Post-medieval, Modern and Industrial

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Resource Assessment

1. Introduction

Until relatively recently archaeology post-dating AD 1500 has received less attention from archaeologists than earlier periods. This is particularly the case for remains of the last 200 years with the notable exception of industrial and perhaps military sites (covered elsewhere in this volume), though these have mainly been the preserve of the amateur. The period is perhaps the most significant in the shaping of our current world. It also holds a bewildering, if not daunting, range of above/below ground archaeological remains and historical sources. In order to truly understand the development of the period archaeologists and historians must work closely together to produce a properly integrated narrative. Much of the work outlined below has been done using historical rather than archaeological sources. The two cannot, and should not, be compartmentalized if one is to gain a true understanding of the period.

The post-medieval period should perhaps be divided into two separate sections: the early post-medieval period from c. AD 1500/40-1750 and the later post-medieval period from AD 1750 (Bird 2006). The latter period can easily be seen as the main period of industrialisation (Palmer 1999, 2004) and the former an age of transition between the medieval world and the Industrial Revolution (Holton 1984) starting with the social impact of the Reformation (Gaimster and Gilchrist 2003). The division between the two is quite easy for some classes of site and artefact but less so for others and as such they are combined here. Although industrial archaeology is often seen as starting in the mid 18th century, with capital investment, organised labour, technological development and factory-scale production (English Heritage 1995: 1) it is quite clear that many industries have their roots before this date. Although the advent of the Industrial Revolution had a huge impact on society, archaeological work has often focused on the new technologies rather than the corresponding 'social' archaeology, which is crucial in understanding the full impact of the new technology (Campion 2001); the two should not be separated (Cranstone 2004).

Despite the publication of the journal of Post-medieval Archaeology since the mid 1960s and serious consideration given to certain features by Wood (1968) it was not until much later that standard texts appeared (e.g. Crossley 1990; Johnson 1996; Newman 2001). However, as the period has received less academic attention than others it currently lacks a strong theoretical tradition (Grant 1987). This is particularly the case with the late post-medieval/modern period. Although this theoretical situation is starting to change (Stratton and Trinder 2000; Tarlow and West 1999) it still lags behind the more developed theoretical foundations in places such as North America, where the period was first studied seriously (Campion 1996; Clark 1999).
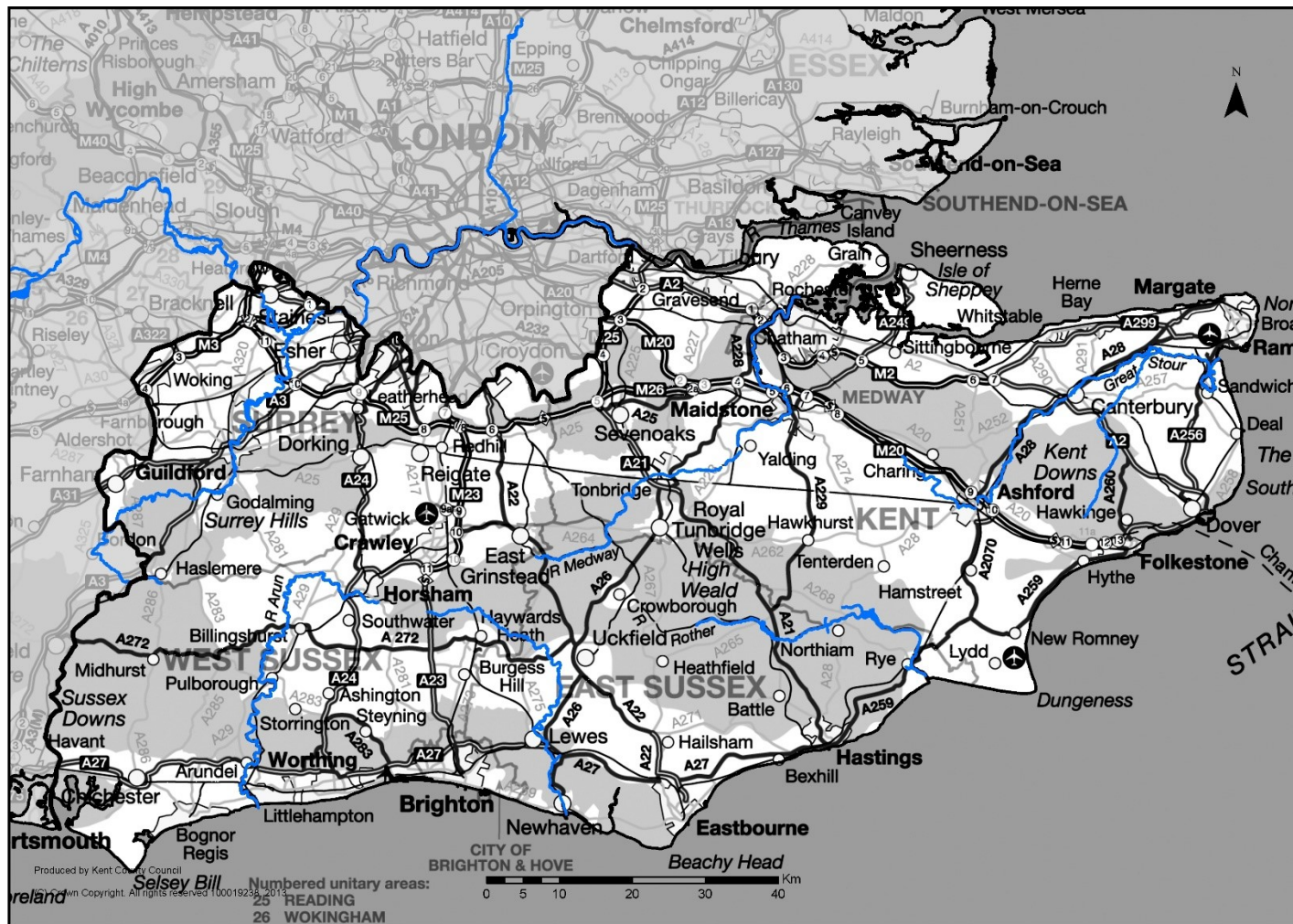
Figure 1. Map of South East Research Framework region

Industrial Archaeology Review has covered industrial themes mainly between
1750-1950 and the hitherto isolated field is beginning to see more overarching
and developed publications (Cossons 2000; English Heritage 1995; Palmer and
Neaverson 1998; Stratton and Trinder 2000; Tarlow and West 1999). To
understand the effects of industrialisation, especially in the last two centuries,
on both the landscape and the lives of the associated workforce, we need to
study not just the evidence of the technological activity but also the surrounding
society – settlement, religious institutions etc. all had a part to play (Palmer
1990: 2004).

Despite the popularity of industrial archaeology such sites have often not been
included on HERs and so have not until recently been considered in the
development management process. This has resulted in the loss of many
industrial sites/landscapes. The Association of Industrial Archaeology's *Index
Record of Industrial Sites* (Trueman 1995), aspects of English Heritage's
Monuments Protection Programme (MPP) and other local initiatives have
helped in getting the more recent past considered in Local Plans etc. (Palmer
2004) and the MPP Stage 1 reports on some 33 industries have been essential
in giving the national context for such sites (Cranstone 1995; Stocker 1995;
English Heritage 2000).

The situation in the South-East has been similar to the national perspective with
generally piecemeal archaeological work having been done on the early post-
medieval period, with a few notable exceptions, and most work being
undertaken on industrial sites by some excellent amateur groups. Although the
region has two very useful guides on industrial archaeology (Greenwood 1990;
Haselfoot 1978a) Sussex has a county specific industrial archaeology guide
(Austin et al. 1985). Surrey is luckier in not only having county gazetteers of
such sites (Payne 1977; Crocker 1990) but also an extensive coverage of
regional gazetteers (cited in Crocker 2004) and study of its later 20th-century
industries (Salmon 1975). In addition there have been a number of useful
historical overviews of the period (Brandon 1974; Brandon and Short 1990;
Lawson and Killingray 2004; Leslie and Short 1999).

During this period the region developed a distinct character, partly the result of
the variable geology, topography and soils of the area but also due to its long
coastline, proximity to the Continent and most notably its proximity to an
expanding London (Schofield 2000a). Although London's influence physically
impacted northern Surrey and Kent, the capital's market reached virtually all
areas in terms of economy and later communications and leisure.

2. Sources

2.1 Archaeological data

The county HERs are not always consistent in the data they provide for the
period. For example, Wealden iron-working sites are usually all listed whereas
certain HERs do not list all/any of the 20th-century fortifications. This
undoubtedly is a result of the variable amount of work done in certain areas and

both the interests and time constraints of the compilers of the HERs. The AIA's 'Index Record for Industrial Sites' initiative (Trueman and Williams 1993) has had mixed success in enhancing HER databases. Perhaps the most common post-medieval sites on the HERs are Listed Buildings but gazetteers compiled by thematic studies (e.g. of windmills) need to be included too.

English Heritage's MPP evaluation of industrial sites has generated much information on industries and has helped the situation (Schofield 2000b). In addition there have been a number of research projects that have all greatly added to the dataset allowing wider interpretations to be made, particularly for the period after AD 1750. These include the Defence of Britain Project, Extensive Urban Surveys and County Historic Landscape Projects and, more recently, the extensive LiDAR survey of the High Weald undertaken as part of the Wealden Forest Ridge Project run by High Weald AONB/East Sussex County Council.

Published excavation reports dealing with the post-medieval period are becoming more common. Despite this, the post-medieval period is often lightly treated on a multi-period site with the main exceptions to this coming from London/historic Surrey. It is quite clear from looking at annual round-ups in publications such as the London Archaeologist, Surrey Archaeological Collections and Post-medieval Archaeology that many more excavated sites and topographic/standing building surveys with post-medieval remains are being undertaken than are being published. This suggests a lot of valuable data is held within the confines of unpublished 'developer' reports and is not easily/rapidly finding an outlet in order for it to be readily available at a regional level.

Reports on environmental archaeological remains published up to 2008 are listed on-line in the Environmental Archaeology Bibliography (EAB) (http://archaeologydataservice.ac.uk/archives/view/eab_eh_2004/). In addition, a database and review of animal bone assemblages from Saxon to post-medieval sites in Southern England form part of the Historic England regional reviews of environmental archaeology (Holmes 2018). It is apparent from the number of reports, and the chronological range of assemblages that scant attention has been paid to animal bone assemblages from post-17th century sites, in some cases the remains having been discarded during excavation (Locker 1982; Westley in Stevens and Stevens 1991). In part this may be due to the disturbed and hence mixed nature of more recent and superficial archaeology, but it is also due to the lack of recognition of the evidential value of post-medieval and early modern assemblages (e.g. Thomas 2009). It is also possible that with more recent organised waste disposal, less refuse was discarded in direct vicinity of buildings/within occupation areas

2.2 Documentary
The period has a huge quantity of documentary, cartographic, pictorial and photographic sources, particularly from the mid 18th century on. These relate to both physical and social aspects of the period and range from tax returns, probate inventories, parish registers and trade directories to Ordnance Survey maps and contemporary photographs. The vast amount of standing buildings

and historical sources has ironically sometimes had an adverse effect in that archaeologists have tended to shy away from the period, or that excavation is seen merely as a secondary means of confirming or enhancing the historical sources. This has particularly been the case with the late post-medieval/industrial period, which is often viewed as the realm of the economic historian and that everything is in the historical sources. This may be the case for the dates of inventions and the names of key individuals, but the historical sources do not often cover the frequently illiterate worker's domestic and employment conditions (Palmer 2004). Nor do they provide all the details or information regarding the development of agriculture and the agricultural landscape. Archaeological work is needed to complete the picture within the rigid historical framework (Brandon and Short 1990) and frequently has highlighted the significant gaps in that record. For example late medieval to post-medieval developments in animal husbandry can best be understood by zooarchaeological research (Albarella and Davis 1996; Davis 1997). Even so, the historical sources need careful consideration to ensure archaeological work is well targeted. As the archaeology is so closely interwoven with historical sources archaeologists and historians must learn to integrate research properly rather than either ignoring or paying lip service to each other (Newman 2001).

3. Transition from the medieval period

Although the late post-medieval/industrial period is quite distinct from the medieval period the division with the early post-medieval period is less obvious in many instances. Many social and economic aspects of the early post-medieval period have their roots firmly in the medieval period. This is particularly the case with certain industries, most notably cloth (including the wool trade, e.g. Ayres 2011), iron and glass, leather working/tanning and horn working (e.g. Serjeantson et al. 1984-88). Even more of a continuum was the process of urbanisation which continued as before when the population began to make a recovery from the medieval epidemics. For most of the early post-medieval period the settlement pattern in the South-East, consisting of isolated farmsteads, nucleated villages, market towns and ports, was very similar to that of the medieval period even if there was a gradual change in building materials and construction technique. The 16th- and 17th-century opening and settlement of the Weald was the last stage of the colonisation started in the medieval period (Brandon and Short 1990). Socially things were very similar until the Dissolution. All in all the transition between the two periods was, with a few sudden exceptions, a gradual progression.

4. Rural landscape and settlement

It is the post-medieval period that has had the greatest input on the current landscape (Betts 2004; Brandon 1974; Brandon and Short 1990). The demands of the growing population and the proximity to London and the Continent meant the response from agriculture and industry had a notable effect on the former medieval landscape (Thirsk 1985). There are also deliberately created landscapes of display relating to country house parks/gardens (Courtney 2001;

Pittman 2012). Although no heavily industrialized areas are present as further north, the South-East does also have distinct, if subtle, industrial landscapes.

The Historic Landscape Characterisation projects in the region have been or will be crucial in providing an overview at the widest level. Some completed projects could already benefit from upgrading and this needs to be factored into a rolling programme of review if the best is to be obtained from them. Much can be learnt about the changing conditions of the rural population by drawing on a wide range of historical sources including estate records, probate inventories, Parliamentary enclosure acts (Tate 1978), field names and cartographic sources. Such studies provide a more localised, but detailed, tier below the HLC projects.

Very little survives of the medieval field systems in the region. Historical sources give a better indication of the practical aspects of the organisation of farming in the early part of the period (Brandon and Short 1990) and some archaeological work has now begun (Margetts 2018). The enclosure of land resulted in a patchwork of hedged and ditched fields which form the familiar landscape around us though the type of fields in the region vary considerably depending on their topographical location and process of formation (Eddison 2000). Enclosure became common from the mid 18th century and particularly in the 19th century with the General Enclosure Act 1845 (Everitt 1976; Hall 2001; Tate 1949, 1967). These enclosed fields are now often being amalgamated for the needs of modern farm machinery and although often fossilised in the cartographic sources, physical evidence is being lost.

Many woodlands disappeared in the post-medieval period, particularly during the 19th-century enclosures, however, many were subjected to rigorous management from the 16th century to meet industrial needs. It has been shown how the integrated use of documentary, archaeological and ecological evidence has proved a useful approach to woodland history (Field 2001; Rackham 1981, 1987). In recent years there has been an increasing interest in woodland archaeology resulting in an excellent summary covering the South East (Bannister 2007). This represents a current overview drawing on numerous woodland surveys, most notably from Surrey (Bannister 1996, 2004; Howe et al. 2005) and Kent (Bannister 2002; Caiger 1964; Hogg 1941; Roberts 1999; Tatton-Brown and Bennett 1983).

In the late medieval and post-medieval periods, marshlands were exploited for wild resources, e.g. birds and fish and for pasturing livestock (e.g. Sibun 2008). Reclamation of marshland, often started in the Middle Ages, continued into the post-medieval period, where increased efficiency resulted in more extensive and longer term benefits. Although Romney Marsh has seen most study (Eddison 2000) other areas have also received attention (Brandon 1971; Farrant 1972). Commons and waste also played an important source of pasture for many settlements during the period. Concentrations of squatters were to be found around such areas though little trace now remains (Courtney 2001). Many of these areas were affected by partial/complete enclosure either illegally or through agreement and later Parliamentary Act (Brandon 1963; Kay 2000). Little archaeological work has been done in this field though a later 18th-mid

19th-century squatter site has been surveyed near Farnham, Surrey (English 2005).

The south-east industries can be seen as more of an element in the development of certain landscapes rather than taking centre stage as the northern coalfields (Palmer 2004). The most obvious example are the expanses of managed woodland and water-management features associated with the Wealden iron industry or the water-powered industries of the Tillingbourne and Wandle valleys in Surrey, which now appear natural to the untrained eye. The modifications of streams and rivers with dams, leats and navigations as well as quarrying and the construction of canals, roads and railways had a significant impact on the local environment.

4.1 Farms
Farms and their associated buildings formed a fundamental foundation for the economy of the region throughout the period. Many are of medieval origin, however, with the great improvements in agriculture in the 19th century, new farms were established away from villages where space allowed for a planned complex designed to accommodate the new methods and machinery (Barnwell and Giles 1997). The multitude of extant farms has perhaps ironically resulted in only a small percentage being studied in detail. Although farmhouses are generally maintained many ancillary buildings, which represent the developing mechanics of a farm, are being lost to decay or conversion. As well as work by the Weald and Downland Museum some historical/archaeological studies have been made (Caffyn 1983; Farrant 1983a; Martin and Martin 2007). However, a more recent comprehensive regional ovrview of extant farms has not only looked at different building types, but their placement within farm lay-outs, and this has provided a platform for future study and assessment (Lake 2014). Many less obvious features were part of the agricultural system. These include stock enclosures, marling pits and dew ponds which have seen a little archaeological work and certainly no concerted study with wider research aims (Drewett 1982; Gardiner 1990a; Stevens 1990). Numerous such features still survive, including Looker's huts, however, they are often not considered/protected and thus rapidly disappearing.

4.2 Houses of the upper class
During the 16th century the increased desire for comfort and its easier attainability for the wealthier are demonstrated in the new style of large stately houses built across the region. The surviving examples are mostly listed in the 'Buildings of England' volumes (Nairn and Pevsner 1965; Nairn 1971; Newan 1976). These sites offer the opportunity to study the changing fashions and comforts of the upper class houses and study this level of society which until now has mainly been undertaken using historical sources alone. Sampling of appropriate deposits for plant and animal remains has the potential to shed insights into the diet of the occupants, providing an often illuminating comparison to the historical sources (Ayres 2011; Locker 2005). Three different types of establishment can be placed within this category:

A number of Royal and ecclesiastical houses/palaces exist in the region: 11 Royal houses were situated in Surrey alone by the time of the death of Henry

VIII (Thurley 2004). The most notable excavations are those at Nonsuch, which have given a good insight into the nature of both the buildings and associated material culture (Biddle 2005), and the Archbishop's Palace at Otford (Philp 1984a), both sites demonstrating the massive nature of the remains associated with sites of this type.

Many moated sites and castles continued in occupation into this period though in the past this aspect has often been treated lightly by the medieval archaeologist. There are some notable examples of historical, standing building and targeted excavation work such as that at Westenhanger castle, Kent, which uncovered extensive evidence of development during the 16th to 17th century (Martin and Martin 2001) and the 16th-century brick house at Laughton Place (Farrant et al. 1991). Conversely, at Hawksden, Sussex, excavation only revealed evidence of some late 16th-century poor quality repairs to the existing building (Martin 1990). Better remains were recovered at Hexstall, Surrey, including a fishpond and deer pound (Poulton 1998), which zooarchaeological evidence has shown provisioned a high status diet, also derived from marine fishing and trade.

After the Dissolution many former monastic structures and their outlying granges became available for conversion into prestigious domestic residencies. The associated lands, once passed into secular hands, were often the source of much wealth and were fundamental in the rise of the landed gentry. The re-use of monastic sites for secular or royal owners has been noted in a number of excavations, particularly in Sussex at Battle and Bayham Abbeys (Hare 1985; Streeten 1983), Wilmington and Michelham Priories (Barton and Holden 1967; Stevens and Stevens 1991), Lewes Friary (Gardiner et al. 1996) but also in Kent at St Augustine's Abbey, Canterbury (Sherlock and Woods 1988). It is quite apparent that the use to which such sites were put shows a range of social status and function, which is well represented by finds and environmental remains. At the Augustinian priory of St Mary Merton, Surrey, plant remains reflected the shift from monastic to manufacturing use of the site. Dietary evidence dominated the earlier assemblages while plants potentially associated with the textile industry figured strongly in the post-dissolution deposits (Giorgi 2007).

Purpose-built houses for the nobility and gentry from this period are frequently still standing, such as the 16th-century ironmaster's house at Batemans, Burwash. These have usually received study to greater or lesser extent such as in the RCHM volumes or individual/county accounts (Oswald 1933). Studies which cover both the house and grounds through time, such as that at Polsden Lacey and Stanmer, offer the best opportunity to fully understand the development of these sites (Berry 2006; Currie 2000). Although the general trend in new-built houses of the later 17th century was a decreasing size, older existing houses were subjected to extensive alterations as fashions changed. Such alterations can lead to difficulties in interpretation of surviving remains. Unfortunately many sites no longer survive: the remains of the early 17th-century house at Old Buxted Place (demolished 1722) were completely destroyed in 1973 during enlargement of a lake (Tebbutt 1975). House shells, or fragments thereof, including Sissinghurst Castle, Kent (1580-1603) and the

early 16th-century Cowdray House, Sussex (burnt 1793) provide opportunities to study relatively unaltered structures (Morris 2005). The investigations at the Elizabethan mansion at Ore Place, Hastings and the multi-period Stanmer House, near Brighton are two of the few instances where actual excavation has been carried out on houses of the 'upper' classes (Barber 1998; Gardiner 1991; Margetts and Thorne 2018). Other remains were recovered of the 18th-century rebuild of a Manor House in Chalk (Moore 1999) and 17th- to early 20th-century vicarage at Kingston upon Thames (Andrews 2001a).

Estate structures, which formed a crucial part of daily life, are relatively numerous but are frequently well hidden and have seldom been subjected to serious study. One of the commonest structures on estates are ice-houses which have received some study in Sussex (Martin 1983, 1984/5, 1994). Water-supply to these large houses was often very elaborate and demonstrates the technical innovations of the age (Palmer 2016). Petworth House had a piped water supply from at least the start of the 16th century (Taylor et al. 1979) and a number of other examples have been studied (Eyre and Allnutt 1989; Palmer and Baxter 1989). Other estate structures such as pigeon houses, stables and bee-boles (Chadwick and Phillpotts 2002; Walker 1988; Walker and Crane 2001) have as yet received little systematic study despite their importance to the infrastructure of the estates. Study of animal bone assemblages can also provide information about estate management practices. For example, dove-keeping is indicated by the presence of bones of young pigeons/doves raised for consumption when not yet fledged at Battle Abbey (Locker 1982) and St. Gregory's Priory (Serjeantson 2011) and freshwater fish (e.g. carp) may provide evidence for the use of local fishponds (e.g. Smith 2001: 316) or for the establishment of commercial freshwater fisheries (Smith and Serjeantson 1997).

Recent archaeological trends have expanded the study of upper class dwellings beyond the houses themselves to their associated settings and the use of the landscape for a display of wealth (Williamson 1995). The transition from the formal gardens of the 16th century to the parkscapes favoured in the 18th century is complex and often variable in date depending on the individual estate (Taylor 1983). It is important that gardens and parks of all social tiers, from the aristocracy to the 19th-century tenant, be considered in order to fully appreciate the significance of their variability (Courtney 2001; Hall 2001). The newly created 19th-century large gardens represent new levels of society entering the field - city gentlemen and industrialists building themselves country retreats within reasonable commuting distance from London (Palmer 2004). After the Great War many large estates were sold off and the land divided resulting in a number of former parks being brought by local authorities (e.g. Stanmer Park, Brighton). Most major gardens have been described in the RCHME volumes (English Heritage 1998) and supplemented by English Heritage in 2000 to enhance the 1998 Register of Parks and Gardens. In addition there are certain organisations, such as the Surrey Gardens Trust, who specialise in this topic; see also the ongoing work of the Kent Gardens Trust in updating the Kent Gardens Compendium. Despite this, most gardens have little statuary protection and there is a real danger to buried remains from current horticultural work unless well-informed management plans are put in place.

To date little archaeological work on the gardens of the region has been undertaken though what has been done has ranged from the larger gardens (Aldsworth 1980; Tatton-Brown 2002; Taylor 2003) to much smaller examples such as those at Ore Place (Gardiner 1991). In addition gardens and parks are also associated with ancillary structures ranging from drainage/irrigation systems, fountains, greenhouses of varying size and complexity (Fig. 2), cold frames, hot beds, toolsheds and a number are also graced with follies of various forms and features for enjoyment such as prospect mounds and summer/banqueting houses (Aldsworth 1983a).

Figure2. The excavated stoke pit and c. 1840s boiler for the large heated greenhouse at Bishopstone Tidemills, East Sussex (Photo: L. Barber)

As well as the effect of emparking on the local landscape and rural community during the period (i.e. the movement of villages such as at Petworth) there is the effect of disparking too. The latter has been studied mainly through historical sources (Crocker 2005; Pittman 2012) but should also consider surviving features on the ground. Animal bone can also provide key evidence for stocking and destocking (e.g. Sykes 2007) as well as the changing role of the emparked animals in consumption and trade. Fallow deer is present in most animal bone assemblages from religious and elite sites as well as several urban ones, suggesting that they continued to be emparked in the South-East into the 18th century (see Pittman 2012), and that their meat was traded and consumed.

4.3 Villages and dispersed housing

The study of domestic rural buildings can help strengthen the evidence for the growth in prosperity of both the farming and rurally based industrial communities. Many houses were adapted between the later medieval period and the end of the 17th century. In addition to the older houses, a number of new houses were built in new styles (Hoskins 1953), most notably 18th- to 19th-century labourers' dwellings for estate, agricultural or quarry workers. These are an integral part of understanding the rural economy and its social structure. The analysis of standing buildings is perhaps the key to the understanding of

this field and the work on the architectural survey of the Rape of Hastings (Martin and Martin 1987) has shown the importance of studying the houses of a cross-section of the population, particularly in combination with historical sources and indeed the general social history of these structures (Johnson 1993, 1997). Combined historical/archaeological work has been well demonstrated to unpick the complex development of individual houses and show the adaptation of new comforts even at middle class dwellings (Aldsworth and Harris 1982; Holden 1963; Perason 1994). In Surrey the systematic use of scientific dating has greatly helped our understanding of the chronological development of houses and specific features within them (Wild and Moir 2013). The functional changes buildings were subjected to is another interesting aspect of the period well demonstrated by a medieval hall house, converted into a barn, at Eastlands, Cowfold, West Sussex (Hughes 2004).

One of the fundamental problems for the study of rural buildings, as with urban ones, is that of differential survival. The buildings still extant tend to be those of the wealthier levels of society whose houses were more durable and worth adapting in later periods. Little is known of the humbler dwellings of the labouring class at the beginning of the period as most of these were usually replaced during the 18th and 19th centuries. Those that do survive tend to have been so extensively altered that little of the original structure remains. The documentary sources for these poorer houses is also scarce as the occupants often had no will and thus no probate inventories were made (Crossley 1990).

There was a great deal of rebuilding in new styles and materials in the 17th and 18th centuries and this gives rise to the opportunity to study the adaptation of the new materials and how this was affected by social status, date and geographical location. In the 16th century timber was still the main material though brick was used for certain features such as chimneys and the replacement of wattle and daub panelling in earlier buildings. Brick was only used for complete construction in the better-off houses at this time (Vigar 2004). The use of stone was usually confined to better quality houses unless a plentiful cheap local supply was available. As such, the increased use of brick for the main construction material in the 17th and 18th centuries, as it came down the social scale, depended on local resources.

Villages usually offer a good opportunity to study buildings of the period as redevelopment has often been slow, or non-existent (Barton 1964; Bedwin 1978). It is unfortunate that when redevelopment takes place it often does so with little or no archaeological input or is of keyhole nature. As well as living villages the region contains some deserted examples which ceased occupation in this period (Burleigh 1973). These sites perhaps offer the best opportunity to evaluate the social context of the buildings through study of ostentation, or the lack of it, and the arrangement of internal space (Campion 1996; Morris 1994; Tarlow and West 1999).

5. *Towns and urbanism*

Urbanisation did not stop at the end of the post-medieval period; it is an ongoing process with infilling and continual expansion (Aldsworth and Freke 1976). As such, in order to fully understand it, the study must continue to the present day where the work of the post-medieval archaeologist can meet that of the urban geographer (Barber 2003). The change, refurbishment and regeneration in urban centres has been continuous. Understanding the historic environment of towns is essential to our understanding of development of human society (Palmer 2004).

Although the character of the region's market towns initially remained unchanged the increase in industrialisation and improved communications in the later 18th and 19th centuries had a profound effect. The degree of change was variable from town to town, depending on transport links, resources, labour and potential market. Perhaps the most notable change was the massive new housing provision causing both crowding and expansion. Between the 1850s and the 1960s the urban environment became characterised by large mixed zones added to the original core, containing a mix of housing, factories, schools, shops and, later, recreational facilities such as cinemas and sports centres (Ballinger 2000).

The urban hierarchy of the region in the early post-medieval period was dominated by towns such as Canterbury, Lewes, Chichester and Guildford, which had their roots firmly in the medieval period and to a certain extent maintained their earlier character as essentially agricultural markets. Although there was an increasing urban population it was not uniform across the area. For example, Canterbury's population grew rapidly (3,600 in AD 1560 to 7,000 in AD 1700) mainly due to an influx of Continental migrants and the dockyards caused rapid early growth at Chatham (Bower 2000, 2004). Essentially much of the region retained its settlement pattern of rurally-based nucleated villages, market towns and countryside though ports often fluctuated due to natural topographic changes (Mayhew 1987).

All the towns had market areas of varying sizes, but none totally dominate any particularly large areas. Only London and its influence along the Thames corridor stands out, particularly affecting Surrey and north Kent, though its influence was apparent over the whole region as a market centre. The ring of market towns such as Farnham, 20 to 30 miles from London served as collecting points for London dealers (Bird 2006). Surrey saw the greatest changes during the period as the poor soils and land-locked position had kept the population comparatively low. The effect of London and Southwark on the northern part of the county began early with major increases in the population of other parts occurring with the coming of the railways in the 19th century (Schofield 2004).

The period saw the establishment of a number of new towns in the region, principally due to the area's proximity to London. These were essentially leisure resorts with the 17th-century spa town at Epsom being one of the first (Borsay 1989). The 18th century saw the dramatic rise of spa towns, most notably Tunbridge Wells, as well as seaside resorts such as Margate and Brighton (Farrant 1983b; Whyman 2004a). These both grew out of existing small

settlements as well as being created on virgin sites as at St Leonards. The rich were the main patrons initially, however, with the increasing ease of transport such resorts quickly came within the reach of the middle and lower classes such as that at Westgate-on-Sea in Kent (Crouch 2000). In addition the new settlements created economic opportunities for all where there had been few beforehand. The resorts also gave rise to particular forms of architecture, from the obvious such as piers, to the more subtle such as a range of accommodation catering for different levels of society, particularly from the 19th century (Brodie et al. 2005). During the 20th century with the advent of the motor car the resorts tended to sprawl, with less planning and cheaper buildings, giving rise to swathes of bungalows, holiday camps and caravan parks. The region also contains examples of 20th-century planned towns such as those at Peacehaven and Crawley (Kay 1999) and hugely expanded commuter towns such as Redhill and Haywards Heath.

5.1 Urban Archaeology

The region has seen numerous urban excavations in the last few decades, with a dramatic increase since the advent of PPG16. These have until relatively recently concentrated on earlier occupation, often at the expense of the post-medieval deposits. Where post-medieval deposits were recorded, they are often not published or only partly so (Freke 1977/8). Chichester is undoubtedly one of the most intensively excavated historic towns in the region and it is commendable that the Post-medieval deposits from the town have been published, albeit occasionally briefly, from an early date (Down 1974a, 1978, 1981, 1989; Down and Magilton 1993). The Post-medieval archaeology in many other historic towns has lagged behind the earlier periods, or indeed still does. A notable exception to this is in historic Surrey where Post-medieval deposits have been dealt with in some detail in the London Boroughs. The proper excavation and reporting of 18th and 19th centuries remains is far more common now than it was in the past. This trend, with a few exceptions, began in London and has often been carried out into the South-East by London-based units, most notably in Surrey and to a lesser extent Kent (Edwards 2007; Hawkins et al. 2002; Wragg et al. 2005). Although many planning-led interventions are small-scale they need to be treated as part of one wider urban landscape in order to allow the chance to fully understand their significance (Courtney 2001).

Archaeological work in historically newer towns such as Brighton and Tunbridge Wells is still in its infancy though the potential for the period is good (Freke 1978; Farrant 1993). The location and analysis of early post-medieval remains, including biological material, associated with these towns will provide an insight into the earliest phases of their development to which can be added the historical sources and standing buildings of the later periods.

Perhaps the most difficult physical problem for post-medieval urban archaeology is the heavy truncation of the shallowest deposits suffered at most sites due to the lack of accumulation of soil/demolition layers after the end of the medieval period (Courtney 2001). Where soil accumulation does occur it is usually to the rear of the structures in open areas, which were frequently used for market gardens and orchards from the 16th century on. Another of the

problems is the cost of publishing complex urban sites. These multiperiod sites produce large quantities of associated artefacts and environmental data. As such all periods are competing from the same financial pot. This gives rise to the need for more summary reports with much data staying in the archive or in the fuller grey report. The post-medieval is often, but not always, the period which suffers the most and many of the new reports, although commendable for their serious treatment of the period, lack detail particularly on the finds/enviromental assemblages.

At the wider level the Intensive and, more commonly Extensive, Urban Surveys of the region's towns has been of major significance in understanding the post-medieval aspects of urbanism, including periods of growth, zones of use and the effect of communications to both a town's economic and domestic elements.

5.2 Urban domestic buildings

The heavily truncated nature of many archaeological deposits relating to buildings is somewhat compensated for by the surviving buildings and historical sources. There are usually a number of early post-medieval buildings surviving, even if they are well hidden behind later facades and modifications. However, there are elements of the post-medieval town that have not survived above ground such as the houses of the poorer majority and structures associated with small-scale urban industry. Another problem is that although population grew in many towns in the early post-medieval period this is not often reflected in urban growth – populations being absorbed by infilling empty plots, adding extensions to existing buildings or sub-dividing them (Taylor 1992). The close scrutiny of the internal lay-out of standing buildings, where later modifications allow, is thus essential to detect these physically minor changes. It is also important to place standing/excavated buildings in their social context by undertaking a study of the related documentary sources where they survive though these are biased toward the more affluent properties.

As noted above, the period saw changes in style of building, construction techniques and materials, the latter facilitated by the easier transportation of materials most notably afforded by the expanding rail network. This is most notable when intense survey has been carried out over a wide geographical area on structures of different dates (Martin and Martin 1987) but combined historical and standing building analysis in Rye has demonstrated much can be learnt from an individual town (Draper 2009; Martin and Martin 2009). Changes were also driven in urban centres by lessons learnt from catastrophes such as the 1666 Great Fire of London and the potential ripple effect of it further from the capital (Schofield 2004). The chronological change to stone and brick within the region's towns is of some interest in understanding the degree to which such lessons were learnt.

Urban excavations frequently uncover structural remains though they are often fragmentary (Blockley et al. 1995; Clough 2004; Down 1981; Stansbie and Score 2004; Williams, D 2005). However, some sites have clearly demonstrated structural preservation below ground can be more complete and the sequence complex as at the riverside site at Mortlake, which produced a

series of phases from the 17th century on (Darton 2004), and in Southwark (Wooldridge 2003). There are often surviving above ground structures of a complex nature (Andrews 2001b). The excavation of 18th- to 19th-century buildings in the London suburbs is also providing important information on the lay-out of both domestic buildings and their sanitary arrangements as well as late urban industry (Grainger 2000; Mackinder and Blatherwick 2000; Sloane and Hoad 2003), particularly when properly integrated with the historical sources.

5.3 Backyards, water and refuse
Perhaps the most notable urban archaeology for the period has come from negative features such as wells and pits to the rear of the buildings. These have provided important information regarding material culture, diet, sanitation/water supply and environment but are usually separated from any associated surviving structural remains by the truncation of the linking stratigraphic sequence. Negative features are common on most excavations and include published examples from Hastings (Rudling 1976; Rudling and Barber 1993), Lewes (Norris 1956; Rudling 1983, 1991), Chichester (Down 1989) and Canterbury (Blockley et al. 1995; Frere and Stow 1983) though their precise function is not always understood. Interpretation might be improved by greater emphasis on sampling for environmental remains on future urban sites. The potential for early post-medieval town dumps, such as those at Plymouth, has been demonstrated (Gaskell Brown 1979) though none have yet been excavated in the South-East. Despite the quantity of wells and pits excavated there has been little attempt to place them in the wider functional context.

5.4 Retail premises and inns
Traditional retail trades (butchers, bakers, tailors) were to be found in many towns and villages. Shop frontages were often inserted into existing buildings from the 18th century and there was an expansion of commercial activity after the mid 19th century with the increase in specialist shops and services such as jewellers, hat shops and photographic studios. Cornershops, located to serve the expanding domestic suburbs and large purpose-built shops and department stores began to appear as well as architecturally distinctive banks and post-offices in the larger towns (Wright 2000). An understanding of these premises is crucial in the study of the economic basis of many settlements. Inns were located in most settlements but were very numerous in market towns situated on well-used road, water or later rail routes. The scale of commerce of the town can often be gauged by the quantity of such premises (Field 2001).

5.5 Public parks and open spaces
Open areas within cities and towns were often provided by municipal authorities from the mid 19th century on as a means of improving the quality of life of the urban population. These spaces make a counterpoint to those established on private estates (Conway 1991, 1996; Elliot 1986). The current municipal parks rarely still retain their original layout, often having been changed to become essentially large grassed areas. Such change hides the original design intentions and inter-relationships between features such as band-stands, paths, planting beds, fountains and benches (Campion 2001). On a more practical level, allotments were also provided for the population to enjoy the recreation,

and benefits, of growing their own food. Such sites contain a myriad of temporary sheds that amply demonstrate the resourcefulness of the urban population. Such sites are now disappearing fast but, together with parks, represent an important piece of the post-medieval urban environment.

6. Political, Administrative and Social Context

In the early 16th century the region still retained a much broken down system of later medieval feudalism. However, between AD 1520 and AD 1660 there was much change as religious ownership gave way to Crown and secular power and the development of the Church of England (Brandon and Short 1990). Local administration by the early 18th century was still largely based on the hundreds, boroughs, market towns and parishes of medieval origin though the national legislation of central government was more notable. After AD 1750 the main bodies of administrative organisation continued to be the hundreds and parishes. Justice was mainly administered through the hundred system while parishes were involved in a range of issues including provision for the poor and road maintenance. New systems of local government were beginning to be developed in the early 19th century, perhaps most notably the Poor Law Unions of 1834 (Wright 2000). Early workhouses, the forerunners of the post 1834 Poor Law Unions, were administered by the parish and quite widely spread, receiving sporadic historical study (Vaux 2006; Wilsher 2005).

From the 1850s there was an increasing complexity in administrative and social organisation. These were mainly associated with national initiatives, often brought about by rapidly increasing urbanisation. A number of administrative organisations were established, including rural/urban councils, school boards and sanitary authorities. This in turn led to a wide range of purpose-built buildings in or around urban centres including town halls, schools, hospitals, cemeteries, police stations, courthouses, prisons and water/sewage works. The rapid social change after AD 1850 helped develop a form of working class consciousness which led to the development of a number of working class establishments including the temperance movement, co-operative societies and working men's clubs (Ballinger 2000). The formalisation of the County Councils and Rural District Councils in the later 19th century, with numerous subsequent boundary changes, and the later establishment of District and Unitary Councils has resulted in the complex tiered system of today (Godfrey 1999; Melling 2004).

6.1 Public buildings

The building and adaptation of public buildings to meet changing administrative, educational, welfare and reform needs is of major importance in understanding our current society (Courtney 2001). The changing locations of civic buildings has been shown to be closely connected with changing urban social space (Courtney 1996) and the use of architecture as a medium to reflect commercial success, status or social control (Campion 2001).

The provision of early schools and their material remains has often been overlooked despite their frequency in the region (Edwards 2004a). With the advent of local authorities and central government acts numerous schools were

constructed in the 19th and early 20th centuries, though many have since been rebuilt.

Both workhouses, prisons and to some extent certain hospitals can be seen as buildings of social control and surveillance (Palmer 2004). The increasing population in the late 18th to early 19th centuries created the need for more centralised systems of dealing with poverty, crime and health. The study of such buildings is therefore very important in understanding how authorities devised methodologies for coping with the problems. These establishments, which segregated men, women and children in both dormitories and exercise areas, demonstrate extreme social control and need to be related to the changes in industrial and agricultural employment which brought them about. A number of national surveys by the RCHME give a good basis from which to start analysis (Brodie et al. 1999; Morrison 1999; Richardson 1998) and there have been some commendable surveys of individual sites (Fermer 1990, 1998) and county overviews (Hastings and Coulson 2004; Killingray 2004a, 2004b; Morrison 1999: 60). Although many such institutions have been lost, some have seen detailed survey work, such as parts of the Uckfield union establishment (Martin 1996).

6.2 Public utilities

Relatively little is known about the provision of water supply and sewage treatment facilities prior to the mid 19th century. Provisions were local and as such tended to be variable depending on geographical location, with sources such as wells, village pumps, streams and ponds playing the dominant role. This led to problems of public health, particularly in urban areas with rapidly increasing population. As a result, a number of 'Improvement Acts' were enacted in certain towns in an attempt to improve sanitary conditions. From the mid-19th century there was a rapid expansion of the provision of public utilities, particularly with the increased understanding of causes of disease brought about by advances in medical knowledge, the establishment of national Acts and municipal authorities. It was not just sanitation that improved, but the provision of gas, emergency services and electricity. Improvement Commissioners were established in a number of towns to provide rudimentary street lighting and policing, but it was the creation of gas light from the 1820s which led to better street lighting, being upgraded by electricity in the late 19th century. Associated utility buildings are becoming rarer, though trade directories offer a good source of information and the MPP as well as certain town surveys have been essential (Crocker, G 1999a, 2004; Douet 1995; Gage 1987; Lawes 1998; Morris 1981, 1982; Schofield 2000b; Sturt et al. 2004). Godalming boasts the first public electric supply in Britain in 1881 (Haveron 1981) though most major towns had supplies in the 1890s. Surrey has a number of reservoirs and waterworks constructed for London's water supply (Mills 1993; Tarplee 1998) and Croydon was important in the history of town water/sewage systems in the 19th century (Lancaster 2000). The MPP report for the utilities looked at 10 sites in Surrey, of which eight were considered to be of national importance (Trueman 2000). Some archaeological survey work is beginning to be done on less obvious water-management features such as weirs, including examples at Sunbury and Shepperton (Howe et al. 2005).

7. Social structure and identity

The majority of the period saw a similar tiered society to what had gone before, even though circumstances may have changed. The wealthy were not just the aristocracy now but included families who had made their fortune from the Dissolution and industry. The later included 16th-century ironmasters and, more notably later 18th- and 19th-century industrialists. It was also a time of great religious upheaval and non-conformity grew steadily, particularly amongst some populations such as those in the Weald. More change was evident with the industrial revolution where a distinct 'working class' emerged which recognised itself as such and frequently pressed for improvements. After the Great War many of the upper-class families could not maintain their estates, conditions for the working classes improved and service industries saw the rise of the middle classes.

The region has seen an increasing multiculturalism from the beginning of the post-medieval period. This has been principally due to its proximity to the Continent and immigration most affected Kent (Edwards 2002: 2004b). Continental immigrants are closely associated with the improvements in the Wealden glass and iron industries (Kenyon 1967; Cleere and Crossley 1985) as well as the cloth industry and drainage works (Edwards 2002). In places such as Canterbury and Maidstone the influx of Flemish, Walloon, and later French, textile workers in the early post-medieval period was a major factor in the population increase in these urban centres. Such migrants brought new skills such as silk weaving and paper-making (Bower 2004). A number of historical studies have been undertaken on these early migrants (Bower 2004; Edwards 2002; Morant 1951) though they remain elusive in the archaeological record. Studies of later multiculturalism and its impact on the region, particularly that post-dating 1950 has hardly begun, though it offers opportunities for analysis, both through oral history, settlement areas and religious buildings/material culture.

8. Communications

The communications network of the early post-medieval was similar to that of the medieval period and places such as the Weald were still a significant barrier to movement, particularly in winter. Major changes to transport began from the 18th century on with improvements in road and water transport and the creation of railways and air travel. The influence from London was instrumental in these improvements and most of the major transport links radiated out from the capital. The increase in better transport has had a profound effect on the possibilities for commuting in the region, particularly in the 20th century and various studies have been made, such as for Kent (O'Donoghue 2004).

Most transport-related research in the region has been involved with the period of greatest change after AD 1800 as typified in Surrey (Crocker 1999a). Archaeology has an important role to play in understanding the process of

constructing the various types of transport infrastructures and their subsequent physical and economic effects on the landscape when in use (Bird 2006). Such infrastructure would also have affected people's daily lives, for example their subsistence patterns, as the availability and cost of certain food items were no doubt affected by changes in transportation costs.

8.1 Roads

The pre-Turnpike road system needs to be carefully mapped and considered as it is crucial in understanding both urban and economic development, the potential through-traffic to support service industry and the start point for the later improvements which often distorted the earlier network (Hall 2001). The importance of the pack-horse for carrying loads should not be underestimated for the early post-medieval period – such routes did not need wide roads or bridges. Few pack-horse bridges remain though one at Hurst Farm, Oxted is scheduled. To date there has been little study of the early post-medieval road network in the region although work has been done on the Wealden routes (Fuller 1953).

The early 18th century saw the beginning of investment into the road network with the construction of Turnpike roads and the improvement/construction of bridges, fords and ferries at river crossings (Allnutt 1982; Farrant 1972/3; Haselfoot 1978b). Many of the Turnpike roads are still in use though modern widening and other improvements has often meant original features, from road make up to milestones and toll cottages, have been swept away though they are essential for our understanding of the system (Albert 1972; Cossons 1993). There has been relatively little work in Surrey on the Turnpike roads (Crocker 2004) though there has been much more study in Kent (Andrews 1997, 2007; Carley 1970; Hiscock 1968; Keith-Lucas 1984; Panton 1985; Panton and Lawson 2004) and Sussex (Austin 1972/3, 2005, 2006, 2007; Townsend 2007).

Another vital part of the road network during the whole of the period were the inns used to accommodate travellers and refresh horses. These associated services for travellers can often be mapped from historical sources which not only give locations but the number of beds available for guests and stabling for horses and thus the importance of the route (Hall 2001; Harrington 2004).

With the rise of the railways from the mid 19th century on, Turnpike trusts began to be wound up, with responsibility for the road network being taken over by the emerging local authorities. An 1862 Act set up Highway Districts to take over the care/maintenance of roads and later that century their duties were taken over by the County Councils. With the advent of the combustion engine investment in the road network increased in the 20th century. Early motorways in the region include the M2 built 1963, and the M25 built between 1972-86, including the Dartford tunnel and, in 1991, the Queen Elizabeth suspension bridge (Andrews and Crompton 2004). Road building/improvement remains a continuing process today as traffic levels continue to rise. Alongside the development of the 20th-century roads and their complex junctions and signage was the provision of services, from simple rural petrol stations to travel lodges (Calladine and Morrison 1998). Many of the former have long gone though a few still survive and some have been subjected to survey (Sowrey 1991).

8.2 Inland waterways

The Thames was the main inland waterway affecting the region though many rivers such as the Medway and Ouse gave natural routeways into the interior. Many of the region's rivers were artificially improved during the period to allow both increased penetration in the interior and easier access for larger vessels. The earliest navigations include the Wey and Godalming Navigations of AD 1651 and 1760 respectively (Crocker 2004), which have seen some commendable archaeological survey work (Currie 1996). The early 19th-century Ouse Navigation has also seen some work, most notably from an amateur group who have excavated one of the locks prior to restoration and historical overviews of all the region's navigations have been undertaken (Hadfield 1969; Vine 1985, 1986, 1989).

Compared with many parts of the country the region has relatively few canals and most are quite late constructions. This is the result primarily of the access afforded by the Thames, various rivers/navigations and the availability of coastal transport and partly the lack of major industry in the 18th to mid 19th centuries. Despite this the canals have seen a lot of historical study and in some cases fieldwork and restoration (Green 2005a; Panton and Lawson 2004; Vine 1972, 1985, 1986, 1989, 2007). Despite the quantity and quality of historical and restoration work done to date on canals and their associated features such as tunnels, bridges and locks, there has been very little excavation and analysis in line with modern archaeological doctrine. There has been notably less work done on other dependent structures including lock-keepers' cottages, wharves and warehouses.

8.3 Coastal

An overview of the region's maritime archaeology is provided by Milne elsewhere in the SERF Maritime chapter. The region's post-medieval coastal trade was largely a continuation of that of the medieval period. Increasingly, London provided the main market and the region, with its large coastline and easy access to the Thames, was in an excellent position to gain (Schofield 2004). Many of the medieval ports such as Winchelsea were declining at the beginning of the period due to silting harbours. However, new ports rose to prominence, such as Rye replacing Winchelsea and Newhaven replacing Seaford. Later in the period, many of the newer ports also suffered problems of silting resulting in major feats of civil engineering including new channel cuts and piers. One notable example is that of Smeaton's 18th-century new harbour mouth at Rye (James 2002). With increasing understanding of silting and improved technology and materials harbours became more sustainable from the later 18th century on and there have been a number of historical analyses of both the developments of harbours/ports as well as the trade in which they were involved on both coastal ports such as Littlehampton (Farrant 1972, 1976) and inland ports such as Faversham (Andrews 1955). Study of specific port facilities as well as navigation aids such as lighthouses has seen less work.

The actual vessels that transported goods by sea are often missing from the archaeological record, particularly from the early period. Occasionally, they are found in silted up former channels though these are rare (Marsden 2003).

Though providing essential information on seafaring their location is unpredictable often resulting in little or no time for recording when they are discovered (Lovegrove 1964). Some 7,350 wrecks are known of around the region's coast, from Hampshire to Kent, most of which are post-medieval (Cross 1996). Probably the most famous shoreline wrecks are the Anne (beached 1690 at Pett Levels) and the Amsterdam (run aground in AD 1749 at Hastings) both of which are protected by law (Marsden 1985, 2003). Perhaps the most famous 'early' wreck off Kent is the Stirling Castle, lost in AD 1703 (Perkins 1999), the excavation of which produced a wealth of finds including important environmental evidence. Numerous 19th-century wrecks are known of from around the region's coast and many more await discovery (Marsden 1987). Where investigated they have often shown important technological changes in design, such as the *Coonatto* (wrecked Beachy Head AD 1876) with its intermediate timber planking on an iron frame construction. Other ships, more mundane in construction, still offer important insights into trade and material culture, most notably the Danish wooden ship *Thomas Lawrence* (sunk off Hastings in 1863) which contained amongst its cargo a tombstone for a mother and child who had died in the Danish Virgin Islands (Marsden 2003) and the S.S. Castor (sunk 1894) with its cargo of Greco-Roman sculptures and inscriptions (Cross 1996).

8.4 Rail

Of all the improvements to communications, the coming of the railways had one of the greatest impacts on the region. The historical and physical remains have attracted a lot of amateur attention in the past (White 1968). These include specific historical studies, such as that on the Reigate Railway Company (Course 1987) and good overviews (Andrews and Crompton 2004; Crocker 2004). Kent railways in particular show the amount of interest that is typical of such a topic (Catt 1986; Garrett 1984; Gray, A. 1984, 1990, 1998; White 1969). Wider synthetic historical study has been undertaken in Surrey, looking at the development of the railway system and, perhaps more importantly, its influence on settlement patterns and relationship with industry (Jackson 1999). In Kent, similar work has been undertaken looking at the affects the railways had on employment (Andrews, F. 2000, 2003) and in Sussex on urban housing (Roberts 2006).

The birth of the railways is represented by the horse-drawn plateways and the region has very early examples, most notably the Surrey Iron Railway (Wandsworth to Croydon), the first public railway, opened in 1803. The 1805 Croydon, Merstham and Godstone railway has been the subject of both historical and archaeological work (Bird 2006; Burgess 1983, 1987; Osbourne 1982; Sowan 1982). The full establishment of the rail network also had a negative impact on road and canal routes as industry and passenger services moved to the more effective form of transport during the later 19th century. There was also a profound effect on the ability to commute longer distances, most notably to London, which gave rise to commuter towns such as Haywards Heath, Redhill and Woking, the latter initially establishing itself as one of London's new satellite cemeteries in 1854 (Janaway 1994). In addition a much wider range of social classes from London and the South-East could enjoy the delights of the seaside at south coast resorts such as Brighton and Worthing.

The westward extension of the network saw the west of Surrey enjoy increased prosperity by giving it links to both London and south coast ports like Southampton and Portsmouth. In addition to the main lines there were a number of 'independent' railways such as the 'Farmer's line' from Tenterden to Robertsbridge in 1900, the Sheppey Light Railway in 1901 (Harding 1972) and a number of industrial ones (Dean et al. 1984).

The railway infrastructure was depleted in the 1960s when many branch lines were closed during the Beeching cuts. This led to a heavy bias on mainline routes to London and affected later urban/commuter growth. There were also railway lines which were never completed but for which elements survive, most notably embankments at Peasemarsh and partially bored but now lost tunnels (e.g. at Croydon, near Oxted in Surrey and the early channel tunnel attempts) (Leeds 2000; Sowan 1979). However, remains relating to the dis-used railways following the Beeching cuts are more common, many of which still have related surviving structures to record ranging from bridges, embankments and cuttings to trackside cabins. In addition there are numerous stations in the region many of which provide excellent examples of industrial architecture (Leicester and Martin 1998; Symes and Cole 1982). Although there has been a lot of historical work on the subject, little archaeological work has been undertaken in the region. This is fairly typical of elsewhere despite the potential (Morris 1994; Trinder 1998).

Although railways served to transport people and goods over both short and long distances the growing urban centres required more localised public transport to serve their own core and surrounding suburbs. As a result trams began to appear in the later 19th century, the first being run between Greenwich and Peckham in 1871. Later they spread to become common forms of urban transport. Although they were first horse-drawn they increasingly became driven by electricity from 1889 on. Despite increasing competition from motor cars and buses trams continued in a few areas until the 1950s. Trams have been another enthusiast concern and the historical work undertaken has been extremely useful with Kent being comprehensively covered (Baddeley 1971, 1975, 1992; Eve 1998a). Other counties have only seen a few town-based historical studies (Donaldson 1982).

8.5 Air
The region has had a close link with the development of air travel, most notably in Surrey at Brooklands (Bird 2006; Crocker 2004; Masefield 1993) though Kent also saw early aviation (Collyer 1982). The rise of the aeroplane connected the region nationally and internationally as never before. Croydon airport, the world's first commercial airport, opened in 1920, has seen a lot of historical study (Cluett et al. 1977-86) as has Gatwick (King 1986) and Shoreham (Almond 1984/5). The region also had numerous smaller civil and military airfields. The archaeological study of the physical remains of airfields, particularly civilian ones, is still in its infancy.

Other forms of communication were also coming into being in the 19th to 20th centuries. These include the provision of semaphore, usually for military purposes (Holmes 1983; Wilson 1976), the postal service, the telephone

system including cross-channel cables to connect with the Continent and wireless telegraphy, which became common in the early 20th century. The physical remains of such forms of communication, including post boxes, sorting depots, telephone boxes and exchanges have received little attention.

9. Energy Production Technology

The early post-medieval period utilised sources of power of medieval origin, though improving technology usually increased efficiency. However, the advent of the Industrial Revolution began an ever accelerating technological advance beginning with steam and ending in the electric/nuclear age we live in today.

9.1 Man/horse-power

Horse and man-power remained in common use for certain tasks, particularly during the early post-medieval period. Horses were used for ploughing as well as road and canal transport (Clutton-Brock 1992). This power form has left little trace, but a few man engines and horse gins remain. Perhaps the most common surviving types are those of later 18th- to 19th-century horse gins, whether on former brickyards or connected with farm complexes. The advent of steam-driven affordable farm machinery marked the demise of the last of these structures. Analysis of horse remains (age, sex, injuries, size, butchery) can inform on the uses, treatment and types of animals, including the development and introduction of new breeds, for example "heavy horses". Continuation in the use of oxen may also be identified in animal bone assemblages.

9.2 Waterpower

The period saw a great expansion in the use of watermills as they began to be used for a wider variety of industries (Crocker 2004). They were used not only for grinding agricultural products, such as corn and oilseed, but in numerous industries such as iron, gunpowder, cloth and paper. With the exception of the iron industry little excavation work has been undertaken on the region's mills despite them attracting historical research. This deficit is helped to a certain extent by the detailed analysis of the multitude of surviving small mills but the majority of these tend to be either of 18th- or 19th-century date, have been modified during these centuries (Gregory and Martin 1997; Crocker, A 1999), or subsequently converted for domestic use. The larger mills have often been demolished. There has been no archaeological work on 16th- to 17th-century cornmills and none survive in anything like their original form. It is apparent from historical sources that in general watermills are likely to be complex sites, often undertaking more than one operation (i.e. corn and fulling) either simultaneously or sequentially.

There are a number of county-wide surveys for watermills. Surrey has more than most (Hillier 1951; Reid 1987-9; Stidder 1990) but East and West Sussex also have good coverage at this general level (Stidder and Smith 1997, 2001) as does Kent (Bennet 1977; Fuller and Spain 1986). Some streams/rivers saw a dense spacing of watermills. For example in the mid 18th century the Darent had an average of one mill for every mile. Although principally corn, the mills

were also concerned with paper, silk, timber, gunpowder and metalworking (Killingray 2004c). The Tillingbourne in Surrey had 21 mills, only nine (used for corn/fulling) were in use prior to AD 1500 and many were later turned over to gunpowder manufacture (Brandon 1984: 75; Crocker 2004; Crocker and Crocker 2000). The river Wandle, one of the hardest worked rivers up until 1805, had at least 24 corn mills by 1610, many of which were later converted for the textile industry (Twilley and Wilks 1974). Mills were even established on the new navigations, such as the Wey and Godalming, to take advantage of the drops at the locks (Crocker 1992; Stidder 1990).

From the mid 19th century there were improvements to mill machinery and by the mid 19th century many larger mills had installed steam engines as an ancillary source of power (Killingray 2004c). Despite the coming of steam, water (and wind) power continued well into the 20th century as steam was too expensive or problematic for small businesses (Crocker 2004). Indeed, sometimes water-power was instrumental in providing for the newer technology, for example Godalming's pioneering electricity supply of 1881 was initially powered by a water-wheel (Gravett 1981/2: 103-5) and early steam engines were occasionally used to pump water back to the top of a waterwheel (Perrett 1979).

Abandoned mills offer the best potential (Baxter 1994). However, buried remains can often be severely damaged by later activity though useful elements often remain (Leary et al. 2005; Howe et al. 2002: 274). Most of our current knowledge of 16th- and 17th-century mills comes from survey and excavation work on the iron industry where study has shown the variability of a number of aspects of water-control systems and wheel construction (Bedwin 1976; Cleere and Crossley 1995). Whether the evidence for the iron industry is representative of other industries remains to be tested by excavation.

Tidemills are rarer in the region mainly due to the specific needs of their location. The tributaries of the Thames in London contained over 30 from as early as the medieval period (Day 1994; Plunkett 1999) but Kent and Sussex contained far less. Sites include mills at Cliffe and Strood in Kent, Bishopstone in East Sussex (Fig. 3) and a number in West Sussex such as

Figure 3. View of the mill complex at Bishopstone Tidemills in 1883 (Photo: Tidemills project
archive, Sussex Archaeological Society)

Birdham and Emsworth. Most of these date to the 18th century and a few such
as Emsworth still remain though now converted for other use. The only mill to
receive archaeological attention is that of Bishopstone Tidemills between
Newhaven and Seaford (McCarthy and McCarthy 1975; Farrant 1975;
Longstaff-Tyrrell 1996) and is currently the focus of a community archaeological
project run by the Sussex Archaeological Society.

9.3 Windpower
Although there are still some 88 standing windmills in Sussex alone (Austin et
al. 1985) they were once far more numerous all around the region. Surrey has
had some 85 windmills since 1800 though only 11 survived by 1964 (Farries
and Mason 1966). Most of the surviving mills are of 19th-century date: a few
18th-century examples, do survive but are often substantially rebuilt. The
standing mills of the region have received a lot of attention from industrial
archaeologists and there are numerous county-wide lists and surveys as well
as more detailed work on individual sites (Austin 1978; Brunnariaus 1979;
Fowell 1930; Hemming 1936; McDermott 1978a, 1978b; Farries and Mason
1966; Smith 1976; West 1974). It is quite clear the technology and design of
mills dramatically improved through the period, particularly from the 18th
century on (Crocker 2004), reaching their peak with the 19th-century tower
mills. These mills still contributed to the industrial revolution after the advent of
steam (Gregory 2002). During the industrial period the mills were used for a
number of functions other than grinding corn and were an important part of the
economy of many villages.

Despite the number of surviving 18th- to 19th-century structures no 16th- to 17th-century windmills have survived and very few have been excavated (Holden 1967). The only archaeological excavation work carried out purposely on windmills in the region are in Sussex and have shown the potential these sites hold for understanding mill development and the physical remains of the rare horizontal mills (Stevens 1982, 1997; Butler in prep). Other horizontal mills are known in the region, but they are very rare (Crocker 2004; Farries and Mason 1966; Cooke 2001: 126).

9.4 Steam

The use of steam in the region was generally not as essential as the more industrial areas elsewhere in the country (Crocker 2004). Unsurprisingly London utilised steam quite early on, particularly for pumping water (Perrett 1979, 1980). There were 10 reciprocating steam engines in use by AD 1775 in the capital with rotative engines being available from AD 1782. During the 19th century, particularly after 1850, steam engines were used more widely in the region such as at quarries like Merstham, Surrey (Sowan 1985/6) and the gunpowder and papermills at Chilworth (Crocker and Crocker 2000). There were also a number of late 19th-century roller mills powered by steam (Cox 1999a) and a few have been subjected to detailed survey (Martin 2002a). The use of steam at these mills allowed them to be placed more centrally, typically close to rail. Despite this, stationary steam engines did not have the impact on the region as elsewhere though smaller engines, whether used to power ships or agricultural machinery, played an important part in the region's economy in the later 19th to early 20th century. These have left little archaeological trace.

9.5 Oil, gas, coal and electricity

Oil and gas engines were used in some factories in the region toward the end of the 19th century (Crocker and Crocker 1981) but were not common. Despite this many towns gained gasworks in the 19th century to supply street lighting and later domestic supply prior to the establishment of the national system. Many of these town gasworks, with their characteristic holding tanks, have been removed and study has been limited to a few specific sites. The rise of the internal combustion engine saw a rapid increase in the need for oil products and large refineries became a common sight on the Thames, particularly in the 1960s (Booth 2004). Essex, where perhaps most of these sites were, has been quick to recognise the need for their recording (Pollard 1997).

The use of electricity for industrial and domestic purposes developed in the later 19th century. Water turbines were one of the first producers and these have been systematically studied in Surrey (Crocker 2001). They provided a more efficient form of water-power for mills from the mid 19th-century on and replaced water wheels enabling water to remain economically viable as late as the 1930s. They were also used in the region to generate electricity for domestic residences in some wealthy homes. Larger scale production relied on the power station and the establishment of the National Grid and the industry has been surveyed as part of the MPP (Lancaster Uni 1994). The region has a number of power stations fuelled by coal/oil (Kingsnorth) and later, nuclear energy (Dungeness), though they have received little study (Murray 2003).

10. Economy/Industry

The period AD 1520-1660 was fundamentally important in transforming the region's economy and locking it into national and international markets (Brandon and Short 1990: 132). The speed of change was different between town/country and coastal fringe/interior with influence from London increasingly growing from the 17th century, particularly in Surrey and north Kent. The variability seen in the location of industries was a result of the presence of raw materials, fuel, power, transport networks and labour. The latter was often dependent on seasonal agrarian regimes, social structure and demographic patterns (Courtney 2001). Despite this, until AD 1800 the region's economy was essentially rural. The exact process of change to a more industrialised economy is often quite subtle and not well understood. The mid 17th to mid 18th century was a period marked by increased living standards as women and children became more actively involved in the labour market in order to buy the new consumer goods (Hudson and Lee 1990). This created the demand, which also helped fuel the Industrial Revolution (Courtney 2001). As industries grew, greater power and control was exerted over the workforce. Although this is far more notable in the northern English mills it was occurring in the South-East, if more subtly, such as exhibited at the early 19th-century village at Bishopstone Tidemills where entry into the village was controlled by gates (McCarthy and McCarthy 1975). The provision of houses for the workforce by the 'industrialist' was mainly a 19th-century occurrence in the region and included many associated with quarries/chalk pits and railway workers. Early 20th-century examples include those provided by Dennis Bros of Guildford (Palmer 2004), as well those for the Kent collieries (Thomas 2004).

The VCH volumes for the region are a good starting point to gain an overview of economy, both agricultural and industrial (Giuseppi 1905; Hewitt 1932; Salzmann 1907). There are also a number of overviews of industry in the region (Austin 1999; Crocker 2004; Palmer 2004; Preston 1977, 1995, 2004; Andrews, F 2000; Ormrod 1995; Chalkin 1990) including late aspects of the economy (Booth 2001). The contemporary industrial scene has been reviewed in Surrey (Hollinghurst et al. 1975) and to a lesser extent in Kent (Booth 2001, 2004). With the more recent changes to the region's economy in the last 30-40 years, with a shift to service industries and tourism, a great many former industrial buildings have either been demolished or converted.

10.1 Woodland Industries
Woodlands were important economically in the post-medieval period (Crossley 1994a; Palmer 2004). They provided fuel for both the Wealden iron and glass industries, timber for construction and a number of other commodities for the tanning and cloth industries (Crocker 2004: 213). Scant trace survives of woodland industries despite their importance (Armstrong 1978). However, this may be in part due to the lack of fieldwork that has been undertaken. For example, the remains of a ploughed-out charcoal kiln at Lamberhurst (Barber 1992) and the excavation of a single charcoal-burner's hut at Fittleworth (Gardiner 1984/5), have been chance discoveries rather than the result of planned research though many more such sites are now known from recent

woodland surveys. Woodyards, saw-pits and mills were also a common feature of the region though some historical work has been done (Kirk 2005) and a saw-pit on the Slindon Estate has been excavated by the Worthing Archaeological Society.

10.2 Agriculture

Agriculture in the region made up the backbone of the economy throughout the period either by supplying foodstuffs for consumption or raw materials such as hides and wool for use in other industries. Generally, the period 1500-1750 is marked by gradual, but not revolutionary, change in the agrarian economy and landscape, though change in the form of enclosure could be dramatic for individual communities (Courtney 2001; Overton 1996a, 1996b). Although revolutionary improvements in farming began in the 18th century, it was not until the early 19th century that these improvements were being used at a national level. These changes included scientific animal breeding, new approaches to crop rotation, new crops, water meadows, new machinery and, most notably in the Weald, drainage. Many of these improvements leave no/little archaeological trace though the remains of early agricultural machinery is often still to be found on farms, whilst animal bones provide scientific evidence for improvements in animal breeding. A pioneering development in Kent was the creation of the first artificial watercress beds in England at the beginning of the 19th century (Eve 1998b, 2000; Duncombe 2003). Agriculture and its ancillary industries such as malting, brewing, dairying, cereal/meal milling, and engineering of agricultural tools/machinery also led to the development of wealth in towns where industry eventually concentrated (Ballinger 2000; Hall 2001). The improvements to communications during this period facilitated the expansion of agriculture by bringing more distant markets within economic reach.

One of the most common crops in the region were hops (Whyman 2004b) though fruit was also very important in Kent, which supplied both the local and London markets (Harvey 1964; Short 1984). Other areas of the region were principally concerned with cereals, such as on the West Sussex Coastal Plain, or wool, as on the South Downs and Romney Marsh (Brandon and Short 1990; Siburn 2008) with horticulture undertaken in numerous smaller holdings particularly nearer to London. There has been a shift here too in the 20th century, with an increase in arable land, though Surrey has been less affected due to its particularly poor soils (Bird 2006).

There has been much historical work on the agricultural economy (Brandon 1998; Brent 1976, 1978; Collins 2000; Everitt 1976; Garrad 1954; Mingay 1989; Monk 1998, Sabin 1908; Short 1982, 1984, 1999, 2006; Thirsk 2000). However, environmental evidence from excavated assemblages has potential for the study of improved animal husbandry and the introduction of new plants (Giorgi 1999) as well as the nature of use of crop plants and their by-products. Only very limited environmental sampling has been conducted (or at least published) from the region, yet it remains a key area for early introductions of a number of species. Zooarchaeological analysis has shown that animal improvements occurred earlier than suggested by many historians and also that cattle and sheep were improved at different times. Further analysis on animal size in the

South-East is necessary in order to determine the chronological and geographical paths of such improvements. Adequate sampling of post-medieval sites must be a priority of project planning. Archaeology can also be of use in the study of the physical remains of farms and accommodation for temporary farm workers. Large quantities of such workers, often from London, descended on the region during harvest time, particularly for the 19th- and 20th-century hop harvest. These workers were accommodated in a huge number of poorly-built huts, most of which have long since disappeared. However, these remains have seen some study (Babtie 2002; Sutherland and Walton 1995) and a few extant structures remain.

10.3 Farming related industry

Of the agriculturally related industries milling has perhaps been the most studied, though this has usually been done from the perspective of water- or wind-power (see above) rather than thematically driven by function. Mills for agricultural produce utilised water and steam with a notable increase in large roller mills at waterside locations in the late 19th century (Crocker 2004; Preston 2004; Stidder 1990). Oilseed mills have also been studied at a national level (Brace 1960) and an extensive survey of Kent examples located 24 sites dating from the mid 18th century (Eve 1998c). From the early 17th to mid 18th century Reigate had 20 oatmeal mills operating, a number of which were still operated by animal power (Crocker 2004). Although some mills have been individually surveyed (Stoyel and Stoyel 1968; Scott and Saunderson not dated) they remain isolated examples.

Most villages, towns and occasionally estates had small bakeries, dairies and butchers to produce the basic range of foodstuffs (Trinder 1993). Many of these establishments have either not survived or been destroyed by conversion. A few examples survive in good condition though little archaeological work has been done. The recent survey of the estate dairy at Firle is a notable exception (Ron Martin *pers comm*.). These sites are crucial in the understanding of the expansion and refinement of the product output of the agricultural economy.

Development of the dairy and veal industries, as well as retail marketing of meat and specialised meat production is also evident from the study of post-medieval animal bone assemblages from the South-East. The presence of bones from veal age calves is known from a number of sites including 17th-century Linacre Gardens and 18th-century Guildford (Smith and Serjeantson 1997). The skeletal remains of beef joints (as opposed to whole carcasses) are typically recorded on many sites of this period.

10.4 Brewing

Brewing was widespread for local needs during the period and a wide range of malthouses, oasthouses and breweries sprang up across the region, particularly from the 18th century on. Poor communications up until the mid 19th century meant difficulties in transportation and thus the limited market areas were conducive to small businesses, unless sited in town or next to water. The number of breweries peaked in the 19th century, with a reduction in numbers in the 20th century due to takeovers often brought about by the ease of transport afforded by the coming of the railways (Crocker G 1999a, 2004).

Many structures relating to the industry survive although most have since been converted to other use, often resulting in the destruction/removal of many of the internal features.

Oasthouses, which appeared in the 16th century, underwent many changes from their beginnings to the 19th century. A number of studies have been made of selected standing structures and the related documentary evidence (Jones et al. 1988; Cronk 1978, 1979) as well as regional overviews (Jones and Bell 1992; Walton 1985; Lake 2014) but archaeological excavations are needed, particularly on the earlier examples, to fully understand their development. Less archaeological/historical work has been done on malthouses though a detailed study has been made of the industry in Kent (Eve and Stead 1998a) and some work, principally historical, has been done on the industry elsewhere (Barritt 1971-2; Holtham 1992, 1995, 1999; Cooke 2001; Moynihan 1990; Sloane and Hoad 2003; Sturley 1990, 1995; Tan 2004; Taylor 2002). All such excavations should make adequate provision for sampling of biological remains from key deposits.

The growth of the temperance movement in the late 19th century led to expansion of mineral water manufacturers (Ballinger 2000) which became very common in most towns in the region though virtually all these factories are now gone. Where they do survive their conversion has usually resulted in the wholesale removal of the internal lay-out and machinery. Study has therefore to rely on historical sources, including trade directories and the numerous glass and stoneware bottles with company names frequently found on archaeological excavations. The latter have seen extensive research (Askey 1981; Reed 1997).

10.5 Extractive industry
The region has a number of minerals which were heavily exploited in the period. Only the workings that survived into the 19th century usually developed on an industrial scale and there are good documentary sources for many of these (Crocker, G 1999a). The industry has benefited from a national overview as part of the MPP (Lancaster University 1996a) but the South-East has a distinctive character different from many other parts of the country.

Iron ore
The supply of ore to the Wealden iron industry resulted in a huge number of mine-pits being dug between the 16th and 18th centuries. These often survive as earthworks in current woodland though only a few have been excavated (Tebbutt 1978; Swift 1982), however, a number are currently being examined at Sharpthorne, West Sussex (J. Mills *pers comm.*). Although the preparation of the ore for smelting by roasting is well known and indeed slight evidence was found at both Batsford (Bedwin 1980) and Pippingford (Crossley 1975b), there are no excavated ore roasting kilns to date.

Building Stone
A number of different types of building stone have been quarried or mined in the region. These include a range of Wealden sandstones, including Horsham stone and Upper/Lower Greensands. Although the form of many early quarries

may have been destroyed by later working, numerous smaller examples
survive, particularly in woodland. Some historical work has been undertaken in
Sussex (Sowan 1984/5) but not on a large scale despite the potential for
analysis (Gardiner 1990b). More work has been undertaken on the Reigate
stone industry in Surrey (Crocker 2004; Sowan 1975, 2000a; Tatton-Brown
2001) which was used throughout the period. The plateways in the quarries at
Merstham and Godstone have also been subjected to study (Osbourne 1982)
as has the extraction of Bargate stone, from quarries around Godalming
(Janaway 1993; Withers 1969). The most prolific building stone in Kent has
been Ragstone, mainly quarried around Maidstone in the 16th and 17th
centuries (Preston 2004) though it is still used for building and, more commonly,
roadstone. Although only preliminary work has been undertaken on the
extraction sites (LeGear 2007a) an excellent survey of its use and distribution
has been undertaken (Worssam and Tatton-Brown 1993).

Lime and cement
The most studied extraction industry of the region is that associated with chalk.
The material has been used throughout the period for building (Sowan 1976,
1984), as well as the production of lime for soil dressing and mortar and in
various industries such as tanning. The demand for these commodities grew
dramatically from the 18th century on and a national overview has already been
undertaken of the resultant industry (Francis 1977; Lancaster University
1996b). The flint from the industry was not wasted, typically being used for
building or being exported to Staffordshire for the ceramics industry. The
numerous chalk quarries dotted along the Downs attest to an important former
rural industry. There are also numerous underground workings of different sizes
(Lee and Russell 1924; Palmer 2004; Williamson 1930). The smaller examples,
often termed deneholes, now interpreted as medieval/post-medieval
agricultural chalk mines, are common in east Surrey (LeGear 1978) and Kent
(LeGear 1995, 2003, 2005, 2007b; Dawkes 2017, 94) where a number have
been surveyed. Many of the open quarries were concerned with the production
of lime, and kilns are frequently associated with them (Holt 1971; Cox 1999b).
The smaller quarries were often for the individual farmer who produced the lime
in small flare kilns for improvements to the more acidic soils. These small kilns
became common in the 18th century, during a period of agricultural
improvements. Although important work has been undertaken compiling lists of
these kilns in Sussex (Holt 1971; Martin 1997) and Kent (Eve and Stead 1998b;
Eve 1999) very few have been excavated or subjected to detailed survey
(Beswick 1985/6; Stevens forthcoming; Williams 2005). Certainly the majority
of kilns with extant remains appear to date from the mid 19th to early 20th
centuries.

The larger quarries developed with the coming of the railways, which allowed
bulk materials to be economically transported greater distances bringing the
London market well within reach. North Kent was the greatest producer of lime
and cement for the London building trades and flourished in the London building
boom of 1850-1914 though there was increased competition after 1900 (Booth
2004; Preston 1977). The region was at the forefront of developments in the
industry, particularly in kiln technology and a number of important structures
exist (Crocker 2004; Johson 2002, 2003; Preston 2004; Sowan 2000a, 2000b,

2000c, 2001) though many have been lost without record (Gravett and Wood 1967). These structures are beginning to be recognised as important, some, such as those at Brockham and Betchworth, at a national level (Richardson and Trueman 1997) though excavation work is rare (Barber 1999; Williams 2005). As well as the kilns, numerous other elements to these sites existed including internal railway systems (Jackson 1999: 196-200; Martin 1985/6; Townsend 1980). Perhaps the most detailed survey of a later 19th- to 20th-century Sussex lime works is that undertaken at Cocking, West Sussex, where detailed structural survey was undertaken alongside historical and oral history work (Martin 2003), and at the Beedings complex (Martin 2004a).

The industry had a wider impact on the landscape than just the works. The employees were often accommodated close by in newly built terraced houses which were alien to the surrounding traditional vernacular architecture in their design and use of new building materials (A. Hann *pers comm.*). This important impact on the earlier settlement pattern is often overlooked in the study of the industry.

Coal
The exploitation of the Kent coalfield was a late, if short-lived, industry in the region. By the 1920s there were four workable mines with the industry peaking in the mid 1930s. Some townships were built to house the colliers and their houses are still evident at these settlements. Chislet was the first of the four mines to close (1969) with Betteshanger the last (1989). Often, little is left to see now – some subsidence, spoilheaps and the colliers' cottages - though surface structures at Snowdown Colliery have been recorded (Underdown 2005) and the fan and winder houses listed. Significant historical work has been done (Johnson 1972; Millward and Robinson 1973; Thomas 2004) though little in the way of archaeological survey.

Clay, sand and gravel
The extraction of clay/brickearth was widespread during the post-medieval period and was often associated with a brickworks which worked to supply building materials to the developing towns and communication networks as well as ceramic land drains from the 19th century on. Very few of these sites remain considering how prolific they once were. Although much historical work has been done on the brickworks (see below) the actual extraction pits are often not studied. Gravel and sand extraction was also common in the region: in Surrey there were numerous small gravel pits and at least 20 larger ones (Hollinghurst et al. 1979) as well as numerous sand workings (Arup 1991; Brown et al. 1985/6; Crocker 1999a; Sowan 1980). Survey work, in close conjunction with historical research, has allowed the plotting of numerous gravel pits dug for 18th-century road dressing to be mapped on Banstead and Walton Heaths (Bagnall 2004).

Other extractive industry
Other mined/quarried materials from the region include gypsum, used for a variety of products such as plaster and fertilizers. This is still undertaken at Brightling/Mountfield in Sussex, where mining began in the late 19th century (Cox 1996). More widespread was the extraction of Fuller's Earth, extensively

used in the cloth industry (Greenwood 1982; Preston 2004; Robertson 1986). The beginnings of the industry are uncertain though in Surrey there is no evidence of extraction prior to the 17th century with the last Surrey pit closing in 1996 (Crocker 2004).

10.6 Iron

The Wealden iron industry has been one of the most intensively studied aspects of the post-medieval period in the region, particularly due to the historical and field survey work of the Wealden Iron Research Group (Lower 1849; Straker 1931; Cleere and Crossley 1985, revised 1995). The new technology of the blast furnace came from the Continent and an influx of French workers is historically known of at this time (Awty 1981). Although much still remains to be discovered the latest publication, together with the gazetteer on the WIRG website, summarises what is known to date and as such does not need repeating in any detail here. Despite this, more recent county overviews for Kent and Surrey are present (Hodgkinson 2004; Preston 2004; Zell and Chalkin 2004) and the industry has been reviewed at a national level (Crossley 1992).

There are at present in the region of 178 post-medieval water-powered sites known in the Weald. These roughly divide between furnace and forge sites although other subsidiary sites, such as boring mills, also exist. Late medieval water-powered bloomery furnaces are also known from historical sources to have continued into the post-medieval period but none have yet been excavated in the region despite work elsewhere (Crossley and Ashurst 1968). Most excavation has been undertaken on post-medieval blast furnace sites (Bedwin 1977/8, 1980; Crossley 1972, 1975a, 1975b, 1979; Magilton 2003; Wildman 1989). Although these have given a representative coverage of furnaces through time and their general lay-out is now well understood they have shown much variation in internal organisation and construction. Boring mills are frequently referred to in the documentary records but as yet only one, associated with the Pippingford East furnace, has been excavated (Crossley 1975b) though a boring bar was discovered at Chiddingly (Butler and Tebbutt 1975).

All iron from the blast furnace that was not directly cast into objects had to be converted into wrought iron in a finery forge. Only four such sites have been excavated; Ardingly (Bedwin 1976), Blackwater Green, Crawley (Place and Bedwin 1992) and Ifield, Crawley (Margetts forthcoming) in Sussex and Chingley in Kent (Crossley 1975a). Unlike furnaces, forges tend to leave little trace of their working area in the archaeological record. However, all sites have produced substantial remains of the anvil bases. Very little trace of the cover buildings has yet been found although the presence of roof tile demonstrates their existence. Although associated domestic settlements have been noted at some sites (Crossley 1975b; Wildman 1989) only one has been excavated (Worthington undated).

The region had numerous local blacksmiths converting the wrought iron bars into objects for use. A possible 18th-century smith's forge was located at Bayham Abbey (Streeten 1983) and the periphery of a 16th/17th-century one was located at Brookland (Barber 1995). Others are known of historically (Down

1974b: 59-74) and there are a number of extant 19th-century structures, some of which have been subjected to detailed survey (Martin 2004b) though little excavation has occurred (Howe et al. 2005).

The demand for iron goods grew throughout the period despite the decline of the Wealden iron industry during the 18th century. There was an increased specialization of metalworking trades to meet these demands i.e. the production of utensils for processing industries and domestic ironmongery. Such products needed higher quality iron and skilled craftsmen, beyond the capabilities of the local blacksmiths (Hodgkinson 2004). Several metal-working mills were established on tributaries of the Thames from the 17th century onward. The earliest example being the iron wireworks at Chilworth in 1603 (Crocker 1999b). Many iron-(and copper) mills and foundries were set up closer to the Thames as well as other locations: the working history of many already having been studied through documentary research (Green 2005b; Hobson 1924; Potter 1982, 2000: 11-13; Stevens 1994).

10.7 Non-ferrous metals

Although smelting was not practised in the region a number of non-ferrous metalworking mills were in use, most notably for copper in Surrey from the 17th century (Crocker 1999b, 2004: 224; Crocker A 2000; Greenwood 1980; Montague 1999). Lead was also worked at some of these mills in the 17th century (Fairclough 1999). In historic Kent there was the royal brass foundry at Woolwich established in AD 1717 and subsequent development of the Royal Arsenal dominated this area (Preston 2004). Other smaller-scale affairs, such as pin and needle making, were present in a number of urban centres across the region such as Chichester. These are rarely encountered though a late 16th- to 18th-century workshop making copper alloy items has been excavated at Southwark (Grainger 2000).

10.8 Glass

Very little work has been undertaken on the Wealden glass industry since that of Winbolt in the 1930s. His work, along with that of Kenyon, located some 42 glasshouse sites and summarised the historical and archaeological evidence at the time (Kenyon 1967; Winbolt 1933). However, these publications rely on fieldwork of the 1930s and earlier and do not contain any furnace plans to modern archaeological standards. The sites suffer poor survival due to the preferred location being at the tops of hills (for draught) in areas prone to later erosion and because many were built on, or only slightly into, the existing ground surface. More recent work has recovered better furnace plans outside the region (Crossley and Aberg 1972) and the industry has been reviewed at both a regional and national level (Crossley 1993, 1994b, 1996). More recent work has increased the number of known sites to 49 (Clark 2006) and begun to increase the amount of scientific analysis on the products (Dungworth and Clark 2004). It is hoped that a new Historic England funded survey of the industry in the Weald will dramatically increase our understanding of this industry (R. Poulton *pers comm.*).

The industry had its roots in the medieval period. This indigenous industry had declined by the early 16th century. Only two glasshouses of this early period

have been excavated: the 14th-century site at Blunden's Wood, Hambledon (Wood 1965) and the mid 16th-century site at Knightons, Alfold (Wood 1982). During the second half of the 16th century an influx of immigrant glassmakers from the Lorraine and Normandy regions of France brought better furnace types into the Weald which improved the efficiency and quality of production. Such early immigrant furnaces were located by Winbolt and Kenyon, i.e. Vann Tudor furnace, Hambledon, Surrey but no detailed plans made.

The end of the Wealden industry came in the early 17th century. This was due mainly to the competition with other industries, particularly iron, for charcoal as fuel. In AD 1615 the proclamation that wood was not to be used as fuel for glass effectively sealed the industry's fate in the Weald and by AD 1620 it had ended (Crossley 1994b: 68). With the use of coal as fuel the industry shifted to London and the north of the country with glasshouses being established at Southwark in AD 1611 and Lambeth in AD 1613. These London glasshouses have seen more modern excavation such as the late 17th-century example at Vauxhall (Tyler and Willmott 2005).

10.9 Textiles

Cloth manufacture was an important industry in the region in the post-medieval period, particularly for Kent (Zell 1994), south-west Surrey and parts of Sussex (Kerridge 1985). Although a lot of sporadic work has been done on the industry this has to date been historical. The predominantly domestic nature of the industry will prove challenging for archaeologists in the identification of most sites related to the industry and a heavy reliance on material culture, including biological remains, will probably be needed.

The peak of the region's woollen industry was in the 16th and early 17th centuries where it was concentrated in the Weald around Cranbrook (Andrews, J 2000; Zell and Chalkin 2004). Many households were involved with spinning which fed the industry. The products were marketed at a local and regional level with London being one of the main outlets. Although prior to the 18th century textile production was on a domestic scale some aspects of the industry, such as framework knitting, were never truly industrial and remained outside factory production until the late 19th century (Crocker 1991). The one exception to this was at the water-powered fulling stage which was mechanised from an early period and was usually run by independent fullers. Water-powered fulling mills were quite common in all counties though in Kent there were never more than 10-15 operating simultaneously (Zell and Chalkin 2004). Although the presence of these mills is well known historically only two have been subjected to excavation (Bedwin 1976; Gardiner and Barber 1990), with a third having its earthworks surveyed (Margetts 2018). Despite these sites containing good archaeological remains none have yet produced evidence diagnostic of the fulling process.

During the 17th century the woollen industry went into slow decline for a number of reasons (Crowe 1973) and had all but gone by the early 18th century, though linen- and fustian-weaving partly replaced it in many areas (Crocker 2004; Kerridge 1985: 124-5; Preston 2004; Shere 2001). There was also the rise of the 'New Draperies', established in the late 16th century in east Kent towns

such as Sandwich. This was a new industry established by immigrants from the Low Countries. In the 1680s the arrival of French Huguenot refugees, who specialised in fine cloth/silks, gave the industry another boost. Although in the early 18th century there were still 344 silk looms and 58 master weavers in Canterbury the industry declined throughout the 18th century (Preston 2004). However, in places the industry survived quite late, with worsted persisting in Cranbrook until the early 19th century with silk and linen production and printing at Canterbury and Godalming (Crocker 1989, 1991, 1991-2; Taylor 1997; VCH Surrey vol 2: 348). The factory system appeared within the Surrey industry around the middle of the 19th century and the surviving buildings were recorded relatively recently (Crocker 1991; IA Recordings 1990). Other more minor enterprises also survived late in Surrey, such as in the poor houses in the east of the county (Stidder 1996: 13; Crocker, G 1999a: 53).

Dyeing is recorded in the woollen industry in the 16th and 17th centuries (VCH Surrey vol 2: 346-7 and 363-4) as well as the bleaching and textile printing industries (Montague 1992). Mills for grinding dye woods on the Wandle are recorded at Wandsworth by AD 1569 (Gerhold and Ensing 1999) and large numbers of seeds of dyer's rocket (*Reseda luteola*) from a known textile centre at St Mary Merton, Surrey, potentially collected for use as a dye plant, show the environmental potential of these sites (Giorgi 2007). Recognition of dye plants in the archaeological record is difficult for many species also occur as ruderal weeds, particularly in urban environments. The excavation of known textile manufacturing sites allows more reliable identification of such plants, which in turn may aid interpretation of similar assemblages from other archaeological sites.

Calico and silk printing developed, partly by Huguenot families, particularly in the 18th century but it declined rapidly from the 1840s due to northern competition and by 1900 only two printing works remained. Excavations on some of the associated sites have proved rewarding. At Bennet's Mill, Merton parts of an 18th-century calico printing works and 19th-century cotton mill were uncovered, and at the former Liberty Works, Merton Abbey Mills, buildings associated with printing were uncovered (Howe et al. 2003: 360 - 361).

10.10 Paper
The region contained a widespread paper-making industry during this period which began in the late 16th century. The industry has been studied at a national level, providing a framework for the south-east industry (Coleman 1958; Hills 1988; Shorter 1977). Work has been mainly historical, with some standing building survey, with Kent and Surrey seeing most study (Crocker, A 2000, 2004; Crocker 1988, 1989/90, 1992, 1994; Crocker and Crocker 1991; Duncombe 2001; Zell and Chalkin 2004). By AD 1700 Kent was one of the leading paper producing counties and by the mid 18th century over 25 paper mills were operating (Preston 2004). At the end of the 18th century the distribution pattern of papermills began to change due to the introduction of chemical bleach, the paper-making machine and the steam engine. These advances removed the need to be close to clean water and water-power and several steam-powered mills were established in Bermondsey and Southwark (Killingray 2004c; Crocker and Humphrey 2002). The industry survived for a

considerable period with huge new paper mills being built in the 20th century on the north Kent coast between the wars to take advantage of imported wood pulp though these declined after 1960 (Booth 2004). To date no excavations have been undertaken.

10.11 Leather

The tanning industry had its roots in the medieval period and was widespread and hugely important throughout the post-medieval period (Clarkson 1960). The Weald provided raw materials in the form of hides and bark and there were both local and regional markets. Tanneries varied in size from the beginning of the period, though there was an increase in numbers from the 18th century (Preston 2004). Numerous sites are known of historically in all counties as well as Southwark (Crocker 2004; Hollinghurst et al. 1975; Semple 2006). Most tanneries had closed by the mid 20th century though a few remained for longer. Upstanding remains are scarce, but a few have been surveyed, such as the 19th-century cast-iron building dismantled at Horsham in 1982 (Aldsworth 1983b). The archaeological potential for tanneries is good in that the process was carried out in pits, frequently lined with clay, timber or brick, set into the ground (Thomson 1981). Despite the existence of numerous tanneries in the region during the period very few have been excavated (Freke 1975; Howe et al. 2004: 332; Wooldridge 2003). In order to study the industry complete plans of tanneries are needed. Some later examples may be obtained from cartographic (Barber 1990) and historical sources (Mead 1989) but complete plans of 16th- and 17th-century establishments will only be obtained through excavation.

10.12 Gunpowder

The production of gunpowder was an important industry in the region. It developed rapidly from the 16th century on, culminating in a number of later 19th- to 20th-century chemical explosives works. Production in the region only ended in the 1930s when the last of the Faversham works closed. Water-power was utilised in the early gunpowder works (Crocker 1986). A national overview has been compiled of both the gunpowder and subsequent chemical explosives industries (Cocroft 2000) and is an essential tool in our understanding of the industry's development and allows individual sites to be placed in a wider context.

Surrey has seen the most study and 16 sites have now been identified (Crocker and Crocker 1990; Crocker 2004). Much historical work has been undertaken on the important site at Chilworth (Crocker 1984; Crocker and Crocker 2000; Crocker et al. 2000) though a detailed English Heritage survey has also been completed (Cocroft 2003). Although many of the Surrey mills closed in the first half of the 17th century the site at Chilworth, established in AD 1626, continued and expanded, only closing after the Great War (Crocker and Crocker 2000; Crocker and Fairclough 1998; Fairclough 2000a, 2000b; Fairclough and Crocker 2005). Most of this site is scheduled due to its early date, its lead in new technology after 1885 and the good preservation of a number of its structures, including an early cordite factory (Cocroft 2000). Other Surrey mills have also been studied through historical sources, such as those at Wandsworth (Gerhold 2002) and some earthwork survey work has been

undertaken of the short-lived late 18th-century mill at Abinger Hammer on the Tillingbourne (English and Field 1991). Kent sites have also seen study (Preston 2004), particularly the Faversham works (established by AD 1573) where buildings have been restored and much historical work been undertaken (Cocroft 1994; Patterson 1995; Percival 1967). Excavation/display work has been carried out at the Dartford mills (Barber 1999; Philp 1984b) and is ongoing at the Leigh site. In contrast, little work has been undertaken in Sussex. The extensive powder works in the Battle area, which began in the late 17th century, as well as further mills at Brede and Sedlescombe, have seen some historical work (Blackman 1923) as has the 19th-century mill at Maresfield (Austin et al. 1985) but no serious fieldwork has taken place.

10.13 Bricks and tiles

The Wealden clays and brickearth deposits, together with local timber, provided raw materials for the production of ceramic building materials and the industry was, and in certain areas still is, an important part of the region's economy. The initial establishment of this industry in the region is not well understood. Many early works were small and short-lived. With the increase in the use of brick during the period numerous longer-term brickyards, both small and large, were established. A comprehensive survey of the historical sources relating to the industry has now been published for Sussex (Beswick 1993) but limited work has been done in Surrey and Kent (Crocker 2004; Palmer 2004; Preston 2004).

The production of bricks in clamp kilns was common in the 16th and 17th centuries with permanent kilns becoming more numerous from the 18th century on with some major brickyards being established. This is typified in Kent where there were major concerns such as at Faversham and Sittingbourne (Hamilton 1980) as well as smaller brickyards including those at Canterbury and Tonbridge (Preston 2004). Other areas with a high concentration of brickworks include Dicker Common in East Sussex which is known to have seen production from the 17th century but which expanded greatly during the 18th and 19th centuries due to the increase in demand for bricks for military use as a result of the wars with France (Beswick 1983, 1993, 2001). The numerous small local brickworks producing hand-made bricks continued through the 19th century but declined with the rise of the industrial-scale production of the larger firms which mechanised the industry with extruded wire-cut bricks from the 1860s on (Hall 2001).

Early kilns have occasionally been found and excavated, such as examples at Westhampnett (Priestley-Bell and Barber 2006) and on the Polegate Bypass (Stevens forthcoming). Such kilns are likely to have been constructed by itinerant makers for specific small-scale jobs. A late 18th-century clamp kiln associated with a specific house-build was fully excavated in Chichester (Down 1989). The development of more permanent kiln types such as the late 18th-century 'Scotch kiln' at Ebernoe (Aldsworth 1983c) has meant numerous abandoned kilns remain on old brickfields and occasionally the full lay-out of the yard can still be established (Aldsworth 1989). Similar detailed historical and archaeological survey work has been carried out at Keymer (Avery 2000; Martin 2000) and an isolated pug mill surveyed in detail at Burgess Hill (Martin

2002b). Such studies can gain a huge amount of data from the OS 25" maps though building function is not always made clear.

Tiles were frequently produced at the same sites as bricks and their study usually goes hand in hand. Although observations have been made, such as the 17th-century tile kilns at the Slindon Gravel Company pits (Evans 1968) no archaeological excavations have been carried out. The detailed recording and restoration of the 19th-century bottle kiln at Piddinghoe is the most thorough piece of archaeological work done on the tile industry to date (O'Shea 1982) and was commendably supported by historical sources (Osborne 1982). It perhaps sets the agenda for other select structures of this nature in the region.

10.14 Pottery and clay pipes

Between the 16th to mid 18th centuries most of the pottery in use in the region was of local/regional manufacture and conformed largely to the marketing pattern of the preceding period (Streeten 1980). Imported material from other parts of the country and the Continent made up a notable part of any assemblage but never dominated the local earthenwares. As such the medieval tradition of numerous potters producing for the local markets in simple kilns continued. This began to change during the 18th century with the increased ease of transportation and the rise of larger industries such as those in London and Staffordshire. These eventually provided better quality wares for the masses and dominate the region's assemblages from the later 18th century on. Despite this many local potteries continued well into the 20th century though their production was more weighted toward the heavier utilitarian glazed red earthenwares.

A number of kiln sites have now been excavated in the region and many more are known of from documentary sources (Streeten 1985a). Perhaps the most interesting is the early 16th-century workshop at Lower Parrock, Hartfield probably worked by a French potter (Freke 1979). Other 16th-century kilns at Boreham Street and High Lankhurst, Sussex have also been excavated but as yet not published and limited work has been done on the similarly dated Hareplain kiln in Kent (Kelly 1972). A number of later kilns have also been investigated. In West Sussex part of a small 17th-century kiln has been excavated in Crane Street, Chichester (Down 1981, 1989) with a further example, dating to the 17th or 18th centuries, at Upper Norwood, Graffham (Aldsworth and Down 1990). The latter is situated in an area known to have contained a fairly extensive pottery industry spanning the late 13th to mid 19th centuries and a further seven, as yet unexcavated, kiln sites in the area were located during fieldwork. One of the largest centres of production in the region during the 16th and 17th centuries was on the Hampshire/Surrey border (Crocker 2004). London appears to have been its main market though its products are found all over the region. Detailed studies have been made on both the products and their marketing (Pearce 1992, 1999). Much less has been done on the actual kiln sites though a few in this area have been investigated at Farnborough Hill and Cove (east Hampshire: Haslam 1975) and Hawley Ash (Holling 1969).

Tin-glazed earthenware and stoneware manufacture was established in Southwark and Lambeth in the 17th century. Although the tin-glazed production declined in the later 18th century stoneware production continued to grow throughout the 19th century in both Lambeth and Fulham. A number of kiln sites have been excavated in south London (Bloice 1971; Dawson 1976; Edwards 1981-2; Killock et al. 2003), kiln development discussed (Dawson 1981) and a comprehensive historical and archaeological account been given of the Fulham and Lambeth works and their products (Green 1999; Killock et al. 2003; Tyler 2005).

Far less work has been done on the numerous local 18th- to 19th-century potteries. Sussex in particular had an extensive industry at this time (Manwaring-Baines 1980a, 1980b) though Surrey and Kent have numerous examples known historically (Brears 1971: 212-16; Crocker 2004; Preston 2004). However, no significant archaeological work has as yet been undertaken on these sites or their products: where such ceramic groups have been located in the past they were never published. A few potteries survived very late (some are still working) mainly producing craft pottery. At Wrecclesham, Surrey a 19th- to 20th-century country pottery grew in the local tradition under the influence of the Arts and Crafts movement (Menuge 1999) and the Rye pottery is still in evidence.

The typological development of clay pipes has established them as one of the best dating tools for the period and they are a common find on sites of the 17th century on. The dating of pipes has been tightened still further in the region by historical research into the individual makers of all counties (Atkinson 1972, 1977; Higgins undated; Oswald 1975). This work has highlighted the 100s of pipe-makers operating in the region at different times. Most of the region's towns had several pipe-makers. Despite this, only one 19th-century kiln has been subjected to archaeological investigation (Norris 1970) though wasters have been found in recent excavations in Maidstone (Edwards 2007).

10.15 Maritime trade and cross-channel ferries
A thematic overview of the region's maritime development is provided by Milne (SERF Maritime: see also the research agenda for this period, below), but a few specific topics are worth noting here.

The coastline of Kent and Sussex provided an important communication link which greatly enhanced the economy of both the coastal fringe and interior. A number of elements have contributed to this maritime economy, including trade, transport, specific industry and fishing. Historical overviews of coastal and riverine ports have been given for Kent and Sussex that chart their general evolution and trade (Lawson 2004; Killingray and Compton 2004; Farrant 1999). Kent's main exports from the later 17th century consisted of corn, fish, wool, timber, copperas, fuller's earth and lime with imports including coal, dairy produce and from the Continent, wine, sugar and bricks. Specific trading ports have been subjected to a number of historical studies in the region such as those on Thanet (Andrews 1953), Faversham (Andrews 1955) and in Sussex (Farrant 1976) but the little archaeological work that has taken place remains isolated (Bradley and Phillpotts 2006).

Boat building and dockyards

Dockyards were situated all around the region's coast though the largest were all in Kent. Here, the naval dockyards were the largest industrial establishment between AD 1500-1700 exploiting Wealden timber and cannon (MacDougall 2004a) with sites at Smallhythe, Woolwich and Chatham. Many of the small early yards went out of use and by AD 1600 Chatham was by far the most important along with its outpost at Sheerness developed from the 1660s (Banbury 1971; Coad 1980; MacDougall 1987, 2001; Palmer 1999). Shipbuilding in the Thames and Medway also included merchant and fishing vessels and there was an increase in timber ship building between AD 1800 and the 1860s. A comprehensive survey of Kent's barge building industry has listed 39 building/repair yards, though only three remain active and extant remains at the others are rare (Eve and Worley 1999). From the 1820s iron steamers were built in Thames shipyards, which encouraged a marine engineering industry (Arnold 2000). By the 1870s iron shipbuilding in Kent fell due to competition from the North-East and finally stopped in 1915 (Killingray and Crompton 2004). Sussex ports, such as Shoreham, also contained shipyards though most were involved with the construction of smaller vessels and the trade had severely shrunk by the start of the 20th century. Despite this Shoreham saw a brief revival building concrete ships as a result of the Great War (Kelly 2005). Many of the ship/boatyards in the region have since been lost to later development and even the largest have closed (Chatham's yard closed in 1984). Excavations at waterfront sites, such as that at Rotherhithe have shown the potential these sites have for producing evidence of post-medieval river walls, shipyards and other bankside industries (Heard 2003).

Fishing

Fishing was a major industry in the region (Lawson 2004; Killingray and Compton 2004). Many fisheries were seasonal and operated on a small scale, usually working local waters but some also worked further afield. Important fishing ports included Gravesend, Hastings and Rye though the industry slumped in the war years 1792-1815 and did not recover until the 1850s when railways allowed quick transport of fish to market and some ports did well e.g. Ramsgate (Powell 1987). In the late 20th century decline set in again with fishing for the local market becoming the norm. Most ports involved with the industry have surviving features such as the net lofts at Hastings, but little fieldwork has been done on these features and archaeological interventions have not revealed substantial traces of the industry.

Despite this, the development of Saxon to post-medieval marine fisheries has seen intense environmental research activity in recent years, with the origins of commercial fisheries investigated through isotope and genetic research (Barrett et al. 2011). The analysis of fish remains can inform on trade in fresh and preserved fish, on fishing locations (deep-sea, in-shore, estuarine) as well as potentially on sources further afield. The interpretive potential of fish bones for informing on social status, transportation and long-distance contacts as well as the ecological consequences of commercial fisheries is enhanced when a long-term view can be taken, and only possible when recovery of fish bones follows best-practice sampling procedures (Campbell et al. 2011).

The oyster industry was also of importance to the region, particularly in the 19th century. Wild oysters were trawled in places such as the north Kent coast (Goodsall 1965) and off Beachy Head in Sussex, and there were numerous artificial oyster beds created for farming. These are often visible on OS maps and many still survive as earthworks. It is commendable to see the beds at Chichester have been the subject of an archaeological survey (CDAS pers. comm.). Remains are also to be found in north Kent, including 19th- century packing sheds, workshops and offices at Whitstable, oyster beds off Seasalter beach and a 19th-century brick-lined pond at Milton Creek, Sittingbourne (Eve undated).

10.16 Ferries/Cross-channel services

Another aspect of the post-medieval maritime economy is the cross-channel ferry industry (Barker 1995). Rye had cross-channel passengers between the 17th and 18th centuries and early in the 19th century Dover increased its crossings to four times a week (Killingray and Crompton 2004). However, the great expansion in the industry came with the railways. Between 1843-44 the South East Railway were the first to link their rail service to cross-channel steamers at Folkestone and the LB&SCR were doing the same at Newhaven. In 1928 the first dedicated car ferry had been introduced and by the 1930s Southern Railway (an amalgamation of the earlier rail companies) had 16 ships at Dover and Folkestone alone. Growth of the cross-channel passenger and freight traffic resulted in the rapid growth of ports like Dover in the second half of the 20th century. Such growth has resulted in dramatic redevelopment of the port facilities which have often swept away earlier installations such as quays, loading apparatus, stations and hotels. The opening of Eurotunnel in 1994 and subsequent establishment of the high-speed rail-link has added a new dimension to the service (Goodenough 2004). A less obvious aspect of the cross-channel communication industry are the cross channel cables such as the submarine telegraph to France opened in 1851 culminating in London being linked to Paris by phone in 1891. (Killingray and Crompton 2004).

Smuggling

Smuggling was rife in Kent and Sussex, most notably in the 18th to early 19th centuries when large organised gangs such as that at Hawkhurst were common. The 'industry' has been romanticised at such places as St Clement's caves, Hastings and has attracted historical research (Waugh 1985). Between 1817-31 the Royal Naval preventative force was stationed at regular points around the coast (Killingray and Crompton 2004) in an attempt to stop the illegal trade. Despite the amount of folklore no archaeological work has been undertaken on the hideouts of the smugglers or the outposts of the preventative force.

11. Engineering and manufacture

The advances of agriculture, industry, communications and technology from the 18th century on saw a rapid development and expansion of millwrights, engineers, construction/manufacturing companies and scientific/electronic

companies. Many of these firms were located in urban settings creating a greater draw into the towns though some, such as Thomas Wood & Sons steam engine works at Crockenhill, Swanley, were in less urban settings. Some of these firms grew large but numerous small ones existed (Stevens 1994). Surrey also saw the establishment of 36 research establishments ranging from medical to military (Hollinghurst et al. 1975). In Kent much of the engineering works were geared around the dockyards and other public sector foundations such as the Royal Arsenal at Woolwich (Booth 2004). But there were also private sector firms including the South East Railway's engineering works at Ashford (1847), Vickers (Crayford, Erith, Dartford), Siemens (Woolwich) and Short Brothers (Rochester). These firms helped Kent's economy through times of unrest though many have since closed. Many of the buildings associated with the myriad of engineering/manufacturing firms have been demolished or been internally stripped during conversion with little or no archaeological recording.

Surrey has also been intimately involved with aircraft manufacture in the 20th century, with sites at Brooklands and Weybridge. The Brooklands site was taken over by the government for aircraft manufacture during both world wars, with production continuing until the 1980s when it closed, and much was demolished in the 1990s. Although the site was redeveloped some of the buildings were retained as part of Brooklands Museum. A database of Surrey aviation companies is being compiled (Crocker 2004: 228). Elsewhere in the region were a number of small aircraft manufacturers, some of which have received historical study (Land 1984/5). Car/lorry manufacture has also been part of the region's economy in the past (Haveron 1985: 45-6; Knowles 2005; Worthington-Williams 1971) with Brooklands being the first purpose-built motor-racing track in the country (1907). This site is of international importance and the remaining track and other features are now scheduled within the Brooklands Museum complex (Crocker 2004).

11.1 Chemical
Although aspects of the industry have been studied at a national scale (Campbell 1971, Cotterill 1996), work in the South-East has been very uneven. Copperas was perhaps the first chemical produced on an industrial scale in England, with the earliest works, dating from the 16th century, often being located along the Thames estuary where it was within easy reach of the cloth trade which used it for dyeing (Bettey 2001; Goodsall 1956; Zell and Chalkin 2004). A number of works are known of but only the 17th-century site at Whitstable has been subjected to excavation (Allen et al. 2002, 2004). The excavation report gives a commendable historical and archaeological overview of the site and the industry in general, which continued until the end of the 19th century by which time larger factories, such as the Queenborough chemical works on the Isle of Sheppey, had been established to serve the wider demand for various chemical products (Stevens 1987).

11.2 Other
The region saw a huge range of other industries that are often completely forgotten (Crocker 2004). Snuff was manufactured at Woking mill in AD 1749 (Stidder 1990: 124) and fibres were used to manufacture rope and wadding with mills on the Wandle at Carshalton and Wallington in the 1830s, though the

best known ropery is that which still survives in Chatham dockyard (Macdougall 2004b). The manufacture of fibre products became linked with the chemical industry to make materials such as linoleum, which was developed in the 1860s. At Mitcham it was associated with the paint and varnish industry that started in the 1840s (Montague 1993). Other concerns included candles and firework factories and several manufacturers of the latter were based in south London in the 19th century (Crocker 2004: 225): the region still has a few left, such as that outside Lewes.

12. Leisure industry

The traditional rural leisure pursuits were often the domain of the upper classes. The development of fox-hunting in the early 18th century could create changes in the landscape as new woodland, coverts and spinneys were established (Ballinger 2000). More obvious is the provision of extra stabling and, particularly, kennels for the hounds on many estates. Other forms of hunting have also left traces such as decoy ponds with their associated landscaping and drainage and fishing lodges. Horse-racing has also left its mark on the archaeological record and there are a number of racecourses still in use in the region such as Goodwood, Plumpton and Brighton (Sussex), and Epsom (Surrey). The continual improvement of these sites has resulted in the removal, sometimes several times over, of the earlier stands and ancillary buildings. For example, although Epsom racecourse dates back to the 17th century, the 19th-century covered stands have been subjected to considerable refurbishment and renewal (Crocker 2004). Some abandoned sites are present too, such as at Lewes and a short-lived one at Itford (1930s), though very little remains above ground.

The huge range of leisure constructions that surround us are often taken for granted historically as they are perceived of as places of current patronage. The increase in the leisure industry, particularly during the late 19th and 20th centuries has included all levels of society and some of the resulting constructions are the first of such scale since Roman times (Palmer 2004). Aspects include hotels, piers, theatres, cinemas, cricket and football grounds, dog/athletic stadiums, motor racing circuits, golf courses, swimming pools/leisure centres and historic sites (Elleray and Eyles 1999; Killingray 2004d; Lowerson 1999). Many of these sites have either been demolished (e.g. early cinemas) or rebuilt/refurbished to such an extent that we are in danger of losing our understanding of how they developed as a result of increased demand and Health and Safety issues. For example, most football grounds have been reconstructed since the Taylor report (Smith 2001), replacing terraces with covered stands. The rise of the cinema in the early 20th century created a new and distinctive building form reflecting design ideas of the time (Richardson and Upson 2001). A minority of sites, such as the coastal piers are protected by law though loss, most notably of Brighton's West Pier and that at Hastings, is still continuing. The world's first purpose-built banked race-track at Brookland (1907) involved vast earthworks as well as diverting the river Wey in three places but is now largely protected. Work on leisure industry sites in the region has normally been undertaken by industrial historians. Though this work

is good, it is often piecemeal and frequently does not include any fieldwork to record surviving structures. Such work includes a summary of lidos and swimming pools in Sussex (Durden 1996) and the study of the Sea House Hotel, Brighton (Mead 1996).

13. Material Culture, Diet and Environment

Compared with the preceding periods archaeological study in these fields has lagged behind. To some extent this has been ably compensated by the study of documentary sources, particularly from the 18th century onward. Pottery of the period can be extremely diverse due to both the increase in vessel types (i.e. plates and cups) and improved communications increasing the quantity of non-local pottery in assemblages. Although the imported wares and 18th- to 19th- English industrialised wares are quite well known, much less is known of the local wares and their distribution (see above).

The study and publication of assemblages from domestic sites, particularly those post-dating AD 1750, is still in its infancy though this has become more common in London (e.g. Tyler 2004; Whittingham 2004). However, there are examples in the region, such as those at Winchelsea, Shoreham and Guildford (Barber forthcoming; Butler 2003; Fryer and Selley 1997). These assemblages of pottery, clay pipe, glass and other items are shedding light on a wide range of social issues and more will be learnt as the corpus of published assemblages builds. Large assemblages of earlier post-medieval pottery have also rarely been published. Those that have appeared are often not from closed, well dated contexts (Backhouse and Backhouse 1977/8; Tebbutt 1968) or have not received the attention of the wider audience they deserve (Child 1990; Vahey 1982). However, more recent work is starting to provide well dated groups from key points in the period, such as at Battle and Bayham Abbeys (Streeten 1983, 1985b), Camber castle (Whittingham 2001) and numerous small, but significant urban groups such as that from Chatham (Williams 1981).

The study of these assemblages is giving a first-hand account of a number of important aspects of the period: trade networks and the improvements in communications; market range and consumer choice/fashion, demographic profiles of households and family wealth. The latter needs careful consideration and more published assemblages from households of known status. Designating status on a few finds alone is not always safe in a society where the poorer people are perhaps the very ones to purchase a few goods out of their social class in order to display some form of one-upmanship against their equals. Consideration also needs to be given to geographical location when considering imports. London was the main source of imported pottery and such material more commonly found its way into poorer households due to its availability. Study of the combined proportion of excavated imports from London and the region's towns will have to be undertaken in order to see how they compare/contrast each with the other considering their position in regard to communication by land/sea (Schofield 2004: 195). Even post-medieval pottery from rural fieldwalking programmes, traditionally scorned and discarded, can shed light on agricultural manuring patterns. Most of this material is of 19th

century date but long-term accumulation of data will allow the variable densities to be studied in relation to the railways, which often brought 'night soil' out of towns.

Environmental evidence from excavated assemblages has the potential for the study of improved animal husbandry and the introduction of new plants, as well as the reconstructing of specific rural and urban diets, environments and activities (Giorgi 1997, 1999; Armitage 1984). Despite this, environmental work in the region has been even more restricted than work on post-medieval artefacts. Good environmental assemblages are often not taken or analysed despite the potential importance they hold if they can be related to a specific household, with or without documentary material (Courtney 2001). Work in the region has been piecemeal for the early post-medieval period but, with the exceptions of single large assemblages (Fryer and Selley 1997), virtually non-existent from the later 18th century on. Most archaeobotanical assemblages from the region consist of one or two scattered samples, with very few sites producing more than five samples for this period. Typical assemblages include scatters of free-threshing wheat and occasional weeds with a few mineralised seeds (Allott 2011). A rare example of a well sampled site was the Norman Hospital of St John, Canterbury, from which a sequence of deposits were taken from the late 15th/early 16th- to 19th-century reredorter: abundant plant foods including fruit remains, cereal bran, fish and bird bone, eggshell and marine molluscs provided insights into the diet of the occupants of the closed hospital, while intestinal parasite eggs (*Trichuiris* and *Ascaris* sp.) confirm the faecal origin of the material (Carrott et al.1994). Unfortunately the samples were never examined beyond assessment level. As mentioned before, this paucity of sampling can partly, but not wholly, be offset by historical work. In addition the recovery of plant remains and other biological material in known historic contexts (such as lime plaster, or oasthouses) can aid interpretation of similar assemblages in less well understood archaeological contexts.

14. Belief and Ritual

14.1 Churches
Church archaeology has traditionally concentrated on the medieval period and comparatively little thought has been given to the later history of these structures. A number of medieval churches/chapels were demolished during the early post-medieval period due to the Reformation and/or economic reasons (Courtney 2001) and on the whole few new Anglican churches were built. However, there were some additions to existing medieval churches and quite a lot of rebuilding, especially during the Victorian period. Changes varied from the insertion of new doors/windows, structural work (Barr-Hamilton 1970) and totally new builds/rebuilds to changes in internal fixtures, fittings and decor. Internal changes included liturgical rearrangements, removal/defacing of anything seen as ostentation by the Puritans, and the monumental evidence for changing views to death and society (Duffy 1994; Llewellyn 1991; Tarlow 1999a).

As churches often reflect fluctuations in both the size and prosperity of the local populations, they have often proved a good indicator of a changing community. Although post-medieval alterations to medieval churches are often 'slight' they are of great significance in helping understand the changing beliefs and attitude during a turbulent religious period. The medieval scholar has often seen Victorian changes as vandalism. However, such changes are part of the ongoing adaptation of the structure to suit beliefs and community needs at the time. These changes are still happening at many churches with the insertion of kitchens/toilets and the addition of meeting rooms/halls though care is now taken not to damage historic features. Work within churches often uncovers parts of the underfloor heating systems. These may have severely damaged earlier deposits but are an important part of the later post-medieval church, which warrant some study in their own right before they are replaced.

14.2 Non-conformist chapels
The period is marked by the rise of the non-conformist population such as in the Cranbrook area and Canterbury in the 17th century (Reynolds 2004). These new ideas saw the construction of various chapels and meeting houses, which became increasingly common after the mid 18th century (RCHME 1986). Many of these structures still remain reflecting among others, Quaker, Baptist, Methodist, and Presbyterian communities. Many of these buildings have been demolished or converted to other use with little/no archaeological survey work. Although nonconformist chapels and the new Roman Catholic churches (following toleration in 1829) had a major effect on village/town populations in industrial areas the effect in the South-East is less well appreciated (Palmer 2004).

14.3 Funerary practices (cemeteries and burial)
The study of death and burial has been a major theme for the archaeology of most periods though the post-medieval and, particularly, the modern periods, have been an exception to this until relatively recently (Palmer 2004). The redevelopment of many urban cemeteries has thrust the topic upon archaeologists, who are beginning to uncover vital data to complement historical sources. Studies are also demonstrating how much variability in burials and superstitious activity there was, not to mention how inaccurate some of the documentary sources can be (Bashford and Sibun 2007; Brooks 1989; Cox 1998; Litten 2002). However, there are still many problems, including dealing with the remains from small-scale groundworks in current churchyards where funding is insufficient to undertake full recording of burials (Courtney 2001). At times it is possible to leave the burials *in situ* by mitigation through foundation redesign as at Barcombe (Meaton 2004). Other sites have seen the wholesale removal of post-medieval burials with little or no recording (Priestley-Bell et al. 1996) while at others, fuller recording has taken place (e.g. Sevenoaks) though full osteoarchaeological analysis is rare (Mays and Anderson 1995). The study of the body, clothing, coffin, associated gravestone and biographical data offers a useful tool for establishing details of burial practice for different elements of society at different times as well as refining osteoarchaeological techniques. Larger burial groups in particular offer the opportunity to study post-medieval diet, demography and health. In a recent overview of the study of post-medieval skeletal remains it was noted that the

only published example of a 'full osteological study of a substantial assemblage' from the period is still that from Spitalfields crypt (Mays 1999: 331).

With increasing urban populations space for burial became acute from the 18th century on particularly in the capital. London looked to its hinterland for at least part of the solution. In Surrey, construction of the Brookwood cemetery, to house the dead of London, was very important in leading the way. In 1852 the London Necropolis and National Mausoleum Company purchased the whole of Woking Common for this purpose and created the largest cemetery in Britain, complete with its own railway station and branch lines to serve the cemetery (Wakefield 1987). The first crematorium in the country was built at Brookwood in 1879, though it was not used until 1885, when the Home Office legalised cremation. Continued demand has resulted in many towns having satellite burial grounds in the suburbs.

14.4 Monuments/memorials
The study of memorials, mausoleums and headstones offers unique insights into many aspects of the period (Gittings 1988). Ostentatious displays of the wealthy are to be found both on country estates and in churches, particularly from the 18th century on. Earlier displays of wealth are to be found in the many effigies, brasses, ledger slabs and private chapels/crypts of the 16th and 17th centuries in local churches. The study of these memorials is piecemeal and even less has been undertaken on the movement or deliberate defacement of them in times of unrest. The majority of monuments are to be found in the churchyards. These show a great variety in display and complexity, from elaborate statues to simple headstones (Burgess 1963). Many of these monuments are in a poor state of repair, both structurally and through weathering of the surfaces, resulting in the loss of biographical data and decorative designs. The study of decoration on headstones can reveal changing attitudes to death and its importance is increasingly being recognised (Tarlow 1999b). Relatively few churchyard surveys have been undertaken in the region despite there now being a standardised approach to recording (Mytum 2000). Work in Lewes has shown the potential such monuments have in providing information on the population and its beliefs (Bareham 2003). The type of stone can also shed light on status, fashion and the funerary/extractive industries and many carry stonemason's or undertaker's marks allowing the study of these trades which expanded rapidly in the 18th century (Tarlow 1998). Other themes of study include the numerous village war memorials to the dead of the two world wars, both within the churches and outside at various places from churchyards to village greens.

15. Conclusions

It is clear from this summary assessment that the archaeological/historical resource for this period in the region is substantial. This assessment cannot be seen as exhaustive, other work exists, frequently in unpublished developer reports, which will add significantly to the study of the period when/if published. The period has been neglected for too long and much data has been lost as a result. However, at county level there is an increasing awareness of the

importance of the period, though this is uneven. Traditional early post-medieval archaeology is now more or less adequately considered in the planning process and industrial archaeology is beginning to receive the same consideration. Domestic aspects of the late post-medieval/modern period are still less well served in the region. However, enlightened work in London has shown the potential for all deposits of these later periods, particularly when integrated with detailed historical research. It is hoped that deposits of the 18th century on will begin to be treated in a similar way in the region as a whole thus allowing cross-county comparisons and regional comparison with the capital.

This assessment may highlight the large amount of work undertaken on the period, but it also highlights the disjointed nature of that work when one is trying to gain even overviews of the region. This disjointedness is as much to do with the size of the resource as the lack of work. There are so many variables. Some topics have seen much historical work but no/limited archaeological work; for others this could be reversed, or an aspect has seen much more work in one county than the other. With a few exceptions archaeological work has lagged far behind that of the historian and that which has occurred is frequently widely spaced between type of site, date and geographical location. In addition, the imbalance between the study of industry and domestic archaeology of the later part of the period leads to a very uneven view from which it is difficult to produce a truly holistic overview. As such identifying gaps is not easy for the gaps may be specific to historic or archaeological research, specific to one aspect of a topic, specific to a particular chronological span within a much wider one or variable between counties. Gaps in the record are clearly there but the lack of work in many instances means the gaps are so wide that basic fieldwork, whether through excavation or standing building survey, is still urgently needed in order to really refine research aims for the longer term future. The systematic location and recording of extant structures of the period must still be a priority for both the long term preservation of information and to facilitate a secure database from which to formulate future strategies for both the preservation of key examples and in order to safely assess the importance of any archaeological remains.

Acknowledgements

Research agenda

15. Introduction

The resource assessment has clearly demonstrated the period's immense complexity and the huge amount of data that has been gathered and that

potentially awaits recording. Despite the amount of data already present there are a number of gaps in our knowledge that still need to be addressed as a priority and which form the basis of this research agenda. Many of these are quite specific to a particular topic, while others are broader overarching themes. Although the emphasis is on gaps which may be addressed by future archaeological work, all require historical research to a greater or lesser extent. For ease of use these are outlined as points to aid quick reference for curatorial archaeologists and researchers alike.

16. General

There are a number of general points which cover various topics within the period and should be borne in mind for future research work.

- It should still be a priority to collect data before it is lost thus accruing a full and balanced dataset for future researchers. Thus the recording of remains, threatened or not, by standing building survey, landscape survey, excavation, artefact/environmental analysis, assessment of character and perception, and oral history projects must continue.

- More 'grey' reports/archives should be made easily available, i.e. published or put on the web, to compensate for the summary information often given in publication reports for this period.

- Much work has been done by individuals and groups in isolation and there is not always an awareness of others doing related research. There is a need for a more combined and coordinated approach to the period within the region.

- The publication of national/county-level initiatives such as the English Heritage MPP surveys and KCC's HER enhancement surveys on industrial remains. A scan through the excellent annual round-ups in Post-medieval Archaeology, The London Archaeologist and the Surrey Archaeological Collections show the huge quantity of evaluations and watching briefs that find fragmented post-medieval remains and finds, particularly in the London Boroughs, which probably will never be published. As such these annual round-ups are essential in disseminating the presence of these works. Although they do not give much detail, they allow a researcher to track down the relevant developer reports, a task which would be easier if they were on-line. Similar summaries should exist, in journals or on the web, for the whole region.

- Many HERs have very patchy cover for the period/aspects of it. Some enhancement work has been done in recent years (i.e. adding data from the Defence of Britain Project, Parks and Gardens Registers etc.) but a more consistent uniformity is still required. Where integration has been done, e.g. with historic mapping they provide an important tool for researchers.

- Statutory lists need to be revised with addition of a wider range of post-medieval/modern sites representative of the period.

- There is a need to create/train more post-medieval/industrial archaeologists both amateur and professional.

- There is a need to encourage the full use of the county HERs alongside documentary, cartographic and pictorial sources by professionals and amateurs alike. A fully integrated approach is essential for this period.

17. Rural Landscape and Settlement

17.1 Landscape and Farms
- An understanding of the multifaceted landscape is essential for conservation and heritage management purposes as well as interpretation. The region's HLC projects need to be completed and synthesised.

- Study the development of fields and their boundaries using a GIS base and historic OS maps.

- More work is needed on the ecology of hedgerows and woods i.e. to shed light on the original planting schemes.

- There is a need to further study woodland features in the region and build up a larger dataset which can be used for comparative purposes. Study of the form of woodland/field boundaries along with their mapping and dating (archaeological/documentary) would be very useful for assessing dates of undated examples.

- The chronology of farm buildings needs study in relation to an assessment of the status of farms and isolated barns and other buildings.

- The comparison of model farm buildings on estates to those of freehold properties.

- The study of the size of farm structures in relation to the scale of associated agriculture would help characterise agricultural landscapes.

- More recording work of unlisted buildings, farm structures, with reference to Lake's (2014) criteria of significance and other less noticed post-medieval agricultural features, such as dew ponds and sheepfolds.

- Recording of extant farm complexes and overviews of complexes in different geographical areas.

17.2 Houses of the Upper Classes

- To look at the impact houses of the royalty/gentry had on the local landscape, economy and social structure.

- To specifically look at the changes made to the fabric and setting of monastic buildings after the Dissolution. What evidence is there to suggest why some new secular owners built up larger estates than others?

- Study of the impact the Dissolution had on the region's landscape and society.

- Study of the mechanics of demolition and re-use of materials of monastic sites during the Dissolution.

- Consider the spatial organisation of the newly-built houses of the gentry and their relationship to the surrounding landscape.

- The economic aspects of running a large house, including estate structures and the estate cottages/domestic life of the staff/servants who often formed a community separate from both the house and/or nearby villages.

17.3 Rural settlement
- The development of the village in the post-medieval period.

- Study of post-medieval modification to existing structures and better dating thereof.

- Social aspects of rural housing, material culture, subsistence and environment, especially for the poor from the 16th to mid 20th centuries. More isolated rural sites need to be excavated.

- Integration of data from house studies (excavated or extant), material culture and historical sources regarding the occupiers.

- Temporary accommodation/shanty towns of the poor, from squatters and iron-workers to navvies and the civilian re-use of military camps.

17.4 Gardens
- The recognition and recording of gardens is a priority because of their susceptibility to destruction without recognition (sometimes through current garden work).

- More comparison is needed across the region in order to understand how gardens were modified as fashions and as individual family fortunes changed.

- Gardens need to be understood as part of the wider manipulation of the landscape by landowners, including parks and the creation of tenant landscapes (Bettey 1993). There is also a need to understand the

relation to their function as places of upper class display and contrived use of space.

- Study of the working aspects of gardens by looking at the material culture/working areas etc. of gardeners and estate structures.

- Study of small gardens/private gardens is needed throughout the period.

- The impact the city gentleman/industrialist's house/garden retreats had on the landscape from the later 18th century on in terms of area taken, social control exerted by gate houses, gates and boundaries etc., garden styles and impact on the local population.

- Fuller study of new technology used in gardens and country estates in general – water-wheels for pumping water into landscaped lakes/fountains, piped water supply, ice-houses, power etc.

18. Urban Landscape and Settlement

- The specialization of early post-medieval small towns; the fortunes of towns on roads and rivers which led to London and the relationship between towns and rural industries (Schofield 2004).

- The relationship between towns and their hinterland (town/country) throughout the whole period, especially their changing role in the industrial period.

- The early post-medieval infilling of vacant plots i.e. in Chichester, which had not been occupied for a considerable period of time.

- There is a need for study of the ways in which towns expanded outwards, particularly in the 19th century; the effect on their layout (markets, zoning of inhabitants etc.) and building types involved.

- Overviews of post-medieval archaeological deposits in the region's towns are needed, such as for Chichester and Canterbury. This would undoubtedly go a long way to formulating research agendas for the future at a specific and regional level.

- Social aspects of urban housing, material culture, subsistence and environment from the 16th to mid 20th centuries.

- Resorts need to have a major study of their history and assessment of their urban character through time.

- The emergence of a professional class (lawyers, doctors etc.) with their concomitant architecture needs study.

- Integration of data from house studies (excavated or extant), material culture and historical sources regarding the occupiers.

- The houses and diet of the poorer majority of the urban population.

- Study of small-scale urban industry is a priority.

- Changing morphology/infilling of the medieval market-places. There is a need to study space within towns as well as buildings. How have the position, size, shape of the market areas changed through time? How far were markets given permanence by provision of market buildings?

- Retail premises – how did shops evolve from those of the medieval period?

- The origins and developments of inns and how they reflect the changing fortune of towns in relation to the changing nature of communications.

- A high priority ought to be given to establishing the correlation between pits/wells etc. and structural remains where deposits allow.

- The use of the evidence from wells and pits to compile a wider view of the systems used for water supply and refuse disposal in the period in the urban setting.

- The development of organized water supply and sewerage systems needs to be studied both historically and archaeologically for individual towns, leading towards a wider synthesis.

- How did the change in urban building materials in London affect new building material trends in the region? There is a need for more comprehensive studies of urban buildings of this period to allow comparisons (Schofield 2004).

- The provision, and changing designs, of public parks and their facilities.

- The provision of allotments and the individual nature of allotment improvised structures.

19. Political, Administrative and Social Context

- What evidence is there for the positioning of new public buildings and churches as a means of expressing social control as the urban population grew?

- Study of the history, activities and remains of the large concentration of government and academic research establishments in the region.

- The lay-out, living conditions and social control of the early workhouses in comparison to those built after the 1834 Poor Law Unions.

- Many buildings of social control such as workhouses, prisons and hospitals need to be studied and comparative county summaries compiled.

- Study of public utilities at local and regional level.

- Continental immigration – is there anything in the archaeological record/buildings/artefacts/ecofacts to indicate such populations in the 16th to 18th centuries?

- Multiculturalism - from 1950s onward. Study of ethnic religious buildings/material culture/subsistence and areas of settlement and spread need study.

20. Communications

- The nature and network of the pre-Turnpike roads needs study to establish the backdrop to Turnpike roads and allow an understanding of early post-medieval economy and urbanisation.

- Work on turnpike roads, including their impact on the landscape and economy of the area. Archaeological work is needed on the provision of their metalling and maintenance and abortive road developments.

- Temporary labour camps for the teams constructing the railways and canals need study.

- Study of railway/canal construction methods including those from unfinished earthworks or tunnels and the sources of materials and its transport.

- The effect canal and rail routes had on the landscape from construction, to use, and to decline.

- The impact of roads, canals and railways on industry/economy, including any downturns after dismantling.

- The study of heavy transport routes i.e. for Wealden iron, building stone – how was it moved within the region and to London.

- Detailed archaeological study of surviving structures along navigations and canals. From bridges, locks, quay facilities and lock-keeper's cottages to sunken boats and features related to associated industry.

- Detailed archaeological study of surviving structures along railways, used/dis-used. From bridges to workers' shelter huts to allow types to be established as well as their date and rarity.

- Archaeological study of services for road transport from coaching inns to service stations.

- Archaeological study of early civil airfields and their related structures.

- Detailed study of establishment and structures associated with the running of other forms of communication such as the postal service (post boxes, sorting depots), the telephone system (phone boxes) including cross-channel cables to connect with the Continent and wireless telegraphy.

21. Technology (Development of Power)

- Study of both early and late tread-wheels and horse-driven mills.

- The form and construction of early post-medieval windmill and watermill sites.

- Are the water management systems and wheels for 16th/17th mills involved with corn, fulling etc. the same as those from the iron industry?

- Early forms of water management and the impact of water-management on the landscape and local economy

- Detailed archaeological work on tidemills.

- The topographical setting of watermills needs to be studied to understand their positioning and factors affecting it.

- The changing use of mills through time for different industries. Is there a correlation between function, topography and geographical location?

- What was the overall impact of steam power on the region?

- More recording is needed of sites associated with oil, gas, coal and nuclear power.

22. Economy (and industry)

- Although there is still a need to continue listing industrial sites, we must also now begin to set such sites in a wider context. The industrial aspects of English Heritage's MPP has encouraged this process though it is not yet complete.

- It is important to understand the changing balance between arable, woodland, waste and commons and industrial use. There is a case for selective preservation of these landscapes i.e. those relating to the iron industry.

- The reclamation of wetlands: the methods used, the resultant field patterns and management systems and the impact on the population and economy of the area.

- The relationship between agrarian regimes and industries and the linkages between different industrial sectors.

- The emergence and evolution of animal-based industries, such as leather, wool, horn-working, veal and dairy products, from the later medieval to late post-medieval period through excavation and the study of environmental data.

- Control and provision by industrialists over their workforce (from housing to pay to welfare to temporal/locational control). Houses built for workers by industrialists: their planning, layout and construction and a comparison between them. To what extent did manufacturers commissioning their new premises and/or have a hand in the design? And to what extent were these houses used as a form of display for the industrialist?

- The effect of industrialisation and de-industrialisation on areas/the region.

- The study of secondary industries which often do not leave much trace.

- The re-use of industrial buildings for domestic or different industrial use.

- Archaeological work needs to look at ancillary buildings/storage etc. and the use of space as well as the main production process.

- Scientific analysis of slags and residues has a key role to play in understanding industrial processes.

- We need to consider the recording of current industries which are still active, or shortly after. Once finished these sites are quickly swept away depriving future archaeologists of the opportunity to add them to the study of continual development of the industries and economy in general. Associated archives from such industries should be sought out and added to the appropriate records office.

22.1 Woodland Industries
- Consideration needs to be given to the relationship of different woodland industries to each other, as well as their woodland environment.

- Further archaeological recording/excavation of woodland features is a priority – saw-pits, charcoal burner's camps etc. This may need to follow on from proper training for fieldworkers in recognition of feature and tree types.

- Need to look at actual management of woodland for industry (coppicing, charcoal burning etc.) and how the whole landscape was organized. Need to survey all industrial sites and the tracks that link them, domestic areas etc.

22.2 Agriculture

- There is a need to produce a list of the published studies on agriculture, and to build on these to create a history of agriculture in the region. This can be supplemented with further work on the primary documents and archaeological research.

- Further archaeological survey on agricultural buildings and other ancillary structures is still needed.

- To what extent did farms change/specialise over time? How does this vary with the underlying geology?
- Environmental evidence has an important role in the study of improved animal husbandry (new breeds, introduction of new animals) and the introduction of new plants.

- Archaeological/historical study of the distribution of 18th- to 19th-century farm machinery and manufacturers should provide information on the inter-relationship between towns and the rural environment, the date of production, the use of these machines, and their effectiveness for agricultural improvements (Ballinger 2000).

- Recording of mushroom farming enterprises of the earlier 20th century and the watercress industry in general are priorities.

- More hop-pickers huts and associated structures and landscape features to be studied archaeologically.

- Excavation of early oast and malt houses is a priority.

- Archaeological study of different mill types (oil seed, meal etc.). Historical study combined with standing building studies is needed to provide a platform to understand what more information we need archaeologically.

22.3 Extractive industry

- Need more mine pits excavated and ore roasting/preparation areas to begin to understand the initial process of the iron industry

- The study of limekiln typology and whether the nature of the chalk demanded different types of kilns from those more commonly associated with limestone.

- Need to study not just the changing lime kiln technology but the site layouts as a whole, including work on other structures such as wash mills, grinding mills, engine/boiler houses, packing sheds, cooper's

shops, locomotive sheds, tramways as well as housing and welfare of the workers.

- Study of the nature of underground workings and their relationship to surface remains.

- The link between industrial-scale quarries and lime/cement works and the communication network.

- Recording small-scale chalk extraction pits dug to provide material for soil dressing.

- Systematic recording of other quarries through historical and archaeological research. The majority of these need to be classified by form, establish the material extracted, their date and distribution.

- There is still a need for the study of the use and distribution of the various types of local building stone and aggregate. Quarries in general need closer study, in some cases using standard archaeological techniques, but always with careful cartographic work.

- The relationship between local building materials and social status. Where good local stone was available in the late 18th or early 19th centuries, was brick considered a more fashionable building material?

- The Kent coalfield with particular reference to the provision of domestic facilities and accommodation for the workers.

- Oral history – to capture memories of industrial workers.

22.4 Metal
- No work has been undertaken on late medieval Wealden water-powered bloomery furnaces, some of which continued into the post-medieval period.

- The establishment of the first generation blast furnaces in the Weald at the end of the 15th century was accompanied by an influx of French workers (Awty 1981) but as yet the comparison of Wealden furnaces with those of the Continent is still in its infancy.

- Double furnaces, which contained two hearths in one stack for the casting of large cannon (i.e. at Worth), have not received any archaeological excavation to date.

- The excavation of well-preserved sites to establish more information on the nature of more ephemeral features such as casting floors, ore-roasting pits and mould kilns is still needed.

- Steel-producing forges (i.e. Robertsbridge). None of these sites have been excavated and it is not known whether they differ in any way from the conventional forges.

- Work is also needed on the occupation sites associated with ironworks. Work on this aspect of the iron industry is badly needed in order to put the sites and their workers into a social framework.

- Reverberatory furnaces – some sites were used mainly for re-melting rather than smelting. Sometimes in towns but some in Weald (i.e. Brenchley in the 16th century) but none have been studied to date.

- The changing nature of the markets for the iron industry.

- The village blacksmith – the changing layout of smithies through time and their interrelationship with the main iron industry.

- More detailed study of the transition to iron/brass mills is needed – through historical, cartographic, standing building, archaeological work. Also their economic basis and lay-out/processes requires further work.

- Need to look at iron and non-ferrous mills involved in production of metal goods i.e. wire/hoops and other domestic items. None seriously excavated.

22.5 Glass
- More fieldwork to locate further sites and confirm the position of known ones.

- Study the relationship between the furnace sites and coppiced woodland.

- Excavate to modern standards furnaces of the immigrant phase and compare/contrast to those of France and London/north of England.

- Establish a better chronology for the furnace sites using archaeomagnetic dating.

- The scientific analysis of excavated material to establish the source of clay and other materials and detect technological advances in manufacture.

22.6 Textiles
- An archaeological and historical overview of the industry in the region is a priority.

- Excavation of fulling mills is a priority.

- The archaeological excavation/recording of buildings associated with the 'cottage' industry stages of production as well as the worker's domestic setting. Are they detectable?

22.7 Paper
- A complete gazetteer and surveys of upstanding remains is a priority for the region.

- Excavation of early paper-making sites is also a priority.

22.8 Leather
- The excavation of tanneries is a priority. To what extent do their construction and lay-outs vary depending on their date and location.

22.9 Gunpowder
- Excavation of early gunpowder buildings e.g. the possible stamp-mills at Chilworth.

- Documentary and field survey/excavation on other gunpowder sites in the region is still needed, particularly in Sussex.

- Study of the fireworks industry is needed.

- More work is needed on the later chemical explosives industry as often much documentary material and many buildings do not survive and where they do the process is not always clear.

- A regional overview is needed on the explosives industry which also takes into account other related sites just outside the area such as those on the north Thames estuary.

- The relationship of the distribution of explosives sites to topography, communications, domestic occupation and defence structures needs study.

- More work is needed on defence research sites, such as that at Fort Halstead in Kent where rocket and atomic research was undertaken.

22.10 Bricks and tiles
- Trade with the Low Countries in the early part of the period needs more study as does the need to distinguish local/Flemish bricks/tiles better.

- A survey of the distribution and use of early brick in lower status buildings.

- There is a need to refine brick/tile dating by more studies of sizes and fabrics in dated buildings and assemblages from well-dated archaeological features.

- There is a need for a systematic survey of Surrey and Kent brick/tile works as has been undertaken for Sussex.

- The morphology of production sites, from kiln technology to ancillary buildings needs further study.

- The spatial distribution of brickyards/kilns in relation to available transport and intended markets warrants further work.

22.11 Pottery and clay pipes

- Further study of the Borderware kiln sites is needed as well as comparative work on other kilns producing similar wares in the area, such as at Graffham and in Chichester.

- More work (including publication) is required on the smaller early post-medieval pottery production sites, including structures around kilns, fuel supplies etc. Some are known only from documentary evidence.

- The excavation of country potteries of the 18th and 19th centuries is needed to study workshops, kilns and products. This will allow a study of distribution once more domestic assemblages of the period are excavated and help refine dating.

- The excavation of clay pipe kilns is a priority.

23. Engineering and manufacture

- There is a need for a comprehensive gazetteer for each industry with historical background, maps and field survey/assessment of remains. This would pull together the multitude of work (historical/archaeological) that has been done and offer a clearer assessment of future research agendas.

- Recording small urban workshops and workshop practices through excavation, historical research and for the more recent, oral testimonies is a priority.

- The study of the manufacture of machine tools and engines.

23.1 Chemical and electrical

- The chemical and electrical industries need a more uniform survey in order to identify priorities of recording.

24 Leisure industry

- There is scope for a comprehensive survey on leisure and entertainment in order to form future agendas. The industry is important in understanding our current recreational environment and there are a wide

range of aspects, from cinemas to golf courses, which have received virtually no serious attention in the region.

- The developments of the leisure industry in response to increasing crowds, the media and health and safety legislation and how it affected site lay-out and building design.

- How does closeness to London affect the provision of large-scale leisure sites? Does the type of leisure entertainment in the region vary from that provided further north? Does this reflect on the social composition of the South-East?

25 Material Culture and Diet

- How did the massive changes in material culture during the period affect society and to what extent are any changes archaeologically detectable?

- Study of more post-medieval artefact assemblages from urban/rural settings is needed to address consumption, availability, social habits, social status and the zoning of classes (Cumberpatch and Blinkhorn 1997). This is particularly the case for the later part of the period.

- The material culture and diet of the rural and urban poor needs study by comparison of archaeological and historical data.

- Study in trade and communication networks in the 18th/19th centuries from both finds and historical sources.

- The material culture and diet of lower status households needs to be compared with those of proven higher status.

- A study of distribution/quantities of post-medieval imports would help highlight growing inland trade and potentially immigration.

- Any material culture/environmental deposit which can be tied down to an individual household is of national importance (Courtney 2001).

- The phenomenology of material culture, buildings and landscape

26 Belief and Ritual

- Post-medieval alterations to medieval churches needs study in its own right. Synthetic works are needed on structural alterations, liturgical rearrangements of interiors, vandalism/defacement of anything seen as ostentation by the puritans/Victorians, and the monumental evidence for changing views to death and society.

- Non-conformist chapels. What are the architectural similarities and variations of these buildings? What of their fittings and internal lay-out? What affect did they have on the local community?

- Churchyard stones/monuments need recording as a priority as the data is being lost to natural weathering/erosion, subsidence and vandalism: from biographic details to displays of wealth and changing fashions.

- The study of the funerary industry using gravestones – stone type, style, mason's marks etc. needs more research.

- How did different communities deal with full churchyards? Satellite cemeteries and cremation - how did they affect later growth of settlement?

- Large assemblages of human remains, particularly where biographical data is present, should be studied to shed light on the health of the population and potentially medical practices of the time.

- There is scope for a major project to document and study non-Anglican burial grounds and burial practice.

- The persistence of 'ritual' beliefs and superstitions in both home and burial contexts. The comparison/contrasting of historical accounts and archaeological findings.

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