

An Archaeological Resource Assessment and Research Agenda for The East Midlands during the modern period (1750-2000)

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I. Introduction

The diversity and survival of both documentary and physical evidence from this period introduces specific challenges for archaeologists, not least because the role of fieldwork may be viewed as a secondary means of confirming or enhancing historically-based perspectives. Equally, opinions differ about the term ‘Industrial Revolution’ (Clark 1999), and for this reason ‘the archaeology of industrialization’ may be a more appropriate term within a multi-period overview when describing sometimes muted or neutral responses to new technology and working systems (Beckett & Heath 1988; Palmer 1999). However, identifying industrialization as the primary period theme (in the academically restricted sense of ‘industrial archaeology’) may obscure or exclude other aspects of social archaeology and tend to reinforce traditional perceptions about the archaeology of the last 200 years or so as being exclusively about industrial activity. That said, it would be unwise to assume a clearly demarcated transition from the post-medieval, and sites of this period should not be seen as divorced in any sense from the broad continuum of earlier regional development. This is particularly pertinent in urban excavation contexts where more recent deposits may be deemed of relatively little significance in comparison with those of earlier periods. It is important to note the often-strong archaeological connections between this and the preceding period (Courtney in this volume).

Nationally, as an archaeological period it has received less comprehensive academic attention and therefore lacks a mature theoretical tradition: Grant (1987), an historical geographer, highlights potential solutions that remain pertinent. Three broad disciplinary strands are prominent for this period’s study: post-medieval, industrial and historical archaeology, pursuing differing research agendas. The *Post-Medieval Archaeology* journal originally featured articles up to the period 1750, but has covered topics concerning C19 ‘industrial’ themes. Crossley (1990) addresses a range of social and cultural themes including industrialisation, but generally not post-1750 themes. Conversely, the *Industrial Archaeology Review* has articles on industrial themes, broadly, but not rigidly 1750-1950. Recent texts on industrial archaeology reflect a maturing discipline: Cossons (2000) is an important milestone; Palmer considers its academic context (1990), setting out research priorities for the Association for Industrial Archaeology (AIA) (1991). Palmer & Neaverson (1998) provides a ‘guide’ to its present status, and English Heritage (1995) sets out their role and perspective. Trinder (1992) provides both national and international perspectives. Despite progress, theoretical and methodological issues remain to be properly addressed in terms of social context, material culture and environmental evidence (flora, fauna).

Finally, historical archaeology (‘the archaeology of the recent past’) has its roots in North American, Canadian and Australian scholarship addressing aspects of ‘colonialism’, evolving a rich, if contentious, theoretical foundation (Campion 1996; Clark 1999). Research is not confined to industrial themes alone, but investigates relationships between notions of ‘identity, power and meanings’. Tarlow & West (1999) is an important collection of nascent British historical archaeological research, covering the period 1500 to the present (but not East Midlands topics). The discipline’s theoretical approach allows for a more consistent progression from that of earlier periods, suggesting potentially rich avenues of exploration within the archaeology of this period, which necessarily embraces a wider remit than the theme of industrialisation alone permits.

II. Existing state of regional knowledge and research

To date industrial archaeologists and economic historians have made perhaps the most significant contribution to regional understanding. Despite this, there remain many areas that are improperly understood, principally because of a lack of expertise rather than perceptions of limited value. In reality a considerable range of evidence exists in varying states of survival, much of it mundane in nature, perhaps explaining occasional scholarly indifference. However, this type of evidence offers the best chance of understanding the broad sweep of industrial and social conditions if we are to move away from concerns with technology,

'firsts' and the more 'spectacular' themes, few of which reflected the realities of life for most people. In the sections below the region's main industries, settlement and transport contexts are indicated but it is useful to begin with an overview of the current status of Sites and Monuments Records (SMR), professional projects and amenity societies.

Post-1750 site records held by the regional SMRs vary considerably, reflecting the interests of individuals, societies or specific demands for professional recording. The AIA's *Index Record for Industrial Sites* initiative (Trueman & Williams, 1993), has enjoyed mixed success in enhancing SMR databases. English Heritage's Monuments Protection Programme evaluation of industrial sites has generated information on both industries and specific sites, leading to a number of new or revised scheduling of monuments (Schofield, 2000). There have been a number of research projects on a county basis, including quarrying, Defence of Britain, parks and gardens, Council for British Archaeology (CBA) record card transcriptions, listed buildings and industrial period monuments identified by various Extensive Urban Surveys (EUS). Additionally, county Historic Landscape Characterization Projects are providing an important resource for investigations into urban and rural landscapes from 1750 onwards.

The Derbyshire EUS project addresses one of the most serious deficiencies in the coverage of the SMR, notably urban centres and the understanding of their growth. Also in Derbyshire, the publication of gazetteers of industrial sites for Amber Valley, High Peak and Erewash (notably the lace industry, at Long Eaton and Ilkeston) has enhanced records, as have CBA report cards. The industrial element of Northamptonshire's EUS has studied 18 industrial period towns in the county, highlighting important industrial and related sites (Ballinger, 1999a&b). Lincoln city has been the focus of a recent industrial archaeology survey (CLAU, 1999).

National and regional archaeological organisations have undertaken valuable landscape studies, and are increasingly contributing to knowledge through site or building recording, particularly at the county unit level. In Nottinghamshire, surveys undertaken by or in partnership with the County Council include Newark's Industrial Archaeological Resource (Sheppard, Walker & Walker, 1993), a rapid photographic survey of the coalfield (e.g. Gould & Ayris, 1995), and the Defence of Britain project. The establishment of a project by English Heritage on the boot and shoe industry of Northamptonshire (English Heritage, 2000a), and the co-ordination of the Defence of Britain project for the county is also significant. Northamptonshire Heritage additionally participated in the English Heritage Historic Farm Buildings programme. In Derbyshire, the extensive survey of aerial photographic holdings for a large part of South Derbyshire has been undertaken by the former RCHME as part of the New National Forest initiative. This survey encompassing parts of Leicestershire, Staffordshire and Derbyshire has produced important new data. A problem that remains to be addressed is that of the availability of 'grey literature' in the form of building surveys, site assessments, evaluations and related activities generated by archaeology units and societies, yet which are not easily accessible at the regional level.

County-based industrial archaeological and historical societies have made a significant contribution to regional knowledge particularly in site recording and analysis, advice on protection, and gazetteers of sites. The Leicestershire Industrial History Society was formed in 1969, carrying out fieldwork and providing advice, and publishing articles in the *LIHS Bulletin*. Other articles have appeared in the *Transactions of the Leicestershire Archaeological and Historical Society*. Nottinghamshire's Thoroton Society publishes its *Transactions of the Thoroton Society* with some articles relating to this period; others feature in the *Nottinghamshire Historian*. The *Nottinghamshire Industrial Archaeological Society* has published a range of locally available materials on the county. Northamptonshire Industrial Archaeology Group, established in 1966, has played a pioneering role in research and recording, publishing articles in the *CBA Group 9 Bulletin* and *NIAG Newsletter* - their gazetteer of the county's industrial sites is forthcoming. The Derbyshire SMR has drawn upon the work and publications of the Derbyshire Archaeological Society, Newcomen Society, Peak District Mines Historical Society, Inland Waterways Preservation Society, and the Arkwright Society. The Lincolnshire Local History Society, now the Society for Lincolnshire History and Archaeology, established the Industrial Archaeology Committee in 1964. Industrial archaeological themes are periodically addressed in *Lincolnshire Industrial Archaeology* (1966-73), and *Lincolnshire History and Archaeology* (1977-98). The *Victoria County Histories* series is undergoing revision for some counties, providing valuable historical and archaeological data when such entries are reasonably current.

Educationally, the region uniquely teaches industrial archaeology as part of an undergraduate degree at two institutions: the School of Archaeological Studies, University of Leicester and at University College Northampton. The University of Leicester hosted the 1994 'Managing the industrial Heritage' conference (Palmer & Neaverson, 1995); In 1999 the UCN and NIAG hosted the East Midlands Industrial Archaeology Conference (EMIAC) on the boot and shoe industry. Active regional research is undertaken by staff on both courses (e.g. Campion, Palmer (& Neaverson) and Trinder).

III. Regional research agenda – the Modern Period

Conservation context

One aspect of the research agenda is to identify and research those sites and buildings which represent the region's industrial and social context for this period, and to formally protect those deemed of regional and/or national significance (English Heritage, 1999). As noted above there are – and have been – a number of archaeological surveys within the region which enhance understanding of this period's archaeological resources. English Heritage's MPP work is particularly notable and seeks to review sites currently scheduled and/or listed, but also to identify new sites considered of national importance for formal protection. To date, the following figures reflect the situation regarding scheduled ancient monuments across the region (English Heritage, 1996; pers comm., Philip Ellis, English Heritage). There are c.74 industrial or related sites for this period within Derbyshire (59), Leicestershire (8), Nottinghamshire (4) and Lincolnshire (3), whereas Northamptonshire and Rutland have none – this figure does not include packhorse bridges, duck decoys or other similar sites. Some 35 of the Derbyshire sites are directly related to lead mining, smelting or mine drainage (soughs), coal or coking (Pleasley Colliery, Seldom Seen engine house, Butterley coke ovens), and transport (railways, tramways, canals). Leicestershire's monuments include the Foxton incline plane, Moira furnace, Snibston Colliery and several former coal-mining sites. Nottinghamshire's sites include Bestwood winding engine house, Papplewick pumping station, Kings Mill Viaduct and a former coal-mining site at Strelley. In Lincolnshire the Sibsey Trader Mill is one of three scheduled windmills within the region, in addition to the Dog Dyke pumping station and the Pinchbeck Engine.

Current details of the numbers of listed buildings within the region are not readily available at the time of writing. Notable Derbyshire sites include the Cromford Mill complex (mostly listed grade I), and the nearby Masson Mill, Cressbrook Mill, Litton (grade II*), North Mill, Belper (grade I) and several buildings at the former Derby Railway Works (grade II*). Lincolnshire has the former Bass maltings, Sleaford (grade II*), Sneaths Mill, Lutton (grade I), the hydraulic engine house at Sutton Bridge (grade II*) and the Torksey Viaduct (grade II*), amongst others. Northamptonshire's Weedon Depot retains numerous listed buildings connected with this munitions site, and Nottinghamshire's Greet House, Upton, was formerly a workhouse, now in the care of the National Trust (English Heritage, 1999a).

An additional merit of the research agenda is the identification of sites and landscapes capable of being incorporated into agri-environmental schemes such as the Countryside Stewardship Scheme which allows for research, conservation and public accessibility of targeted sites, an important aspect of wider public involvement in archaeology. Also of conservation importance are the ecological aspects of archaeological sites, rarer flora and fauna sometimes surviving only because of a site's protected or isolated status, such as railway lines, canals, quarries and extractive sites. Campion (1997) identifies specific integrated management at regional scheduled sites of differing periods, but these are not advanced as broad research themes within this chapter's context.

Regional research context

Aside from resource management objectives, the establishment of a research agenda seeks perhaps two *academic* outcomes: first, an understanding of the character of the region itself; and second, its relationship, significance and, where relevant, unique, contribution to the wider national context of this period. A complicating factor in the East Midlands is that opinions have varied concerning its geographical extent, and what may be regarded as relevant: put another way, current political boundaries, as distinct from its geology, may artificially distort and constrain research outcomes and objectives. For example, both Lincolnshire and Northamptonshire have at different times been excluded from industrial studies of this period, and NW Derbyshire is frequently associated with Manchester (Palmer & Neaverson, 1992; Smith, 1965). Similarly, the county of Rutland has until recently been politically absorbed by Leicestershire, but historically has remained principally agricultural in nature, in contrast with the former.

The following sections reflect the period's principal regional themes: agriculture, parks, gardens, country-house estates and woodland, major industries, settlements and the military context. Although treated as separate topics it is important to stress that many were inter-related, and could not have existed without effective transport systems, workforces, the processing of natural resources, food and fuel. These sections

highlight the range of publications, main themes, and representative sites and features. Fuller details of county-specific issues can be found in Authors (2001). Following some resource assessment entries, the 'potential' themes reflect a broad consensus about *regionally* significant topics, especially where these will contribute to a better understanding of regional uniqueness, and how this might dovetail with and enhance the national context. These entries highlight those aspects about which knowledge is currently poor. The lack of an entry does not indicate unimportance at the county level, only that within this specific context enough is perhaps currently understood. Main research themes are summarised at the end of this chapter.

A comment on Information technology, data storage and relational access

The role of Geographical Information Systems (GIS) are clearly of benefit to regional research and understanding, but their use is seen as an *enabling* function, rather than an end in themselves. Similarly the assumption made here is that the curation of relational archaeological databases (for example the Archaeological Data Service, Sites and Monuments Records and English Heritage's National Monuments Record) is accepted as a important but separate issue to that of identifying research themes. Similarly, the enhancement of resource management databases managed by English Heritage, though important, are not primary concerns within this context. The AIA's *IRIS* initiative might similarly be enhanced to provide more consistent coverage of both the range and depth of site recording, leading to a synthesised, integrative database providing regional and national coverage. Funding is clearly relevant here also, but seen as a separate issue to that of *what* to research. These issues and the need for relational access to data and standardised formats are addressed more fully in the chapter on cross-period themes (**reference**).

IV. Resource Assessment

Regional overview

In keeping with its geographical context, the East Midlands reflected striking diversity during this period, as relatively early transport networks evolved and matured to encompass often disparate industries, in a mostly land-locked region. Urbanization was hastened by this process, rapidly transforming small, agriculturally dependent towns and villages, whose locations were sometimes determined by the enduring open-field system until belatedly 'commodified' by Parliamentary enclosure. However, it is important to stress that industrialization did not vanquish a substantial economic reliance upon pastoral, arable and related farming activities, which remained significant throughout the period.

At the national level the East Midlands region may be characterized as predominantly agricultural, with a significant national contribution in hosiery, lace and footwear manufacture, a series of internationally important textile mills along the River Derwent, Derbyshire's C18 lead mining industry, and a sizeable coal extraction industry in Nottinghamshire. However, this broad sweep masks a complex process of industrialization of many contrasts, and sometimes striking dynamism. Regional industrialization between 1750-1900 can be summarised as follows: in Leicestershire during the C19, hosiery, and later, boot and shoe manufacture, were staple industries. By contrast, Rutland relied to a significant extent upon agriculture, reflected in the stasis of its county town, Oakham. Nottinghamshire was massively dominated by the hosiery and lace industries throughout the C19, and coal for much of the late-C19 and C20. Northamptonshire remained rural and little altered since the post-medieval period, until the 1850s, experiencing dramatic change through the growth of boot and shoe manufacture into the C20; during the mid-C19 its landscape experienced change through iron ore extraction. Conversely, Derbyshire's late-C18 development of water powered textile manufacture along the River Derwent and the emergence of a system of factory labour is its most significant contribution to the pattern of industrialization, but its extractive industries were also prominent. During the C18 Lincolnshire's main role was as a supplier of food and raw materials for London and the industrial districts lying to the W and NW of England, and only in the C19 did Lincolnshire establish an important role in engineering for the production of agricultural machinery.

By the C20 many regional industries had declined, particularly textile and boot and shoe manufacture, to be replaced by new or diverse enterprises of which engineering was prominent. Since WWII industry has undergone often dramatic restructuring, and many are virtually extinct, such as coal and iron-ore extraction,

textiles and footwear. Agriculture remained throughout a significant, if turbulent, aspect of regional economic activity. Finally, two world wars resulted in the creation of numerous military sites, notably WWII bomber airfields, followed by Cold War observer posts.

Texts addressing aspects of regional industrialization and settlement are varied in content and approach, but Palmer & Neaverson (1992), and Smith (1965) are quite comprehensive. Other texts include Beckett (1988), Beckett & Heath (1988), Campion (forthcoming), Chapman (1967), Greenwood (1987) and Palmer (1994). Broadly county-based industrial overviews include, for Leicestershire, Anon (1983); Rutland, Palmer & Neaverson (1991); Northamptonshire, Ballinger (1999a&b), NIAG (forthcoming) and Trinder (1982; 1998); Derbyshire, including the Peak District, Crossley (1991), Harris (1971) and Nixon (1969); Nottinghamshire, Brown (1989) and Weir (1991); and Lincolnshire, Wright (1982, 1983).

The following overview is not definitive, but reflects broad themes, necessarily brief overviews, and publications mostly indicated by county contributors (authors, 2001). As elsewhere, research into the latter C20 is less well represented in the region, but a valuable national overview is to be found in Stratton & Trinder (2000).

Settlements, multiculturalism, archaeology of buildings, religion and public utilities

Settlements

In many instances as settlements expanded they erased traces of earlier periods of occupation, and the continuity of land plot usage may reflect this. Industrialization brought major changes in rural and urban settlements across the region, but its effects varied greatly, most notably in massive new housing provision. The five large county towns, Nottingham, Leicester, Lincoln, Derby and Northampton experienced growth of different scales, characterized by substantial changes in settlement patterns, with a population shift from a rural to urban environment – conversely, Oakham, in Rutland reflected its largely agricultural dependency. The impact on towns and villages depended on proximity to transport links, resources, labour, main centres and the attitudes of landowners towards industrialization in ‘open’ and ‘closed’ villages. The urban environment was characterized by large mixed zones added to the original core of settlements, containing a mixture of houses, factories, schools, social clubs, shops, and latterly, cinemas. The development of specialist shops was exemplified by Boots the Chemist in Nottingham (Chapman, 1974). Local government functions including school boards, burial boards, boards of health, sanitary authorities and district councils, developed during the late-C19 and early-C20. Schools, prisons, hospitals (Richardson, 1998), local government offices (Stenning, 1989) and cemeteries (Brooks, 1989), were also established. Parishes provided workhouses and an example is being conserved near Southwell, Nottinghamshire, formerly serving the Thurgarton Hundred.

Potential

- Fieldwork and research investigating the nature of the transition from post-medieval and earlier settlement patterns to this period
- Fieldwork and research evaluating ownership of land and plots within settlements
- Research into social control and paternalism within regional industry, as reflected in workers’ colonies
- Fieldwork addressing settlement expansion beyond historic cores, and fringe location of industries and associated housing
- Fieldwork and analysis addressing the nature and expansion of nascent settlements
- Fieldwork to assess the development and inter-relationship of factories, workshops, housing, shops, church and amenities
- Fieldwork identifying the shrinkage of villages and relationships to industrial vicissitudes

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- Research to identify the influence of poor laws and other controls (open and closed villages) on plan forms
- Fieldwork and analysis to assess the evidence for both continuity and change in settlement patterns and urbanisation
- Fieldwork and analysis to evaluate to what extent industrialization and urbanization enhanced living conditions for local populations
- Field recording and analysis to assess factories as a factor in the bonding of settlements
- Fieldwork and analysis to assess the impact of co-operative movements on the social, economic and physical development of settlements
- Fieldwork and analysis to better understand the nature of estate villages
- Fieldwork and analysis to better understand the significance of entertainment, including cinemas, theatres, racecourses (horses, greyhounds)

Multiculturalism

The research agenda meeting highlighted the need to arrive at a better understanding of multiculturalism, particularly within modern urban areas within the region, such as Leicester, Nottingham and Northampton. This represents a hitherto largely under researched aspect of archaeological activity but the following go towards establishing a research framework in this context.

Potential

- Fieldwork and research to arrive at an understanding of the nature of C20, especially post-WWII, settlement patterns
- Fieldwork to evaluate the nature of cultural diversity and its impact on the built environment
- Survey work to assess the range and nature of ethnic religious buildings; and the adaptive re-use of former industrial, religious or civic buildings for this purpose
- Survey work and evaluations of industrial activity
- Research to evaluate perceptions and attitudes towards cultural heritage, and perceptions of exclusion or inclusiveness experienced by different ethnic groups

Archaeology of buildings

Buildings from this period provide many opportunities for the evaluation of social context. The affirmation of status through building envelopes is well established, both through ostentation (or the lack thereof) and/or the careful arrangement of internal spaces (Campion, 1996; Morris, 1994; Palmer, 1994, 1999; Palmer & Neaverson, 1998; Tarlow & West, 1999). Prisons, schools, workhouses, factories, hospitals, almshouses, council offices, libraries, cinemas and industrial complexes if evaluated spatially may provide more detailed insights into the functional impetus underpinning plan forms, and the intentions of owners or bodies concerned to reflect commercial success or status through the medium of architecture. Similarly, the wide variety of architectural detailing used by speculative buildings in terraced houses is significant, reflecting the nature of a commercial, competitive market, especially in rapidly expanding industrial towns (Campion, forthcoming).

Potential

- Building evaluations investigating adaptive re-use of factory buildings and outworkers' workshops for new (?post-) industrial activity
- Fieldwork addressing the types of buildings associated with urbanization and the development of civic administrative organisations
- Analysis focusing upon the development, distribution and spatial nature of prisons, workhouses, lock-ups, schools, hospitals
- Fieldwork and analysis addressing issues of 'power and control' within specific industries or commercial activities
- Fieldwork and research assessing mass housing provision, with some attention to the identification and recording of 'slum' housing (often early-mid C19 in origin), usually condemned during the 1930s and 40s, of which few examples now survive
- The archaeological recovery of data enabling the understanding of consumption through the excavation of cess-pits and related features: diet, flora, refuse, material culture (often core issues in historical archaeological methodologies)
- Survey and analysis of cinemas with attention to their social function, the range of technology used, and the context of their decline.

Religion and cemeteries

Non-conformity continued to develop and chapels were erected in the C18 and early-C19 (RCHME, 1986), evident in many industrial settlements. For example, a primitive Methodist chapel frequented by framework knitters survives in Chapel Street, Ruddington, immediately opposite the Knitters' Museum. Shepshed in Leicestershire, also an important centre for framework knitting, had strong associations with Roman Catholicism from the 1830s onwards. Similarly noteworthy is the position of Arkwright's church (1792-7) alongside the River Derwent at Cromford, directly visible from the mill complex itself. His workforce would pass the mill en route to worship from the village, perhaps affirming the link between religion and the work ethic (S. Gould: pers comm.).

Cemeteries are an undervalued aspect of settlement evidence, significant for their value in terms of social status, demographics, attitudes to death and the role of religion. Similarly, the numerous cemeteries attached to, or serving the needs of the region's Royal Air Force stations are similarly revealing: for example, those alongside RAF Coningsby, and at Scopwick church – serving RAF Digby - in Lincolnshire contains many graves of aircrew lost on operations during WWII.

Potential

- Survey and analysis to understand the inter-relationships of chapels to industrial communities; and the denominational influence upon industrial settlement development – or stasis
- Building surveys of church and chapel styles (materials, designs, motifs, locations) to aid understandings of ideas of status, perceptions and motivations; this extends to the Neo-Gothic revival during the C19
- Surveys and research of cemeteries: distribution, grave-marker materials and decoration, styles, locations within settlements – such field records to be made available to SMRs to provide data for further surveys and publications on this under-researched subject
- Survey of cemeteries to establish the extent of non-stone grave markers (i.e. Welsh slate, cast-iron, wood): this provides data for the analysis of the decline of vernacularism; changing attitudes towards grave-marking; and, the availability of non-stone materials (transport systems, local foundries)

- Research to investigate ideas of social status, attitudes towards cemeteries and their relationships to local communities and settlements, based upon surveys of features, locations and styles
- Surveys and research into the establishment of crematoriums, new cemeteries, chapels of ease and dual-use chapels: these data provide for the analysis of solutions to land shortages as traditional graveyards become full, perceptions of burial in new settlements and differing approaches and attitudes to burial and remembrance
- Research to understand the context of social/regional commemorations of both world wars

Public utilities

Water-provision was based locally on natural sources such as wells, streams, ponds and village pumps at the beginning of the period, but evolved through new technology and legislation. The expansion of towns and cities during the C19 led to public services such as water, sewerage, gas and electricity. Leicester and the larger towns in the county grew in the C19, but until 1848, water supplies were obtained from sometimes-polluted wells. A Board of Health report for Wigston Magna conveys the challenges of improving living and working conditions in the mid-C19 (Anon, 1855). A local waterworks company was established in 1851 building reservoirs at Thornton, and pumping stations at Cropston and Swithland. The disposal of sewage from Leicester until the 1850s went into the natural watercourses causing pollution in the Soar valley. A piped system was introduced, but the removal of waste continued along the canal until the Beaumont Leys sewage farm (1891), the waste pumped up by the Abbey Pumping Station. Nottingham had its own waterworks company by 1845, and established the Boughton (1871) and Papplewick pumping stations (1884), and by the late C19 the Nottingham Corporation was developing its sewage farm at Stoke Bardolph. In Northamptonshire, research undertaken on this subject was conveyed in a series of lectures at the University of Leicester's Northampton centre, but is otherwise unpublished. A beam engine from Northampton's Cliftonville waterworks is preserved as a working exhibit at Kew waterworks museum, and the buildings of the Rushden and Higham Ferrers Water Company can be viewed in the Sywell country-park. In 1750 Lincoln and Grantham each had water conduits to provide a limited water supply, but individual householders looked to wells or cisterns.

Improvement Commissioners were established in a number of towns to provide rudimentary street lighting and policing but it was the creation of gas light and coke companies from the 1820s that led to improved street lighting. In Leicestershire there were gas works in the county and in Leicester itself at the Belgrave site - electricity generation began at the Aylestone Road gasworks. Other stations were built at Loughborough and Hinckley, but rural areas relied upon supplies from outside the county until the National Grid system. The Northampton Electric Light and Power Company provided an early public electricity supply with its Angel Lane station from 1891. An archaeological record was made of the small rural gasworks at Kings Cliffe in 2000, prior to site redevelopment. In Nottinghamshire the development of gas was complex, but is little researched. Electricity power stations along the River Trent remain a feature of the later C20. In Lincolnshire several large enterprises built their own electricity generating plants, and local authorities and private companies produced electricity supplies. Electricity sub-stations remain largely under-researched in the region. Public utilities have been assessed by English Heritage's Monuments Protection Programme, resulting in a series of reports (Schofield, 2000). Palmer & Neaverson (1992) provide a detailed overview of this subject in the region, and relevant sites.

Potential

- Survey and research work investigating the nature, types and impact of public utilities on settlement expansion (locations, land values, speculative building)
- Research addressing the relationships between the development of industrialized waste management, population growth, attitudes and developing knowledge about disease and its carriers

Linking town and country: the regional transport infrastructure

It is important to stress that much of the region's transport system evolved to enable the import of raw materials for processing within the region's many industries, which were then exported as finished or semi-finished goods to important external markets for ceramics, textiles, fuel and food. The availability of this flexible transport system was of paramount importance for the sustained growth of many industries and settlements. Both innovation and continuity in transport systems is evident during this period, in addition to evidence for the impact of economic fluctuations and investment in the prosperity, stagnation or decline of settlements dependent upon transport systems. Lincolnshire's coastline both required and enabled different responses for the movements of goods and produce.

The region's major road network frequently followed Roman roads, in turn established as turnpikes from the mid-C18 by acts of parliament, to improve roads in lamentable condition. These were critical to improving the movement of goods, but became less important as canals and railways evolved. The survival of coaching inns, tollhouses and mileposts is erratic across the region, but important in aiding understanding of this system. Texts include Albert (1972), Cooper (1983), Cossons (1934; 1950), Cossons (1993), Harris (1971), Hey (1980) and Nixon (1969).

The relatively early evolution of the region's canal network during the late-C18 and early C19 was central to development, its impact extending across most counties (Palmer and Neaverson, 1992: xiv). In Leicestershire, the improvement of the River Soar for navigation to the River Trent, and other schemes including the Grand Union Canal, Ashby Canal, Wreake Navigation, Oakham Canal, and Leicester and Northampton Union Canal, allowed for the movement of coal and other essentials. A trust proposes to rebuild the Foxton inclined plane (operated 1901-1911), as part of the active Grand Junction Canal. In Nottinghamshire, the River Trent was the traditional core of the transport system enhanced by links such as the Nottingham Canal, shipping coal through Nottingham; and the Chesterfield Canal from Derbyshire to West Stockwith port. In Northamptonshire the River Nene was made navigable, making it accessible to the E coast. Three canals traversed the county: the Oxford, Grand Junction, and Grand Union (Blagrove, 1990). Stoke Bruerne is now the focus of a canal museum and village dramatically altered by the Grand Junction canal, and retains many original features including the canal tunnel between it and Blisworth. In Derbyshire, limestone and lime were exported along the Cromford Canal, which retains its railway terminus and Leawood Pumping Station; and the Erewash Canal, both to the River Trent. The Peak Forest canal was opened to Bugsworth and Whaley Bridge providing access to Manchester. Lincolnshire's role as a source of food and raw materials led to the improvement of navigable rivers and new waterways: the Stamford Canal, Fossdyke Canal, the Louth Navigation, and restoration of the River Witham. Regional texts include Boyes & Russell (1977) and Hadfield (1970).

It has been noted that Lincolnshire is unique in having a coastline. In 1750 Boston was still the main port, but declined after 1850; a wet dock (1882-84) improved its fortunes. Grimsby had little traffic after the Louth Navigation of the 1750s, but new docks in the 1850s led to the town becoming the major international fishing port for a time.

The region's railway network had a negative impact on road and canal routes as industry and passenger services migrated to this more effective form of transport during the C19. Railways were preceded by tramways and primitive railways: for example, Leicestershire's horse-drawn waggon-ways connected collieries and limestone quarries in the NW with the canal system and River Soar; the Leicester and Swannington line brought coal into Leicester. During the latter C19 a number of railways were established to all points of the county, including the Great Central. In Nottinghamshire early railways carried coal to the Cromford Canal: later, the Midland Counties Railway and the Great Northern Railway, using the Bennerley viaduct, provided important passenger rail connections. Passenger branch lines were similarly established throughout Northamptonshire, also used for the ironstone quarrying industry, but railway construction is often overlooked - a research agenda for navvy camps has been suggested (Morris, 1994; Trinder, 1998). In Derbyshire demand for Peak District limestone led to the Cromford and High Peak railway, with its working Middleton Top engine House, the Peak Forest tramway and Crich mineral railway. Passenger links also developed between Derby and the county's towns. Railways similarly transformed many Lincolnshire towns, such as the Midland Railway Company. By 1856 one third of the county's network had been opened, dominated by the Great Northern and the Manchester, Sheffield and Lincolnshire (renamed Great Central, 1897). Railways encouraged holiday resorts on the coast in the late-C19 at Skegness and Cleethorpes. The Beeching cuts of the 1960s dramatically reduced the regional infrastructure. Texts on regional railway history include Anderson (1985, 1986) and Gould (1979).

Air transport within the region is exemplified by the East Midlands airport near Castle Donington, a former WWII RAF airfield, now the premier passenger air transport facility for the region. But this should not obscure the number of earlier, small inter-war civic airfields such as Sywell near Northampton (opened 1928; extant clubhouse dates from 1935), also serving the region.

Potential

- Non-intensive survey of extant transport features, such as structures, railways, horse-drawn railways, roads, waterways and canals, with the aim of updating SMR databases
- Archaeological recovery of evidence in respect of river and canal craft to better understand this form of trade/transport activity, with an additional aim of understanding regional diversity as a response to local conditions
- Field survey work to establish the extent of transport as an inter-linked system characteristic of the region: canals/horse-drawn and other railways; and, evidence for changes to new technology, or the continuity of earlier systems
- Survey of waterways as a self-sufficient system linking regional counties – important where programmes of renewal and replacement may result in lost evidence of former structures
- Fieldwork and research to establish the nature and development of linear transport systems (railways, canals, rivers, tramways)
- Research to assess the impact of linear transport systems on industrial and commercial settlements and networks, and the evidence (structural and documentary) for flexibility in terms of economic fluctuation
- Survey work focused upon identifying the extent and nature of horse-drawn railways, now mostly accessible only through physical remains
- Survey and evaluation to establish the nature of settlements and buildings alongside transport routes: wharves, depots, warehousing, ownership of plots, speculative building
- Analysis to determine the development and vicissitudes of commuter settlements related to transport and commercial infrastructures; and their long-term (un)sustainability
- Field survey work to establish the nature and distribution of navvy camps, with some emphasis upon the living and working conditions of the navvies themselves (diet, accommodation, amenities)
- Survey and analysis of inter-war regional airports, facilities and support/maintenance sites.
- Survey and analysis to assess the impact of the Second World War upon previously civil airports, subsequently adapted as military airfields or related sites

Landscapes: elite town and country estates, parks, gardens and woodland

Country estates have become increasingly important as indicators of social and cultural evolution (sometimes identified as ‘elite landscapes’), often closely linked to private or public buildings and houses. Significant areas of land were consumed in executing designs, representing a considerable cumulative regional total. English Heritage’s non-statutory *Register of Parks and gardens* (1998) details the basis for providing a county-based register, but inclusion can be complicated by modifications and redesigns: a garden created in the 1500s may have been dramatically remodelled by the 1800s. This process of change is reflected in the fate of many country-houses, gardens and estates across the region, often having undergone dramatic change since the 1750s, either acquiring or shedding land holdings (Betley, 1993). For example, 1000 acres were added to Nottinghamshire’s parks between 1790 and 1820, and by 1873 the five largest estates controlled 137,000 acres. Subsequently, after WWI many of the region’s large estates were sold off, and the land divided. In tandem with the redistribution of estate lands, Nottinghamshire has lost 14 Country houses since 1900, doubtless reflecting developments elsewhere. During the C20 parks were acquired by local authorities,

such as pre-1750s Wollaton and Rufford in Nottinghamshire, or Clumber Park (begun 1770), by the National Trust. Other Trust examples, in Derbyshire, include Kedleston Hall (begun 1759) and Calke Abbey (begun 1701; lime kilns from late-C18), both with gardens. Belvoir Castle, Leicestershire (rebuilt early 1800s), and its gardens remains privately owned, but open to the public. Paxton made changes to Chatsworth House's existing formal gardens in the C19 - its deer-park being landscaped by Capability Brown in the mid-C18. The house, gardens and parkland are now a significant Derbyshire heritage attraction. Northamptonshire's numerous country-house parks have been extensively recorded by the Northamptonshire Parks and Gardens Trust. Examples include Brockhall, Daventry (1790s) and Kingsthorpe Hall, Northampton (1775). Also important were the technical innovations at many country houses for water supply, sewage and food storage – icehouses were a common feature at many.

The development of foxhunting, begun towards the end of the post-medieval period, wrought changes in the landscape, notably on estates and the countryside in Leicestershire and Northamptonshire. New woodland, coverts and spinneys were established in addition to kennels and stables. Additionally, the hunting of game and use of duck decoys were important activities requiring structures, landscaping, grouse moors and effective drainage.

Public parks and gardens remain an important focus for recreation, universally provided in most cities and towns by municipal authorities from the mid-C19 onwards, a striking counterpoint to those established on private estates (Conway, 1991, 1996; Elliott, 1986). Designed to enhance the living conditions of industrial towns by social reformers, free access was possible where local councils used rates to maintain them. Arboretums ('a place where trees are grown for study display') were established at Derby (1840: an important early park), Lincoln (1872) and Nottingham (1852), whilst Leicester's Abbey Park opened in 1882. Northampton's largest parks were at the Racecourse and Abington Park, established around the C15 manor house. In the main municipal parks tend not to have retained the flower-beds, vistas, boundary features and fences as originally created, frequently becoming degraded and allowed to lapse into large expanses of mown grassland. This can distort our appreciation of original design intentions and the subtle relationships of bandstands, pagodas, shelters, benches, paths, fountains and pools to long extinct floral features.

From the 1780s the region benefited from a large increase in the demand for leather goods. The bark used for tanning came from oak underwood, met from existing woods, from resources in the extensive Sherwood Forest, Nottinghamshire (White, 1875), and Rockingham Forest in Northamptonshire, and other locations. Between 1780 and 1850 there was substantial use of oak, particularly for building and shipbuilding – replanting replenished stocks. Such new plantations often included a wide range of tree species, frequently planned for both recreational and practical purposes. New plantings and forest management activities appear to have declined in the early-C20, perhaps reflecting the fortunes of large estates, as outlined above. Wood yards and saw mills were also significant: The Boughton and Castle Ashby estates in Northamptonshire both retained evidence for saw mills until recently, a situation doubtless reflected elsewhere in the region, but little survey work has taken place.

Potential

- Surveys to record and investigate the social context, roles and influence of country houses and estates
- Research to identify the extent of the mimicry of innovation, styles and features from elite landscapes and gardens in those provided by local authorities in urban areas
- Surveys of the applications of technology in country houses and their estates
- Surveys of saw mills on country estates
- Identification and recording of the fox-hunting and game shooting landscapes, and related structures (stables, kennels, hides, duck decoys)
- Survey work to assess the provision, distribution and roles of public parks in industrial (and non-industrial) settlements
- Record parks' surviving features and analyse evidence for original layouts

- Research (field recording and documentary) evaluating the extent of public ‘control’ exercised in parks by hard and soft boundaries, gates, facilities
- Survey and evaluation of woodland industries and relationships to regional industries such as footwear
- Record the evidence for the extent of silviculture woodlands and their management
- Record and evaluate the woodland landscape context: locations, access, workforce, species diversity and settlements

Agriculture and the processing of its products

This section identifies the strong links between agricultural and farming activity, and the subsequent processing of such produce. As stressed previously a major factor was the availability of an effective transport system that allowed for the movement of raw goods, and their subsequent export once processed.

Farming

Improvements in farming accelerated in the C18, evident nationally and regionally from the 1820s. These included scientific systems for cattle breeding and new approaches to crop rotation and drainage. Large-scale activities included malting, brewing, flour and grist milling, and the manufacture of cheese. Animal products in the form of skins and wool provided the raw materials for shoe making and framework knitting – ultimately staple manufacturing industries. Marketing produce and natural resources required road, river and canal transport, and finally railways. Planned farms were developed away from nucleated villages on land unconstrained by earlier development or restricted land plots. Uses of technology, new crops and animal breeding became more pronounced, especially on the great estates. The development of model farms on large estates introduced new patterns of building layout into both open countryside and villages. Innovative agricultural machines had to be manufactured and during the C19, many towns had ‘agricultural implement makers’ listed. Regionally, belated parliamentary enclosure was enacted mostly throughout 1750-1850 and had a dramatic impact on the landscape, and social and economic situation. Hoskins (1957) is a chronological study of Wigston village in Leicestershire, discussing agriculture and related themes. Despite extensive enclosures Nottinghamshire’s clay-lands saw the survival of open fields well into the C19, extant at Laxton (Lowe, 1798). The county’s ducal estates were often the focus of new innovations and investment resulting in enhanced productivity. Martin (1977) details the enclosure of Kettering, Northamptonshire, and its eventual impact upon industrialization. Upland pasture grazing remains significant in Derbyshire’s Peak District, characterised by stone walling of enclosed fields, often shared with the earthwork remains of lead-mining. Shallow soil constrained arable in these areas, but on the lowlands to the county’s S and E it was more prevalent (Farey, 1811-17). In Lincolnshire, heavily reliant upon agriculture, most open fields and common land had disappeared between 1760 and 1820 (Beastall, 1978). It was the C18 and early-C19 before the deeper fens of Lincolnshire were subdued, where scoop wheels and pumps assisted drainage - remains of wind-driven, steam and diesel engines survive at several sites, such as the Dogdyke pumping house. Later in the century, in the face of agricultural depression, fen-land farms specialised in higher value crops. During the C20 intensive farming methods and diversification have resulted in landscape changes, particularly through the removal of field boundaries and additions of new farm buildings. The conversion of many redundant barns and other farm buildings has been widespread. Barnwell & Giles (1997) include farm case study examples from the East Midlands. The Society for the Protection of Ancient Monuments conducted a survey of barns some years ago.

Potential

- Fieldwork and evaluation to assess the relationships between planned farms, enclosure, land ownership, new ‘scientific’ methods of farming, and the evidence for the (diverse) adoption of new technology within the region – capital investment is an important aspect to be addressed within this landscape context

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for the Modern Period (1750-2000)

- Research into rural landscapes based upon the impact of farm estates
- Surveys and evaluation of the distribution of farmsteads and estate buildings
- Surveys and research of model farms (notably in Rutland): distribution, functions, styles
- Research addressing changes to field systems after enclosure, the emergence of new settlements and impact of local laws and constraints on development and expansion
- Research to test whether urbanisation led to a growth in arable production to meet regional population demands; and related issues – milling, malting, food production
- Fieldwork to establish the nature of improvements to farm land: drains, culverts, hedges, buildings; and research to identify those investing in such changes, especially on larger estates
- Research into methods of working the land during this period; ongoing recording of practices
- Research into the impact of war (Napoleonic, WWI, WWII) on agricultural intensification
- Archaeological recovery and analysis of environmental evidence (grain, wool, thatch etc)
- Acquire and evaluate evidence for newly-introduced crops and fruit types: rape-seed in Lincolnshire from C16 to c.1820, madder, woad, horticultural expansion; exotic fruit and vegetables from C17 & C18 suggest increased demand for continental varieties from French, German and Dutch refugees
- Research into the nature of rural, local agricultural industries: e.g. materials, food processing, light engineering

The archaeology of ‘improvement’

This section relates principally to a need to better understand the aspirations of the working-class particularly, but not exclusively, in seeking to improve their living conditions through greater control over land, produce, education and the provision of access to the means of such improvements. Northamptonshire is noted for its early involvement with such aspirations. As a subject it is capable of being included within several contexts but is detailed here because of the important link with both farming, and individual sustenance through allotments and smallholdings.

Potential

- Archival and fieldwork research into the role of freehold land societies in encouraging and enabling greater personal independence in livelihood terms
- Archival and fieldwork evaluation of the significance of tied-cottages within this context, especially in Lincolnshire
- Research into the importance of smallholdings and allotments as contributing both to self-improvement and independence, but also wider agricultural productivity and landscape development
- Archival and fieldwork research to evaluate the links to markets and industry necessary for successful, sustainable sustenance within the context of self-improvement
- Archival and fieldwork research to assess the wider community benefits of improvement, notably in the form of schools and other communal facilities

Brewing, malting and food manufacture

Regionally, brewing has been a minor but widespread activity, broadly reaching a peak in the mid-C19, but declining thereafter. Prior to the C19 brewing was mostly a domestic industry supplying local markets, followed by substantial growth in the early-C19, and a technological revolution from the 1850s often prompted by national markets. Broadly, commercial breweries only appeared in most towns after 1780. Remains of the industry include disused or converted maltings, and former brewery buildings. In 1855 there were 83 maltsters and 20 brewers in Leicestershire, but dramatically fewer by the 1930s. In Nottinghamshire malting grew from a small-scale industry into large urban commercial enterprises (Patrick, 1977; 1996). Newark was the most important centre, exporting beer to Europe by the late-C18 (Sheppard, Walker & Walker, 1993). Northamptonshire had large commercial breweries and malt houses in the main market towns – its brewing history has been documented (Brown, 1998), but there has been relatively little archaeological work with the exception of recording work at the Northampton Brewery Company, Phipps Brewery and the Anchor Brewery (NIAG, 1970; Starmer, 1970b). Derbyshire's involvement was constrained by its diverse geology, but malting was significant in Derby supplying national markets in the early C18, and at Langwith. The processing of barley for beer was an important industry in Lincolnshire - by 1856 there were 163 maltsters, with Sleaford and Grantham notably supplying national markets. In the 1750s breweries were often small undertakings, but during the C19 and early-C20 firms grew larger, taking advantage of the railways in barley growing areas. Boston was important but many associated structures have gone or are threatened. Diversification into new and exotic crops and fruits was also significant (Thirsk, 1985). The temperance movement in the late-C19 led to the growth of county mineral water manufacturers.

Food production based on agricultural produce is well represented in the region. Dairying, producing milk, butter and cheese commercially was an important Peak District activity, based around Ashbourne (Harris, 1971), also covered in Trinder's (1993) comprehensive account of the food industry in Derbyshire and elsewhere. The manufacture of Stilton cheese occupied many significant Leicestershire dairies (Hickman, 1995), and the Melton Mowbray pork pie is similarly of national significance (Hickman, 1997). In many large towns commercial bakeries were established often through Co-operative Societies – good examples survive in Kettering and Northampton.

Potential

- Survey and analysis to establish the extent to which malting and related activities expanded to service growing urban populations; and, transport systems enabling such expansion
- Fieldwork to assess the survival and nature of cheese production as reflected in the cheese chambers of vernacular buildings

Milling

Industrial corn and grist milling based upon wind and waterpower - the latter enduring for a considerable time - was extensive within the region, but many sites have been lost or converted. The continuity of waterpower throughout the region in textile and iron manufacture is also noteworthy (see below). Subsequently, population growth during the C19 resulted in the construction of steam-mills. Leicestershire had many watermills, but the lack of high ground providing falls of water restricted their size (Ashton, 1977). A map survey c.1980 identified 113 sites with few retaining machinery: of wind-mills, some 160 sites have been confirmed, the majority with no standing remains - even fewer retain sails or are complete with machinery. Moon (1981) has researched examples in Leicestershire and Rutland; Henry (1988) concentrates on Rutland. Nottinghamshire's mills survive to varying degrees (Brown, 1989; Weir, 1991: 114), where Green's restored windmill, Steinton, Nottingham is a working museum. Northamptonshire mills have been identified through documents and fieldwork (Starmer, 1970a; Stainwright, 1991): Starmer is currently surveying all water and windmill sites to assess survival since the fieldwork of 30 years ago. Derbyshire's numerous water-mills made good use of water supplies especially in the Peak District, of which Rowsley corn mill, adapted for roller milling, is a noted example, but wind-mills were few in number (Harris, 1971; Nixon, 1969). In Lincolnshire, water-powered mills in the W and on the Wolds, fulled cloth and made paper as well as grinding. Windmill technology in Lincolnshire reached its peak in the C19 brick tower mills, such as the Sibsey Trader, built in 1877. The county's numerous windmills have been widely researched (Dolman, 1986; Wailes, 1991). Others served the needs of agriculture such as the oil seed crushing mills, and later-C19 fertiliser factories. Following WW1 the government sponsored several sugar beet factories.

Potential

- Survey and analysis to establish the extent to which corn-milling and related activities expanded to service growing urban populations; and, transport systems enabling such expansion
- Surveys to establish the typological context of mills and to ensure that SMR databases are up to date and regularly revised

The extractive and ceramics industries

Extractive industries

The region has a variety of minerals ranging from coal and fireclay, limestone and roadstone, to sand and gravel in the extensive low river valleys (Hewlett, 1979). Beginning with ironstone, in Leicestershire its extraction has left considerable landscape remains, including workings, inclines, cuttings and tunnels of the extensive railway system which serviced quarries. The modern ironstone quarrying industry in Northamptonshire originated in the 1850s, running until 1980 (Tonks, 1989, 1990, 1991, 1992). Important sites include Irchester Country Park and Easton on the Hill. Within the clays of the lower coal measures of NE Derbyshire, Chesterfield, Bolsover, Amber Valley and the Erewash, the availability of ironstone led to a local iron and steel industry, but this has been little researched. The quarrying and smelting of ironstone in Lincolnshire started in the 1860s in a rural setting, expanding to become the town of Scunthorpe.

Limestone was found both in the NW and E of Leicestershire, Derbyshire and Northamptonshire. It was burnt to produce lime for agricultural improvement, and mortar and cement for building. Kilns were constructed at quarries, or alongside canals or rivers where the stone could be brought closer to fuel supplies – a Derbyshire SMR search identified c.100 entries relating to lime kilns (Hill, 1986). There are exceptional C18 and early-C19 industrial limekiln complexes at Grin Hill, near Buxton, the Peak Forest, and also fine later-C19 bank kilns at Millers Dale, Buxworth. At Calke on the property of the National Trust are also preserved a large complex of limekilns (Marshall, Palmer & Neaverson, 1992). In Lincolnshire, limestone quarries for Ancaster building stone were exploited to the W of Sleaford. Northamptonshire's Irthlingborough cement works was a significant consumer within the county.

The quarrying of stone, sand and gravel remains an extensive industry in Leicestershire, producing slate, granite and roadstone. Local buildings testify to the durability of Swithland slate and Mountsorrel granite. In the E of the county there were freestone quarries at Clipsham and Ketton. Northamptonshire's extractive enterprises were the stone and slate quarrying industries with large quarries at Weldon, Helmdon and Collyweston, the latter's slate industry of national importance. The peak years for the industry were 1715-1730, with the re-building of Stamford and Oundle. Large numbers of former quarries shown on OS maps indicate that farmers also had individual slate pits. Gravel extraction in the county continues, reflected in large areas of open water in the Nene valley. In Derbyshire, other building materials including freestone was available. The Tarmac company's involvement in Derbyshire included sand and gravel extraction. The creation of millstones and pulpstones was also significant, with a number of sites extant (Tucker, 1985). In Lincolnshire developments at Scunthorpe generated interest in mineral working in the county, where opencast or underground mineral mines were opened on a minor scale.

Coal deposits in Leicestershire, Nottinghamshire and Derbyshire have made an important impact on the regional and national economy (Gould & Ayriss, 1995; Green, 1935&b; Owen, 1984). Conversely, Northamptonshire and Lincolnshire had little or no accessible reserves. Coal mining tended to work shafts for long periods - excluding shallow mining - with the result that surface buildings were renewed, so destroying earlier structures, but below ground archaeology often survives. Leicestershire's industry, on a relatively minor scale, was located in the NW of the county but little survives above ground – the Snibston heritage centre retains original features, and Neaverson (2000) investigates Califat Colliery. From the 1750s coal was the most important export from Nottinghamshire, and significant nationally (Griffin, 1981). Small-scale mining up to the late-C18 on the exposed coalfield was transformed during the C19 into the major deep pits of the C20. In 1860 there were 21 collieries, spread over a wide area - by 1910 output stood at 11m tons. There are few C19 remains of the industry, but the Bestwood engine house survives. From the late C19 to the inter-war period the coalfield enjoyed investment in technology from companies such as Barber-Walker. In the 1920s 8 new pits were sunk in the Dukeries area, to the N and NE of Mansfield, and company villages

and settlements established, especially during the inter-war period (Waller, 1979, 1983). New markets emerged in the mid-C20 supplying to the power stations along the River Trent. In Derbyshire's eastern coal-field seams open-cast extraction has erased many traces of earlier mining - projects looking at early mining remains are being undertaken. To the E of the surface outcrops is the concealed coalfield where C19 deep coal mines and mining towns grew, such as Pleasley Colliery, whose engine house and headstocks survive. In the Peak District there are exceptional surface remains of coal extraction near Buxton, and sites including Barlow Colliery and Ringinglow are also of national importance.

The C18-19 saw the growth of companies with interests in both coal and iron production, including the Butterley Company, and the Stanton Ironworks Company that became the largest colliery owner in the Midlands during the latter-C19. In the C18 a preference for coke as a fuel promoted the coking industry, notably in the iron and steel industry where attempts to control levels of sulphur were found necessary after other approaches, notably coal, were found to be unsatisfactory. A later use was made of coke in the railway industry. Prior to the C18 coal was coked in open stacks, but gradually banks of beehive coke ovens were built and used at collieries across the region, but few now survive such as those at Unstone, Derbyshire.

Lead mining was a significant industrial activity in the Peak District area of Derbyshire, where traditional pastoral land-use has enabled lead-working remains to survive, but they are under ongoing threat (Barnatt, 1995, 1996; Ford & Rieuwerts, 1968). The cyclical nature of the industry has seen the periodic working, abandonment and reworking of deposits, with the loss of earlier workings. Studies tend to focus on the larger scale mines after the mid-C18 but smaller scale mining of earlier periods is less researched: remains include engine houses, gin circles, buildings and processing floors. Typically, these include dressing floors, buddles, crushers, ponds and water management features in varying states of preservation. The introduction of improved smelting techniques attracted investors and larger companies, who took up leases on small mines (Crossley & Kiernan, 1992; Nixon 1969; Willies, 1969). Investments in steam powered de-watering pumps and the driving of drainage levels, or soughs (Rieuwerts, 1966), enabled mines to be sunk to previously inaccessible ore deposits, as at Magpie Mine, Sheldon. Following the completion of the Monument Protection Programme, the scheduling of some 35 sites reflects their significance (Schofield, 2000). The pioneering research of the Peak District Mines Historical Society remains important.

During this period Nottinghamshire's gypsum extraction industries continued to grow, and by 1908 it produced half of the total UK output. Gypsum was used for lime ash floors and plaster, but also for medicines, fertilisers, bleaching, plaster of Paris and ornaments. Extraction methods during the C19 included open casting, and deep mining. Of the early industry little now survives. In Derbyshire, gypsum deposits suitable for the production of plaster of Paris, and blocks of alabaster for religious and secular ornamentation were exploited around Chellaston. In Lincolnshire, gypsum for flooring was extracted in the Isle of Axholme.

Until recently little attention had been given to the exploitation of Derbyshire's upland peat deposits by individual farms and whole communities as a primary source of fuel. The detailed farm surveys of Edale and the Upper Derwent Valley by the Peak District National Park Authority is revealing the network of track-ways that serviced quarries and peat extraction areas.

Potential

- Survey work to record and evaluate the physical nature of underground workings where these are accessible
- Excavation to exploit the large potential for greater understanding of surface features associated with Derbyshire's lead mining industry, including rakes
- Research to assess the extent of both marginality and seasonality in the extractive industries, notably in Derbyshire lead mining where miners often supplemented income with pastoral farming
- Research to better understand the markets, settlements, communities and transport infrastructures directly related to extractive industrial activity
- Fieldwork and research to investigate coal mining and the impact of capitalist paternalism on its settlements

- Research to evaluate the longevity of obsolescent technology in some extractive contexts – i.e. the use of steam-engine technology despite the availability of newer forms of power
- Where opportunities arise, research to assess the nature of industrial land contamination and pollution
- Research and fieldwork to evaluate the use and distribution of building stone; and its relationship to status in vernacular and polite architecture
- Record extraction and craft techniques relating to the slate and stone industries
- Research to assess miners' track ways and paths to extractive sites, especially where these were tolerated across private lands

Clay and related products

Once widespread on a local basis, brick pits existed at many towns and villages. Many supplied newly developing towns, canal or railway construction sites, but there are few remains. O'Rourke (1970) surveyed Northamptonshire sites. Clay was extensively used for roofing tiles, providing an important industry in Lincolnshire. Improvements in agricultural methods required tile drains for poorly drained fields, used extensively across the region.

The use of local clays in the manufacture of china ceramics, pottery and earthenware products was important in eastern Derbyshire, notably in Royal Crown Derby porcelain (Palmer & Neaverson, 1992: 159). Porcelain production was also notable at Pinxton and Torksey in Derbyshire, the latter site yielding large quantities of evidence. Trade networks to import ball clay from the south-west, and then export finished goods was important, as was the availability of calcined flint for clay bodies and flint-kiln sites capable of such processing. The production of white salt-glazed stone-ware and cream-ware in Derby (c.1760-1790) is intrinsically linked to the availability of non-local materials. Additionally, the brown salt-glazed stoneware manufacturers were widespread in Derbyshire, but have been little studied archaeologically. Such wares were exported widely with some examples finding their way to North America, seemingly a major market during the C18 and C19. The South Derbyshire industry including Swadlincote and Church Gresley were significant manufacturers of yellow-ware during the C19, the latter still producing white-wares. The widely exported products of the county raise important issues about material culture, transportation, markets, materials and production systems. Despite these, only small-scale excavations have taken place at Swadlincote and Melbourne with the result that South Derbyshire is one of the least studied areas of ceramics manufacture despite its importance. As a separate issue, the manufacture and distribution of clay pipes also warrants attention regionally.

Potential

- Material culture evaluations of ceramics production (typology, seriation, social context, usage)
- Survey work and analysis to determine the relationship between urbanization, transport and the production and distribution of bricks
- Fieldwork and research into South Derbyshire pottery manufacture
- Survey and research into ceramics production infrastructure – importing raw materials, exporting finished goods
- Analysis of clay pipe manufacture and markets (locations, site nature and distribution, chronology, markets, transporting goods, relationships to main settlements)

Textile, clothing and footwear

Textile mills

Textile manufacture was a significant, diverse regional industry. Throughout the period it had been at the forefront of innovation and enterprise, but new technology was taken up erratically, with many textile mills continuing with earlier forms of motive power. Nottingham was important for its early involvement in cotton spinning, where Arkwright's first mill of 1769 employed 300 by 1771, before moving to Cromford. In Nottinghamshire, by the 1790s there were a number of textile mills of which the Robinson's cotton mills on the River Leen were the first to use steam power in the country (Greatrex, 1986-7). Chapman (1981-2, 1967) offers valuable accounts of textile mills in the region. Northampton's cotton mill of 1742 was an early, moderately successful enterprise, continuing in use for some twenty years.

Derbyshire, however, witnessed the first successful harnessing of waterpower to manufacturing technology, leading to a factory-based system of mass production and innovative relations of labour. Lombe's silk mill in Derby of 1721 is believed to be the earliest in Britain - Caledine (1993) reconstructs the mill. The use of cotton in hosiery had been hampered by the problems of maintaining a supply of thread of suitable quality. Arkwright adapted machinery for waterpower at Cromford in 1771. This is held to be the first successful water powered cotton-spinning mill: a second was constructed in 1777 - recently excavated. The Cromford Mill complex is significant, contrasting with the nearby Masson Mill of 1783. Arkwright also initiated a workers' colony (Chapman, 1976). From 1776, Strutt and Arkwright developed mills at Belper using the River Derwent for mechanised cotton spinning (Cooper, 1983). Between 1776 and 1816, 6 separate mills were constructed with housing (Barley, 1961), communal buildings and farms, transforming it from a small village reliant upon nail making (Robson, 1964). At Darley Abbey, the Boar's Head Mill was established for cotton production along with community housing including an early sewage treatment plant - English Heritage plans further survey work (Menuge, 1993). The Derwent Valley Mills have been formally nominated for inscription as a World Heritage Site, reflecting their unique level of survival (DVMP, 2000) – a response is awaited from UNESCO. Derbyshire has other cotton-spinning sites of note, such as the Cressbrook (c.1783) and Litton mills (1782), on the River Wye, the tributary of the Derwent.

Leicestershire took no part in the introduction of powered carding and spinning of cotton: steam powered spinning of wool and worsted emerged during the late-C18. Many mills were built during the early decades of the C19 - there were 38 wool or worsted spinning mills in 1838 in the county. Yarn production also gave rise to a number of merchants' warehouses. Northamptonshire's cottage industries included weaving, wool-combing and silk making, but did not progress to textile mills on any scale, except, notably, the Burton Latimer worsted mill of 1847. Lincolnshire had little success with the textile industry, despite several enterprises (Chapman, 1967).

Potential

- Surveys of textile buildings and adjacent settlements, to better understand their relationships to each other and the prevailing local economic and social systems
- Survey work to establish the distribution of textile mills regionally, and their specific functions, relative success, sources of power, evidence for innovation or continuity, and links to communications systems
- Early cotton mills are poorly documented – archaeological survey work and spatial analysis to establish typologies, evidence for adaptive re-use, accretions, agglomeration and work systems
- Survey work to acquire evidence for the continuity – or otherwise - of 'domestic' production within the context of mill production; and the inter-relationships between mill and home working
- Building Survey and spatial analysis to identify the extent of gender differentiation within mill complexes
- Building surveys to establish the extent that adaptive re-use was possible within textile mills to accommodate and enable often new uses (for example, at Cromford Mill from the mid-C19)
- Survey work to identify evidence for Jenny-shops for the spinning of cotton in the East Midlands, of which little is currently known

Hosiery and lace: outworking and factories

Northamptonshire's hand-made lace industry was on a significant scale during the earlier part of this period, but few identifiable buildings remain – the survival of lace school and lace merchants' premises has not yet been gauged through specific survey. Areas of Nottinghamshire, Leicestershire and Derbyshire had a significant involvement with the framework-knitting outworking industry, widespread by 1750, continuing until c.1870, when it declined into the C20. Production occurred in houses, or workshops, often attached to master hosiers' dwellings. Building survivals are erratic, but have been widely studied (Campion, 1996, forthcoming; Palmer, 1994, 2000; Smith, 1965, 1963). Two museums, at Wigston, Leicestershire, and Ruddington, Nottinghamshire are based in former framework knitting buildings. In Leicestershire, outworking was increasingly supplanted by the boot and shoe industry from the 1870s. Frame making was an important regional industry providing the foundations for late-C19 and early-C20 engineering.

A growth in powered hosiery production (steam, gas, oil or electricity engines) resulted in multi-storey factories from the 1860s in main towns and larger villages. By 1895, there were 231 hosiery manufacturers in Leicestershire. Its elastic web manufacture evolved in the 1850s, in which several factories specialised. Hosiery in Nottinghamshire remained outside the factory system until the 1850s, when Hine and Mundella's factory opened in Nottingham, encouraging other entrepreneurs. Essential support functions were the dyeing and finishing works, of which Leicester and Nottingham had many; wholesale and retail networks were also significant. Throughout the C20 the industry declined steadily and many buildings have been adaptively re-used or demolished. The research of such factories has been erratic.

The home-based lace industry evolved from framework knitting, centralizing in nascent factories from the 1820s. Machine innovations provided impetus to lace technology: Heathcoat's bobbin net machine (1810) was significant in escalating Nottingham's economy, where 1820s and 30s housing survives (Campion, forthcoming; Mason, 1994). From the 1820s steam engines for lace manufacture were introduced. Lace factory expansion took place outside Nottingham's limits in the 1870s, for example, Beeston's Anglo-Scotia Mills and other mills in Long Eaton. Tenement factories occurred where lace firms shared space and power sources, but the industry declined throughout the C20. The Nottingham Lace Market is a significant survival. Between 1851 and 1877, 71 factories and 41 warehouses were built in the Saxon Burgh area of the city, many in the Lace Market including the Adams building on Broadway (Beckett, 1997; Mason, 1994; Oldfield, n.d.)

Potential

- Building surveys to identify types and distribution of accommodation used for craft industry prior to 1850
- Survey and research work with the aim of seeking to understand the links between craft industry and larger scale manufacturing in the period prior to 1850
- Building and settlement survey work to establish the relationships between factories and outworkers' housing (and examples of 'resistance' to factory working in the form of hybrid buildings)
- Survey and research work to investigate the causes and possible consequences of limited settlement growth within otherwise successful outworking centres, such as Ruddington in Nottinghamshire, which largely failed to expand despite economic success during the latter half of the C19
- Research to assess the extent of seasonality existing within framework knitting outworking and its impact upon 'local' agriculture and the adoption of allotments for sustenance
- Survey work with the aim of better understanding the transition from framework knitting to boot and shoe outworking in 1870s Leicestershire, based upon building survey and documentary research
- Survey work to better understand the relationship of 'open' and 'closed' villages to outworking industry (the Vale of Belvoir a noted example of the uncompromising rejection of outworking as a form of income for inhabitants)

- Survey and documentary research to identify and understand the relationship between freehold societies, land ownership and the evolution and continuity of outworking
- Research into the different responses to technological take-up in the region: for example, the loom and power innovations in Nottingham's lace factories, yet which did not occur in comparable Leicester factories

Additional potential

- Survey and research to identify and understand the production of clothing in the region, other than lace and knitted goods

Boot and shoe: outworking and factories

Boot and shoe manufacture, and its associated trades, were significant in Leicestershire and Northamptonshire during the latter half of the C19, but far less pronounced elsewhere in the region. In Northamptonshire this industry evolved out of earlier craft-based activity, itself a major national supplier of footwear from at least the latter C18. From the 1850s a transition to national supplies came with the development of machines enabling bulk production, making both counties significant nationally. However, the mechanization of processes was erratic and it was not until the 1890s that separate processes were contained within single factories. Prior to this, in both counties, the industry was based upon an outworking system using garden and yard workshops for much of the period 1850-1900, but it had largely declined by the century's end (Campion, forthcoming; Kirby, Thomas & Turner, 1988; Palmer, 1994; Starmer 1982; Trinder 1998). The system was not dissimilar to framework knitting where small workshops were a feature of houses in Leicestershire villages close to the city, and numerous towns and villages in Northamptonshire – NW Kettering is a significant surviving example (Campion, forthcoming; Trinder, 1998). In Northamptonshire particularly, the industrialization of the boot and shoe industry had a major effect on town and village settlement patterns (Greenall, 1975). In both counties shoe manufacturers built factories within streets of speculative, or co-operative society terraced housing in a number of towns and village. St Michael's Road, Northampton reflects this mix of large factories and terraced housing. Leicester's CWS Wheatsheaf works (1890s) was then the largest shoe factory in the world.

In contrast to the hosiery trade, the boot and shoe industry had a considerable warehousing element, both for raw materials and finished products, some of the latter belonging to shoe chain stores, both manufacturing and retailing footwear. There was also a large supporting industry for the boot and shoe trade in both counties. Tanning, leather dressing and preparing were major elements, along with the manufacture of specific elements of boots and shoes, as were polishes and dubbin. Companies also specialised in the manufacture of machinery, tools and cardboard boxes for the shoe trade. The industry declined during the C20, with the re-use or loss of many factories.

Research on buildings associated with the boot and shoe industry in Northamptonshire is ongoing by English Heritage (English Heritage, 2000a). Significant research has been undertaken on the boot and shoe industry, especially on documents and its products. Northampton Museum and Art Gallery has both a nationally important collection of boots and shoes, and a significant range of boot and shoe making machinery.

Potential

- As for hosiery and lace research themes, above
- Survey work and research into the organization of the Northamptonshire boot and shoe industry and its pre-1850 industrial buildings

Iron and Steel manufacture

Iron and steel manufacture, although not a major industry within the region, was still significantly represented. In the C17 and early-C18 water powered furnaces provided the basis for the iron smelting

industry. The coincidence of ironstone, streams for waterpower, and supplies of charcoal from the extensive woodlands of the area promoted the growth of the industry. The region has two of the earliest surviving coke furnace sites in Britain: Moira furnace, built c.1804-6, in Leicestershire (Cranstone, 1985); and the Morley Park ironworks built in the 1780s, near Ripley, Derbyshire (Riden, 1988; Palmer & Neaverson, 1992: 36). The iron industry was not significant in Nottinghamshire: by 1907 the county was producing 205 tons of iron. Iron smelting was closely linked to ironstone quarrying in Northamptonshire in the C19-20. Iron ore was smelted at a total of 12 sites (1857-1981) - by 1945 only four iron furnaces remained working (Beaver, 1951). The majority of iron ore blast furnace sites have been largely destroyed - Towcester and Heyford are of potential archaeological value, but less survives at Corby. Instone (1970) undertook a survey of foundries in Northampton, later extended to cover Northamptonshire as a whole (Starmer, 1981). Starmer (1970c) also conducted extensive survey work on ironworks. The late-C18 saw the evolution of a number of major iron companies and sites in Derbyshire, which all grew through the late-C18 to early-C19. The Butterley Company initially supplied cast iron rails and wheels for horse drawn tramways, troughs for canals, and cast iron beams. The Codnor Park works at Butterley of 1807 became a major supplier of wrought iron. Their rolling and forge welding of plates and bars enabled the construction of the St. Pancras railway station roof. Yet, as a source of primary iron, Derbyshire's industry began to decline after the 1850s. Cheaper ironstone was available in Northamptonshire making local manufacture uneconomical. In Lincolnshire, the Trent Iron Works was built at Frodingham from 1862.

Engineering

Regionally, all industries required support trades, including agriculture and these were established mostly between 1780-1840 often in urban settings. Some towns and cities subsequently achieved international prominence through the success of engineering firms of which Lincolnshire has notable examples. Its first engineering works were established in Boston producing steam driven thrashing machines, exported worldwide. After 1840, Hornsby in Grantham, and Marshall in Gainsborough achieved prominence. Likewise, Clayton & Shuttleworth, Ruston, Foster and Robey in Lincoln contributed to the city's international importance, and during WWI firms were involved in aircraft production making the city the largest centre of production in the world (Walls & Parker, 2000; Wright, 1982). The mechanisation of hosiery and footwear production gave rise to a large number of machine makers, forming the basis of an extensive engineering and iron-founding industry. In Leicestershire many engineering companies developed, specialising in a limited range of products including boot and shoe machinery, textile machines, machine tool making, electrical engineering, lifting equipment, cranes and typewriters. By 1911, in Leicester alone, engineering employed nearly 3% of the population, its firms making a considerable impact on its economy, and growth of support services. Other companies made civil engineering and quarry plant for the county's extensive extractive industry. In Northamptonshire a large number of firms provided machinery for the boot and shoe trade, but firms not connected with this industry existed before this, for example Harris & Clayton, producing beam engines, of which an example is displayed at the Henry Ford Museum in the USA. In Nottingham, Campion began cycle manufacture in 1860 in addition to his hosiery concern. An employee of his, Humber made tricycles, building a factory for cycle manufacture in Beeston (1880) - in 1908 Humber moved to Coventry. Nottingham's Raleigh Cycle Company grew out of a small firm to become one of the leading cycle manufacturers in the world. John Player and Sons remain a major manufacturer in Nottingham, making use of production machinery (Mason, 1981). Rolls Royce in Derbyshire remains a major engineering company within the region (Pugh, 2000, 2001), its wartime role noted in the next section.

Military sites – defensive, offensive, storage, production and training

Military themes of the last century were not addressed in academic terms to any great extent until recently, a situation being reversed through the Defence of Britain Project and English Heritage's assessments of military remains. County SMRs hold information to varying degrees of completeness about both the C20 and preceding periods. During the C18 and C19 barracks are the most enduring symbol of this period, but they survive erratically. In Northamptonshire, Gibraltar Barracks in Northampton and the Royal Ordnance Depot at Weedon Bec are notable (English Heritage, 1999b). C19 military encampments are rare, as is evidence for military field-works. Militia drill halls featured in many towns, but their numbers are declining.

The region was militarily significant during the C20, especially in the two World Wars and subsequent Cold War and the region is surprisingly rich in both remains and significance (Lake, 2000). This is recognizable largely through now isolated features, such as pillboxes, searchlight and anti-aircraft batteries, command and observation bunkers, and in the plethora of airfields. Additionally, training camps, Prisoner of War camps, supply depots and transport installations are represented.

The region boasts a significant link with military aviation, particularly Lincolnshire through its association with the RAF in both WWI and WWII with the establishment of bomber airfields during the latter conflict, some used by the USAAF (Barrymore Halpenny, 1981; Blake, Hodgson & Taylor, 1984). Between 1939-45 the region had 96 airfields within the counties of Lincolnshire (45), Leicestershire (14), Rutland (3), Derbyshire (4), Nottinghamshire (14) and Northamptonshire (16) (Willis & Holliss, 1990). Post-war, many bases were returned to use as agricultural land and few survive intact, though some sites have been re-used for post-war industrial estates, or the broken up concrete runways as hard-core for modern motorways elsewhere. War memorials, as distinct from military cemeteries, at many former airfield sites may be one of the few clues as to their former use (Ingham, 1995). Lincolnshire airfields assessed under English Heritage's listing survey, which retain important buildings include Cranwell, East Kirkby (with its restored control tower), Manby and Scampton - famous for its connection with the Dambusters and now the base of the Red Arrows display team (English Heritage, 2000b). Additional airfield sites of significance include Bracebridge Heath, Lincoln (important WWI hangers and associated buildings); Harrington and Polebrook's Cold War THOR sites; and both Hinton-in-the-Hedges and Tollerton for airfield perimeter defences – pillboxes, Bofors-gun positions, observation posts and dispersed aircraft blast shelters (often known as 'E' pens, reflecting their shape in plan). RAF Digby, Lincolnshire, has a restored 1939-40 Sector Operations room museum within the camp boundary; its nearby fighter airfield satellites of Coleby Grange and Wellingore retain some features – respectively a 1941 control tower at the former, E-pens at both sites, and a series of pill-boxes and battle headquarters at the latter.

The Defence of Britain project is currently focusing upon anti-invasion defences (Lowry, 1996). Several coastal defensive sites are noteworthy including the Freiston shore coast battery, the Haile sand fort and the network of pillboxes in Boston Haven. Inland within the region there are 54 extant pillboxes on the Burton to Ashbourne 1940 invasion Stop Line, and some 25 dispersed pillboxes. Derbyshire and Northamptonshire lay behind the static anti-invasion defences and lack evidence for Stop Lines or associated defences (Alexander, 1999). Radar and Cold War early warning sites survive to varying degrees: Stenigot in Lincolnshire has extant WW2 and Cold War radar structures (Osbourne, 1997); and Fiskerton's Royal Observer Corps HQ bunker complex is also important.

Royal Ordnance Factories producing munitions were located in the region, and Stratton & Trinder (2000) provide a detailed assessment of war production both nationally and regionally, including specific sites. Supply sites included depots at Dalby, Chilwell and the Fauld bomb store. In Northamptonshire major munitions factories from WW1 at Warkworth are now represented by extensive earthworks and in both world wars at the Abbey Works in Northampton - recently investigated.

Other examples of World War Two manufacturing, storage and development survive at Weedon Depot; for aircraft parts assembly and repair in Northampton, and at Armstrong-Whitworth's Sywell plant; for work at Corby on 'Pluto' and the 'Mulberry' harbours. Borough Hill in Northamptonshire was a focus for early RDF (radar) experiments and aircraft navigation systems. At Tollerton in Nottinghamshire, Field Aircraft Services Ltd repaired Lancasters and other military aircraft during the war years. Rolls-Royce was a major aero-engine designer and manufacturer, in addition to its work on tank-engines. Its Derby Nightingale Road car works of 1908 remains significant, where aero-engines such as the Spitfire's Merlin were designed and developed before and during WWII, and tested at the company's main test-centre, Hucknall airfield, Nottinghamshire (Pugh, 2000, 2001; Ritchie, 1997). Jet aircraft with Rolls Royce engines were subsequently test flown from Balderton, Nottinghamshire during 1943-4 (notably Whittle's Meteor jet trials), and Church Broughton, Derbyshire where concrete runways were available (Barrymore Halpenny, 1981: 113). In addition to aero-engine development, Rolls Royce used Hucknall as a repair site for fighter aircraft during the Battle of Britain in 1940.

Potential

- Survey and research work to investigate the nature and distribution of pre-C20 military sites of a permanent or temporary nature (i.e. 1750-1914)

- Survey work to record and investigate the nature, extent and changing nature of defensive and offensive facilities throughout the period
- Research to assess the contribution of industry towards overall war production
- Research into the impact of military/war production sites on nearby civilian settlements (provision of new buildings, roads, structures estates, community buildings)
- Survey and research work to assess the impact of war production on factory site expansions, and evidence for the modernization of plant, adoption of new technologies; evidence for expansion occasioned by government investment in key areas (boot and shoe, munitions, aircraft, collieries); impact of post-war contraction
- Survey work to record and evaluate the evidence for gender differentiation within wartime production contexts as women became absorbed into formerly male work contexts
- Build upon English Heritage's and Defence of Britain Project's extensive research of C29 documentary archives for military sites; enhance findings through targeted fieldwork and surveys

V. Research Agenda – principal themes

The range of research potential highlighted suggests a series of inter-dependent networks that constitute a significant key to an accurate understanding of regional development and diversity. Notably, this reflects an awareness that settlement patterns are imperfectly understood, but are central to an understanding of the social and cultural context of industrialization – or the lack thereof. It is also striking that these non-prioritized research objectives point away from single-sites and technology, moving instead towards a broadly historical archaeological agenda in terms of the 'people' aspects, and the understanding of relationships between sometimes disparate themes. This represents a continuum from earlier periods of regional archaeology, placing the modern period into its appropriate context and provides a solid foundation upon which to craft further gains in knowledge.

The broad research themes can be summarised as:

- *Settlements* – transition from post-medieval period; nature and impact of settlements; plot ownership; workers' colonies and paternalism; issues of 'power and control' in building types; adaptive re-use of industrial buildings; civic buildings; intra-settlement facilities and relationships; nascent settlements; prisons, schools, workhouses; the nature of entertainment; the archaeology of consumption; impact of public utilities
- *Multiculturalism* – nature of C20 settlement patterns; cultural diversity; religious buildings; industrial activity; approaches and perceptions regarding the cultural heritage
- *Religion and cemeteries* – types, locations, buildings, use of materials, social context
- *Transport systems* – inter-relationships between different types; inter-dependency; impact of transport on industrial and settlement development; construction sites; what now survives; C20 airports
- *Landscapes: estates, parks and gardens, woodland* – social context and influence; distribution; new technologies; relationships to industrial settlements; what survives; woodland industries
- *Farming and the processing of its products* – relationships between enclosure, settlement and industry; distributions and nature of planned, model farms; the context of estate farming; rural agricultural industries; the archaeology of (self) improvement – freehold land, tied cottages, allotments, education; milling and malting

- *Extractive industries* – underground workings; inter-relationships of workings to markets, settlements and communities; transport context; building stone; slate and stone industries; industrial context of brick making; ceramics manufacture; clay pipe manufacture
- *Textile mills* – inter-relationships of mills in economic and landscape contexts; continuing survey work of early mills and water management systems; juxtaposition of outworking to mill production; gender roles in working systems; adoption of or resistance to new technologies
- *Outworking* – pre-1850 craft industry buildings of all types, and what survives; relationships between craft industry and/or outworking to factories; transition from framework knitting to boot and shoe; pre-1850 organisation of the Northamptonshire boot and shoe industry; impact of ‘open’ and ‘closed’ villages
- *Military sites* – nature and survival of sites from 1750-1914; defensive and offensive facilities; industrial contribution to production; impact of warfare on former peacetime production; wider context

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