a long ancestry, stretching back to the medieval period, and in common with their medieval antecedents may preserve hunting lodges, park pales and other features of archaeological significance. From the Post-Medieval period, some deer parks in this area were developed by the gentry as parks embracing novel design concepts that have left some very distinctive archaeological signatures.
	Assessment, evaluation and mitigation: possible park boundaries and other features should be located by the examination of documentary, cartographic and air photographic/lidar evidence during desk-based assessments, including walkover surveys to identify extant remains. Some well-preserved earthworks will merit preservation *in situ*. If not recommended for preservation, linear earthwork boundaries will need to be surveyed where threatened by quarrying; trenches should be excavated across them to establish their date and character and to seek buried land surfaces or other remains. Buried soils may be preserved beneath standing earthworks, and may preserve palaeobotanical, molluscan and other environmental remains with potential for elucidating the environment prior to construction of the bank. Resources must be made available for the recording, sampling and analysis of any buried soils located during excavation, including provision for scientific dating.		

INDUSTRIAL			
16.Kilns	Important evidence for limekilns was obtained during excavations at Slaughterhouse Lane in Newark (HER M8806), while maltkilns have been located in several villages, notably Laneham (HER M4715).	Limekilns are widely distributed across the Magnesian Limestone escarpment (e.g. in woodland and fields around Quarry Banks, Newstead: HER M7481, 7482 & 7484) and may survive in rural locations vulnerable to aggregates extraction as well as urban contexts (e.g. Sutton in Ashfield: cluster of limekilns and quarries: HER M17442, M17444, M17745 & M17448).	Malt kilns have been identified at Nottingham (Young 1982) and pottery kilns in modern rural locations on sites such as the deserted village of Annesley (HER M8933 & M8934). Comparatively little, however, is currently known about kilns in this area.
	Assessment, evaluation and mitigation: although comparatively few kilns dated securely to these periods have been identified in the three Character Areas, the few recorded examples emphasise that kilns for the manufacture of pottery and other products should be anticipated on rural as well as urban sites, and hence should be considered when developing archaeological schemes of treatment. Desk-based assessments might locate potential kiln sites, and in such cases these should be investigated further by fieldwalking, geophysical survey and trial trenching prior to the formulation of an appropriate mitigation strategy. Structural remains recorded during extraction would require full excavation, including provision for appropriate recording and analysis of associated artefacts and environmental remains.		
17.Quarries	Most evidence for early aggregates quarries in this or other Character Areas is likely to have been destroyed during later working, but documentary, cartographic, cropmark and earthwork evidence permits recognition of a number of now disused quarries that together help piece together the earlier history of the quarry industry on the Sands and Gravels - for example at Elton (HER M1352), Ranskill (HER M4909), Collingham (HER M18290), Little Carlton (HER M2964) and Langar (HER M18224).	A small number of now disused Post-Medieval or Modern limestone quarries have been identified from documentary sources – notably at Sutton-in-Ashfield, where documentary study has permitted recognition of a cluster of 19th century quarries and limekilns (HER M17442, M17444, M17745 & M17448).	Clay pits have been identified from documentary, earthwork and cropmark evidence at several sites located on the Sherwood Sandstone, notably in woodland at Clumber Park (HER M4604) and near Worksop (HER M18215) and Clipstone (HER M3997), but references to quarries associated with the extraction of sandstone bedrock have yet to be located.
	Assessment, evaluation and mitigation: desk-based assessment should aim to locate sites of early quarries by examination of the available documentary, cartographic and air photographic/lidar evidence, combined with a walkover survey of the application area. Many old quarries are likely to have been erased by later working, but traces of earlier quarrying should be sought and mapped to enhance our understanding of the development of the quarrying industry and its landscape impact. Any associated remains such as the footings of old quarry buildings or trackways should also be fully recorded as part of the mitigation strategy.		
18.Mills and associated structures	Post-medieval/Modern water-powered mills for flour production and industrial manufacture, including fulling, paper production, textile manufacture and sawn timber, together with associated features such as millponds and dams, are scattered along the Trent and its tributary valleys (e.g. Newark: Salisbury 1983). Extraction in riverside environments should anticipate, therefore, industrial archaeological remains indicative of former mills, ancillary buildings, weirs and other structures, in addition to standing buildings. Wind-powered post-mills, which continued in use into the early post-medieval period, might be represented archaeologically by traces of mill mounds (perhaps with traces of trenches for cross-beams into which the post supporting the sails had been set) or by annular cropmarks preserving traces of a central cross	Documentary, excavation and survey evidence provide evidence of Post-medieval/Modern water-powered mills for flour and industrial production along the river valleys of the Magnesian Limestone escarpment, with a particularly marked concentration in and around Mansfield. Less is known of the distribution of windmills, which are represented principally by buildings evidence not considered in this study.	In common with the Magnesian Limestone, a scatter of Post-Medieval to Modern windmills is known from documentary, excavation and survey evidence: for example, at Kirkby (HER M5307), Cuckney (HER M5369) and Bramcote (HER M595).

	marking the cross-beam trenches (e.g.Cromwell post-mill: HER M8624; compare Table 6.2.7.14). The emphasis shifts during the Post-Medieval and Modern periods towards smock and tower mills that are represented principally by standing buildings, the distribution of archaeological remains thus providing a partial record of their spatial distribution.		
	Assessment, evaluation and mitigation: walkover surveys and searches of air photographic/lidar, documentary, place-name and cartographic records should be conducted to ensure that wherever possible archaeological remains of post-mills and later tower or smock mills are identified in advance of extraction (with particular focus obviously upon areas of high ground providing optimal locations for windmills). Watermills and associated structural remains should be anticipated in appropriate topographic locations, which should be highlighted in desk-based assessments and walkover surveys. Structural remains exposed during extraction should be excavated to establish the character and date of the mill, according to a mitigation strategy agreed with the archaeological curator.		
19.Relics of woodland industries	A wide range of woodland industries, persisting as important components of the rural economy into the early twentieth century, may be deduced from documentary, ecological and archaeological sources. The archaeological evidence includes woodland boundaries, engineered woodland tracks, saw-pits and other physical traces of woodland industries such as charcoal and white-coal (kiln-dried wood) production sites.	A similar range of evidence to that surviving on the Sands and Gravels should be anticipated in this Character Area	The extensive forests that extended across the Sherwood Sandstone provided important woodland resources throughout these periods, and an expansion in aggregates extraction may be expected to impact significantly upon preserved archaeological remains. As in the other Character Areas, we might expect these to include woodland boundaries, engineered woodland tracks, saw-pits and other physical traces of woodland industries such as charcoal and white-coal production.
	Assessment, evaluation and mitigation: desk-based assessments should seek to identify sites associated with woodland industries from documentary, cartographic and air photographic/lidar evidence, while walkover surveys should aim to locate earthworks and other archaeological remains. Well-preserved earthworks are likely to be recommended for preservation *in situ*. For all remaining sites, extraction should be preceded by surveys of surviving woodland boundaries, trackways and industrial remains, geophysical surveys where appropriate to locate buried features and deposits, and evaluation trenching to establish the level of preservation and character of the remains. It should be anticipated that mitigation will involve more extensive excavation of the threatened area of the site, combined with appropriate palaeoenvironmental analysis.		
RECREATIONAL			
20.Decoy ponds and fox coverts	Decoy ponds have been noted in woodland at Bunny (HER M116; possibly HER M125) and along with fox coverts (which have escaped recording in the HER, but could be represented perhaps by small enclosures in woodland) may represent a significantly more widespread landscape resource than can be demonstrated from current HER data.	No examples of either class of monument have been recorded in this Character Area, but as elsewhere examples should be sought particularly in woodlands and parklands associated with gentry recreational activities.	Decoy ponds are noted at Welbeck (HER M6851 & M6852) and Haughton (HER M8712), but again these and other monuments associated with hunting, fishing, etc. may be significantly underrepresented in the HER.
	Assessment, evaluation and mitigation: examples of these structures provide important but largely neglected sources of evidence for gentry leisure pursuits, and should be sought during walkover surveys, particularly of woodland and parkland, and documentary and cartographic research. Preservation *in situ* will be considered for particularly well-preserved remains in view of their landscape interest (and in the case particularly of decoy ponds, their ecological value). Where development is agreed, any disturbance should be preceded by surveys of surviving earthworks, geophysical survey where appropriate, and evaluation trenching to establish the level of preservation and character of the remains prior to developing an appropriate mitigation strategy. It should be anticipated that mitigation will involve further excavation of threatened areas, accompanied by appropriate environmental analysis.		

21.Deer parks	See Gardens and Parks.		
22.Hunting lodges	No definite examples of Post-Medieval or Modern hunting lodges have been recorded so far in this landform zone.	Post-Medieval or Modern hunting lodges are represented currently by a ruined building at Harworth, dated to the 18th and 19th centuries (HER M5582). An earthwork above Pleasley Vale, which has been assigned to the medieval period (HER M5332), would benefit from further investigations to establish its character and date.	Two hunting lodges known from documentary sources, at Bestwood (HER M5261) and Blidworth (HER M2736), have been assigned a medieval to Post-Medieval/Modern date, and more of the High Medieval examples that are scattered widely across the Sherwood Sandstone (Table 6.2.7.16) may have continued in use beyond that period.
	Assessment, evaluation and mitigation. Some hunting lodges will survive as standing buildings, and we focus here upon the assessment, evaluation and mitigation strategies that should be employed for locating and investigating archaeological remains of these. Desk-based assessments should seek to identify surviving sites from place-name, documentary, cartographic and air photographic/lidar evidence, while walkover surveys should locate preserved earthwork remains. Well-preserved earthwork sites may be recommended for preservation *in situ*. Where development is agreed, any disturbance should be preceded by surveys of surviving earthworks, geophysical survey where appropriate to locate buried remains, and evaluation trenching to establish the level of preservation and character of the remains. It should be anticipated that mitigation will involve further excavation of the threatened area of the site, combined with appropriate environmental analysis.		
RELIGIOUS, RITUAL AND FUNERARY			
23.Churches and chapels, including associated graveyards	Archaeological remains of churches and chapels, including traces of building foundations, associated graves and gravestones, may be threatened where located in open country - notably on the sites of deserted or shrunken villages (Table 6.2.8.10). Field chapels and isolated non-conformist chapels in rural areas may also be vulnerable to development.	As Sands and Gravels.	As Sands and Gravels. It should be emphasised, however, that Nonconformist chapels with associated burial grounds are especially characteristic of the Sherwood Sandstone; study of these is highlighted as a key priority in the Research Agenda and Strategy.
	Assessment, evaluation and mitigation*:* as with deserted or shrunken villages, desk-based assessments should seek to identify archaeological remains of chapels, churches and any associated remains from place-name, documentary, cartographic and air photographic/lidar evidence, while walkover surveys should seek to locate any surviving archaeological remains. Well-preserved earthwork sites are likely to be recommended for preservation *in situ*. Where development is agreed, any disturbance should be preceded by surveys of surviving earthworks, geophysical survey where appropriate to locate buried remains, and evaluation trenching to establish the level of preservation and character of the remains in order to devise an appropriate mitigation strategy. It should be anticipated that mitigation will involve extensive excavation of the threatened area of the site, combined with appropriate environmental analysis.		
24.Cemeteries and burial pits unassociated with ecclesiastical structures	Several burials associated with the Battle of Stoke Fields (1487) have been recorded in the vicinity of East Stoke (Bishop 1987). Given the wide area over which the battle was fought, further examples may await discovery in river terrace deposits close to the focus of the battle.	No examples have currently been recorded.	Unpublished excavations at Kilton, Worksop, revealed an inhumation cemetery interpreted as probably a Post-Medieval/Modern gallows cemetery, possibly with earlier origins (HER M6096; see Table 6.2.8.6).
	Assessment, evaluation and mitigation*:* in this and the other Character Areas, burials unassociated with known ecclesiastical structures should be anticipated, although commonly it may not be possible to predict these in advance. These include Nonconformist burial grounds, such as that of the Plymouth Brethren at Carlton in Lindrick (HER M5389), just outside		

	our study area, gallows cemeteries (Table 6.2.8.6), plague pits and grave pits associated with battles and skirmishes. Desk-based assessments a should seek to identify potential sites from documentary and walkover surveys, although sites with no surface evidence of burials may often emerge only during watching briefs conducted during extraction. Where sites are predicted, ground disturbances should be preceded where appropriate by geophysical survey to locate buried remains, with evaluation trenching to establish the level of preservation and character of the remains. It should be anticipated that mitigation will involve excavation of areas preserving burials. Provision should be made for excavation and full recording of any human remains disturbed during extraction, including appropriate scientific analysis and dating.		
TRANSPORT			
25.Bridges	Numerous Post-medieval or Modern bridges survive in this Character Area, particularly along the Trent and Idle and in the Vale of Belvoir, although close dating may be difficult. Many survive in use today, but any that are no longer extant may preserve archaeological evidence for their construction or for earlier structures that would merit recording if threatened by development.	Bridges of Post-Medieval or Modern construction are distributed widely across this Character Area, although less densely than on the Sands and Gravels. Again, any structures that no longer survive may preserve useful archaeological evidence for their construction or for earlier structures that similarly would merit recording if threatened by development.	Bridges of this period survive in a variety of forms, including a packhorse bridge across the Meden (HER M17751) and bridges designed as components of parkland landscapes (e.g. Clumber Bridge: HER M4595). As elsewhere, any structures which do not remain in use today may preserve valuable archaeological evidence for their construction and/or for earlier phases of building work construction that would merit recording if threatened by development.
	Assessment, evaluation and mitigation: desk-based assessments should seek to identify potential bridge sites from documentary, cartographic and air photographic/lidar evidence, while walkover surveys should investigate whether structural remains might survive (e.g. in riverbanks). Particular emphasis should be placed upon the identification of palaeochannels with the potential for crossing points and associated structural remains. Timber or stone bridges might be buried in redeposited sand and gravel deposits, as at Hemington in Leicestershire (Ripper and Cooper 2009), and a continuous watching brief may provide a suitable approach to mitigation (with provision for full excavation, environmental sampling and analysis, and radiocarbon or dendrochronological dating of associated timbers). Well-preserved bridges, particularly those surviving in waterlogged environments, will involve significant costs (both for excavation and for sampling and analysis of associated environmental remains) and hence every effort should be made to identify high-risk locations during the assessment stage.		
26.Former roads and tracks, including turnpikes, packhorse tracks and associated roadside furniture	Roads or tracks no longer in use are rarely identified in the HER, but are likely to be represented abundantly in cropmark plots (e.g. South Muskham: HER M18282), as elements of deserted or shrunken villages, and as earthworks in woodland or pasture. Dating is problematic, and it is difficult to disentangle former medieval, Post-Medieval and Modern roads. Roadside furniture may also survive, as shown by the discovery of milestones near East Leake (HER M216 & M235). Many milestones in this and the other Character Areas were buried next to their original location during the Second World War, and as they appear not to have been recovered may be revealed during development.	None has been noted in the HER. However, as noted for the other Character Areas, archaeological evidence for roads and tracks that are no longer in use and associated remains such as milestones might survive in a wide variety of locations.	The HER notes two medieval or later roads preserved as linear earthworks in Thieves Wood near Sutton in Ashfield (HER M2559 & M2575) and traces of a packhorse track and bridge crossing the Meden (HER M17750), but archaeological evidence, particularly in wood and parkland landscapes, may be more extensive. Roadside furniture may also survive, as shown by the discovery of milestones around Babworth (HER M4500 & M4501) and Warsop (HER M4057 & M4058).
	Assessment, evaluation and mitigation: historic maps provide an important source of evidence for former roads and tracks and should be investigated, together with aerial photographs, lidar plots and relevant documentary sources, during desk-based assessments. Walkover surveys, particularly in woodland and parkland, may also recover evidence for roads and tracks that are no longer in use and for associated roadside furniture. Provision should be made for targeted excavations of tracks and roads to elucidate their character and to establish whether they seal buried soils with potential for the preservation of significant palaeoenvironmental remains.		

27.Ferries and fords	Documentary evidence for ferries is available for several locations along the Trent (e.g. Gunthorpe: HER M5472; Farndon: HER M3554), some possibly with archaeological traces of associated riverside structures. A post-medieval ford is documented at Averham (HER M5671).	No examples of ferries or fords have been recorded in the HER, but undocumented examples should be sought during assessment and subsequent work.	Fords are occasionally documented, notably across the Meden and Maun (HER M7464 & M18361). Further examples should be sought during assessment and subsequent work.
	Assessment, evaluation and mitigation: examples of ferries or fords and of associated structural remains might emerge from studies of relevant documentary, place-name and cartographic sources during desk-based assessments and during field surveys focusing upon the identification of structural remains visible in riverbanks. A continuous watching brief may provide a suitable approach to mitigation (with provision for full excavation and recording if remains are revealed during extraction). Investigations of waterlogged environments may yield deposits with significant palaeoenvironmental potential, and provision should be made for environmental sampling and associated scientific dating.		
WATER SUPPLY AND DRAINAGE			
28.Dams and other water-control features.	Water control features such as dams (including an important cluster of Civil War dams around Newark), weirs, bankside revetments and flood banks are well represented along the Trent and may be disturbed during extraction in riverine areas. The wide alluvial expanses of the lower Trent, from the extreme north of the County into the Humber Wetlands preserve an especially rich variety of features relating to drainage from Post-Medieval times, described in detail in publications springing from the Humber Wetlands Survey (Van de Noort 2004, 154–63).	No traces of dams or other water-.control features have been recorded so far in the HER but, as in the other ACAs, examples should be anticipated – particularly in floodplain and parkland environments such as that at Shireoaks.	Several dams, some created during the design of parkland landscapes (e.g. Clumber Park Cascade: HER M4566; Snake Pond, Rufford: HER M18349), may be recognised along minor streams crossing the Sherwood Sandstone (e.g. Rainworth Water) in association with floodplain landforms. These may be underrepresented in the HER, which would benefit from further surveys of the water-control features surviving in parkland landscapes.
	Assessment, evaluation and mitigation: assessments should identify from documentary study or field survey sites that might preserve vestiges of dams, bankside revetments and other water management features. Assessments of former wetlands should ensure compilation of a full record of the drains and other landscape features associated with Post-Medieval and Modern drainage. Unexpected discoveries of riverine structures, such as bankside timber revetments should be anticipated, and provision made for a continuous watching brief during ground disturbances that might reveal significant structural remains. Appropriate provision will need to be made for the excavation of any structural remains recorded during archaeological monitoring of extraction, with due regard to the likelihood of multiple structural phases. Investigations of waterlogged environments may yield deposits with significant palaeoenvironmental potential, and appropriate provision should be made for sampling, analysis and scientific dating.		
29.Wells	Wells of these periods, sometimes in combination with well houses and/or other structures, survive in some rural locations that could be affected by aggregates extraction (e.g. Thurgarton: HER M17599) but are underrepresented in the HER. Dating is often problematic, and many recent wells may have originated in medieval times.	Robin Hood's Well at Greasley (HER M2336) has been assigned a broad date range encompassing the medieval to Modern periods, but no other examples of Post-Medieval or Modern date are noted in the HER.	A scatter of Post-Medieval or Modern wells has been recorded, including examples at Worksop (HER M18338) and Farnsfield (HER M5932; M5933), plus a thin spread of wells dated broadly from the High Medieval to Modern periods (including examples in parkland at Newstead and woodland at Blidworth: HER M2688 & M5317).
	Assessment, evaluation and mitigation: examples should be sought during walkover surveys and searches pf documentary, place-name and cartographic sources, and should be recorded fully prior to destruction. Post-Medieval or Modern wells may have earlier origins and should be dismantled carefully with this in mind. Appropriate provision should be made for sampling and analysis of associated environmental remains, bearing in mind that wells might yield waterlogged deposits with excellent preservation of organic remains.		

6.3 PERIOD SYNTHESES

A detailed assessment of the archaeological resource of each of the County's aggregates-producing areas, together with supporting references, has been provided in Sections 6.1 and 6.2 above. In this section, we provide a concise summary of this resource and highlight the principal interest of areas accessible for aggregates extraction as sources for studies of Nottinghamshire's past.

Variations in site frequencies and densities between each Aggregate Character Area are summarised in Tables 6.1.1–6.1.2 and Figs 9–11, employing the definition of 'site' as either (a) a Monument or (b) an Element that cannot be linked to a Monument type (Section 4.4). Many Monuments and Elements occur in close proximity to one another, and hence not all sites may be distinguished individually in the computer-generated maps that are included in this document.

Within each Aggregate Character Area, attention has been focused firmly upon the archaeological resource of areas that are potentially available for aggregates extraction. This tight focus has required consideration of the full range of known monument types for the prehistoric and Roman periods, as examples of each occur in areas that are potentially available for quarrying. For the Early Medieval to Modern periods, attention has been focused upon a more restricted range of evidence, excluding from analysis monument types that occur exclusively outside potential aggregates extraction areas (for example, in established urban areas). This approach is reflected in the discussion below, which comprises concise syntheses of the prehistoric and Roman periods and for the Early Medieval to Modern periods summaries of the key monument types that may reasonably be investigated by reference to the archaeological remains surviving in areas suitable for aggregates extraction.

6.3.1 PALAEOLITHIC: *c*.950/850,000 years ago to *c*.9500 cal BC

Recent discoveries in East Anglia have provided convincing evidence for hominin activity from as early perhaps as *c*.950,000 years ago (Parfitt *et al* 2010; Parfitt, Ashton and Lewis 2010), but in Nottinghamshire hunter-gatherer settlement cannot yet be traced to such an ancient period. Two cores and a hard-hammer flake, all heavily rolled and made from fine-grained quartzite cobbles, were recovered from sands and gravels during Trent Valley Palaeolithic Project fieldwork at East Leake (Bridgland et al eds 2014, 271–3; fig.5.16; plate 13). It was suggested originally that the deposits from which they derived might represent a very early (MIS12) terrace of the Trent, but more recent assessment suggests that the formation from which they were recovered most likely represents a downstream continuation of the Knighton Terrace deposits associated with the Soar, probably dating from MIS 8 (Table 6.2.1: Period 1; Bridgland et al eds 2014, 88–90, 271–3, 288). These and other finds of Lower Palaeolithic stone artefacts in the river terraces of Nottinghamshire, even though heavily rolled and redeposited, are nonetheless of outstanding importance for unravelling the history of early hominin activity in the County. Particular attention may be drawn in this respect to the significant quantities of heavily rolled flint and quartzite handaxes, flakes and cores from MIS 5d–2 Beeston Terrace deposits (Howard and Knight 2004a, 17; Bridgland et al eds 2014, 267–71, Plate 2), including rare pieces identified as of Levallois technique. Their very abraded condition may imply redeposition from earlier periods, but further precision in dating is currently not possible.

The terrace gravels are also notable for the preservation on the Late Devensian Holme Pierrepont Terrace at Farndon Fields near Newark of at least one nationally important *in situ* Late Upper Palaeolithic campsite (Table 6.2.1: period 5b). Analysis of the lithic artefacts from this site, which was discovered during fieldwalking prior to dualling of the Fosse Way to the south-west of Newark, suggests that hunter-gatherers may have migrated between the Trent Valley and cave sites in the Magnesian Limestone, notably those at Creswell Crags (e.g. Garton 2009). These groups may be assumed to have ranged over the intervening Sherwood Sandstone, and hence the discovery provides rare evidence not only for *in situ* activity foci but also for the possible routes of movement of hunter-gatherer communities. Other surface finds of Upper Palaeolithic lithic artefacts were recorded during the same fieldwalking campaign and indicate dispersed activity across the river terraces and beyond. The key role of fieldwalking as a prospection technique for Palaeolithic material is illustrated by Map 6, which shows clearly the linear pattern of Palaeolithic finds recorded to the southwest of Newark during fieldwalking prior to dualling of the A46 (Fosse Way).

The evidence from the Sands and Gravels is complemented by discoveries in the caves and rock shelters of the Magnesian Limestone escarpment of lithic, faunal and other remains that may be dated as far back as the Mousterian period (from as early perhaps as *c.*50,000 years ago; Table 6.2.1: Period 4). Particularly extensive evidence for Late Upper Palaeolithic activity has been obtained from Creswell Crags, including lithic artefacts, extensive faunal remains and the only known parietal cave art in Britain. The discoveries at Creswell are of international importance, and along with finds from other limestone caves and rare surface finds of Late Upper

Palaeolithic lithic artefacts emphasise the particular significance of this landform for studies of early hominin activity. Further examples of caves may survive beneath talus or other slope deposits, as demonstrated by discoveries at Creswell Crags in Church Hole, and identification of these should be regarded as a high priority.

The Sherwood Sandstone, by contrast, has so far yielded little evidence that might indicate Palaeolithic activity. Rare references to Palaeolithic finds are contained in the HER, but re-examination of these by a Palaeolithic finds specialist is recommended to check this attribution and to refine the dating. It seems likely, despite the current paucity of data, that the Sherwood Sandstone would have been traversed by Palaeolithic hunter-gatherers moving between the Magnesian Limestone escarpment and the Trent, possibly along the main river valleys. To test this hypothesis, we would recommend re-examination during assessment of lithic artefact collections, followed by the targeting of colluvial and other masking deposits in valley bottoms to establish whether traces of early activity might be preserved beneath or interstratified with these.

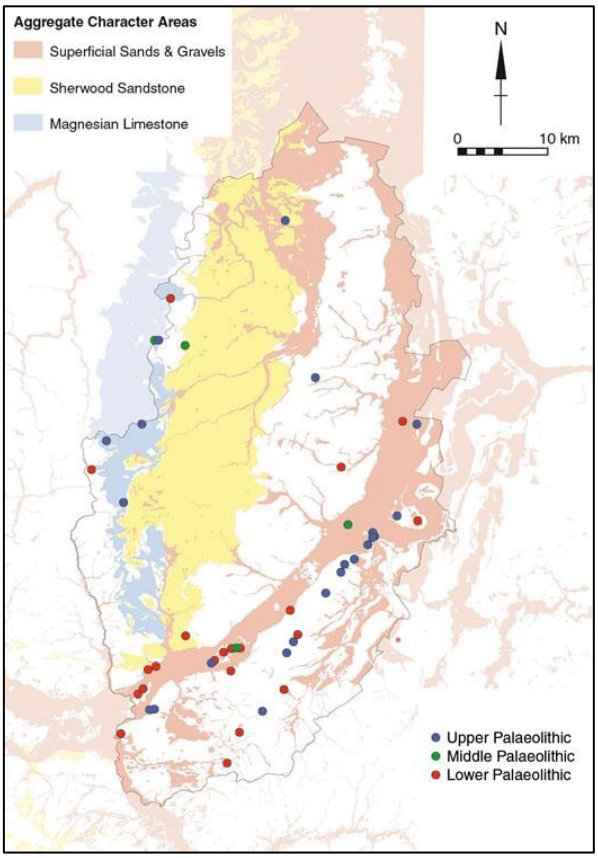

Fig.16. Distribution of Palaeolithic sites.
Source: Nottinghamshire HER

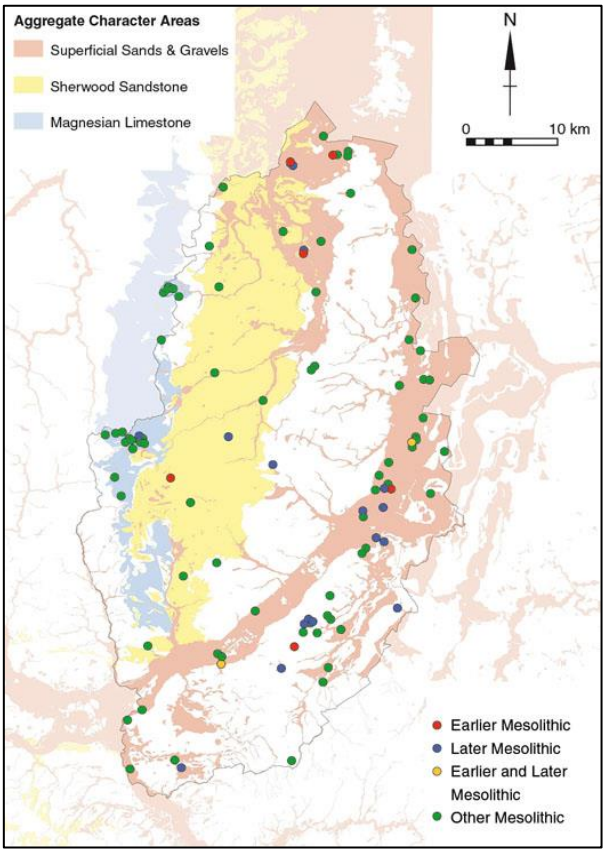

Fig.17. Distribution of Mesolithic sites.
Source: Nottinghamshire HER

6.3.2 MESOLITHIC: *c.*9500 cal BC – *c.*4000 cal BC

Mesolithic sites, which have been distinguished principally on the basis of typologically diagnostic lithic artefacts, are thinly scattered over Nottinghamshire (0.02 sites per km²; Table 6.1.2; figs 10–11), but by comparison with the Palaeolithic are more evenly distributed across the Aggregate Character Areas (Map 7). A particularly sparse scatter of diagnostic lithic artefacts is indicated across the Sherwood Sandstone, which in an area focused upon the catchments of the Rivers Meden, Ryton and Idle was shown by fieldwalking to preserve virtually no evidence of Mesolithic activity (Garton 2007, 22-24). This is in sharp contrast to areas walked by the same methods in the Sands and Gravels and across the Magnesian Limestone escarpment. Further fieldwalking to investigate these intra-regional contrasts is recommended, but on current evidence there is a suggestion of a genuinely lower density of Mesolithic activity across at least parts of the Sherwood Sandstone. The distribution of lithic artefacts across the other Character Areas is distorted by variations in the intensity of fieldwalking, but significantly higher densities of material may be discerned in the few areas that have been systematically fieldwalked (notably in the Trent Valley around South Muskham and on the Magnesian Limestone at Elmton in neighbouring Derbyshire). The current distribution pattern must be interpreted cautiously, but at the very least it provides evidence for the utilisation of resources across a wide range of environmental zones. There is for the County as a whole a higher representation of sites attributed to

the Later Mesolithic, although many of the sites recorded in the HER have not been differentiated by period. This contrast might relate in part to rising population levels, but interpretation is frustrated by the significantly greater duration of the Later Mesolithic, observed trends towards greater group mobility (and hence site density) and of course the problem of dating sites closely on the basis of artefact typology.

Sites of both the Earlier and Later Mesolithic are represented principally by surface lithic scatters indicating open-air activity foci, but as in Derbyshire caves and rock shelters along the Magnesian Limestone escarpment appear to have remained favoured locations for some communities. Further examples of caves may survive beneath talus and other slope deposits, and identification of buried sites should be regarded as a priority. In addition, rare evidence from the Sands and Gravels for pits yielding Mesolithic material emphasises the need to search for structures associated with open-air sites. Finds of Mesolithic organic material in palaeochannels, including the discovery at Staythorpe of a human female femur, cut antler and animal bones, stress the potential of these landforms for the survival of remains that may elucidate the Mesolithic economy and society and the changing environment. Discoveries of sites in wetland environments and on terrace-edge sites dipping beneath floodplain alluvium, including Misterton in the north Nottinghamshire carrs and Collingham in the Trent Valley, emphasise the potential of other landforms for the preservation of organic remains complementing those surviving in caves and beneath slope deposits. There is also significant potential for the preservation of sites beneath reworked coversands, notably around Girton and Tiln in the lower Trent Valley, and location and investigation of these may be flagged as another key priority.

Fig.18. Female femur from Staythorpe, dated to 5740-5620 cal BC (Beta-14401; 95% probability). Stable isotope analysis revealed a reliance upon animal protein and no influence of coastal food resources, highlighting the potential of this technique for furthering our understanding of Mesolithic diet (Table 8.2: Research Objective 2D). © University of Sheffield

6.3.3 NEOLITHIC TO MIDDLE BRONZE AGE (*c.*4000 cal BC – *c.*1150 cal BC)

HER data indicate only a modest increase in site densities in the three Aggregate Character Areas between the Mesolithic (47 sites; 0.03 per km²) and Neolithic (71 sites; 0.05 per km²), with seemingly no significant differentiation between the Character Areas, but a significant jump from the Neolithic to the Bronze Age (527 sites; 0.38 per km²; Table 6.1.2; Figs 10–11), especially on the Magnesian Limestone. The evidence is dominated by lithic scatters and single finds, including polished stone axes and axe-hammers. Few of these finds have been examined by lithic artefact specialists, and further study is recommended to test the validity of these distributions and to tease out subtler patterning between, for example, the earlier and later Neolithic. There is also the difficult problem of determining how many lithic finds scatters or findspots might derive in part or wholly from post-Bronze Age activity. These problems cannot be resolved on the basis of current evidence, and for the purpose of this study we have grouped ‘Neolithic’ and ‘Bronze Age’ collections together. In the longer term, we recommend the systematic re-examination of extant collections by appropriately trained lithic artefact specialists and, from the perspective of this document, specialist examination of extant lithic finds during assessment to establish their character and potential date range.

Taking HER data for the Neolithic and Bronze Age together, the record of lithic surface finds shows a pronounced but predictable bias towards intensively fieldwalked areas, including the Magnesian Limestone

around Mansfield and Shireoaks and the Sands and Gravels of the Trent Valley to the north of Newark (Garton 2002). As in the Mesolithic, the Sherwood Sandstone emerges as an island of comparatively sparse finds, represented in the HER principally by widely scattered findspots. Systematic walking of the brickwork-plan field systems of the Sherwood Sandstone by Daryl Garton (2007, 22–4) revealed a similar pattern of sparse single finds and no finds clusters, which might indicate that activity foci of these periods were genuinely less dense across at least some parts of this landform. Notable contrasts in the densities of lithic finds may also be discerned between areas on the Magnesian Limestone and Sands and Gravels, with significantly higher densities of Neolithic or Bronze Age lithic artefacts recorded on the Limestone. This contrast may reflect in part variations in the intensity of fieldwalking. However, comparison of the results of systematic fieldwalking employing comparable methodologies on the Magnesian Limestone around Elmton in Derbyshire (Knight *et al* 1998) and on the Sands and Gravels near Newark (around South Muskham and along the Fosse Way: Garton 2002, 27) suggests that these patterns might reflect real variations in the density of activity. Interpretation is problematic, not least because of uncertainties regarding dating, but the possibility of real differences in land-use and settlement patterns between landforms should be tested by further fieldwork.

No obvious temporal increases in the density of activity may be discerned from consideration of the lithic artefact distributions generated from HER records, but analysis of the results of several systematic surveys of the Aggregate Character Areas suggests that this may have increased quite significantly from the earlier Neolithic. This may be postulated on the river terraces of South Muskham in the lower Trent Valley (*ibid.,* 26–27, fig. 5) and along the Fosse Way where it traverses the Trent terraces to the south-west of Newark (Kinsley and Knight 1992, 43–44, fig.38). Away from the river valleys, a similar trend towards higher levels of activity has been suggested on the Magnesian Limestone escarpment during fieldwalking in Elmton parish (Knight *et al* 1998). Fieldwalking by Daryl Garton (2007, 25) on the Sherwood Sandstone has also revealed a preponderance of Late Neolithic and Early Bronze Age artefacts, although the quantities of artefacts recovered are too small for firm conclusions on variations in settlement density to be drawn.

The lithic record for this period is augmented by rare discoveries of Bronze Age metalwork hoards and by scattered finds of Early to Late Bronze Age metalwork. Single finds of metalwork have been obtained mainly from riverine and other watery contexts, most notably along the Trent. However, although especially common across the Sands and Gravels, scattered metalwork finds in river valley and other locations across the other ACAs suggest that structured deposition of metalwork was a common theme across the County.

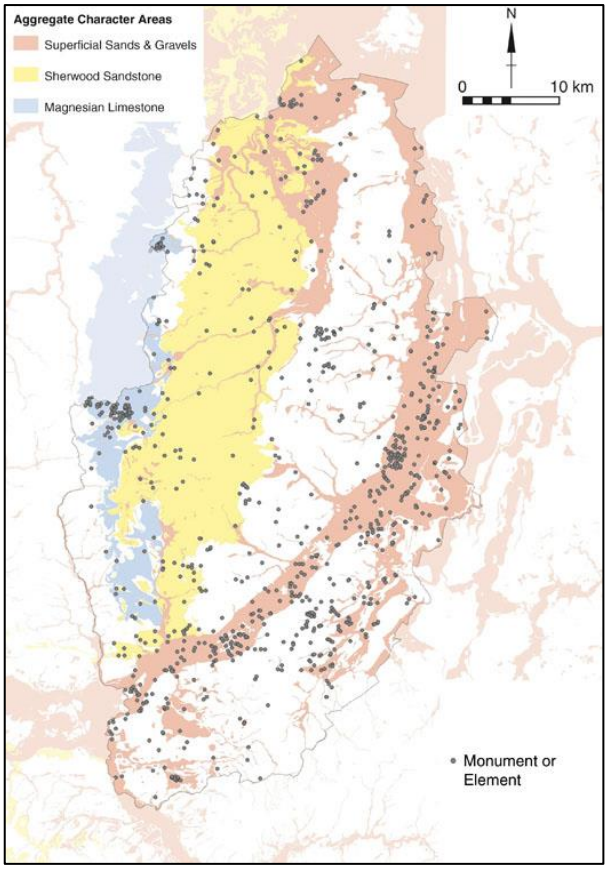

Fig.19 Neolithic and Bronze Age Monuments and Elements. Source: Nottinghamshire HER

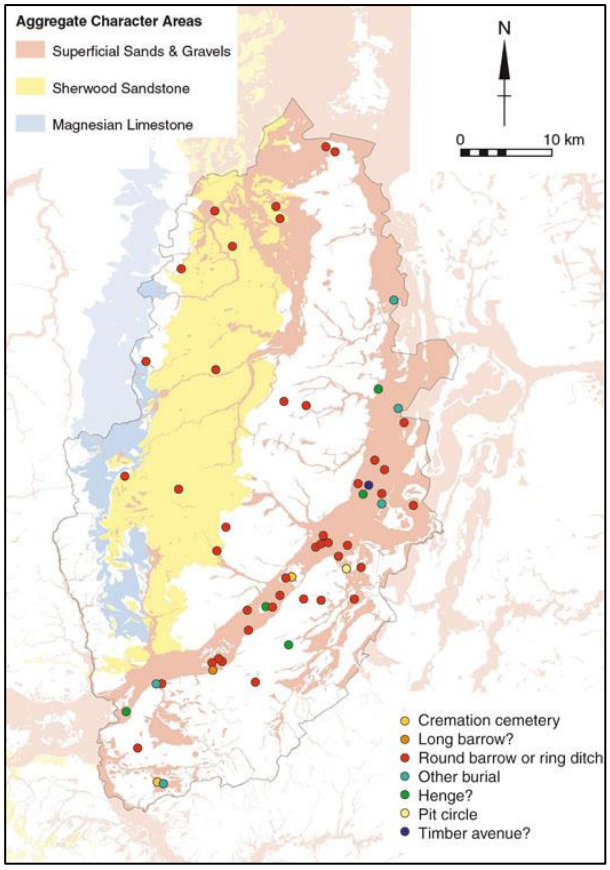

Fig.20 Neolithic and Bronze Age funerary and ceremonial sites. Source: Nottinghamshire HER

Further contrasts between the Character Areas are indicated by the greater range and variety of monuments across the Sands and Gravels. This is particularly noticeable in the Trent Valley, which has yielded evidence for a thin scatter of settlements preserving structural remains, together with early burnt mounds and a broad range of ritual and funerary monuments (including round and possibly long barrows, flat-grave cremation cemeteries, henges, pit circles and possibly timber avenues). Ring-ditches, many of which may signify denuded barrows or have defined open arenas for burial and ceremonial activities, are particularly well represented on the Sands and Gravels, including a nationally rare early Neolithic example at Great Briggs, near Holme Pierrepont. Further funerary or ceremonial locations may be indicated by the aforementioned discoveries of Bronze Age weaponry and other artefacts in watery contexts, particularly along the Trent, and at Langford by a remarkable deposit of human skulls and animal bones in a palaeochannel. With the exception of a thin scatter of possible barrows and other burials, such monuments are conspicuous by their absence from the other Character Areas, even though the sandstone and limestone geologies are eminently suitable for cropmark formation. Discoveries on the Derbyshire Magnesian Limestone, notably of an Early Neolithic long cairn during quarrying at Whitwell, suggest that a broader range of funerary or ceremonial monuments might await discovery across this landform, while some of Nottinghamshire's limestone caves might also have performed funerary or domestic functions (as, for example, at Creswell Crags). However, there is currently a suggestion of real differences in the Neolithic and Bronze Age record of Nottinghamshire between the Sands and Gravels and the other Character Areas.

6.3.4 LATE BRONZE AGE AND IRON AGE (*c.*1150 cal BC – AD 43)

HER data suggest a significant decrease in the density of sites in all Character Areas during the first millennium BC, from 527 (0.38 per km²) in the Bronze Age to a mere 102 (0.07 per km²) in the Iron Age (Table 6.1.2; Figs 10–11). This is particularly at odds with the evidence of excavation on the river terraces, which has demonstrated a high density of Iron Age settlements at extensively excavated quarries such as Hoveringham. It may, however, owe much to the poor representation of pottery and other artefacts that may be dated securely to the first millennium BC in fieldwalking collections and the emphasis in the Neolithic and Bronze Age record upon highly durable lithic scatters and single finds (an unknown proportion of which could in fact relate to Iron Age activity). This contrast in site densities should not be seen, therefore, as necessarily an indicator of reduced activity, but rather as testimony to the limitations of the available archaeological data.

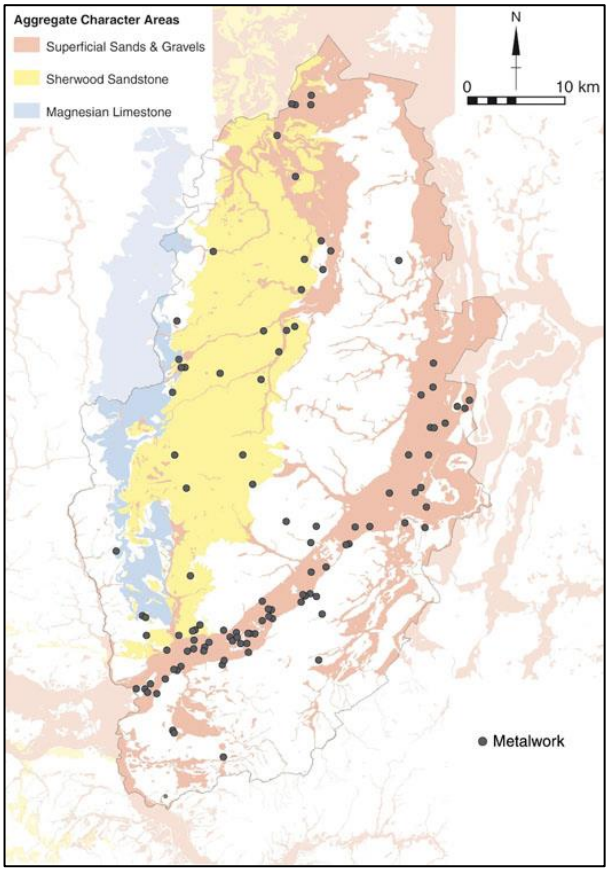

Fig. 21. Bronze Age metalwork: artefacts continued to be deposited, particularly in watery contexts, throughout the Bronze Age and into the Iron Age.

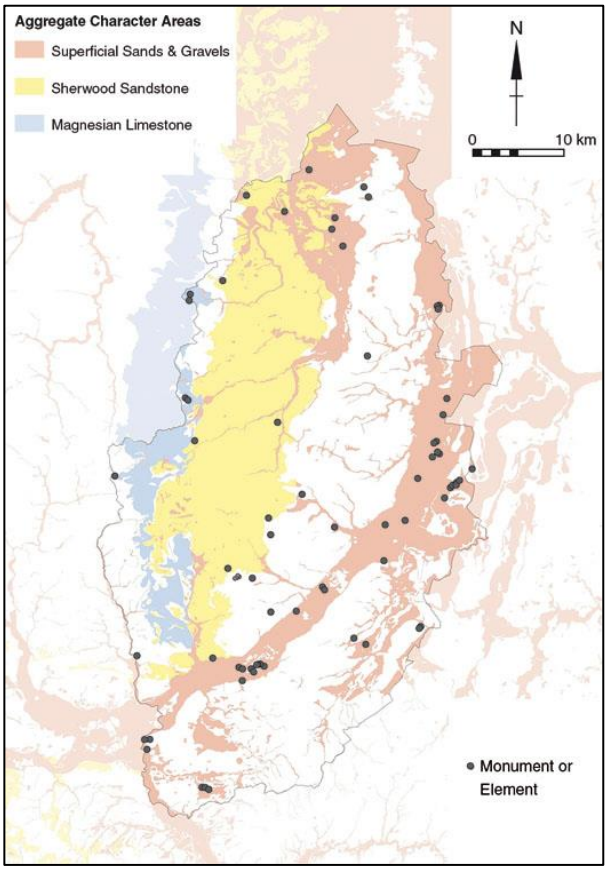

Fig.22 Distribution of Iron Age Monuments and Elements. Source: Notts. HER

By contrast with the Neolithic and earlier Bronze Age, the emphasis in the archaeological record of the Late Bronze Age and Iron Age lies firmly upon domestic rather than funerary and ceremonial sites. Burial monuments that may be dated with confidence to the first millennium BC are currently conspicuous by their absence, with the possible exception of rare groups of square-ditched enclosures that may be related to the funerary enclosures that in Yorkshire demarcate barrows of the Arras tradition (Fig. 3). Discoveries of human bones and articulated or disarticulated animal skeletons may be expected in pits or in liminal features such as enclosure ditches, by analogy with other East Midlands sites, but currently the only securely dated examples from Nottinghamshire may be attributed to the Roman period. Evidence for burials may also be provided by some of the Late Bronze Age and Iron Age bronze weapons and other artefacts that have been retrieved from riverine and other watery contexts, notably along the Trent, while it is possible that some limestone caves might have continued to serve as foci for burial or other ritual activities (see also Section 6.3.4).

Fig.23. Palaeochannel landforms adjacent to the River Trent near North Muskham, showing clearly as dark bands of moisture-retentive alluvium. The sands and gravels into which the channels were cut preserve extensive cropmarks, including a cluster of subsquare ditched enclosures that by comparison with monuments in eastern Yorkshire may have demarcated Iron Age funerary barrows. © English Heritage (Derrick Riley Collection: DNR 427/31)

Evidence for first millennium BC settlement is far more extensive, particularly across the river terraces of the Trent and its major tributaries. Much of this evidence derives from large-scale excavations conducted in advance of quarrying, and in essence demonstrates a transition during the course of the first millennium BC from a landscape of open to enclosed settlements. These sites are characterised by wide and seemingly random scatters of pits, post-holes and occasionally roundhouses, as demonstrated at Hoveringham Quarry. There is no observable typological differentiation between these settlements, but the discovery during quarrying at Girton of an Early Iron Age midden stratified beneath blown sand and of burnt mounds that might have continued in use into the early first millennium BC hints at greater complexity. As far as can be established, these unenclosed settlements were not linked to systems of fields or linear boundaries, suggesting perhaps that during this period there was comparatively little pressure upon land resources. From the mid-first millennium BC, however, we see the beginnings of significant changes in the organisation of settlements and the wider landscape. Habitation areas were increasingly enclosed, generally by a rectilinear ditched enclosure with flanking banks, and may have incorporated other enclosures that could have performed specialised roles associated with activities such as the corralling of stock.

Fig.24. Hoveringham Quarry: multi-phase Iron Age roundhouse, showing two phases of bedding trench and a later post-hole ring. © Trent & Peak Archaeology, on behalf of Tarmac

No examples of hillforts or analogous defended enclosures have been recorded on the Sands and Gravels, with the possible exception of a site at Aslockton in the Vale of Belvoir that could represent a large defended enclosure associated with a population group beyond the level of an extended family unit. There are hints also that some Late Iron Age enclosures may have formed parts of larger agglomerated settlements, as perhaps at Brough and Rampton. These could signify the growth in the Late Iron Age of sizeable communities and may anticipate the nucleated rural settlements that developed during the Roman period.

The development of enclosures across the Sands and Gravels appears to have been linked in some areas to the growth of linear ditched boundaries and pit alignments, which may have divided blocks of land farmed by individual communities, and of field systems. The mechanisms underlying this process remain unclear, but links have been suggested with increasing pressure upon land resources, possibly in the face of rising population levels, and the need to maximise use of the available resources (Knight and Howard 2004b, 91–3). Fields would have increased the stocking capacity of the available land, and along with other changes of the period, such as the development of crops that could be sown in both the autumn and spring, the construction of ponds and wells, and an expansion of salt production, would have permitted a more intensive farming regime. These developments may have culminated in parts of the Trent Valley with the development of extensive coaxial field systems, comprising blocks of rectilinear fields linked to trackways and pit alignments. These systems are principally a feature of the Roman landscape, but their origins may lie in the Late Iron Age.

Considerably less is known about the development of Late Bronze Age and Iron Age settlement on the Magnesian Limestone and Sherwood Sandstone, and the location and characterisation of settlements in these areas remains a key priority. A stone-built enclosure at Scratta Wood near Worksop provides a valuable insight into Iron Age settlement on the Magnesian Limestone, but otherwise we can point only to rare earthworks or cropmarks that might signify settlement of this period, including perhaps a possible hillfort at Strawberry Bank near Sutton-in-Ashfield. It is also possible that domestic activity of some kind might have continued in some of the many caves and rock shelters that flank the deep gorges incised into the plateau surface (Table 6.2.3.4). Hillforts or related sites might also have extended to the Sherwood Sandstone, as suggested by the possible ‘marsh fort’ that has been identified in alluvial farmland at Crow Wood near Styrrup in the extreme north of the County. Otherwise, however, undoubted evidence for Iron Age settlement in this Character Area is restricted at present to a small number of Roman ditched enclosures such as Dunston’s Clump that on the basis of associated finds may be argued to have originated in the Late Iron Age. The brickwork-plan field systems that characterise the Roman period across the Sherwood Sandstone might also have pre-Conquest origins, in common with the coaxial field systems of the Lower Trent Valley, and determination of the chronology of these field systems must be regarded as key priority for future research in Nottinghamshire.

Fig.25. The value of aerial photography on the Superficial Sands and Gravels is emphasised by the remarkable clarity of the cropmarks revealed in this view of the Trent Valley near North Muskham. The photograph shows a complex of rectilinear ditched enclosures and trackways dating probably from the late prehistoric and Roman periods, including a double pit alignment leading westwards from the River Trent (bottom) to beyond the A1 dual carriageway. © English Heritage (Derrick Riley Collection: DNR 847/24)

6.3.5 THE ROMAN PERIOD (AD43 – *c.*410)

The Roman period saw a significant increase in the density and variety of known sites in each of the Character Areas, with an increase for all areas from 102 (0.07 per km²) in the Iron Age to 323 (0.24 per km²) in the Roman period (Table 6.1.2; Figs 10–11). Similar densities of sites have been recorded on the Sands and Gravels (0.32 per km²) and the Magnesian Limestone (0.31 per km²), but the density of recorded sites on the Sherwood Sandstone (0.13 per km²) is surprisingly low given that large tracts of the Sandstone preserve relics of extensive systems of brickwork-plan fields and enclosures that seem to have developed principally in the Roman period (Garton 2008). The density figures may reflect in large part variations in the intensity of fieldwalking and the uneven spread of sites investigated intensively in advance of quarrying, and it is anticipated that the contrast between the Sherwood Sandstone and the other Character Areas will be reduced

when the results of recent fieldwalking of the brickwork-plan fields in an area focused upon the catchments of the Rivers Meden, Ryton and Idle (Garton 2008) are fully integrated into the HER.

The Roman Conquest spurred the development of an elaborate road network, indicated in this region by several major roads such as the Fosse Way and by a number of lesser roads. These provided the framework for a system of early forts extending along the south-eastern edge of the Trent Valley, including several examples constructed on the Trent river terraces, and north-westwards into Brigantia. Some of these Trent Valley forts, such as *Ad Pontem* near Thorpe, provided the impetus for the development of small towns, while others, such as a marching camp at Holme on a raised 'island' in the Trent floodplain downstream of Newark, were occupied temporarily prior to abandonment. North-west of the Trent, examples have been recorded from air photographic and other evidence on both the Sherwood Sandstone, at Farnsfield, Calverton and Warsop, and the Magnesian Limestone, at Broxtowe. It is conceivable too that some earlier hillforts and analogous defended sites might have continued in use alongside these Roman forts, although currently only the enigmatic site at Aslockton in the Vale of Belvoir has yielded conclusive evidence for Roman as well as Iron Age activity.

The Roman period also saw significant developments in the pattern of rural settlement and the organisation of the agrarian landscape, both of which seem to have varied quite significantly between Character Areas. Compelling evidence is available for the development on the Sands and Gravels of a hierarchy of small rural settlements (mainly enclosed farmsteads), larger nucleated villages, villas and towns, but the settlement patterns on the Sherwood Sandstone and Magnesian Limestone suggest a very different social and economic framework. Towns are absent from both of these areas, while only the Limestone has yielded evidence for villas (at Mansfield Woodhouse and, conceivably, at the site of a hypocaust near Broxtowe in Nottingham). In both of these Character Areas, the emphasis lies firmly upon small, generally rectilinear enclosures demarcated by ditches or, on the Magnesian Limestone, sometimes by stone walls (as at Scratta Wood near Worksop). Such sites recall strongly their Iron Age antecedents, and in view of the limited material evidence for social or economic differentiation between settlements may signal fundamental social and economic contrasts between settlements located in these areas and the more Romanised Trent Valley.

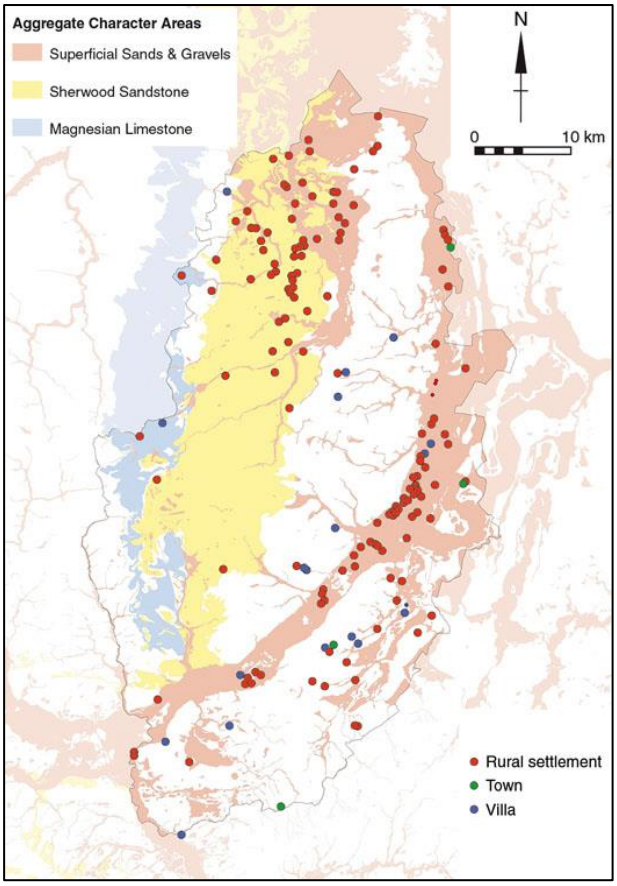

Fig.26. Distribution of Roman rural settlements, towns and villas. Source: Notts HER

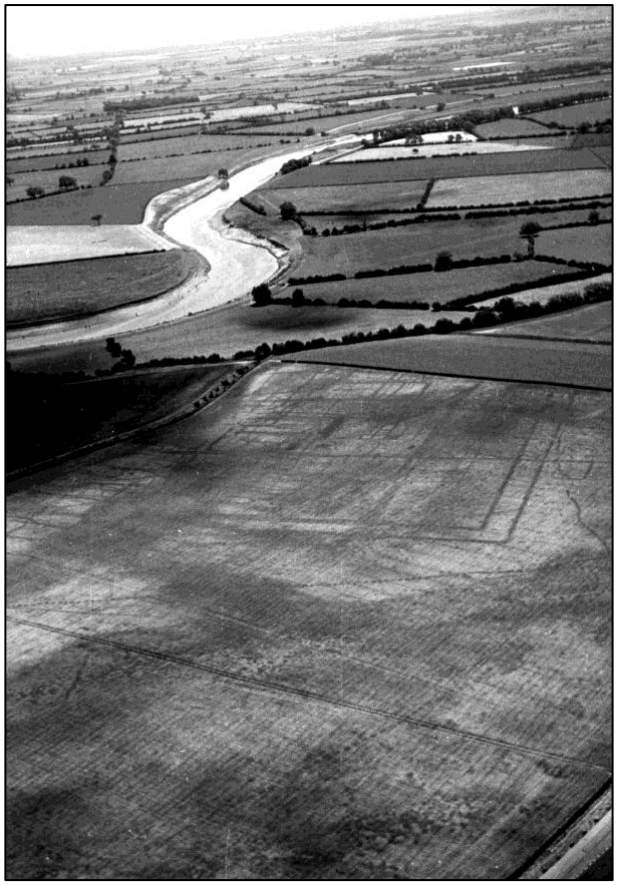

Fig.27. Cromwell: villa building in the centre of a double-ditched enclosure on a terrace of the Trent. © English Heritage (Derrick Riley Collection: DNR 426/23)

Further evidence for spatial variability is provided by studies of the organisation of the agrarian landscape. Both the Sherwood Sandstone and parts of the Trent Valley see the development of coaxial field systems, possibly developing from Iron Age roots. These comprise groups of rectilinear fields, integrated with ditched trackways and predominantly rectilinear ditched enclosures for habitation, stock, intensive horticulture or other purposes. There are some significant morphological differences between the field systems recorded in these Character Areas. For example, pit alignments, which are common in the Trent Valley, are seemingly absent from the Sherwood Sandstone, while none of the Trent Valley fields exhibit the classic elongated 'brickwork' plans of their Sherwood Sandstone counterparts. We may also postulate significant functional variations, with perhaps a higher emphasis upon arable in the Trent Valley and a greater focus upon pasture, particularly for sheep, on the Sherwood Sandstone. Comparable systems appear to be absent from the Magnesian Limestone, despite the suitability of this geology for cropmark formation, and there is a real possibility, therefore, of significant variations in land-use patterns between the Aggregate Character Areas that merit further investigation.

Fig.28. Aerial view of the Sherwood Sandstone outcrop in the vicinity of Hodsock, showing cropmarks of the brickwork-plan field system and associated enclosures. Determination of the origins, development and functions of these fields systems remains a key research priority – and should be prioritised in schemes of investigation.

6.3.6 EARLY MEDIEVAL (*c.*410 – 1066)

The Early Medieval period is poorly represented in the HER by comparison with the more prolific Roman and High Medieval periods (Figs 10–11), with only 114 sites (0.08 per km²) for all of the Character Areas (Table 6.1.2). This may reflect in part demographic changes following the ending of Roman administration, but other factors such as the end of mass pottery production, possibly with a more prominent role for organic and other perishable goods, and the poor archaeological visibility of settlements, may have led us to underestimate the extent of activity in this period. There is also a strong likelihood that many sites lie beneath established villages or towns such as Nottingham and Newark, both of which are known to have originated as Anglo-Saxon burhs. Neither towns nor villages of course can fall within the remit of aggregates archaeology, and we focus in this and subsequent sections upon those categories of site that may reasonably be investigated during aggregates extraction.

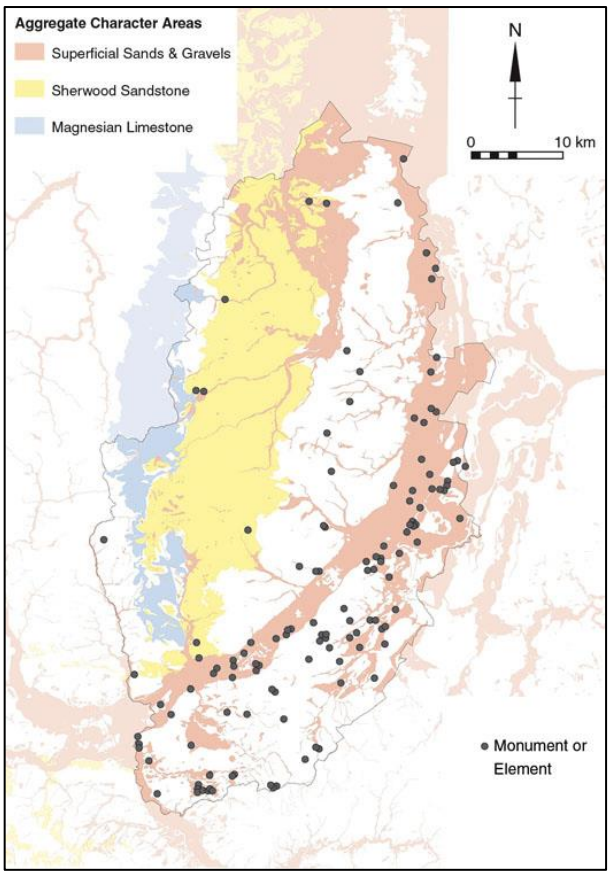

Fig.29. Distribution of Early Medieval Monuments and Elements. Source: Notts HER

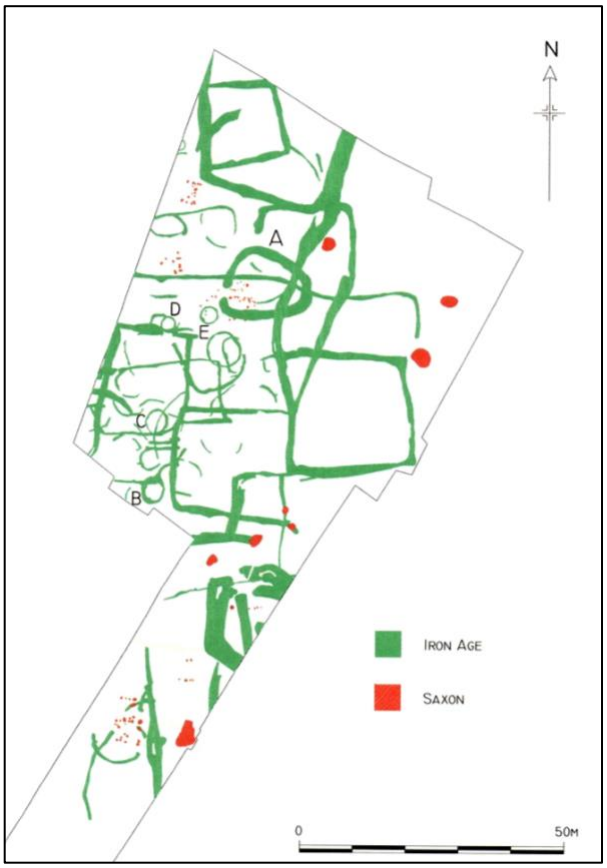

Fig.30. Iron Age and Anglo-Saxon settlement at Brough: some Iron Age field boundaries may have persisted into the Roman and later periods, influencing perhaps the layout of the medieval open fields. © Trent & Peak Archaeology

Fields and field systems

The fate of the coaxial field systems of the late Roman period is unclear, but there are indications that some of the rectilinear field systems of the river terraces had continued in use, albeit in modified form, into the sub-Roman and Anglo-Saxon periods (notably at Brough-on-Fosse, on the outskirts of the Roman town of *Crococalana).* Some components of the Roman brickwork-plan field systems of the Sherwood Sandstone, which on current evidence may have been abandoned progressively after the 3rd century AD, may also have continued in use beyond the Roman period, but further work is required to test this hypothesis. How long such long-established field systems might have persisted is difficult to establish, but there are indications that they may have continued long enough on some sites to have influenced the development of the medieval open fields. The evidence is tenuous, but there are suggestions at Brough and at sites such as Willington in the Derbyshire Trent Valley that Roman ditch alignments had sometimes influenced the layout of the medieval open fields and the positioning of the ridge and furrow that is integral to the open field system. Such work provides a valuable pointer to further research, which it is recommended should include the retrieval of pottery and other datable finds from furrow fills to investigate their date range and their relationship to earlier boundary systems.

Rural settlements

Archaeological traces of rural settlements remain elusive across each of the Character Areas, due in large part to the difficulty of identifying the structural elements of Anglo-Saxon settlements and concealment beneath later medieval villages. However, the potential of large-scale aggregates extraction for identifying hitherto unknown sites and for elucidating settlement morphology, social and economic variability, processes of settlement drift and the changing rural landscape are emphasised by the few examples of Anglo-Saxon settlements that have been recorded by excavation (notably on the river terrace sands and gravels of the Trent Valley at Brough, Girton, Langford and Holme Pierrepont, and on glaciofluvial sands and gravels near East Leake). The archaeological footprints of such sites display variable combinations of rectilinear post-pit buildings, sunken-floored buildings (grubenhäuser) and scatters of pits and post-holes that are difficult to identify unless large areas are investigated in advance of extraction. This emphasises the desirability of large-

scale targeted excavations of suspected sites, together with the routine application of strip, map and sample procedures (Table 7.2.8). The preservation of significant structural remains at Girton by blown sand deposits provides an additional explanation for the rarity of recorded Anglo-Saxon settlements in areas of redeposited coversands. It also emphasises the importance of monitoring closely the excavation of coversands and other deposits that might mask features and deposits associated with settlement of this period.

Fig. 31. Investigations in the Trent Valley in advance of aggregates extraction have shed significant light upon processes of settlement drift and nucleation from late prehistoric to medieval times, as illustrated here by the sequence of shifting settlement that has been postulated in the vicinity of Girton (photographs © Nottinghamshire County Council, with modifications by Steve Baker; source: Elliott, Jones and Howard 2004, fig.7.11, 168–73)

Fig.32. Anglo-Saxon post-pit building recorded during excavations immediately north of the Roman small town of *Crococalana*, Brough-on-Fosse. © Trent & Peak Archaeology

Burials

Inhumation, cremation and mixed-rite cemeteries, dating mainly from the 5th to early 7th centuries, are widely distributed across the river terraces and glaciofluvial sands and gravels, notably at Newark and Holme Pierrepont, together with rare single inhumations. The latter class of monument includes a remarkable burial at Winthorpe near Newark, which revealed a female inhumation associated with a rich range of grave goods. These burials provide an important insight into religious and ritual practices as well as ideal opportunities for isotope, DNA and other scientific analyses aimed at determining genetic relationships, diet and other demographic characteristics. No examples of burials have been recorded on the Magnesian Limestone, while investigations on the Sherwood Sandstone have revealed so far only a rich barrow burial at Oxton, perhaps signalling differences in burial traditions between the Character Areas.

Territorial boundaries and moot sites

Attention should be drawn also to the discovery in all Character Areas of linear earthworks that might mark Early Medieval territorial boundaries, and hence may contribute usefully to studies of early parochial organisation. Dating for all is problematic, but examples merit excavation, wherever threatened, to investigate their character and date. A small number of potential moot sites, which would have served as meeting and assembly places, have also been recorded on the Sands and Gravels and Sherwood Sandstone, and investigations of monuments at risk should be encouraged in view of the light they could shed upon early systems of administration.

Fishweirs and other riverine structures

Extraction of sands and gravels along the river valleys of Nottinghamshire regularly exposes palaeochannels and redeposited terrace sands and gravels, and in the process has exposed fishweirs and other riverine structures that provide important insights into Early Medieval usage of riverine resources. The retrieval during quarrying near Colwick of a timber Anglo-Saxon fishweir provides an outstanding example of the preservation of structures that can contribute to studies of subsistence and related issues such as woodland management. Other important finds include a remarkable 8th century cal AD timber bridge at Cromwell, which provides proxy evidence for an associated road or trackway across the floodplain, and the rare evidence for riverine transport that is provided by the discovery in the Idle Valley near Mattersey of a logboat dated by radiocarbon to the 5th century cal AD.

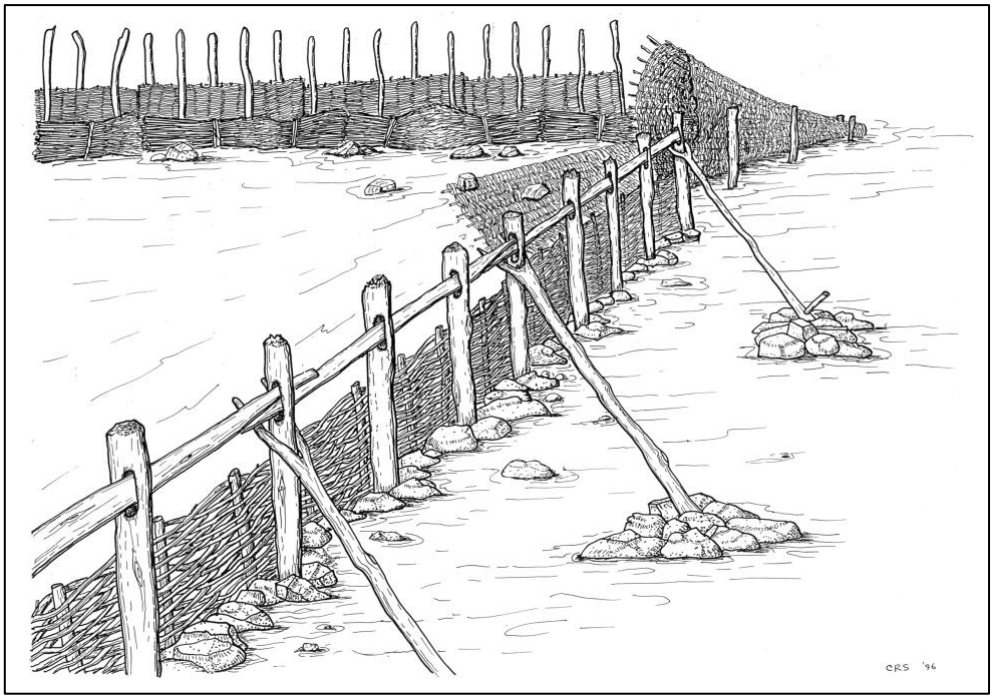

Fig.33. Reconstruction of Anglo-Saxon fishweir uncovered during sand and gravel extraction in the Trent Valley at Colwick, immediately downstream of Nottingham (Source: Salisbury 1981)

6.3.7 HIGH MEDIEVAL (1066 – 1485)

After sites of the Modern period, the 1087 High Medieval sites recorded in the HER are the most densely distributed across the three Character Areas (0.79 per km²), occurring in approximately equal densities across the Sands and Gravels (0.98 per km²) and Magnesian Limestone (0.95 per km²) but in significantly lower densities across the Sherwood Sandstone (0.55 per km²). These variations may in this instance reflect actual differences in land-use, given that large areas of the Sherwood Sandstone are known from documentary sources to have comprised woodland and heathland during the High Medieval period.

A significant proportion of the High Medieval archaeological resource lies in urban and other areas beyond the scope of this study (notably the nationally important rock-cut caves of Nottingham, which span the medieval to modern periods) but a broad range of monument types has been identified in rural areas with potential for aggregates extraction. These are listed in the tables above, and as for the Early Medieval period we focus here upon those categories of site that may reasonably be investigated during mineral extraction.

The agrarian landscape

Vestiges of ridge and furrow, headlands and other earthworks associated with open field agriculture, together with field shapes reflecting open fields, are distributed unevenly across the Character Areas (with particularly poor representation across the Magnesian Limestone and the northern part of the Sherwood Sandstone). There is significant potential for investigating the growth of the open field system, the process of early enclosure and variability between and within the Character Areas. On the Sherwood Sandstone, for example, archaeological and historical data suggest that pasture, principally for sheep, may have prevailed over much of the area, as part of a complex patchwork including woodland, wood pasture, sheepwalks, warrens and temporary arable enclosures (brecks) supplementing arable infields. There is also significant scope for elucidating the character, distribution and development of specialised land-use regimes, such as water meadows and osier beds, and for examining the specialised means of food production that are indicated archaeologically by rabbit warrens and fishponds. Other features of the agrarian landscape that merit consideration include isolated moated enclosures; these are sometimes associated with archaeological remains of buildings, but could occasionally have been used for purposes such as orchards.

Rural settlement

There is restricted scope for the study of later medieval settlement, as most archaeological remains will be associated with modern villages lying outside areas appropriate for aggregates extraction. Structural remains of deserted or shrunken villages in rural settings could, however, require investigation in advance of quarrying, and if not preserved *in situ* should form elements of schemes of treatment aimed at elucidating the morphology

and functions of settlement and the processes of shrinkage and desertion. Isolated moated enclosures may also lie within areas selected for aggregates extraction, and if not preserved *in situ* could yield valuable evidence of the date, character and function of this heterogeneous monument class.

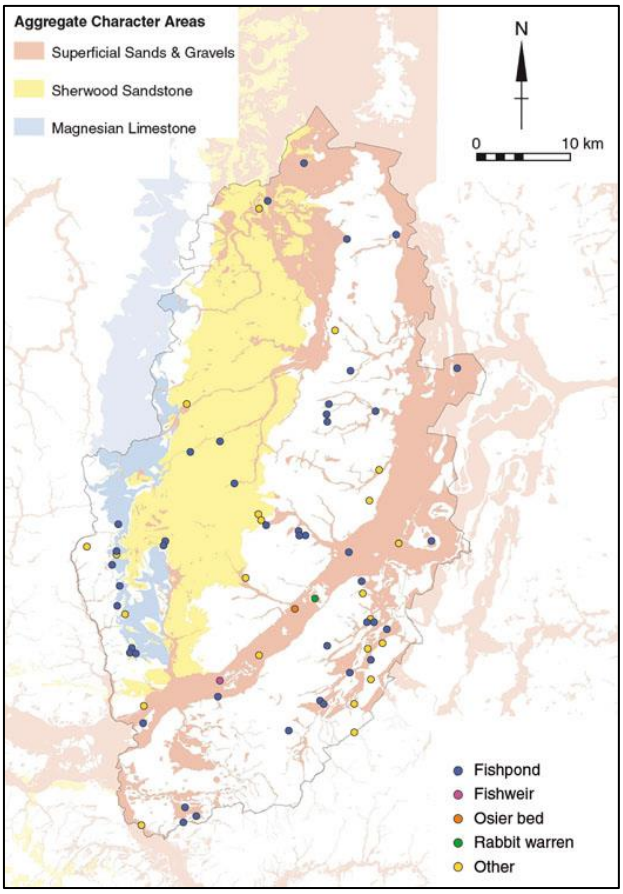

Fig.34. Distribution of High Medieval monuments relating to agriculture and subsistence. Source: Notts HER

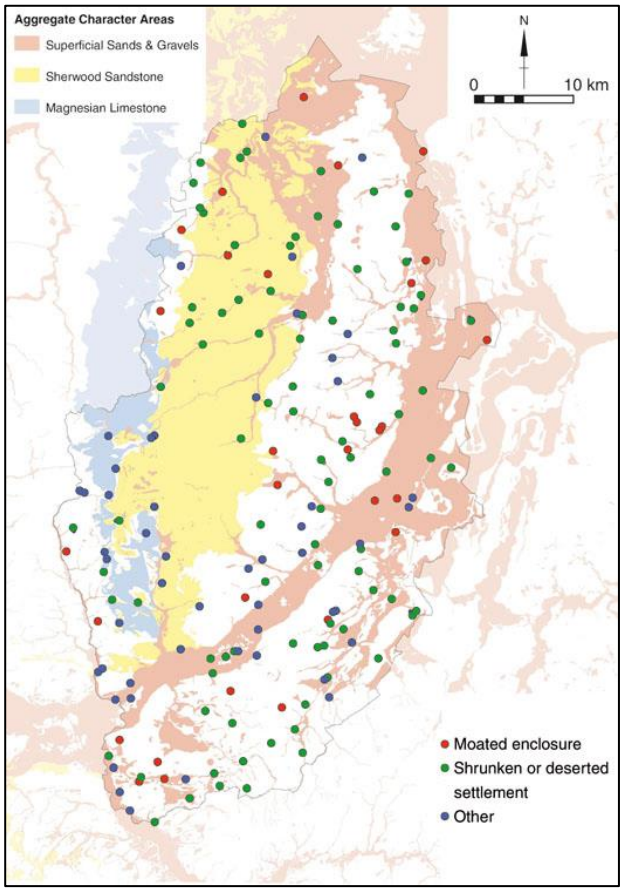

Fig.35. Distribution of High Medieval domestic monuments. Source: Notts HER

Deer parks, monastic estates and granges

Deer parks have been identified in each of the Character Areas, although not surprisingly they are particularly densely distributed across the woodlands and heathlands of the Sherwood Sandstone, and may yield archaeological remains of associated structures such as park pales and hunting lodges. Opportunities may also arise in areas designated for aggregates extraction for the investigation of fishponds, relict ridge and furrow and other landscape features associated with monastic foundations and granges.

Territorial boundaries and moot sites

As in the Early Medieval period, attention should be drawn to survivals in each of the Character Areas of linear earthworks that may contribute to studies of parochial organisation. Dating is problematic, but examples merit excavation wherever threatened to investigate their character and date. A small number of potential but as yet undated moot sites have also been recorded on the Sands and Gravels, notably at Aslockton in the Vale of Belvoir, and at Blyth Law and Thynghowe on the Sherwood Sandstone. Investigation of the late medieval use of possible moot sites revealed during the assessment of potential aggregates extraction areas could shed useful light upon developing systems of administration.

Fishweirs and other riverine structures

As discussed for the Early Medieval period, aggregates extraction may expose fishweirs and other riverine structures with major potential for elucidating the use of riverine resources. An 11th–12th century cal AD V-shaped timber fishweir recorded at Colwick emphasises the potential of the Trent Valley and other riverine environments for the preservation of structural remains of major regional importance, and other remains such as mills, mill dams, bridges and bankside revetments should be anticipated during extraction.

Fig.36. Late medieval water meadow complex near Hoveringham Quarry (© J. Pickering: photograph reference no. SF1163–26, 3–9–72. NMR no.SK 6846/11)

6.3.8 POST-MEDIEVAL AND MODERN (1485 to present)

The Post-Medieval and Modern periods are represented respectively by 878 and 2239 sites, yielding average densities of 0.64 and 1.63 sites per km² (Table 6.1.2; Figs 10–11). The Magnesian Limestone dominates in terms of the density of remains, as might be expected in view of the disproportionate impact of industrialisation upon this Character Area. An even greater proportion of the archaeological resource falls in urban and other areas beyond the scope of this study than in earlier periods, but nonetheless a broad range of monument types that might potentially be affected by aggregates extraction has been identified. Details are provided in the tables above, and we focus here upon the key categories of site that characterise these periods.

The agrarian landscape

The rural zones of each Character Area preserve archaeological remains that are fundamental to understanding the evolution of the agrarian landscape and variations between landforms, and aggregates extraction may be expected to impact significantly upon this resource. These periods saw the progressive enclosure of the open fields, culminating with the geometric field patterns that characterised the 18th and 19th centuries and the modified field patterns of the 20th and 21st centuries. Plentiful landscape evidence survives that may elucidate these developments and the application of industrial practices to farming (indicated, for example, by the straight ridge and furrow created by steam ploughing). Other key developments include the expansion of water meadows and osier beds and, particularly in the lower Trent and Idle Valleys, the development from the 17th century of major drainage schemes designed to improve the agricultural potential of wetlands. Fishponds and rabbit warrens add to the diversity of the landscape, together with isolated moated enclosures that in common with their medieval predecessors might sometimes have defined areas used for purposes such as orchards.

Rural settlements

As in the High Medieval period, there is limited scope for the study of rural settlement, as most archaeological remains will be associated with modern villages lying outside areas appropriate for aggregates extraction. Again, if preservation *in situ* is not recommended, remains associated with deserted or shrunken villages could yield significant information on settlement morphology and functions and the processes of abandonment. Investigations in rural areas designated for aggregates extraction may also permit study of activity beyond the village, as reflected, for example, in the isolated Nonconformist chapels and burial grounds that are particularly characteristic of the Sherwood Sandstone.

Relics of rural industrialisation

The agrarian changes of the period were accompanied, as the Industrial Revolution gained momentum, by progressive industrialisation of the countryside. Many relics of this process remain and merit recording and analysis in advance of development. Particular attention should be drawn to the impact of coal mining and quarrying, together with the landscape impact of kilns, textile mills, railways, canals and other industrial and transport installations. Woodlands merit special scrutiny, as they would have provided raw materials for a wide range of activities and may preserve saw pits, charcoal burners' hearths and other remains indicative of woodland industries.

Gardens and parklands

One of the hallmarks of the Nottinghamshire landscape is the transformation of established monastic estates, following the Dissolution of 1536–40, into gardens and parklands for the aristocracy and gentry, particularly across the Sherwood Sandstone and Magnesian Limestone. These preserve a wide variety of recreational, ornamental and other features, often some distance from the grand house that sits at the centre of the estate, and hence may fall within areas designated for extraction. Monuments that might be affected by development include recreational structures such as fox coverts or duck decoys, major landscape features such as tree avenues or ornamental ponds, and fishponds

Battlefields and fortifications

A final theme emerges from the extensive remains that have survived of battlefields, skirmish sites and defensive works. These provide a substantial body of evidence for the landscape impact of warfare, while the Civil War fortifications around Newark form a monument complex of national importance. Monuments include the site of the last battle of the War of the Roses at Stoke Fields (1487), an unparalleled concentration of Civil War defensive and offensive sites around Newark (many, as at Hawton, surviving as earthworks), three Civil War battlefields and skirmish sites, and a varied collection of World War I/II and Cold War remains focused particularly upon Sherwood Forest (including airfields, pillboxes, anti-aircraft and searchlight batteries, communal bunkers and training trenches). All have the potential to contribute significantly to studies of the landscape impact of conflict between the late 15th and 20th centuries, while some, such as the Civil War earthworks around Newark, may be of such significance that preservation *in situ* will be recommended

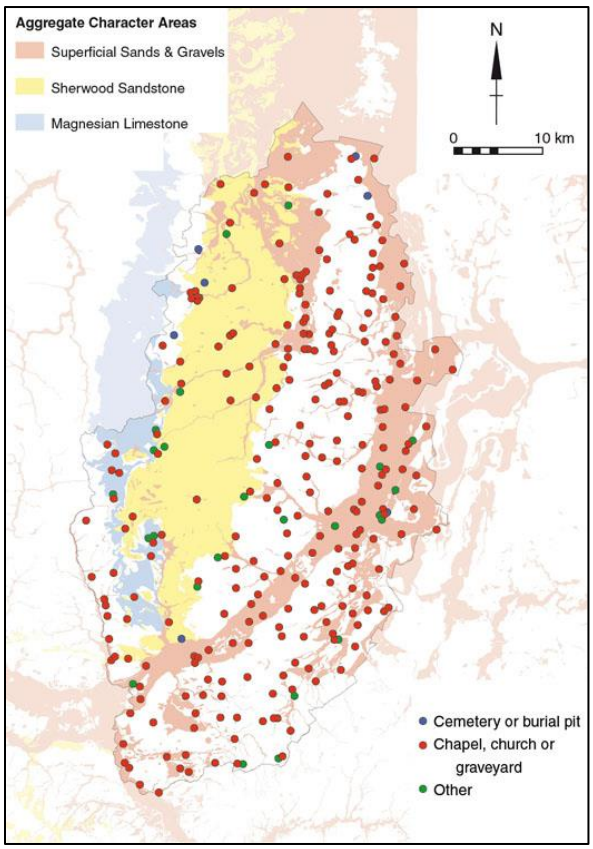

Fig.37. Post-Medieval and Modern religious, ritual and funerary monuments. Source: Notts HER

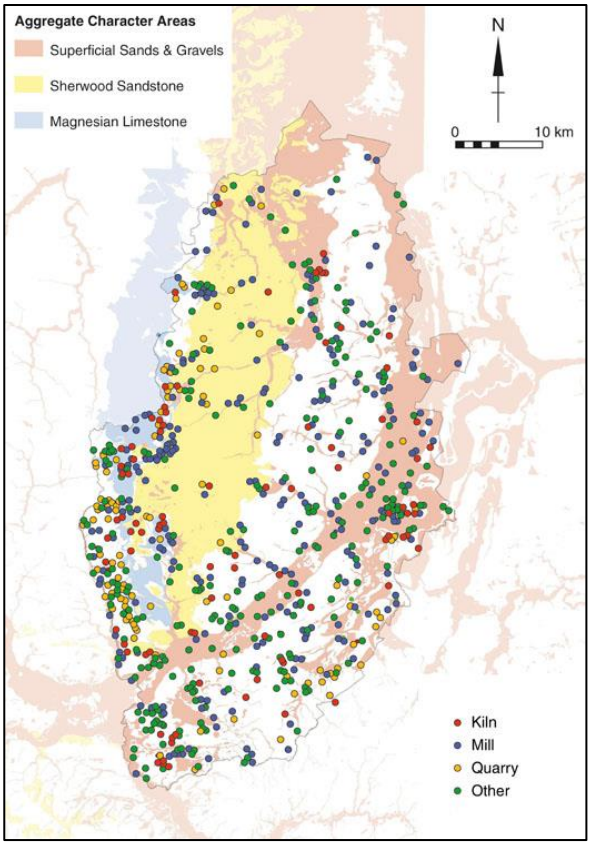

Fig.38. Post-Medieval and Modern industrial monuments. Source: Notts HER

7. LANDFORMS AND ARCHAEOLOGY:

GEOMORPHOLOGICAL PROCESSES, ARCHAEOLOGICAL ASSOCIATIONS AND ASSESSMENT, EVALUATION AND MITIGATION STRATEGIES

7.1 INTRODUCTION

Detailed analyses of the distributions of archaeological sites and finds within each of the Aggregate Character Areas have emphasised the close correlations between certain archaeological and environmental remains and particular landform elements (Section 6.2). Holocene palaeochannels, for example, may be expected to yield waterlogged palaeobotanical and other organic remains that may elucidate landscape change and developing subsistence economies, while organic material deriving from pre-Holocene interglacial and interstadial environments may be preserved within and beneath cold stage gravels deposited in the major river valleys. The river terrace sands and gravels are also renowned for their complex cropmark palimpsests, and in particular for the wealth of prehistoric and Roman sites that was first noted in *A Matter of Time* (RCHME 1960; see also Whimster 1989). Some landforms may be restricted to particular Character Areas – such as coversands, which are limited to the Superficial Sands and Gravels of the Lower Trent. Alternatively, other landforms may occur across a variety of Character Areas – such as glacial till (boulder clay), remnants of which overlie Sherwood Sandstone and Magnesian Limestone bedrock. To clarify these relationships, correlations between landform elements and Aggregate Character Areas have been summarised in Table 4.3.1 above.

In this section, tabular summaries are presented of the observed archaeological associations for each of the landform elements defined in this document. Undifferentiated deposits, which can include head, talus and alluvial fan accumulations of highly variable origin and character, are not included because of the difficulty of generalising on the subject of archaeological associations or recommended assessment, evaluation and mitigation strategies. The key geomorphological processes operating within each landform element are also noted, together with the variety of assessment, evaluation and mitigation techniques that should be considered during the compilation of archaeological schemes of treatment in advance of aggregates extraction. It is hoped that this will provide a succinct guide to current practice that will be of value to aggregates companies, consultants and contractors working in Nottinghamshire.

Helpful summaries of the techniques referred to in the following tables are provided in *Mineral Extraction and Archaeology: A Practice Guide* (MHEF 2008, 17-29), the published guidance booklet and archive report relating to the Derbyshire and Peak District Aggregates Resource Assessment (Brightman and Waddington 2010; 2011) and the ALSF-funded publication *Making Archaeology Matter* (Knight and Vyner 2007). The last of these was prepared with the aggregates industry of the Trent Valley firmly in mind, but many of the techniques it describes are as applicable to the Magnesian Limestone and Sherwood Sandstone as the Sands and Gravels.

A summary of recommended assessment, evaluation and mitigation techniques, developed with due regard to the recommendations in the Standards and Guidance documents published by the Chartered Institute for Archaeologists,[25] is provided at the end of this section under the following four headings (Table 7.2.8):

1.Pre-Determination desk-based assessment: desk-based study, aimed at providing a synthesis of current knowledge of the archaeological resource, combined with a walkover survey of the proposed extraction area This provides the crucial foundation for the development of an evaluation strategy aimed at determining the nature of the archaeological resource within a specified area using appropriate methods and practices.

2. Pre-Determination evaluation: programme of investigative work employing various combinations of the intrusive and non-intrusive fieldwork techniques that are listed in Table 7.2.8. The combination of techniques will be agreed with the appropriate archaeological curator, taking into account variations in the effectiveness of these between landform elements.

3. Post-Determination mitigation: programme of archaeological observation and investigation conducted in advance of and/or during ground disturbance, combined in certain circumstances with preservation *in situ.* The range of fieldwork methodologies to be employed will be agreed with the archaeological curator, who may recommend different approaches across the quarry depending upon the nature of the archaeological resource

[25] See https://www.archaeologists.net/codes/cifa for current guidance

and the diversity of landform elements. All ground disturbances will require archaeological control and supervision ('watching brief'), with adequate resources for the use where appropriate of strip, map and sample techniques and for 100% excavation of features or deposits where this is deemed essential for a satisfactory understanding of the archaeological remains. Appropriate contingency funds must be made available to cover the risk of unexpected discoveries – such as logboats, timber bridges and fishweirs in alluvial zones (Table 7.2.5).

4. Post-fieldwork tasks: analysis, archiving, report preparation and dissemination, including full publication where recommended by the curator.

It should be emphasised that although some fieldwork techniques are restricted to Post-Determination mitigation (e.g. strip, map and sample), many others (such as sediment coring) may be recommended during evaluation or mitigation, or possibly both. Similarly, preservation *in situ* may be recommended at any stage of the development process, and for sites of national importance may be recommended without a requirement for assessment. In addition, depending upon their character, post-fieldwork tasks may be conducted at a variety of stages in the development process.

There can in fact be no hard and fast rules on when to use particular archaeological techniques, as the choice of these and the decision at which stage to employ them will depend upon the character of the site, its environmental setting and details of the development proposal. We have, therefore, eschewed a simple staged approach, but hope that the tables below will provide clear definitions of the techniques to be considered at all stages of the development process and hence expedite the formulation of archaeological schemes of treatment.

To assist further the choice of technique, we have indicated in Table 7.2.8 variability in the effectiveness of evaluation techniques between landforms. We have followed in principle the scheme devised for Derbyshire and the Peak District (Brightman and Waddington 2010, Table 15), but have modified the tabular format to show both the impact of landform type upon the efficacy of evaluation techniques and curatorial requirements for the assessment, mitigation and post-fieldwork stages. The suitability of field methods as evaluation techniques for particular landforms is indicated by a gradation from darker to lighter shades of blue, with dark blue indicating circumstances where particular techniques have proved to be especially effective. Most of the mitigation strategies are standard requirements (and are shaded dark red), but targeted excavation, 100% excavation of features or deposits and preservation *in situ* are options to be decided in liaison with the archaeological curator (and are shaded light red). In addition, while it is recommended that quarry conveyor belts should always be fitted with metal detectors during the quarrying of alluvial and other landforms likely to yield metalwork that was deposited in watery contexts (Tables 7.2.4–7.2.6), their use during the excavation of sandstone or limestone bedrock and of till deposits is a matter of curatorial judgement.

7.2. ARCHAEOLOGICAL ASSOCIATIONS WITH LANDFORM ELEMENTS

Tabular summaries are provided below for each landform element of geomorphological processes, archaeological associations and the variety of assessment, evaluation and mitigation techniques that should be employed during archaeological investigations in advance of and during aggregates extraction (Tables 7.2.1–7.2.7). A summary of the standard curatorial requirements for assessment, evaluation and mitigation and the varied suitability of evaluation techniques between landform elements is summarised diagrammatically in Table 7.2.8.

It should be emphasised that the first task during the development of a scheme of archaeological investigation will be to search and collate Historic Environment Record and Historic Landscape Characterisation data maintained by Nottinghamshire County Council (Table 7.2.8: Task 1.1). It is expected that close liaison will be maintained with the Nottinghamshire HER Team and County archaeological curator from the outset of investigative work associated with aggregates extraction.

TABLE 7.2.1. MAGNESIAN LIMESTONE BEDROCK		
Geomorphological Processes	**Archaeological Associations**	**Assessment, Evaluation and Mitigation Techniques**
• Thin and intermittent deposits of Middle Pleistocene till, deposited by Anglian glaciers, are recorded on BGS maps, and may fall within proposed extraction areas. It is likely that thin, unmapped are spread more widely across this landform. • Coversands and loessic sediments were deposited extensively over this area in the late Pleistocene and were reactivated during the Holocene. These deposits form the parent materials for the light and fertile loamy soils that have developed over much of the gently undulating terrain of the limestone escarpment. Pockets of loess with preserved palaeosols may survive in caves, fissures, *etc*. • The escarpment is dissected by steep-sided gorges, cut by meltwater-enriched Pleistocene rivers. Caves and rock-shelters flanking these gorges may preserve multiperiod archaeological remains, which may have been buried or reworked by fluvial, aeolian, slope and rock failure processes, human or animal activity and chemical processes such as calcification. • Palaeolithic materials deposited in plateau or hillslope settings may have been reworked or buried by periglacial, hillslope and mass-movement processes. • Hillslope and plateau settings have generally been stable during the Holocene, but there is potential for significant localised colluviation and mass-movement activity. • Holocene alluvial accumulations are comparatively restricted, reflecting the prevalence of narrow, steep-sided gorges, but more extensive alluvial spreads with potential for preserving archaeological and environmental remains have been mapped in some of the broader river valleys.	• **Palaeolithic.** Caves and rock shelters, some yielding evidence for Palaeolithic activity, are distributed widely across the limestone, and have major potential for elucidating Pleistocene settlement (notably Church Hole). Undisturbed sites may be preserved below talus, while significant cultural and environmental remains may be preserved in caves beneath flowstone. Pockets of loess within caves may preserve significant environmental remains. Any work may reveal hitherto unknown fissures and other features with undisturbed environmental or cultural remains. Rare Late Upper Palaeolithic lithic artefacts found during fieldwalking may signify open-air sites, but more work is required to demonstrate the character of the sites from which they derive. • **Mesolithic.** Activity may have continued in and around some caves and rock shelters, some of which may preserve undisturbed environmental and cultural remains (e.g. below talus). Significant numbers of sites are known have in extensively fieldwalked areas, and more may lie beneath alluvium or colluvium. • **Neolithic to MBA.** Lithic artefact scatters recovered during fieldwalking or test-pitting and rare surface finds of stone axes and metalwork provide evidence for potential activity foci, while caves might preserve evidence for domestic, burial or other ritual activities. Major ceremonial and funerary sites are currently conspicuous by their absence in Nottinghamshire. • **LBA and Iron Age.** A stone-walled enclosure at Scratta Wood provides significant structural evidence of settlement, while earthworks of uncertain character at Strawberry Bank might signify a promontory fort. Rare cropmark enclosures may also signal Iron Age activity Some lithic scatters could date from this period, complementing rare surface finds of pot and metalwork, while some caves might have served as foci for domestic or ritual activities. • **Roman.** Rare cropmark enclosures or trackways might signify Roman activity, but there is currently no evidence to rival the brickwork-plan field systems of the Sherwood Sandstone landform. Activity is otherwise indicated by rare rural settlements, villas and forts, some with associated cemeteries, rare discoveries of kilns and iron-smelting furnaces, and two potential roads. • **Medieval.** Very sparse evidence is available for Early Medieval activity, although some villages and open field systems may originate in that period. Landscape evidence for the High Medieval period includes ridge and furrow, field boundaries reflecting open field cultivation and a limited range of other earthworks (particularly fishponds and shrunken or deserted villages), some relating to monastic estates. This landform is characterised by more isolated hamlets and farms than the remainder of the County, and some significant contrasts may be discerned with the processes of village nucleation observed elsewhere in the County. In common with the Sherwood Sandstone landform, some significant forest-edge/secondary settlements may also be identified. **Post-medieval and Modern.** Field boundaries indicating the progression from open field to enclosed landscapes provide a key archaeological resource, investigation of which should form a key element of schemes of treatment. Many traces also survive of rural industrialisation, including quarries, limekilns, features associated with coal mining, mills and straight ridge and furrow formed by steam ploughing. Significant garden and parkland features associated, for example, with water management and gentry leisure pursuits, should also be anticipated in this landform's extensive parklands (e.g. Newstead Abbey).	• **Desk-based assessments**, including **walkover surveys** to locate earthworks, slope deposits potentially sealing caves, *etc*., should precede all other work. • **Geomorphological mapping** should be conducted of landform elements identified during assessment. Further fieldwork may be required to clarify surface landforms and sub-surface stratigraphy (see below). • **Aerial photography.** Few crop- and soilmarks are known by comparison with Derbyshire, despite the suitability of the limestone for their formation and the presence of extensive arable land. All available vertical and oblique air photographs should be inspected, followed by transcription of cropmarks, *etc*. • **Lidar surveys** may assist earthwork identification, particularly in woodlands impervious to air photography, and all available lidar and **other remote sensing records** should be examined during assessment. • **Geophysical surveys**, including magnetometry and earth resistance, can be effective evaluation techniques, together with **ground-penetrating radar** for the location of fissures and **airborne techniques** such as multispectral remote sensing. • **Earthwork surveys** have highlighted the potential of this landform for the preservation of Iron Age/ Roman enclosures, ridge and furrow, traces of woodland industries, *etc*., in woodland and other environments little damaged by ploughing, and such remains should be sought and surveyed where required. • **Fieldwalking** is crucial for locating sites where surfaces little modified by Holocene geomorphological processes have been ploughed and should be conducted routinely. Identifications of lithic concentrations are especially important, as these may provide vital evidence for prehistoric sites represented by scant (if any) structural remains. **Test-pitting** can elucidate further the character of finds scatters and the site stratigraphy, and may identify remains preserved beneath alluvium, *etc.* • **Sediment coring** may be recommended to investigate sub-surface stratigraphy (e.g. colluvial accumulations along valley sides/bottom). • **Evaluation trenches** are useful for establishing the character of known sites and their archaeological and environmental potential (e.g. location of features beneath ridges of ridge and furrow). Large-scale trenching may not always be routinely recommended, as sites with dispersed structural remains may elude discovery by this method (e.g. Neolithic to Early Iron Age and Anglo-Saxon settlements). • **Targeted excavation** may be recommended during mitigation, depending upon the results of evaluation (e.g. regionally important cropmark sites). • **Strip, map and sample techniques** provide the most effective method for locating dispersed structural remains such as characterise Neolithic to EIA settlements. These should be applied routinely to ensure that sites of particular periods and types are not missed during excavation. Mitigation strategies will require contingency provisions, which will be targeted by reference to this document upon the most significant remains. • **Palaeoenvironmental sampling and analysis** should be carried out routinely during evaluation and mitigation. The alkaline bias of soils on limestone bedrock provides excellent potential for organic preservation, and provision should be made for environmental sampling and analysis, including scientific dating. • **Caves, rock shelters and fissures** provide a resource of national significance for studies of early prehistory, and some will be of such significance that preservation *in situ* is recommended. Any disturbances will require tailored evaluation/mitigation strategies devised with appropriate specialist input.

TABLE 7.2.2. SHERWOOD SANDSTONE BEDROCK		
Geomorphological Processes	**Archaeological Associations**	**Assessment, Evaluation and Mitigation Techniques**
• Sporadic deposits of Middle Pleistocene Till, deposited by the Anglian glaciers that would have extended across Nottingham shire *c*.425,000 years ago, are recorded on BGS maps of the Sherwood Sandstone, and may fall within proposed extraction areas. It is likely that thin, unmapped deposits of till extend more widely across elevated areas of the gently undulating terrain that characterises this landform. • The Sherwood Sandstone is characterised by light and dry soils, particularly susceptible to wind erosion, and depending upon the agricultural regime the more moisture-retentive tills may in certain periods have been particularly favoured by agricultural communities. More detailed mapping of till deposits is required to investigate the potential impact of variations in soil character upon settlement patterns and agricultural practices, and every opportunity should be taken to plot and to characterise more precisely these veneers of glacial drift. • Palaeolithic materials deposited in plateau or hillslope settings may have been reworked or buried by Quaternary periglacial, hillslope and mass-movement processes. • Hillslope and plateau settings have generally been stable during the Holocene, but there is potential for significant localised colluviation and mass-movement activity. • Extensive Holocene alluvial accumulations characterise the broad and open river valleys that traverse the Sherwood Sandstone, and may seal well-preserved archaeological and environmental remains.	• **Palaeolithic.** No sites have currently been recorded, but particularly in the Upper Palaeolithic period we should anticipate evidence of encampments of hunter-gatherers migrating between the Trent Valley and limestone uplands. Some sites may lie concealed beneath alluvium or colluvium. • **Mesolithic.** Sparse scatters of lithic artefacts have been recorded in intensively fieldwalked areas, but more may be sealed beneath alluvium or colluvium in valley bottoms. • **Neolithic to MBA.** The archaeological record is dominated by lithic artefact scatters, although even in intensively walked areas surface densities are generally low. Occasional finds of stone axes and metalwork have also been made. Rare discoveries have been made of possible Beaker burials, undated ring-ditch cropmarks and circular mounds interpreted as possibly Neolithic or Bronze Age barrows, but no funerary or ceremonial monuments definitely of this period have been recorded. • **LBA and Iron Age.** The Roman brickwork-plan field systems may originate in the Late Iron Age, together with some of the associated enclosed settlements (e.g. Dunston's Clump). Marsh forts or promontory forts should also be anticipated, although positive evidence for these has yet to be recovered. Some lithic scatters might relate to activity in this period, which is represented also by rare pottery scatters and occasional discoveries of metalwork and coins. • **Roman.** The rural landscape is characterised by brickwork-plan fields, integrated with trackways and domestic or specialised enclosures. These field systems may imply colonisation of hitherto marginal areas in response to increasing pressures on land resources and may be linked to the development of a more intensive agrarian economy with an emphasis upon pasture. Some Roman roads traversed this landform, linking a number of early forts. Villas and towns are conspicuous by their absence. • **Early Medieval.** Some brickwork-plan field systems may have continued in use, while some medieval villages and open field systems may have pre-Conquest origins. The area preserves several linear earthworks that might represent early territorial boundaries, plus a rich barrow burial at Oxton. • **High Medieval.** Ridge and furrow and field shapes suggesting open fields survive in some areas and provide a key resource for assessing the extent of open field agriculture. A rich variety of other earthworks is preserved, many surviving in woodland or parkland and some relating to monastic estates; these include fishponds, moated enclosures, deserted or shrunken villages, and deer park and other boundary features. Some significant forest-edge/ secondary settlements may also be identified. • **Post-Medieval and Modern.** Field boundaries provide a key resource for rural landscape studies, along with water meadows, osier beds and traces of rural industrialisation (including quarries, limekilns, vestiges of coal mining, mills and straight ridge and furrow formed by steam ploughing). This landform is renowned for its country parks and gardens, which preserve crucial evidence for park and garden design and gentry leisure pursuits (including fox coverts, duck decoys, tree avenues and ornamental ponds); many other monuments are preserved in heath, woodland *etc* (e.g. 20th century military remains).	• **Desk-based assessments**, including **walkover surveys**, to precede other work. • **Geomorphological mapping** should be conducted of landform elements identified during assessment. Further fieldwork may be required to clarify surface landforms and sub-surface stratigraphy (see below). • **Aerial photography.** Crop and soil-marks show clearly on the well-drained Sherwood Sandstone, which in Nottinghamshire are renowned for the brickwork-plan field systems dating principally from the Roman period. All available air photographs should be inspected, followed by transcription of cropmarks, soilmarks, *etc*. • **Lidar surveys** may assist earthwork identification, particularly in woodlands impervious to air photography, and all available lidar and **other remote sensing records** should be examined during assessment. • **Geophysical surveys**, including magnetometry and earth resistance, can be very effective on this landform, and together with **airborne techniques** such as multispectral remote sensing should be included in the evaluation toolkit. • **Earthworks** are particularly well preserved in the extensive woodlands and parklands of this landform and have major potential for enhancing studies of garden and park design and for preserving earlier features such as fishponds, deserted or shrunken villages and 20th century military remains. Walkover surveys should be conducted during assessment to ensure the identification and subsequent evaluation of extant remains. • **Fieldwalking** is crucial for locating sites where surfaces little modified by Holocene geomorphological processes have been ploughed and should be employed routinely. Identifications of lithic concentrations are especially important, as these may provide vital evidence for prehistoric sites represented by few if any structural remains, while fieldwalking of brickwork-plan fields has demonstrated the potential of this technique for elucidating the date and possible functions if these fields. **Test-pitting** can elucidate further the character of finds scatters and the site stratigraphy, and may identify remains preserved beneath alluvium, colluvium, *etc*. • **Sediment coring** may be recommended to investigate sub-surface stratigraphy (e.g. colluvial accumulations along valley sides and bottoms). • **Evaluation trenches** provide useful means of establishing the character of known sites and their archaeological and environmental potential. However, large-scale evaluation trenching may not always be recommended as many key sites are likely to elude discovery by this method (e.g. Neolithic to Early Iron Age and Anglo-Saxon settlements). Important archaeological deposits and features may survive beneath the ridges of ridge and furrow, and the potential for preserved remains should be determined during evaluation. • **Targeted excavation** may be recommended during mitigation, depending upon the results of evaluation (e.g. regionally important cropmark sites). • **Strip, map and sample techniques** provide the most effective method for locating dispersed structural remains, such as characterise settlements of the Neolithic to EIA and Early Medieval periods. These should be applied routinely to ensure that sites of particular periods and types are not missed during excavation. Such mitigation strategies will require contingency provisions, which will be targeted by reference to this document upon the most significant archaeological remains. • **Palaeoenvironmental sampling and analysis** should be carried out routinely during evaluation and mitigation, including provision for scientific dating.

TABLE 7.2.3. MIDDLE PLEISTOCENE TILL		
Geomorphological Processes	**Archaeological Associations**	**Assessment, Evaluation and Mitigation Techniques**
• Thin and intermittent deposits of Middle Pleistocene till, deposited by the Anglian glaciers that would have spread southwards across Nottinghamshire c.425,000 years ago, have been recorded on BGS maps of the Magnesian Limestone and the Sherwood Sandstone. Glaciofluvial deposits of sand and gravel form discontinuous layers and lenses throughout these till deposits. It is likely that thin deposits of till, not recorded on BGS maps, extend more widely across each of the Aggregate Character Areas, and more extensive deposits than may be deduced from current records should be anticipated during extraction. • These tills, historically known as boulder clay, form a moisture-retentive, clay-rich landform that can vary from waterlogged to indurated (hardened) depending upon conditions, and their distribution may have impacted significantly upon settlement and agricultural practices. Detailed mapping of till deposits should be viewed as a priority for investigating the potential impact of variations in soil characteristics upon settlement patterns, and every opportunity should be taken to plot and to characterise more precisely these veneers of glacial drift. • Localised colluviation and mass-movement activity may have impacted upon this landform during the Holocene, and in turn may have distorted the archaeological record through the burial of preserved remains.	• **Palaeolithic and Mesolithic.** The HER records no sites on these landforms; but it would be surprising if the wide-ranging hunter-gatherer groups that are implied by lithic artefact distributions in adjoining areas of the Sherwood Sandstone and Magnesian Limestone had not traversed the scattered patches of glacial till that comprise this landform. • **Neolithic to MBA**. Very rare lithic scatters and single finds (e.g. axe-hammers) have been recovered from till overlying Sandstone and Limestone. Heavier clay soils may have proved unattractive to early agriculturalists in comparison to the light, easily cultivated soils of the river terraces and other landforms, and hence this comparative paucity of evidence might reflect in part real differences in the distribution of activity at this time. • **Iron Age and Roman.** Cropmarks and soilmarks indicating landscapes of brickwork-plan fields, trackways and enclosures extend beyond the Sherwood Sandstone to superficial till deposits, notably in the vicinity of the excavated LIA to Roman enclosure at Dunston's Clump, emphasising that till deposits are capable of generating useful cropmark data. There is some evidence that Roman enclosures may have been preferentially sited on the more moisture-retentive and richer agricultural soils that developed on till deposits, and for an emphasis in the brickwork-plan fields upon pasture (illustrated by the clustering of pottery and other finds inside enclosures rather than scattered widely as would be expected if they had formed components of manure scatters on arable fields). In addition, extrapolations of known Roman roads suggest that some are likely to have traversed tills overlying sandstone and limestone. • **Early Medieval.** No sites have currently been recorded, but as elsewhere in the County this may reflect in large part merely the difficulty of locating sites of this period. Some of the recorded brickwork-plan field systems may have continued in use into the sub-Roman period and beyond. In addition, as in other Character Areas, some later medieval villages and open field systems may have pre-Conquest origins**.** • **High Medieval.** Ridge and furrow and field shapes suggesting open fields extend across some areas of till and provide an important landscape resource for studies of agrarian change. Traces also survive of deserted or shrunken villages and, particularly in woodland and parkland, a variety of other earthwork remains echoing those found across the Sherwood Sandstone and Magnesian Limestone (some relating to monastic estates). • **Post-medieval and Modern.** As in the other Character Areas, field boundaries provide important evidence for the developing agrarian landscape. Remains indicative of rural industrialisation are also widespread, particularly in the south-west of the County on till deposits mantling Magnesian Limestone (including quarries, limekilns, mills and features relating to coal mining). Other key resources include deserted or shrunken villages, features elucidating developments in park and garden design and military remains (particularly of the First and Second World Wars on tills overlying Sherwood Sandstone), recalling in terms of their density and variety the archaeological resource of the neighbouring Sherwood Sandstone and Magnesian Limestone.	• **Desk-based assessments**, including **walkover surveys**, should precede all other investigations. • **Geomorphological mapping** should be conducted of landform elements identified during assessment. Further fieldwork may be required to clarify surface landforms and sub-surface stratigraphy (see below). • **Aerial photography.** Heavier clay soils are more moisture-retentive than those of the limestone or sandstone and hence less suitable for cropmark formation, but nonetheless tills above Sherwood Sandstone have yielded quite extensive cropmarks. All available oblique and vertical air photographs should be examined during assessment, followed by the transcription of cropmarks, soilmarks, earthworks etc revealed during assessment. • **Lidar surveys** may assist earthwork identification, particularly in woodland. All available lidar and **other remote sensing data** should be examined during assessment. • **Ground-based geophysical surveys** should be considered during evaluation, focusing upon suitable for heavier and more moisture-retentive clay soils. • **Earthwork surveys** have highlighted the potential for the preservation of a wide variety of prehistoric and later earthworks in woodland, parkland and other environments not seriously denuded by ploughing, especially in areas with heavier clay soils. Walkover surveys should be conducted to ensure the identification and subsequent evaluation of extant remains. • **Fieldwalking** is crucial for locating sites where surfaces little modified by Holocene geomorphological processes have been ploughed and should be employed routinely. Identifications of lithic concentrations are especially important, as these may provide vital evidence for prehistoric sites represented by scant (if any) structural remains, and fieldwalking should precede and inform mitigation strategies. • **Test-pitting** can elucidate further the character of finds scatters and the site stratigraphy, and in particular may identify remains preserved beneath alluvium, colluvium, *etc*. • **Sediment coring** may be recommended to investigate sub-surface stratigraphy (e.g. to determine the character and thickness of drift deposits). • **Evaluation trenches** are useful for establishing the character of known sites and their archaeological and environmental potential (e.g. identification of features beneath ridges of ridge and furrow). Large-scale trenching will not always be recommended, as sites with dispersed structural remains may elude discovery by this method (e.g. Neolithic to Early Iron Age and Anglo-Saxon settlements). • **Targeted excavation** may be recommended during mitigation, depending upon the results of evaluation (e.g. regionally important cropmark sites). • **Strip, map and sample techniques** provide the most effective method for locating dispersed structural remains, such as are especially characteristic of Neolithic to Early Iron Age and Early Medieval settlements. These should l be applied routinely to ensure that sites of particular periods and types are not missed during excavation. Such mitigation strategies will require contingency provisions, which will be targeted by reference to this document upon the most significant archaeological remains. • **Palaeoenvironmental sampling and analysis** should be carried out routinely during evaluation and mitigation Provision should be including for appropriate scientific dating of deposits and associated artefacts.

TABLE 7.2.4. RIVER TERRACE AND GLACIOFLUVIAL SANDS AND GRAVELS		
Geomorphological Processes	**Archaeological Associations**	**Assessment, Evaluation and Mitigation Techniques**
• Glaciofluvial sands and gravels, formed during the Middle Pleistocene in close association with glaciers, mask some areas of limestone and sandstone bedrock and may seal pre-Anglian Sands and Gravels. They also form discontinuous layers and lenses in Middle Pleistocene till deposits. • Organic material deriving from pre-Holocene interglacial and interstadial environments may be preserved within and beneath cold stage gravels. • River gravels, deposited by meltwater-rich rivers, preserve a complex sequence of Pleistocene terraces, formed in response to downcutting by fluvial erosion of river floodplains. The chronology of the river terraces remains a matter of debate, but current views are summarised concisely in the Quaternary Research Association's Field Guide to the Trent Valley and adjoining regions (White *et al* eds 2007). • Pre-Holocene fluvial terrace surfaces largely stable during Holocene, but surfaces may have been modified along the valley margins as a result of localised colluviation and alluviation. • Palaeolithic materials may have been reworked or buried by fluvial, periglacial, hillslope and mass-movement processes. • Fluvially deposited sands and gravels in the valley bottom are buried beneath variable depths of alluvium (principally of Holocene date, but some of late Pleistocene origin). Alluvium is sometimes interstratified with peat, and in the lower Trent is sealed by extensive deposits of Holocene peat. Alluvium also cloaks parts of the late Devensian Holme Pierrepont Terrace, particularly along its edges. In all these areas, there is significant potential for sub-alluvial archaeological remains, palaeochannels and buried land surfaces.	• **Palaeolithic.** River terraces, including MIS 5d–2 Beeston Terrace deposits and probable MIS 8 Knighton Terrace deposits of the Soar at East Leake, have yielded rolled flint and quartzite handaxes, flakes and cores, redeposited from Lower Palaeolithic activity foci of unknown date. Surface finds of LUP lithic artefacts are also known, while field-walking, test-pits and excavation at Farndon Fields have revealed nationally important *in situ* activity foci. • **Mesolithic.** Fieldwalking and test-pitting have revealed thin scatters of lithic artefacts, especially of the Later Mesolithic, with some notable concentrations at sites such as Collingham. Some scatters may be sealed by alluvium or colluvium, and hence may extend more widely than can be demonstrated from surface evidence. Rare pits may also relate to Mesolithic activity. • **Neolithic to MBA.** A wide variety of funerary and ceremonial monuments is known, including henges, pit circles, timber avenues, ring-ditches and cremation cemeteries, plus burnt mounds. Settlements are less well known, and where excavated comprise dispersed scatters of pits, post-holes and gullies. Extensive lithic scatters have been recorded during fieldwalking, along with finds of metalwork, often from watery contexts, and polished stone axes. • **LBA and Iron Age.** Some earlier monuments may continue in use, notably burnt mounds, but this period sees some major changes. These include the earliest known pit alignments and fields, a shift from open to enclosed settlement, and new monument types such as middens, defended enclosures and possibly square-ditched barrows. Metalwork deposition continues, often in watery places, while some lithic scatters might also signal activity of this date. • **Roman.** Evidence survives of a dense spread of settlements and rectilinear field systems integrated with trackways and pit alignments, especially on the terraces downstream of Newark (where fieldwalking revealed artefact spreads interpreted as evidence for manuring of arable fields). There is compelling evidence for a developing hierarchy of small towns, villas, villages and farms. Major roads linked early forts, towns and roadside settlements. Temples and shrines should be expected, along with inhumation and cremation cemeteries. • **Early Medieval.** Significant remains have been recovered of Anglo-Saxon inhumation/cremation cemeteries and rare princely burials, together with groups of timber buildings, pits and sunken-floored structures indicative of settlement. Some Roman fields may have remained and may have influenced medieval open field layouts. Some roads/trackways may also have persisted, while some linear earthworks/cropmarks may mark early territorial boundaries. • **High Medieval.** Ridge and furrow and field shapes suggesting open fields provide a key resource for studies of agrarian change. A wide variety of other archaeological remains may survive in rural areas, including traces of fishponds, moated enclosures, deserted or shrunken villages, field chapels, post-mills, warrens and deer park boundaries. • **Post-medieval and Modern.** Field boundaries provide important evidence for the developing agrarian landscape and rural industrialisation (including quarries, limekilns, mills and straight ridge and furrow indicating steam ploughing). Other key resources include fishponds, deserted/shrunken villages, field chapels, moated enclosures, warrens, features illuminating changes in park and garden design and gentry leisure pursuits, and military remains (notably of the Civil War and World Wars I and II).	• **Desk-based assessments**, including **walkover surveys**, to precede all other work. • **Geomorphological mapping** should be conducted of landform elements identified during assessment. Further fieldwork may be required to clarify surface landforms and sub-surface stratigraphy (see below). • **Aerial photography.** Crop- and soilmarks show well on well-drained gravel terraces lacking significant alluvial veneers or slope deposits, and the major river valleys preserve remarkable cropmark palimpsests. All available air photographs should be inspected, followed by transcription of cropmarks, earthworks, *etc*. • **Lidar surveys** may assist earthwork identification, particularly in woodlands, and are particularly useful for palaeochannel mapping. All available lidar and other **airborne remote sensing data** should be examined during assessment. • **Geophysical surveys** have been applied effectively on this landform, both for targeting particular sites and for examining rapidly large application areas, and should be considered at the evaluation stage, together with **airborne techniques** such as multispectral remote sensing. • **Earthwork surveys** have highlighted the potential for the preservation of earthworks and palaeochannels in woodland, pasture and other environments protected from ploughing. Walkover surveys should be conducted to ensure the identification and subsequent evaluation of extant remains. • **Fieldwalking** is crucial for locating sites where surfaces little modified by Holocene geomorphological processes have been ploughed and has proved particularly effective in studies of the cropmark palimpsests of the Trent Valley around South Muskham. Identifications of lithic concentrations are especially important, as these may provide vital evidence for prehistoric sites represented by scant (if any) structural remains, and fieldwalking should precede and inform mitigation strategies. **Test-pitting** can elucidate further the character of finds scatters and the site stratigraphy, and in particular may identify remains preserved beneath alluvium, colluvium, *etc*. • **Sediment coring** may be recommended to investigate the sub-surface stratigraphy and topography and to map palaeochannels. • **Evaluation trenches** are useful for establishing the character of known sites and their archaeological and environmental potential (e.g. identification of features beneath ridges of ridge and furrow). Large-scale trenching may not always be recommended as many key sites are likely to elude discovery by this method (e.g. Neolithic to Early Iron Age and Anglo-Saxon settlements). • **Targeted excavation** may be recommended during mitigation, depending upon the results of evaluation (e.g. regionally important cropmark sites). • **Strip, map and sample techniques** tend to provide the most effective method for locating dispersed structural remains, such as characterise settlements of the Neolithic to EIA and Early Medieval periods. These should be applied routinely to ensure that sites of particular periods and types are not missed during excavation. Such mitigation strategies will require contingency provisions, which will be targeted by reference to this document upon the most significant archaeological remains. • **Palaeoenvironmental sampling and analysis** should be carried out routinely, including provision for scientific dating. On these landforms, sites with well-preserved faunal assemblages will be of particular significance. • **Application of a metal detector** to the conveyor belt is particularly recommended for this landform.

TABLE 7.2.5. ALLUVIUM		
Geomorphological Processes	**Archaeological Associations**	**Assessment, Evaluation and Mitigation Techniques**
• Thick alluvial deposits accumulated in valley bottom locations during the Holocene, principally in response to soil erosion and increases in sediment loads arising from woodland clearance and ploughing. These deposits extend across the modern floodplain and partially cloak the late Devensian Holme Pierrepont Terrace sands and gravels. • Late Pleistocene alluvium, dated securely by OSL dating and associated with Late Upper Palaeolithic lithic artefacts, has been identified on the edge of the Holme Pierrepont Terrace at Farndon Fields, suggesting a more extended chronology for some of the alluvium in valley-bottom locations. • Alluvium is sometimes interstratified with peat, and in the carrlands of the lower Trent is buried beneath extensive deposits of Holocene peat. • In all of the above areas, there is significant potential for the preservation beneath alluvium of structural remains and organic artefacts, and of palaeochannels and buried land surfaces with associated organic remains capable of elucidating the changing Holocene environment. • Lateral movement of the river across the modern floodplain and sudden shifts in course after flood (avulsions) have created a very distinctive floodplain topography of silted palaeochannels, oxbows, point bars, levees and other fluvial features. This channel mobility has also caused significant reworking of the Devensian sands and gravels and hence destruction of some archaeological structures and deposits. Assessment and evaluation should seek to identify areas where sands and gravels have been extensively reworked by fluvial erosion, as this will impact upon the range of archaeological remains that may be expected to survive.	• **Palaeolithic.** Dense scatters of Late Upper Palaeolithic artefacts were recovered during fieldwalking of the Holme Pierrepont Terrace at Farndon Fields. In addition, test-pitting and trenching revealed significant quantities of LUP finds stratified in late Pleistocene alluvium, interpreted as backswamp at the time of their deposition. The discovery at Farndon emphasises that some areas of alluvium might preserve artefact concentrations indicative of nationally important LUP open-air sites. • **Mesolithic.** Wetland resources are likely to have attracted Mesolithic hunter-gatherers, and activity foci in alluvial valley bottom locations may be sealed beneath or interstratified with alluvium. Some artefact scatters may be observed to continue beneath alluvium, but such remains may only be detected by test-pitting or other intrusive work. • **Neolithic to MBA.** Burnt mounds were located near watercourses and may be preserved beneath alluvium, together possibly with timber or brushwood trackways and logboats. Lithic scatters may continue beneath alluvium at terrace-edge sites. Floodplain locations may also be expected to preserve evidence for riverside activities associated with funerary and other ceremonial practices, including the deposition of metalwork and human remains. • **LBA and Iron Age.** Some terrace-edge settlements and field systems continued into alluvial zones, which may also preserve the remains of seasonally occupied sites and specialised structures such as wooden trackways and late examples of burnt mounds. Logboats should also be anticipated, together with ceremonially deposited metalwork and other material. • **Roman.** Significant numbers of enclosures, field systems, *etc*, may be seen to overlie alluvium, which might have been favoured in certain circumstances on account of its moisture-retentive and more productive soils. In other areas, alluvium may seal and hence preserve remains of this period, and on sites prone to periodic flooding may be interstratified with Roman structural remains or deposits. As in other periods, floodplain environments may be expected to preserve a rich range of evidence, including timber trackways, bridges, fords and logboats. • **Early Medieval.** There is evidence to suggest that settlement along the Trent and other major river valleys may have retreated to the more elevated locations favoured by later medieval villages in the face of increases in the frequency and magnitude of flooding and a rising water table. Remains should be anticipated on the floodplain of sub-alluvial fishweirs, timber bridges (and associated trackways) and logboats. • **High Medieval.** Ridge and furrow survives on some areas of the floodplain and provides important evidence for arable expansion into these flood-prone environments. Water meadows and osier beds have also been recorded, together with a wide range of structural remains (including relics of bridges, ferries, fords, fishweirs and mills preserved beneath alluvium). • **Post-Medieval and Modern.** Remains have survived beneath alluvium of a wide range of water-powered mills and other industrial sites, together with bridges, ferries, fords, dams, weirs, bankside revetments, flood banks and wharves. Water meadows and osier beds may also survive as visible features in floodplain environments.	• **Desk-based assessments**, including **walkover surveys**, to precede all other work. • **Geomorphological mapping** should be conducted of landform elements identified during assessment. Further fieldwork may be required to clarify surface landforms and sub-surface stratigraphy (see below). • **Aerial photography** is not an effective technique on areas of deep alluvium, but crop- or soilmarks are often visible in areas of thin alluvial cover or on low islands within the floodplain. Air photographs may also reveal palaeochannels, ridge and furrow and other earthworks. All available photographs should be inspected, followed by transcription of cropmarks, earthworks, *etc*. • **Lidar surveys** may assist earthwork identification, and are particularly valuable for mapping palaeochannels, ridge and swale, *etc*. All available lidar and **other remote sensing data** should be examined during assessment. • **Geophysical surveys** capable of identifying sub-alluvial channels and enabling reconstruction of the sub-alluvial topography should be considered during evaluation (e.g. electrical resistance tomography; ground-penetrating radar) and may be combined with sediment coring (below). • **Earthwork surveys**. Any earthworks located within the application area should be identified and surveyed prior to further investigation. • **Fieldwalking** is not appropriate on floodplains or terraces masked by deep alluvium, but may assist where earlier landforms protrude as 'islands' in the floodplain, on old (higher) alluvial terraces that have not experienced alluviation since early/mid-Holocene times, and terrace-edge locations where it may be possible to identify alluvial deposits that potentially seal well-preserved structural remains or deposits. **Test-pits** may aid characterisation of known finds scatters, especially where terrace-edge scatters continue beneath alluvium, reveal sub-alluvial finds in blank areas and assist studies of site stratigraphy. • **Sediment coring** should be conducted to establish the sub-surface stratigraphy and topography and to identify palaeochannels and other organically rich deposits. • **Evaluation trenches** provide a useful means of establishing the character of sites and their archaeological/environmental potential (e.g. identification of features beneath ridges of ridge and furrow). Large-scale trenching may not always be routinely recommended, as many key sites are likely to elude discovery by this method (e.g. Neolithic to Early Iron Age and Anglo-Saxon settlements). • **Targeted excavation** may be recommended during mitigation, depending upon the results of evaluation (e.g. palaeochannels yielding significant structural remains). • **Strip, map and sample techniques** provide effective methods for locating sub-alluvial structural remains and should be applied routinely. Stripping should be monitored closely to locate palaeochannels, buried soils, structures such as bridges, fishweirs and burnt mounds, boats, metalwork and other prehistoric to modern finds. Contingency provisions should be made for the recording of structural remains and finds and for the recording, sampling, dating and analysis of organic samples. • **Palaeoenvironmental sampling and analysis** should be carried out routinely, including provision for scientific dating. Associated organic remains have major potential for elucidating changes in landscape, agrarian economy and local climate • **Application of a metal detector** to the conveyor belt is strongly recommended for this landform: for example, for the retrieval of Bronze Age and Iron Age metalwork (compare Table 7.2.6).

TABLE 7.2.6. PALAEOCHANNELS AND CARRLANDS		
Geomorphological Processes	**Archaeological Associations**	**Assessment, Evaluation and Mitigation Techniques**
• Abandoned channels, active during the Holocene, may survive as visible linear depressions on the floodplain or Holme Pierrepont Terrace, or may lie sealed beneath alluvium and/or peat. Many channels incorporate pollen, waterlogged plants, insect and other organic remains that can elucidate the changing environment of river valleys and their environs. Radiocarbon dating of these deposits can provide a tight chronological framework for study of changes in vegetation, local climate and fluvial geomorphology. • Woodland clearance, which appears to have accelerated significantly during the Neolithic and Bronze Ages, impacted progressively upon surface run-off levels and the fluvial geomorphology of the major valleys. Quarrying of fluvially redeposited sands and gravels along some stretches of the Trent Valley has revealed large numbers of uprooted Neolithic and Bronze Age tree trunks, aligned parallel to the direction of flow of ancient rivers. These appear to have been uprooted by fluvial erosion and provide crucial evidence for early palaeochannels and the impacts of woodland clearance upon river discharge, erosion and alluviation. • Evidence for the dynamic fluvial regime of the Trent Valley before the navigational and other improvements of the Post-Medieval and Modern periods is provided by structural remains and artefacts indicating former river courses in redeposited sands and gravels (e.g. anchor stones for fishing; bridge foundations). • Extensive peat deposits developed in the carrlands of the lower Trent and Idle and form significant thicknesses of material above alluvium. These may seal earlier archaeological sites and may yield datable organic deposits with high environment potential.	• **Palaeolithic.** The potential for campsites, knapping foci, *etc*, in late Pleistocene waterside or marshland environments is demonstrated most eloquently by the LUP finds retrieved from Farndon Fields, and palaeochannel, backswamp and other wetland zones should be scrutinised closely for evidence of early open-air sites. • **Mesolithic.** The rich ecological resources of lowland riverine and marshy environments are likely to have attracted Mesolithic hunter-gatherers, as demonstrated by the extensive Mesolithic site at Misterton Carr, and activity foci in valley bottom locations may be sealed beneath later alluvium and sometimes peat. Artefact scatters may continue beneath alluvium or peat into valley bottoms, as at terrace-edge sites such as Collingham. Palaeochannels may yield important evidence of nearby activity, as shown by a female human femur, cut antler and animal bones found in a Mesolithic channel during investigations at Staythorpe. • **Neolithic to MBA.** Burnt mounds were located near watercourses and may be preserved on the edges of palaeochannels or incorporated into their fill as a result of later fluvial erosion, as recorded during excavations at Girton Quarry. Other structures that might survive in close association with palaeochannels or marshland environments include timber or brushwood causeways and riverside structures such as wharves. Palaeochannels may also be expected to yield evidence for riverside activities associated with funerary and other ceremonial practices, including the deposition of metalwork and human remains, together with logboats. Trackways in neighbouring counties are well known for the ceremonial deposition of Bronze Age metalwork and other finds (e.g. Fiskerton in the Witham Valley near Lincoln). • **LBA and Iron Age.** Burnt mounds may have continued in use into this period, although unequivocal evidence for continuity into the first millennium BC has yet to be demonstrated. Specialised riverside structures such as wharves, wooden causeways and logboats should also be anticipated, together with ceremonially deposited metalwork, other finds and possibly human remains. • **Roman.** A rich variety of evidence should be expected from palaeochannels and other wetland locations, including logboats, timber or brushwood trackways, remains of bridges and fords, and other riverside structures. In addition, the discovery at Holme Pierrepont of a virtually complete Roman spoked wooden wheel emphasises the potential of these landforms for the preservation of some remarkable artefacts. • **Medieval to Modern.** A wide range of archaeological remains, including the Anglo-Saxon and High Medieval fishweirs at Colwick, a remarkable Early Medieval bridge at Cromwell and ferries, fords, bankside revetments, fishweirs, dams, floodbanks, wharves and mills, may survive in association with palaeochannels or in other waterlogged environments. Investigations of visible palaeochannels and valley-bottom sands and gravels redeposited by fluvial erosion should also anticipate discoveries of logboats and other river craft, plus a variety of specialised artefact types associated with fishing and other river-based activities (such as anchor stones and wicker fishing baskets).	• **Desk-based assessments**, including **walkover surveys** to locate and record old river channels, ridge and swale *etc.* should be conducted first. Documentary and cartographic research may provide clues to the position of former river channels (e.g. spatial configuration of parish boundaries following former river channels). • **Geomorphological mapping** should be conducted of landform elements identified during assessment. Further fieldwork may be required to clarify surface landforms and sub-surface stratigraphy (see below). • **Aerial photographs** may reveal traces of old river channels and other fluvial features. All available vertical and oblique air photographs should be inspected during assessment and potential channels and other fluvial features (e.g. ridge and swale) should be plotted. • **Lidar surveys** are particularly valuable for mapping palaeochannels, and all available records should be examined. The results of **multi-spectral and other remote sensing techniques** should also be collated and assessed. • **Geophysical surveys** capable of identifying sub-alluvial channels and of reconstructing the sub-alluvial topography, such as electrical resistance tomography and ground-penetrating radar, should be applied in appropriate circumstances. These may usefully be combined with sediment coring (below). • **Sediment coring** should be conducted to establish the sub-surface stratigraphy and topography of alluvial zones, and in particular to identify palaeochannels and buried land surfaces indicating former areas of carrland and areas with well-preserved organic remains. • **Evaluation trenches** are particularly useful for assessing palaeochannels and for investigating the sub-surface stratigraphy of former wetlands. Provision must be made for appropriate recording of structural remains and finds, and for the recording, sampling, dating and analysis of organic samples. • **Targeted excavation** may be recommended during mitigation, depending upon the results of evaluation (e.g. palaeochannels yielding significant structural remains). • **Strip, map and sample techniques** provide a cost-effective mitigation strategy in view of the high likelihood of preserved palaeochannels with associated organic remains, buried land surfaces, structures such as bridges, fishweirs, wooden trackways and riverside burnt mounds, boats, metalwork and a host of other finds of prehistoric to modern date. Provision must be made for appropriate recording of structural remains and finds, and for the recording, sampling, dating and analysis of organic samples. This may require the use of contingencies for unexpected discoveries, while multiple discoveries will require careful prioritisation of resources. • **Palaeoenvironmental sampling and analysis** should be carried out routinely, including provision for scientific dating. Palaeochannels have a high potential for the preservation of pollen, plant macrofossils, insects and other organic remains, and hence for study of changes in the vegetation, agrarian economy and local climate. • **Application of a metal detector** to the conveyor belt is strongly recommended to ensure that metalwork deposited in riverine and other watery or damp locations does not elude discovery. Material recorded by this method cannot be tightly provenanced, but prompt retrieval may permit attribution of an approximate location. This is especially important in river valley environments in view of the wealth of metalwork that was deposited in wet or damp locations from the Early Bronze Age.

TABLE 7.2.7. COVERSANDS		
Geomorphological Processes	**Archaeological Associations**	**Assessment, Evaluation and Mitigation Techniques**
• Within the sparsely vegetated landscape of the Dimlington Stadial and the subsequent Lateglacial period, fine-grained glaciofluvial deposits were subject to processes of wind erosion. Extensive sheets of coversand were deposited across eastern England. Sand sheets blanket the Holme Pierrepont Sand and Gravel terraces on the eastern side of the valley floor in the Lower Trent Valley and in the Idle Valley around Tiln; they may extend over wider areas than is currently indicated in BGS records. • Palaeolithic land surfaces would have been buried by coversand deposition, and hence areas of coversand provide key opportunities for the discovery of *in situ* Palaeolithic remains. • The coversands may have been reworked at several periods subsequent to their deposition, notably around 8200BP (due to climatic change and/or human activity; Table 4.3.1) and possibly in the Roman and High Medieval period (in response perhaps to agrarian expansion and clearance). These deposits may potentially seal, therefore, finds and structural remains dating from a wide range of periods (including, at Girton, a rare Nottinghamshire example of a LBA-EIA midden).	• **Palaeolithic.** No definite finds of Palaeolithic lithic artefacts have yet been recorded in association with coversands, but there is significant potential for burial of *in situ* Upper Palaeolithic remains beneath these deposits. • **Mesolithic.** Lithic concentrations indicative of Mesolithic activity are particularly common on the coversands, which may have provided attractive environments for hunter-gatherer communities exploiting a wide range of ecological zones - most notably in the vicinity of the important Idle Valley site at Misterton Carr and around North Clifton, Spalford and Besthorpe in the Lower Trent downstream of Newark. • **Neolithic to MBA.** Extensive lithic scatters have been recorded during fieldwalking and excavations, notably at Misterton Carr and along the eastern side of the Trent Valley from Newton Cliffs to Besthorpe. Rare structural remains have been noted in association with occupation, including pits that may relate to Neolithic or Mesolithic activity at Newton Cliffs, while some of several ring-ditch cropmarks might signal funerary monuments of this period. Many more sites might lie below coversands or, on valley-edge sites such as Girton, beneath complex sequences of fluvial and wind-blown deposits. • **LBA and Iron Age.** Important sites of this period might lie preserved beneath coversands, as demonstrated by the discovery at Girton of an Early Iron Age midden and possible cultivation traces of this period. Other evidence for Iron Age settlement has been recovered from sites such as Besthorpe, suggesting that the light, easily cultivated and well-drained (but easily eroded) soils might have proved attractive to early farming communities. • **Roman.** Evidence for extensive Roman settlement and associated field systems has been recorded during excavations at Besthorpe and is supplemented by discoveries of surface scatters of pottery and other material (e.g. coins). • **Early Medieval.** Finds scatters of this period, plus discoveries of several sunken-floored structures and timber buildings on coversand deposits at Girton, provide important evidence for settlement in this period. As in earlier periods, there is significant potential for the preservation of additional structural remains beneath coversands, which may have been extensively reworked subsequent to their deposition. • **High Medieval to Modern.** Relics of ridge and furrow, field shapes suggesting open fields and field boundaries providing evidence for the process of enclosure are among the key archaeological resources of this landform, and together provide an important source of evidence for the evolving agrarian landscape. Scatters of medieval and later finds retrieved during fieldwalking have the potential for elucidating further changes in land-use, while scattered sand pits and documentary references to windmills, brick kilns and other structures emphasise the potential for the preservation of remains related to rural industrialisation.	• **Desk-based assessments**, including **walkover surveys**, to precede all other work. • **Geomorphological mapping** should be conducted of landform elements identified during assessment. Further fieldwork may be required to clarify surface landforms and sub-surface stratigraphy (see below). • **Aerial photographs** may reveal significant archaeological features and should be inspected routinely, followed by transcription of cropmarks, earthworks, *etc*. Many sites may lie beneath reworked coversands, but occasional discoveries of ring-ditches and other sites (e.g. Roman marching camp at Misterton) emphasise the importance of systematic searches of air photographs during assessment. • **Lidar surveys** may assist earthwork identification, particularly in woodlands impenetrable to air photography, and all available lidar and **other remote sensing records** should be examined during assessment. • **Geophysical surveys.** The effectiveness of ground-based geophysical and **airborne remote sensing techniques** is likely to be impaired by the masking effect of coversands. These techniques should be carefully targeted, taking account of the extent and depth of masking deposits, and it would be prudent to trial a range of techniques before committing resources to a large area. • **Earthworks** recorded during assessment should be surveyed prior to further investigations. • **Fieldwalking.** The potential of fieldwalking as a means of locating early archaeological sites is limited by the burial of Palaeolithic land surfaces under wind-blown sand and by the burial of Holocene sites under reworked coversands, but important evidence for activity may still survive (e.g. of Anglo-Saxon finds on sand dunes at Girton). **Test-pitting** may provide a more effective prospection method for early sites in which finds scatters are interstratified with coversands and should also assist understanding of the site stratigraphy and site formation processes. • **Sediment coring** should be considered as an effective means for establishing the depth of coversand deposits, which in turn will influence decisions on evaluation and mitigation strategies. • **Evaluation trenches** are useful for establishing the character of known sites and their archaeological and environmental potential, but large-scale evaluation trenching is not always recommended as many key sites may elude discovery by this method (e.g. Neolithic to Early Iron Age and Anglo-Saxon settlements). • **Targeted excavation** may be recommended during mitigation, depending upon the results of evaluation. • **Strip, map and sample techniques** provide the most effective method for locating dispersed structural remains (notably of Neolithic to EIA and Early Medieval settlements) and should be applied routinely to ensure that sites of particular types and periods are not missed during excavation. Such techniques are especially crucial on coversands, where the effectiveness of many prospection techniques is impaired by the depths of masking deposits. • **Palaeoenvironmental sampling and analysis** should be carried out routinely during evaluation and mitigation, including provision for scientific dating. • **Application of a metal detector** to the conveyor belt is particularly recommended for this landform, which might seal palaeochannels, *etc*., with a high probability of associated metalwork.

Landforms (see key below and Tables 7.2.1 – 7.2.7)	**ML**	**SS**	**Till**	**S&G**	**Alluv**	**PC**	**CS**
1. PRE-DETERMINATION DESK-BASED ASSESSMENT: CURATORIAL REQUIREMENTS							
Documentary and cartographic searches							
1. Search and collate Notts HER (Historic Environment Record) and HLC (Historic Landscape Characterisation) data							
2. Search and collate all relevant documentary sources							
3. Search and collate all relevant cartographic records (including historic and geological mapping)							
4. Research and assess place name evidence							
5. Search and collate Portable Antiquities Scheme data							
Other tasks							
6. Aerial photograph coversearch: plot archaeological sites from cropmarks, soilmarks, earthworks *etc.*							
7. Collate ground-based geophysics, lidar and other airborne remote sensing data							
8. Compile geomorphological maps from historic borehole data *etc*							
9. Plot palaeochannels and record known data on chronology, associated organics, artefacts, *etc*.							
10. Conduct walkover survey and plot archaeological sites, palaeochannels, *etc.* on base map							
2. PRE-DETERMINATION EVALUATION TECHNIQUES: SUITABILITY FOR EACH LANDFORM							
Non-intrusive techniques							
1. Commission aerial photographic, lidar, multi-spectral and other airborne remote sensing surveys							
2. Undertake ground-based geophysical survey (magnetometry, earth resistance, ground-penetrating radar, *etc*, as appropriate)							
3. Conduct surveys of extant archaeological earthworks (including plotting of ridge and furrow)							
Intrusive techniques							
1. Fieldwalking							
2. Sediment coring and analysis							
3. Test-pitting							
4. Evaluation trenching							
5. Palaeoenvironmental sampling and analysis							
3. POST-DETERMINATION MITIGATION: CURATORIAL REQUIREMENTS							
1. Archaeological control and supervision ('watching brief')							
2. Targeted excavation							
3. Strip, map and sample							
4. 100% excavation of features and deposits							
5 Metal detector attached to quarry conveyor belt							
6. Preservation *in situ* of structural remains, deposits, *etc*							
4. POST-FIELDWORK TASKS: CURATORIAL REQUIREMENTS							
1. Assessment of finds, environmental remains, *etc.*							
2. Updated Project Design							
3. Analysis of artefacts and ecofacts							
4. Preparation and dissemination of synthetic report							
5. Preparation of journal summary							
7. Preparation of full publication							
8. Archive preparation and deposition							

Table 7.2.8. Summary of standard curatorial requirements for assessment, evaluation and mitigation (red: always required; light red: required in certain circumstances) and of the suitability of evaluation techniques between landform elements. The suitability of evaluation techniques for each landform is indicated by a gradation from darker to lighter shades of blue, with dark blue indicating landforms where particular techniques have proved to be especially effective (ML: Magnesian Limestone bedrock; SS: Sherwood Sandstone bedrock; Till: Middle Pleistocene till; S&G: River terrace and glaciofluvial sands and gravels; Alluv: alluvium; PC: palaeochannels and carrlands; CS: coversands)

8. ARCHAEOLOGICAL RESEARCH AGENDA AND STRATEGY

INTRODUCTION

A Research Agenda and Strategy has been compiled for each archaeological period, employing an innovative tabular format permitting direct comparison between each Aggregate Character Area and easy correlation between Agenda Topics and Research Objectives. It was judged appropriate, in view of the significant overlap of research priorities between the Post-Medieval and Modern periods, to combine these in a single table, but otherwise each period has been allocated a separate table.

Agenda Topics have been defined by reference to the regional research priorities defined in the East Midlands Historic Environment Research Framework (EMHERF; Knight, Vyner and Allen 2012), and are restricted to topics that may reasonably be pursued during archaeological work in advance of and during developer-funded aggregates extraction. Correlations are noted with the numbered EMHERF Agenda Topics, thereby permitting easy correlation with the research priorities identified in that document.

For ease of reference, Agenda Topics have been numbered consecutively by period (1.1, 1.2, *etc*.), while Research Objectives have been allocated a unique alphanumeric code, incorporating the relevant period number (1A, 1B, *etc*.). Correlations between Agenda Topics and Research Objectives are indicated by filled circle symbols. A distinction has been drawn between Research Objectives that may be applied across all of the aggregates-producing areas and those that are specific to particular Aggregate Character Areas. From the Palaeolithic perspective, for example, prospection for natural caves sealed by talus or other slope deposits is only relevant in the context of the Magnesian Limestone, while prospection for pre-Anglian river deposits is confined to the Superficial Sands and Gravels. By contrast, the location and investigation of open-air sites, typological and trace element analyses of lithic artefacts and routine scientific dating are prioritised for each Character Area.

Fig.39. Laser technology provides a highly accurate and cost-effective tool for the surveying of subterranean features, as demonstrated by this unprocessed point cloud image of the interior of Church Hole Cave, Creswell Crags. © Trent & Peak Archaeology

TABLE 8.1. PALAEOLITHIC: *c.*950/850, 000 YEARS AGO – *c.*9,500 cal BC			
AGENDA TOPICS / **RESEARCH OBJECTIVES**	**1.1**. Can we elucidate the colonisation of Nottinghamshire by the earliest (pre-Anglian and early Intra-Anglian) hunter-gatherers and the environments over which they ranged?	**1.2**. What was the relationship between cave and open-air hunter-gatherer sites and how might this have changed over time?	**1.3**. Can we shed further light upon the patterns of movement of Upper Palaeolithic hunter-gatherers?
	EMHERF: 1.1.1–5; 1.5.1; 1.5.3	EMHERF: 1.3.1; 1.3.2; 1.4.3	EMHERF: 1.4.2–5
ALL AGGREGATE CHARACTER AREAS			
1A. Clarify typology/chronology of known Palaeolithic artefacts recorded in application area during assessment	●	●	●
1B. Prospect for open-air sites by fieldwalking and test-pitting to locate artefacts of flint, quartzite and other lithic raw materials		●	●
1C. Conduct detailed archaeological investigations of open-air sites within potential extraction areas		●	●
1D. Conduct typological and trace element analyses of lithic artefacts to investigate raw material sources and mobility patterns		●	●
1E. Promote routine scientific dating to clarify the poorly understood chronology of hominin activity	●	●	●
SUPERFICIAL SANDS AND GRAVELS			
1F. Locate pre-Anglian and early intra-Anglian river deposits with the potential for preserving traces of early hominin activity	●		
1G. Study the typology, raw materials and contexts of lithic artefacts contained in pre-Anglian and early intra-Anglian deposits and analyse associated organic remains	●		
MAGNESIAN LIMESTONE			
1H. Prospect for caves, rock shelters and fissures sealed by talus, colluvium *etc.* and potentially preserving Pleistocene cultural/environmental remains		●	●
1I. Conduct excavations to clarify character and date of activity in subterranean features threatened by aggregates extraction and ensure appropriate environmental analysis		●	●
SHERWOOD SANDSTONE			
1J. Locate and investigate sites sealed by colluvium or alluvium in valley bottoms, with the aim of locating routes of movement of hunter-gatherers between the Magnesian Limestone and Trent Valley		●	●

TABLE 8.2. MESOLITHIC: *c.*9500 cal BC – *c.*4000 cal BC				
AGENDA TOPICS / **RESEARCH OBJECTIVES**	**2.1**. How were caves and rock-shelters utilised during this period, what was their relationship to open-air settlements or specialised activity foci, and how might this have changed over time?	**2.2**. Can we elucidate further the character of open-air sites, and in particular establish changes in their morphology, functions, density and topographic locations over time?	**2.3**. How far can analyses of lithic collections and human bone enhance our understanding of mobility patterns (especially between the Trent and Pennines and in intervening areas)?	**2.4**. What may analyses of organic remains in caves, palaeochannels, *etc.*, contribute to studies of landscape change and developing Mesolithic subsistence strategies?
	EMHERF: 2.2.1; 2.3.1; 2.6.1	EMHERF: 2.2.1; 2.2.2; 2.3.1–5	EMHERF: 2.5.1; 2.5.2; 2.6.3	EMHERF: 2.6.1–3
ALL AGGREGATE CHARACTER AREAS				
2A. Clarify typology/chronology of Mesolithic artefacts during assessment and enhance knowledge of distribution of Mesolithic sites by further fieldwalking and test-pitting	●	●	●	
2B. Use strip, map and sample techniques to identify Mesolithic pits and other features		●		
2C. Promote routine scientific dating of contexts yielding Mesolithic cultural and/or environmental remains	●	●	●	●
2D. Building upon work at Staythorpe (Section 6.2.2), prioritise isotope analyses of human bones dated securely to this period			●	●
SUPERFICIAL SANDS AND GRAVELS				
2E. Locate and analyse organic deposits associated with Mesolithic activity, including targeting of known Mesolithic palaeochannels		●	●	●
2F. Prioritise fieldwalking, test-pitting and strip, map and sample to locate sites beneath coversands or alluvium, and thus with high potential for preservation of features/organics		●	●	●
MAGNESIAN LIMESTONE				
2G. Prospect for further caves and rock shelters that may be buried below talus, colluvium, *etc.*	●			
2H. Conduct excavations to establish character and date of activity in caves/rock shelters in areas approved for extraction; conduct environmental sampling and analysis	●		●	●
2I. Prioritise fieldwalking and test-pitting of areas in vicinity of Mesolithic caves/rock shelters to investigate relationship of open-air sites to caves and rock shelters	●	●	●	
SHERWOOD SANDSTONE				
2J. Test hypothesis of comparative paucity of activity in this ACA by encouraging fieldwalking, test-pitting and strip, map and sample to locate and characterise Mesolithic sites		●	●	
2K. Prioritise location and analysis of Mesolithic organic remains to enhance poor environmental record of this ACA, especially in Meden, Maun and Poulter valleys				●

TABLE 8.3. NEOLITHIC TO MIDDLE BRONZE AGE: *c.*4000 – *c.*1150 cal BC				
RESEARCH OBJECTIVES / **AGENDA TOPICS**	**3.1**. How far may the use of caves and rock-shelters have continued into this period, and what functions may they have performed?	**3.2**. Can we enhance the poor record of domestic sites, clarify their morphology, socio-economic status and interrelationships, and identify field/boundary systems?	**3.3**. Can we elucidate the growth of monumental landscapes and ceremonial/funerary traditions, and can we discern significant variations between landforms?	**3.4**. Can we refine our understanding of the processes of environmental change, the development of agriculture/diet and the variability of these between landforms?
	EMHERF: 3.2.1; 3.4.3; 3.5.3	EMHERF: 3.2.2; 3.3.4; 3.5.1–4; 3.7.1; 3.8.1; 3.8.2; 3.9.1; 3.9.2	EMHERF: 3.1.4; 3.4.3; 3.6.1–4; 3.7.2; 3.7.3; 3.8.2; 3.9.3	EMHERF: 3.2.1–4; 3.3.1–4; 3.4.1–3
ALL AGGREGATE CHARACTER AREAS				
3A. Assess fieldwalking, air photo and lidar resource to enhance distribution of known/potential sites (including examination of recorded lithic artefacts to check typology)		●	●	
3B. Prioritise strip, map and sample in order to identify and record settlements, monuments and field boundaries, particularly those with well-preserved organic remains		●	●	●
3C. Conduct fieldwalking and test-pitting across different ecological zones to test for variations in density/character of sites; excavate lithic scatters to clarify date/character		●		
3D. Undertake isotope analyses of human bone uncovered during excavation				●
3E. Prioritise scientific dating to refine chronology of monuments, progress of woodland clearance, *etc.* (especially Bayesian analysis of radiocarbon dates)	●	●	●	●
3F. Maximise metalwork retrieval by ensuring that metal detectors are applied to conveyor belts in suitable landforms (especially riverine environments)			●	
SUPERFICIAL SANDS AND GRAVELS				
3G. Prioritise location, sampling and dating of palaeochannels and sub-alluvial land surfaces yielding environmental data; monitor extraction in riverine areas			●	●
3H. Prioritise fieldwalking, test-pitting and strip, map and sample to locate sites below coversands/alluvium, and thus with high potential for preservation of features/organics		●		●
MAGNESIAN LIMESTONE				
3I. Prospect for caves/rock-shelters buried below talus and other slope deposits	●			
3J. Investigate use of caves/rock shelters, the character and date of activity and their relationship to open-air sites	●	●	●	
3K. Prioritise location and analysis of palaeoenvironmental remains from caves, rock shelters and other locations	●			●
SHERWOOD SANDSTONE				
3L. Test by further fieldwork the hypothesis that sites may have been sparsely distributed across this area		●		
3M. Prioritise location and analysis of palaeoenvironmental remains, especially in the Meden, Maun and Poulter valleys				●

TABLE 8.4. LATE BRONZE AGE AND IRON AGE: *c.*1150 cal BC – AD43				
AGENDA TOPICS / **RESEARCH OBJECTIVES**	**4.1**. Can we elucidate further the morphology, functions and spatial distribution of settlements, their interrelationships and the processes of enclosure and nucleation?	**4.2**. When, where and why did the earliest field and linear boundary systems develop, how did these change over time, and what functions may fields, pit alignments and other boundaries have performed?	**4.3**. What may analyses of environmental remains contribute to studies of the developing agrarian economy and its landscape impact?	**4.4**. Can we shed further light upon developing funerary and ritual traditions, including the structured deposition of metalwork and other artefacts in watery and other contexts?
	EMHERF: 4.2.1; 4.2.2; 4.3.1–3; 4.4.1–3; 4.5.1–3; 4.10.1	EMHERF: 4.6.1–3	EMHERF: 4.8.1–4	EMHERF: 4.7.1–3
ALL AGGREGATE CHARACTER AREAS				
4A. Identify, date and characterise fields and linear boundaries (e.g. by strip, map and sample)	●	●	●	
4B. Maximise opportunities for location and analysis of organic deposits	●	●	●	●
4C. Promote routine scientific dating, especially Bayesian modelling of radiocarbon dates	●	●	●	●
4D. Ensure effective characterisation of the LBA-EIA settlement resource by routine use of strip, map & sample	●	●	●	
4E. Promote studies of artefact production and distribution	●			●
SUPERFICIAL SANDS AND GRAVELS				
4F. Prioritise location, sampling and dating of palaeochannels and sub-alluvial land surfaces yielding environmental data; monitor extraction in riverine areas			●	●
4G. Prioritise investigation of placed deposits in riverine and other contexts				●
4H. Conduct large-scale excavations of Late Iron Age nucleated settlements and field systems of the river terraces and floodplain	●	●		
MAGNESIAN LIMESTONE				
4I. Promote fieldwalking, test-pitting, *etc.* to enhance comparatively poor knowledge of settlement distribution and prioritise area excavations to establish character	●	●	●	
4J. Prioritise investigations of locations with the potential for the preservation of ecofacts, artefacts or structural remains in caves, fissures and below talus or colluvium	●		●	●
SHERWOOD SANDSTONE				
4K. Prioritise large-scale stripping of brickwork-plan fields and settlements, focusing upon relationship of fields to settlements, dating of field ditches and environmental analyses to test hypothesis of pastoral emphasis	●	●	●	
4L. Focus investigations on valley bottom locations that may preserve artefacts, ecofacts or structural remains below colluvium or alluvium (e.g. Meden Valley)	●		●	

TABLE 8.5. ROMANO-BRITISH: AD43 – *c.*410				
AGENDA TOPICS / **RESEARCH OBJECTIVES**	**5.1**. Can we enhance our understanding of the developing settlement hierarchy, and in particular the relationships between farmsteads, nucleated villages, villas, estates and towns?	**5.2**. Can we shed further light upon the development of field and boundary systems, their relationship to Iron Age and post-Roman systems of land allotment, and their articulation with settlements?	**5.3**. What may analyses of organically rich deposits in palaeochannels, settlement contexts, field ditches, *etc.* contribute to studies of landscape change and the developing agricultural economy?	**5.4**. Can we shed further light upon the developing industrial economy, and how might the character and pace of change have varied between the Aggregate Character Areas?
	EMHERF: 5.3.1–5; 5.4.1; 5.4.3; 5.4.5; 5.4.6	EMHERF: 5.4.1; 5.4.4; 5.4.5; 5.5.4	EMHERF: 5.5.1–5	EMHERF: 5.6.1–5
ALL AGGREGATE CHARACTER AREAS				
5A. Focus resources upon the identification of Roman field systems and their relationship to settlements; encourage excavations to establish their character and development	●	●	●	
5B. Prioritise the location of structural remains and finds that may elucidate industrial developments, and undertake appropriate specialist analyses	●			●
5C. Promote routine scientific dating, especially Bayesian modelling of radiocarbon dates	●	●	●	●
5D. Prioritise collection and analysis of organic samples, especially from waterlogged environments and in contexts preserved beneath alluvium, colluvium and coversands			●	
SUPERFICIAL SANDS AND GRAVELS				
5E. Prioritise identification, sampling and dating of palaeochannels in the Trent, Idle and other major river valleys; monitor extraction in riverine areas			●	
5F. Promote investigation of areas in close proximity to secondary urban centres to investigate the impact of towns upon their immediate hinterland	●	●	●	●
5G. Prioritise excavation of the nucleated settlements of the river terraces and floodplain and of the coaxial field systems of the Trent downstream of Newark	●	●	●	●
MAGNESIAN LIMESTONE				
5H. Prioritise area excavations of rural settlements to enhance comparatively poor knowledge of Roman settlement morphology and functions	●	●	●	●
SHERWOOD SANDSTONE				
5I. Prioritise excavation of brickwork-plan fields and enclosures, focusing upon interrelationships of fields and settlements, dating of field ditches and environmental analyses to investigate the agricultural economy	●	●	●	●

TABLE 8.6. EARLY MEDIEVAL: *c.*410 – 1066				
AGENDA TOPICS / **RESEARCH OBJECTIVES**	**6.1**. Can we elucidate the development and territorial organisation of rural settlement, hierarchies of settlement, and the shift in some areas from dispersed to nucleated settlement?	**6.2**. Can we enhance our understanding of developing burial traditions, the changing demography of this period and pagan and Christian rituals and beliefs?	**6.3**. Can we trace the later history of Roman rectilinear field systems and the growth of the open field system, and how may agricultural practices have changed over time and across the County?	**6.4**. Can we provide further information on the development of trade and industry, and in particular the role of the Trent as a communications route and socio-economic divide?
	EMHERF: 6.4.1–.5	EMHERF: 6.1.1–6; 6.2.1–6	EMHERF: 6.7.1–5	EMHERF: 6.3.3; 6.3.4; 6.6.1–6
ALL AGGREGATE CHARACTER AREAS				
6A. Undertake systematic fieldwalking, metal-detecting and test-pitting to locate settlements and other activity foci	●			
6B. Prioritise strip, map and sample to locate and investigate settlements, fields and funerary sites, with focus upon study of shift from dispersed to nucleated settlement	●	●	●	●
6C. Survey ridge and furrow prior to extraction and ensure retrieval of finds from furrow fill during excavation			●	
6D. Focus upon the identification and analysis of structural remains and finds that may elucidate cultural links, industrial developments and trading networks	●			●
6E. Ensure routine scientific dating, particularly of excavated material spanning the poorly understood sub-Roman period	●	●	●	●
6F. Collect organic material from appropriate contexts; ensure systematic sampling, dating and analysis			●	
6G. Ensure the excavation of linear earthworks that might date from this period, particularly where they mark parish boundaries	●		●	
SUPERFICIAL SANDS AND GRAVELS				
6H. Monitor extraction of alluvium and terrace deposits to locate and investigate buried fishweirs, bridges, *etc.* and identify, sample and date palaeochannels	●		●	●
6I. Prioritise excavation of the coaxial field systems that extend across the Trent Valley downstream of Newark to investigate the possibility of post-Roman use			●	
MAGNESIAN LIMESTONE				
6J. Search for Early Medieval settlement, which currently especially poorly represented in this ACA, locate associated fields and prioritise excavation	●		●	●
SHERWOOD SANDSTONE				
6K. Prioritise the investigation of brickwork-plan fields to investigate the possibility of post-Roman continuity and the relationship of brickwork-plan fields to medieval open fields			●	

TABLE 8.7. HIGH MEDIEVAL: 1066 – 1485				
AGENDA TOPICS / **RESEARCH OBJECTIVES**	**7.1**. Can we elucidate the growth of nucleated villages and parishes, moated and other manorial sites, dispersed hamlets and farms, the form, evolution and functions of associated buildings, and the processes of desertion/shrinkage?	**7.2**. Can we shed further light upon the development of the open field system, changes in the agricultural economy and diet, and woodland management practices - and how may these have varied within the County?	**7.3**. What can we learn from investigations of monastic estates of the growth of monastic settlement, its social, economic and landscape impact, and variability between the monastic orders?	**7.4**. Can we advance our understanding of the production and distribution of pottery and other industrial or agricultural products and of the developing communications network?
	EMHERF: 7.2.1–4; 7.3.1–.5	EMHERF: 7.7.1–6	EMHERF: 7.5.1; 7.5.2; 7.5.6	EMHERF: 7.6.1–4
ALL AGGREGATE CHARACTER AREAS				
7A. Identify ridge and furrow and review documentary and map data that may elucidate developing settlement patterns and field systems	●	●	●	
7B. Conduct systematic surveys of ridge and furrow and ensure retrieval of finds from furrow fills during excavation to clarify dating		●	●	
7C. Undertake systematic fieldwalking to refine understanding of spatial variations in settlement patterns and land-use	●	●	●	
7D. Prioritise identification and analysis of structural remains and finds elucidating industry and trade	●		●	●
7E. Ensure routine environmental sampling/analysis and scientific dating	●	●	●	
7F. Conduct targeted excavations of linear earthworks and cropmarks marking parish, county or other medieval boundaries (e.g. wapentakes)	●			
SANDS AND GRAVELS				
7G. Monitor extraction of alluvium and terrace deposits to locate and investigate fishweirs, bridges, mills, *etc.* and identify, sample and date palaeochannels		●		●
MAGNESIAN LIMESTONE				
7H. Prioritise the location and investigation of deserted or shrunken villages and relics of associated fields, which currently especially poorly represented in this ACA	●	●	●	●
SHERWOOD SANDSTONE				
7I. Prioritise earthwork searches and surveys in areas of Sherwood Forest that have escaped modern ploughing and have a high potential for earthwork preservation (e.g. deer park and other boundary features)	●	●	●	

TABLE 8.8. POST-MEDIEVAL AND MODERN: 1485 TO PRESENT						
AGENDA TOPICS / **RESEARCH OBJECTIVES**	**8.1**. Can we elucidate the development of early enclosures, drainage schemes & other landscape changes linked to agrarian improvements?	**8.2**. Can we clarify the development of rural settlement, including construction of the flimsy structures that may be associated with the landless rural poor?	**8.3**. Can we shed light on developments in estate and garden design, including the landscape legacy of gentry leisure pursuits (e.g. fox coverts and fowling decoys)?	**8.4**. How did industrialisation and transport develop-ments impact upon the rural landscape (e.g. coal mining; lime-burning; canals & railways; quarrying)?	**8.5**. What traces have the military campaigns of the Tudor and later periods left in the rural landscape?	**8.6**. Can we enhance our understanding of the archaeology of outlying chapels, graveyards and other burial sites in rural areas available for extraction?
	EMHERF: 8.3.1; 8.3.2; 9.6.1; 9.6.2	EMHERF: 8.4.1–5; 9.1.1; 9.6.3	EMHERF: 8.2.1–5;9.5.1–6	EMHERF: 8.4.4;8.5.4; 9.1.1;9.4.1–5; 9.7.1–5	EMHERF: 8.7.1; 8.7.2; 9.8.1–3	EMHERF: 8.6.2-3; 9.3.2–4
ALL AGGREGATE CHARACTER AREAS						
8A. Ensure survey and excavation of deserted or shrunken villages and identification of physical remains relating to outlying settlement structures, chapels, burial sites, *etc.*		●				●
8B. Identify structural remains associated with landless rural poor (e.g. in small, irregular enclosures on edges of pasture, roads, *etc.*)		●				
8C. Identify landscape features and structures associated with parkland landscapes and gentry leisure pursuits			●			
8D. Record archaeological evidence of military activities in rural areas (battlefields, World War I/II batteries, *etc.*)					●	
8E. Identify narrow ridge and furrow formed by steam ploughing and other traces of industrialisation of agriculture	●			●		
8F. Record archaeological evidence of industrial activities in rural areas (e.g. old quarries & coal mining remains)				●		
8G. Prioritise systematic fieldwalking in order to elucidate spatial and temporal variations in field use and to identify ploughed-out industrial sites, battlefields *etc.*	●	●		●	●	
SUPERFICIAL SANDS AND GRAVELS						
8H. Prioritise recording of Civil War earthworks and associated features in areas designated for aggregates extraction around Newark					●	
8I. Monitor extraction of alluvium and terrace deposits to locate and investigate wharves, weirs, mills, bridges and other river-related transport and industrial features				●		
MAGNESIAN LIMESTONE						
8J. Prioritise surveys to locate and record the industrial archaeological remains that characterise rural areas of this ACA (notably limekilns and limestone quarries)				●		
SHERWOOD SANDSTONE						
8K. Prioritise recording of archaeological remains associated with this ACA's exceptional resource of outlying non-conformist chapels and burial grounds						●
8L. Promote surveys of the woods and parklands that characterise this ACA to locate traces of ridge and furrow, park and garden structures, rural industry, *etc*.	●	●	●	●	●	●

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APPENDICES 1–3

Compiled by David Budge

APPENDIX 1. LIST OF EVENT, ELEMENT AND MONUMENT REFERENCES ADDED TO THE HER DURING THIS PROJECT	
Event Reference	**Event Title**
9377	Watching brief at Ratcher Hill quarry, Mansfield, by John Samuels Archaeological Consultancy (JSAC)
9378	Evaluation on land adjoining East Leake Quarry by Cotswold Archaeology
9379	Watching brief on topsoil stripping, Phases 6 & 7, East Leake Quarry, Lindsey Archaeological Services (LAS)
9380	Watching brief on Phase 14 (south), East Leake Quarry, by LAS
9381	Watching brief on Phase 14 (north), East Leake Quarry, by LAS
9382	Watching brief on Phase 8, East Leake Quarry, by LAS
9383	Watching brief on Phase 11, East Leake Quarry, by LAS
9384	Watching brief on Phases 12 and 13 (north), East Leake Quarry, by LAS
9385	Watching brief on Phases 12 and 13 (south), East Leake Quarry, by LAS
9386	Magnetometer survey, Phase 9, East Leake Quarry, by Oxford Archaeotechnics
9387	Topographic survey, Phase 9, East Leake Quarry, by Oxford Archaeotechnics
9388	Topsoil stripping, Phase 9, East Leake Quarry, by Oxford Archaeotechnics
9389	Watching brief, Phase 9, East Leake Quarry, by LAS
9390	Excavation, Phases 9 and 10, East Leake Quarry, by LAS
9391	Watching brief and excavations in Phases 3, 4 and 5, East Leake Quarry, by LAS
9392	Fieldwalking at Girton Quarry southern extension, by Trent & Peak Archaeology (TPA)
9393	Trial trenching at Girton Quarry southern extension, by TPA
9394	Metal detecting at Girton Quarry southern extension, by TPA
9395	Watching brief at Girton Quarry southern extension, by TPA
9396	Fieldwalking at Girton Quarry northern extension, by TPA
9397	Watching brief on Test-pit 01, Girton Quarry northern extension, by TPA
9398	Watching brief on Test-pit 02, Girton Quarry northern extension, by TPA
9399	Geophysical survey at Girton Quarry northern extension (Area A) by Oxford Archaeotechnics
9400	Geophysical survey at Girton Quarry northern extension, by Oxford Archaeotechnics
9401	Watching brief at Girton Quarry northern extension, by TPA
9402	Watching brief, Phase 5, Girton Quarry northern extension, by TPA
9403	Watching brief and excavations at Girton southern extension, by TPA
9404	Geophysical survey at Langford, by TPA
9405	Excavation at Steetley Cave, by Oxford Archaeology North
9406	Watching briefs and trial trenching at Holme Pierrepont Quarry, by TPA
9407	Watching brief at Kirton Quarry, by Network Archaeology
9408	Watching brief at Kirton Quarry, by Network Archaeology
9409	Fieldwalking at Kirton, by JSAC
9410	Geophysical survey at Kirton, by GSB Prospection
9411	Casual find during walkover survey at Kirton, by TPA
9412	Geophysical survey at Misson, by West Yorks Archaeological Serviices (WYAS)
9413	Trial trenching at Misson, by MAP Archaeological Practice
9414	Fieldwalking at Misson, by MAP Archaeological Practice
9415	Casual find at Hagg Hill Quarry, Misson, by unknown person or persons
9416	Metal detecting at Misson by unknown parties
9417	Casual find from between Misson and Bawtry
9418	Casual find from Newington / Misson
9419	Fieldwalking at Misson, by Northern Archaeological Associates (NAA)
9420	Watching brief at Misson, by WYAS
9421	Geophysical survey at Misson, by WYAS
9422	Fieldwalking at Misson, by WYAS
9423	Watching brief on phase 2, Newington Quarry, Misson, by NAA
9424	Watching brief at Newington Quarry Phase 1, Misson, by NAA
9425	Geophysical survey at Misson, by GSB Prospection

9426	Trial trenching at Scrooby Top Quarry, Archaeological Research & Consultancy, University Sheffield (ARCUS)
9427	Excavation at Scrooby Top, by ARCUS
9428	Geophysical survey at Scrooby Top, by ARCUS
9429	Fieldwalking at Scrooby Top, by ARCUS
9430	Watching brief at Scrooby, by Doncaster Archaeological Society
9431	Fieldwalking at Scrooby, by Doncaster Archaeological Society
9432	Watching brief at Scrooby Top Quarry, Phase 4 Stage 1, by ARCUS
9433	Watching brief at Kirton Cream Quarry, Kirton, by Network Archaeology
9434	Watching brief at Kirton Best Red Quarry, Kirton, by Network Archaeology
9435	Watching brief at Kirton Quarry, by Network Archaeology
9436	Fieldwalking at Tiln North, Sutton and Hayton, by TPA
9437	Trial Trenching at Tiln North, Hayton and Sutton, by TPA
9438	Geophysical survey at Tiln, by Engineering Archaeological Services Ltd
9439	Earthwork survey at Tiln Holt, Hayton, by TPA
9440	Excavation at Tiln Holt, Hayton, by TPA
9441	Watching brief at Tiln, Hayton and Sutton, by TPA
9442	Fieldwalking at Tiln, by TPA
9443	Test pitting at Tiln South, Hayton, by TPA
9444	Metal detecting at Tiln, Hayton, by TPA
9445	Watching brief at Kilvington, by Pre-Construct Archaeology Lincoln (PCA)
9446	Evaluation (Phase 3) at Red Hill, Ratcliffe on Soar, by University of Leicester Archaeological Services (ULAS)
9447	Phase 4 excavation on Access and Haul Roads at Red Hill, Ratcliffe on Soar, by ULAS
9448	Watching brief at Red Hill, Ratcliffe on Soar, by ULAS
9449	Fieldwalking south of Slaynes Lane, Misson, by NAA
9450	Excavation during Phase 3, Newington Quarry, Misson, by NAA
9451	Geophysical survey at Scrooby Top, by ARCUS
9452	Fieldwalking at East Leake Quarry, by TPA
9453	Trial trenching at Bulcote and Gunthorpe, by TPA
9454	Watching brief at The Alps, Hodsock,, by TPA and LAS
9455	Trial trenching at Adbolton, Holme Pierrepont, by TPA
9456	Watching brief on service trench at Red Hill, Ratcliffe on Soar, by Birmingham University Field Archaeology Unit (BUFAU)
9457	Walkover survey in Lord Stubbins Wood and Parsons Wood, Warsop, by TPA
9458	Trial excavation at Sturton le Steeple, by TPA
9459	Geophysical survey at Sturton le Steeple, by TPA
9460	Systematic fieldwalking survey at Sturton le Steeple, by TPA
9461	Evaluation at Raymoth Lane, Worksop, by PCA
9462	Watching brief at Gamston, by CgMs Consulting
9463	Test pitting at Farndon by LAS
9464	Watching brief on Harworth–Bircotes pipeline, by PCA
9465	Trial trenching at Foxholes Farm, North Muskham, by NAA
9466	Watching brief on river drainage and associated works, Perlethorpe cum Budby
9467	Watching brief on house construction, Barnby Moor, by M&M Archaeological Services
9468	Evaluation at Apleyhead Interchange, Babworth, by Oxford Archaeology
9469	Geophysical survey at Apleyhead Interchange, Babworth
9470	Trial trenching at Red Hill, Ratcliffe on Soar, by Birmingham Archaeology
9471	Watching brief at Burridge Farm, South Muskham, by JSAC
9472	Trial trenching at North Muskham by JSAC
9473	Excavation at Tiln, Hayton, by TPA
9474	Watching brief at Hoveringham, by TPA
9475	Watching brief at Sutton Grange, Lound, by TPA

Element Ref.	Element Title
11917	Post-medieval pit at Rempstone
11918	Modern finds from Rempstone
11919	Worked flint from Rempstone

11920	Worked Flints from Phase 7, East Leake Quarry
11921	Post Med-Mod features, Phases 6 and 7, East Leake Quarry
11922	Linear features in Phase 14, East Leake Quarry
11923	Bronze Age cremations in Phase 8, East Leake Quarry
11924	Pits and post hole in Phase 8, East Leake Quarry
11925	Ro pottery from Phases 12 and 13 (south), East Leake Quarry
11926	Worked flint from Phases 12 and 13 (south), East Leake Quarry
11927	E Med features from Phases 12 and 13 (south), East Leake Quarry
11928	Possible BA/IA pit in Phases 12 and 13, East Leake Quarry
11929	Earthwork platforms, Phase 9, East Leake Quarry
11930	Iron Age features, Phases 9 and 10, East Leake Quarry
11931	Burnt material and other features in Area 1, Phase 9, East Leake Quarry
11932	Post-medieval finds, Phase 9, East Leake Quarry
11933	Worked flint from Phase 9, East Leake Quarry
11934	Bronze Age ring ditch and associated features, Phase 5, East Leake Quarry
11935	Early Medieval burials, Phase 5, East Leake Quarry
11936	Medieval–modern features, Phases 3-5, East Leake Quarry
11937	Neo/BA flints from Girton Quarry southern extension
11938	Fire-cracked pebbles from Girton Quarry southern extension
11939	Saxo-Norman pottery from Girton Quarry southern extension
11940	Medieval pottery from Girton Quarry southern extension
11941	Saxon pottery from Girton Quarry southern extension
11942	Romano-British pottery from Girton Quarry southern extension
11943	E Med metalwork from Girton Quarry southern extension
11944	E Med grubenhaus, Girton Quarry southern extension
11945	Prehistoric flintwork, Girton Quarry southern extension
11946	Romano-British pottery, Girton Quarry southern extension
11947	E Med pottery, Girton Quarry southern extension
11948	E Med sunken-floored features in Girton Quarry southern extension
11949	Post-med finds from Girton Quarry northern extension, Spalford
11950	Post-med finds from Girton Quarry northern extension, Spalford
11951	Ro pottery from Girton Quarry northern extension, South Clifton
11952	Late Mes to BA flints from Girton Quarry northern extension, South Clifton
11953	Medieval pottery from Girton Quarry northern extension, South Clifton
11954	Ditch at Girton Quarry northern extension, South Clifton
11955	Romano-British pottery from Girton Quarry northern extension, South Clifton
11956	?Ro features, Girton Quarry northern extension, South Clifton
11957	?BA mounds and pits at Girton Quarry northern extension
11958	Pit alignment and ditch at Girton Quarry northern extension
11959	Ditch system at Girton Quarry northern extension
11960	Prehistoric pits at Girton Quarry northern extension
11961	Fire-cracked pebbles from Girton Quarry northern extension, Spalford
11962	Ditches at Girton Quarry northern extension, Spalford
11963	Preh ditches and pits at Girton Quarry southern extension
11964	BA middens and cultivation at Girton Quarry southern extension
11965	Late Neo/early BA burials at Girton Quarry southern extension
11966	?IA /Ro features at Girton Quarry southern extension
11967	E Med features at Girton Quarry southern extension

11968	Romano-British pottery at Langford
11969	E Med and Med features, Girton Quarry southern extension
11970	Steetley Cave, Worksop
11971	Ditches and enclosures at Langford, site C
11972	Post-medieval pit alignment at Holme Pierrepont
11973	Ring-ditch G, Holme Pierrepont Quarry
11974	Ring-ditches at Holme Pierrepont Quarry
11975	E Med graves and ring-ditches at Holme Pierrepont
11976	Possible pillow mound structures at Holme Pierrepont Quarry
11977	E Med grubenhaus at Holme Pierrepont Quarry
11978	Prehistoric pits at Holme Pierrepont Quarry
11979	? Ro pit at Holme Pierrepont Quarry
11980	Romano-British pottery from Kirton
11981	Possible circular features at Kirton
11982	Lithic artefact from Kirton
11983	Lithic artefacts from Misson
11984	Bronze Age palstave from Hagg Hill Quarry, Misson
11985	Romano-British finds from Misson
11986	Bronze Age sword or dagger from near Misson
11987	Neolithic polished axe from Misson
11988	Mesolithic to Bronze Age lithic artefacts from Misson
11989	Romano-British pottery from Misson
11990	Medieval pottery from Misson
11991	Post-medieval lithics from Misson
11992	Romano-British ditches at Misson
11993	Unworked flint from surface of prehistoric palaeosol, Misson
11994	Neolithic to Bronze Age lithic atefacts from Misson
11995	Lithic artefacts from Misson
11996	Ditch at Misson
11997	Probable Romano-British ditches at Scrooby Top, Scrooby
11998	Postp-medieval pottery from Scrooby
11999	Romano-British ditches and other features at Scrooby Top, Scrooby
12000	Lithic artefacts from Scrooby
12001	Post-medieval pottery from Scrooby
12002	Romano-British ditch at Scrooby
12003	Flint flake from Scrooby
12004	Ditches at Scrooby
12005	Post-medieval finds from Cream Quarry, Kirton
12006	Pond at Kirton
12007	Linear cropmarks at Tiln, Hayton and Sutton
12008	Romano-British pottery from Tiln, Sutton and Hayton
12009	Post-medieval artefacts from Tiln, Sutton and Hayton
12010	Fire-cracked pebbles from Tiln North, Hayton and Sutton
12011	Quern fragments from Tiln, Sutton and Hayton
12012	Mesolithic lithic artefacts from Tiln, Hayton and Sutton
12013	Prehistoric pottery from Tiln, Hayton and Sutton
12014	Ditch in Trench 1, Tiln North, Hayton
12015	Lithic artefacts from Trench 1, Tiln, Hayton
12016	Romano-British ditches and features in Trenches 2 and 3, Tiln, Hayton
12017	Romano-British features in TRrenches 04, 05 and 06, Tiln, Hayton and Sutton
12018	Burnt mound material at Tiln, Sutton
12019	Earthworks at Tiln Holt, Hayton
12020	Lynchet at Tiln, Hayton
12021	IA / Romano British features at Tiln, Hayton and Sutton
12022	Wooden artefacts from Tiln, Hayton

12024	Post-medieval coin hoard from Tiln, Hayton
12025	Linear features at Kilvington
12026	Iron Age pit at Red Hill, Ratcliffe on Soar
12027	Romano-British features at Red Hill, Ratcliffe on Soar
12028	Medieval well and other features at Red Hill, Ratcliffe on Soar
12029	Post-medieval features and finds at Red Hill, Ratcliffe on Soar
12030	Romano-British pottery from Red Hill, Ratcliffe on Soar
12031	Lithic artefacts from Red Hill, Ratcliffe on Soar
12032	Romano-British pottery from Misson
12033	Medieval pottery from Misson
12034	Mesolithic and Neolithic lithic artefacts from Misson
12035	Early Neolithic and later Mesolithic lithic artefacts from Misson
12036	Mesolithic knapping sites in natural hollows, Misson
12037	Linear features at Scrooby
12038	Worked flint from East Leake Quarry
12039	Worked flint from East Leake Quarry
12040	Worked flint from East Leake Quarry
12041	Post-medieval finds from East Leake Quarry
12042	Prehistoric / Romano-British finds from Trench 01, Site 3, Bulcote
12043	Romano-British linear features in Trench 2, Site 2, Bulcote
12044	Iron Age and Romano-British features, Site 1, Trench 03, Bulcote
12045	Prehistoric pottery from Misson
12046	Post-medieval / modern artefacts from Misson
12047	Medieval pottery from Misson
12048	Ditches, pits and other features at Hodsock, Areas 01 - 05
12049	Ditches and other features at Hodsock, Areas 06 to 13
12050	Romano-British ditches and other features at Hodsock, Areas 14 - 28
12051	Medieval pottery from Hodsock
12052	Pottery from Hodsock
12053	Prehistoric flint from trench 01, Adbolton, Holme Pierrepont
12054	Medieval finds and features in Trenches 01 and 02 at Adbolton
12055	Fire-cracked pebbles from Adbolton, Holme Pierrepont
12056	Post-medieval features in Trench 03, Adbolton, Holme Pierrepont
12057	Medieval pottery in Trench 03, Adbolton, Holme Pierrepont
12058	Post-medieval pottery from Trench 04, Adbolton, Holme Pierrepont
12059	Medieval pottery from Trench 04, Adbolton, Holme Pierrepont
12060	Prehistoric finds and features in Trench 04, Adbolton, Holme Pierrepont
12061	Post-medieval pottery from Trench 05, Adbolton, Holme Pierrepont
12062	Medieval ditch in Trench 05, Adbolton, Holme Pierrepont
12063	Post-medieval wall, demolition rubble and finds from Trench 06, Adbolton, Holme Pierrepont
12064	Medieval gully and post hole in Trench 06, Adbolton, Holme Pierrepont
12065	Iron Age ditch in Trench 07, Adbolton, Holme Pierrepont
12066	Iron Age gully and pit in Trench 08, Adbolton, Holme Pierrepont
12067	Lithics from Trench 09, Adbolton, Holme Pierrepont
12068	Romano-British pottery from Trench 07 or 08, Adbolton, Holme Pierrepont
12069	Romano British finds and features at Red Hill, Ratcliffe on Soar
12070	Long mound and terraces at Warsop
12071	Bank and ditch at Warsop
12072	Clearance cairn at Warsop
12073	Mound, possibly a barrow, at Warsop

12074	Earthworks of D-shaped enclosure
12075	Romano-British features at Site B, Sturton le Steeple
12076	Lithic artefacts from Site B, Sturton le Steeple
12077	Early medieval stake from Site B, Sturton le Steeple
12078	Prehistoric pottery from Site B, Sturton le Steeple
12079	Romano-British features and finds at Site C, Sturton le Steeple
12080	Medieval pottery from Site C, Sturton le Steeple
12081	Romano-British features at Site D, Sturton le Steeple
12082	Bronze Age wooden stakes at Site E, Sturton le Steeple
12083	Romano-British artefacts from Site E, Sturton le Steeple
12084	Post medieval field ditch at Site A, Sturton le Steeple
12085	Romano-British enclosure and features, Raymoth Lane, Worksop
12086	Pit at Worksop
12087	Post-medieval pit at Farndon
12088	Medieval pottery from Farndon
12089	Late medieval / post-medieval and modern pottery and artefacts from Farndon
12090	Late Mesolithic / early Neolithic flints from Farndon
12091	Possible early medieval pottery from Farndon
12092	Late Neolithic / Early Bronze Age lithic artefacts from Farndon
12093	Medieval or RB quern from Farndon
12094	Medieval artefacts from Hodsock
12095	Romano-British features from Trench 1 at Fox Holes Farm, North Muskham
12096	Pit alignments and other features in Trench 4 at Foxholes Farm, North Muskham
12097	Medieval and post-medieval features in Trench 5, Foxholes Farm, North Muskham
12098	Post-holes in Trench 6, Foxholes Farm, North Muskham
12099	Pit in Trench 9, Foxholes Farm, North Muskham
12100	Unstratified blade core and knife from North Muskham
12101	Piles and walling at Perlethorpe
12102	Walling of canal, Perlethorpe
12103	Stakes and other features at Perlethorpe
12104	Culvert at Perlethorpe
12105	Ditch in Trench 03, Babworth
12106	Ditches and gullies in Trenches 12, 14, 20, 34 and 61, Babworth
12107	Post-holes or pits and ditches in Trench 60, Babworth
12108	Ditch in Trench 30, Babworth
12109	Wooden pipe in Area G, Perlethorpe
12110	Romano-British urban occupation layers, features, industrial activity and finds
12111	Prehistoric or Saxon pottery from Trench 56, Red Hill, Ratcliffe on Soar
12112	E med or prehistoric pottery from Trench 18, Red Hill
12113	Romano-British inhumations in Trench 24 at Red Hill, Ratcliffe on Soar.
12114	Romano-British inhumation in Trench 35, Red Hill, Ratcliffe on Soar
12115	Medieval and post-medieval artefacts and features at Red Hill, Ratcliffe on Soar
12116	Lithic artefacts from Red Hill
12117	Linear ditch at South Muskham
12118	Iron Age features in Trenches 1 and 2 at North Muskham
12119	Features in trenches 3 and 4, North Muskham

12120	Romano-British features at Tiln.
12121	Burnt mound at Hoveringham
12122	Ditches at Hoveringham
12123	Features at Sutton Grange, Lound.

Monument Ref.	Monument Title
18368	Early BA cremation cemetery, Phase 8, East Leake Quarry
18370	Burnt mound at Phase 9, East Leake Quarry
18371	Middle Iron Age settlement, Phase 9/10, East Leake Quarry
18372	Bronze Age cemetery, Phase 5, East Leake Quarry
18373	Early Medieval inhumation cemetery, Phase 5, East Leake Quarry
18374	E Med settlement at Girton Quarry southern extension
18375	Burnt mounds and "water pits" at Girton Quarry northern extension
18376	Beaker cemetery at Girton Quarry southern extension
18377	Early Saxon inhumation cemetery at Holme Pierrepont
18378	Early Saxon settlement at Holme Pierrepont
18380	Post-medieval rabbit warren, Holme Pierrepont
18381	Middle / late Neolithic / Early Bronze Age knapping site at Misson
18382	Romano-British settlement at Tiln, Hayton
18383	IA / Romano-British settlement at Tiln
18384	Parish boundary, Cossall/Trowell
18385	Mesolithic knapping site at Misson
18386	Iron Age occupation at Adbolton, Holme Pierrepont
18387	Romano-British settlement at Sturton le Steeple
18388	Romano-British settlement at Sturton le Steeple
18389	Romano-British settlement at Sturton le Steeple
18390	IA / Romano - British settlement enclosure at Raymoth Lane, Worksop
18391	Canal at Thoresby, Perlethorpe cum Budby
18392	Mill at Thoresby, Perlethorpe cum Budby
18393	Iron Age settlement at North Muskham
18394	Burnt mound at Hoveringham

APPENDIX 2. LIST OF HER ENTRIES AMENDED DURING THIS PROJECT

Monument Reference	Monument Title
500	Red Hill Roman settlement, Ratcliffe on Soar
777	Adbolton deserted village
778	Adbolton Church, Holme Pierrepont
2995	Multi-period settlement, South Muskham
4924	Farmstead, Hodsock
5091	Farmstead, Misson
8047	Bronze Age Barrow Cemetery, Holme Pierrepont
18341	Roman Farmstead, Scrooby

APPENDIX 3. LIST OF HER ENTRIES REDATED DURING THIS PROJECT			
Reference	**Title**	**New Period From**	**New Period To**
M1234	Prehistoric occupation, Smite Hill, Langar cum Barnstone & Wiverton Hall	Mes	BA
M1237	Prehistoric occupation, Langar cum Barnstone	Mes	BA
M3985	Flint working site in RLN1, Sutton in Ashfield	Neo	BA
L27	Flint flakes from Crow Wood Hill, Gotham	Neo	BA
L33	Flint scraper from Bunny parish	Pa	BA
L481	2 flint flakes from Thrumpton	Pa	BA
L490	Flint flakes found off Flawford Lane, Plumtree	Neo	BA
L557	Flint finds from near gravel workings, Attenborough	Pa	BA
L569	4 flint arrowheads found at the rear of 90, The Downs, Wilford. (1) (Grid ref corrected by OS)	Neo	BA
L861	A beaked horseshoe-shaped scraper, in unpatinated black flint, was found on the surface on the Hall	Neo	BA
L945	Flint finds from Bassingfield, Holme Pierrepont	Neo	BA
L995	Prehistoric flintwork, Cropwell Butler	Neo	BA
L1175	Prehistoric flint finds, Bingham	Neo	BA
L1234	Extensive scatter of worked flints, Smite Hill, Langar cum Barnstone & Wiverton Hall	Mes	BA
L1235	Worked flints, Tithby	Neo	BA
L1237	Extensive scatter of worked flint, Langar cum Barnstone	Mes	BA
L1239	Flaked flint tool, Langar cum Barnstone	Neo	Neo
L1353	Worked flints, Bingham	Neo	BA
L1354	Worked flints, Bingham	Neo	BA
L1355	Worked flints, Bingham	Neo	BA
L1356	Worked flints, Bingham	Neo	BA
L1357	Worked flints, Bingham	Neo	BA
L1499	Worked flint flakes, Thoroton	Pa	BA
L1504	Small flint scatter, Thoroton	Neo	BA
L1559	Flint blade, Aslockton	Mes	BA
L1570	Flint flakes, Sibthorpe	Neo	BA
L2027	Worked flint flakes, East Bridgford	Neo	BA
L2248	Flint finds from Arnold	Neo	BA
L2249	Red Hill, Arnold: flint finds	Neo	BA
L2251	Western Boulevard	Neo	Neo
L2421	Flint flakes found in "The Dumbles", Selston	Neo	BA
L2787	Flint cores and flakes, Oxton	Neo	BA
L2796	Flint awl, Edingley / Halam	Pa	BA
L3038	Flint Flake from Newark	Pa	BA
L3113	Finds from Millfield, East Stoke	Neo	BA

L3530	Worked Flint from Hawton	Pa	BA
L3540	Flint Finds from Collingham	Neo	BA
L3696	Flint Flakes from Balderton	Neo	BA
L3946	Flint blade found on Fackley Road, Sutton in Ashfield	Pa	BA
L3965	Flint thumbnail scraper from Skegby	Neo	BA
L3966	Flint finds from HH5, Sutton in Ashfield	Mes	BA
L3967	Flint finds from TM1, Sutton in Ashfield	Neo	BA
L3968	Flint finds from HH9, Sutton in Ashfield	Neo	BA
L3969	Flint finds from HH6, Sutton in Ashfield	Neo	BA
L3970	Flint finds from HH7, Sutton in Ashfield	Neo	BA
L3971	Flint finds from HH3, Mansfield	Mes	BA
L3972	Flints and a core from HH4, Mansfield	Neo	BA
L3973	Flint finds from HH2, Mansfield	Neo	BA
L3974	Flint finds from HH1, Mansfield	Neo	BA
L3975	Flint finds from WN3, Sutton in Ashfield	Neo	BA
L3976	Flint implements and waste from WN1, Sutton in Ashfield	Mes	BA
L3979	Flint waste from WE3, Sutton in Ashfield	Neo	BA
L3980	Flint finds from WN2, Sutton in Ashfield	Neo	BA
L3981	Flint finds from BR1, Sutton in Ashfield	Neo	BA
L3985	Flint finds from RLN1, Sutton in Ashfield	Mes	BA
L3994	Flint finds to east of Dawgates Lane, Sutton in Ashfield	Neo	BA
L4014	Flint Wasters from SW3, Mansfield	Neo	BA
L4015	Flint finds from PE1, Mansfield	Neo	BA