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COWLEY STOCKS

BRICKMAKING IN WEST MIDDLESEX FROM 1800

PETER HOUNSELL

Thesis presented for the degree of Doctor of Philosophy, Thames Valley University

Examined February 2000.

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List of Maps, Tables, Graphs and Illustrations

Abstract

From the end of the seventeenth century until the early part of the twentieth, most of the buildings in London were constructed from brick, since there was no building stone available in the immediate vicinity of the capital. Suitable clay is readily found in the London area, but as districts that had once housed brickworks were built over, the area from which capital drew its supplies of bricks expanded into parts of Kent, Essex and Middlesex. So by the middle of the nineteenth century a greater proportion of London's needs were met from supplies from extra-metropolitan yards than from those which were still operating within the inner suburbs. Brickworks became increasingly less welcome in built-up areas because of the nuisance caused by the smoke from their kilns or clamps, but could be accommodated in rural areas such as West Middlesex.

The clay from which bricks were made in Middlesex was known as brickearth, and occurred as a shallow layer, usually overlying a gravel substratum. These thin seams were quickly worked out and the land was then restored to fertility by the addition of manure, which was readily available from stables in the capital, or mack, the sweepings of city streets. Brickmaking existed within an agricultural economy and could provide the means of short term profits for landowners, since more income could be gained by letting land to brickmakers rather than to farmers, but only until the brickearth had been exhausted.

Brickmaking for the London market in Kent, Essex and Middlesex depended on good transport links. The Thames and the Medway provided a route for the brickfields east of the capital, and for Middlesex yards in places like Brentford and Isleworth. The brickfields of the Cowley district were established close to the Grand Junction Canal, and the construction of the canal was the determining factor in causing the brickearth to be exploited. Canal boats took bricks arm to the Paddington basin where a number of brick merchants established wharves; the boats collected return cargoes of rubbish, either ashes, which was used by the brickmakers themselves, or manure. The symbiosis between the brickmaking and rubbish collection that developed was of considerable importance to the metropolitan economy.

Most Cowley stocks were hand-moulded by teams of men, women and children working on piece rates. The industry made extensive use of sub-contracting and was highly seasonal in nature, manufacture taking place in the summer months. Although some

mechanisation was introduced during the nineteenth century, and although the industry was finally subject to regulation by the factory acts in the 1870s, traditional methods persisted.

Demand for bricks, and the prices paid for them, fluctuated widely during the course of the century, in line with variations in the level of building, which itself reflected movements within the economy. Competition came first from brickmakers north of London who sent their products by rail into the city, and from the 1880s from those who worked the deep seams of the Lower Oxford Clay in Buckinghamshire, Bedfordshire and Cambridgeshire, and whose fletton bricks could be produced more cheaply than London stocks. These became the dominant bricks in the London area after the First World War. Brickmaking in the Cowley district survived, on a reduced scale, until the 1960s.

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Acknowledgements

I returned to academic study after a gap of twenty years since I had taken my first degree. In the interim I had researched local history, lectured to WEA classes and published a book aimed at a popular audience. I came with a proposal to investigate the brickmaking industry of West Middlesex, which, I thought, had not been researched in the depth that it deserved. My enthusiasm for the subject was matched by my ignorance of the work that had taken place in the social and economic history of the period in the two decades since I had last studied it in any detail. My debt therefore to my two supervisors, Professor John Armstrong of Thames Valley University, and Professor Martin Daunton who moved from University College, London to the University of Cambridge during the course of the project, cannot be overestimated. With their particular interests and wide knowledge they complemented each other admirably and provided an ideal level of support; John met me most often and read successive drafts of some chapters, whilst Martin made perceptive and helpful comments when chapters were in a more finished state. They, like my family and I, have had to live with this topic for a period of eight years, as the research has been done in the leisure time outside a full time job.

Naturally I have spent much time in libraries and archives, and I am grateful for the assistance I have received from the staff at the London Metropolitan Archives, the Public Record Office, the City of Westminster Archives, the British Library first at Bloomsbury and later in the Euston Road, the Newspaper Library at Colindale, and the local history libraries of the London Boroughs of Hounslow and Hillingdon. I was fortunate, as a librarian with the London Borough of Ealing, to have both privileged access to the local history collection, and to be able to obtain a large number of monographs and periodical articles on inter-library loan. My thanks go to several colleagues who have helped me.

My family have had to endure both my enthusiasm for bricks and the box files of documents that have at times taken over our living room. They have also put up with my regular absence at weekends when research beckoned and with the consequent neglect of domestic responsibilities. It has, however, been an interesting experience to be studying for a degree in my forties whilst my daughters pursued their own undergraduate

courses. My wife Frances, herself a writer on local history, allowed me to discuss my findings with her and to take her on walks along the canal towpath, which were part pleasant exercise, part research. She also proof read the final draft of the thesis for me, a considerable chore. If I cannot claim she was unfailingly cheerful during the long gestation of this thesis, she has been supportive throughout.

Finally my thanks go to the two historians who examined this thesis, Dr Richard Wilson of the University of East Anglia and Dr Stephen Inwood of Thames Valley University, who made my viva a less daunting experience than I had anticipated.

Chapter One: Victorian brickmaking- images and perceptions

This is a study of the prosaic world of Victorian brickmaking, not the most pleasant of working environments, but by no means the worst, and of a group of workers who were regarded as crude, drunken and ungodly. It is a dirty world, one that brings us close to materials such as clay, sand, ashes, breeze and other constituents of dust heaps. Brickmakers do not feature very strongly in Victorian literature, but where they do make an appearance they are viewed as living on the edge of conventional or polite society. Dickens description of a brickmaker's workcamp in *Bleak House* is perhaps well known:

> I was glad when we came to the brickmaker's house; though it was one of a cluster of wretched hovels in a brickfield, with pigsties close to the broken windows, and miserable little gardens before the doors, growing nothing but stagnant pools. Here and there, an old tub was put to catch the droppings of rain water from a roof, or they were banked up with mud into a little pond like a large dirt pie. At the doors and windows, some men and women lounged or prowled about, and took little notice of us, except to laugh to one another, or to say something as we passed, about gentlefolks minding their own business, and not troubling their heads and muddying their shoes with coming to look after other people's.[1]

Dickens' fictional brickmakers are located near St Albans in Hertfordshire, but his account could have been of the notorious Potteries area of Kensington, whose filthy condition had been the subject of an article in *Household Words* in 1850. [2] Another novelist also has a description of brickmakers, and since the proximity of the canal to the brickfields is fundamental to the workings of the industry in West Middlesex, Trollope's portrayal of a colony of brickmakers in his fictional Barsetshire is perhaps more directly relevant than the Dickens' quotation.

> And on the brink of this canal there had sprung up a colony of brickmakers, the nature of the earth in those parts combining with the canal to make brickmaking a suitable trade. The workmen there assembled were not, for the most part, native-born Hoggestockians, or folk descended from Hogglestockian parents. They had come thither from unknown regions, as labourers of that class do come when they are needed. Some young men from that and neighbouring parishes had joined themselves to the colony, allured by wages, and disregarding the menaces of the neighbouring farmers; but they were all in appearance and manners nearer akin to the race of navvies than to ordinary rural labourers. They had a bad name in the country; but it may be that their name was worse than their deserts. The farmers hated them, and consequently they hated the farmers. They had a beershop, and a grocer's shop, and a huxter's shop for their own accommodation, and were consequently vilified by the small old-established tradesmen around them. They got drunk occasionally, but I doubt whether they drank more than did the farmers themselves on market day. They fought among themselves sometimes, but they forgave each other freely, and seem to have no objection to black eyes. I fear that they were not always good to their wives; nor were

[1] Dickens, C., *Bleak House*. London, 1868. Chapter VIII. (Penguin Popular Classics edition, 1994, p.97)
[2] Malcolmson, P.E., "Getting a living in the slums of Victorian Kensington". *London Journal*, 1, 1975, p. 31

> their wives always good to them; but it should be remembered that among the poor, especially when they live in clusters, such misfortunes cannot be hidden as they may be amidst the decent belongings of more wealthy people. That they worked very hard was certain; and it was certain also that very few of their number ever came upon the poor rates. What became of old brickmakers no one knew.[3]

Trollope's comments on these brickmakers serve to introduce a number of the themes that are examined in this work: the peripatetic nature of brickmakers' lives; their reputation for drunkenness and unruly behaviour; their independence and hard work. The passage also notes the presence of the beershop, an essential adjunct to the brickfield, and reports the tension that existed between the brickmakers and the largely agricultural community in which they worked. Contemporaries saw brickmakers near the bottom of the social ladder, yet they were at least one step above the people of the streets that Mayhew described in such detail. When working, they earned good money that compared favourably with the pay of agricultural labourers who were their neighbours in rural parishes such as the one that Trollope describes. Similar parishes were the home of brickmaking in West Middlesex.

At one level a study of brickmaking in the Cowley district is an attempt to look with the fascination of the industrial archaeologist at methods of manufacture that have largely disappeared. At another the social historian looks at the lifestyle that belongs to a world we have lost, particularly one that involved to such an extent the employment of small children in heavy and dirty work. But there is a much broader economic significance to brickmaking on the fringes of London, when it is viewed as part of a whole range of goods and services without which the Victorian city could not function.

Take again an image of bricks as the agent of urban development, this time from a visual source, the much-reproduced Cruikshank 1829 engraving of "London going out of town",[4] a shower of bricks colonising rural areas outside the city. (see illus 1.1). By the time that Cruikshank drew this picture many of the bricks that were being used in London's expansion were coming from outside it, in mainly rural areas of Kent, Essex and Middlesex.. Aside from the power of this visual representation of London's

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[3] Trollope, A., *The last chronicle of Barset.* London, 1867. Chapter XII. (World Classics edition, Oxford, 1980, p.117)

[4] The phrase dates from the eighteenth century. See Landa, L.A.,"London observed: the progress of a simile". *Philological Quarterly*, Vol 54, Part 1, 1975, p. 276

unchecked expansion it causes us to reflect on the vast number of bricks required to sustain this level of growth. Victorian London was largely a brick built city, and mostly constructed from the characteristic grey or yellow stock bricks. If this is not always immediately apparent it is because in many places the colour of the bricks is obscured by atmospheric pollution, or the buildings themselves are faced with red brick, stone or terra-cotta.[5] Behind the facades, whatever the material, is usually a carcase of brick, and yellow bricks are often visible on the side elevations of buildings with more elaborate frontages.

This provides us with an interesting contrast. On the one hand the employees of brickmaking firms were a hard-living community of men, women and children, whose behaviour drew comparison with the notorious canal and railway navvies; on the other here was an industry that was able to deliver the hundreds of millions of bricks that enabled that rapid expansion of London, and other cities, to take place. To do this brickmaking developed a unique relationship with the city.

There was a long tradition of viewing London as organic entity, which grew large at the expense of the rest of the country, a head grown too big for the body that sustained it. To William Cobbett, one of the fiercest critics, it was the "great wen", a tumour feeding on and corrupting the surrounding areas. In this interpretation the city has parasitic qualities in relation to its rural hinterland. [6] "The capital is become a overgrown monster, which like a dropsical head, will in time leave the body and extremities without nourishment and support" is the verdict of Matt Bramble in Smollett's novel *Humphrey Clinker.* [7]

Whether the city impoverished the districts on its borders, as many critics obviously thought, the two had a close relationship and a mutual dependency. Continuing the analogy of the body, the city needed a number of nutrients for its survival and growth. The city, again like a body, produced waste products that needed to be disposed of. At one level the city's inhabitants, both human and animal, needed to be fed, and excreted wastes in the form of night soil and stable manure. At the next level, the city also needed

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[5] A good example of the use of unadorned yellow stock brick is in Kings Cross station, constructed 1851-2
[6] Porter, R., *London: a social history.* London, 1994, p. 162
[7] Byrd, M., *London transformed: images of the city in the eighteenth century.* London, 1978, p. 89

fuel, mostly in the form of coal, to heat houses, to cook food, to be turned into gas that lit homes and streets, and to generate the steam power that made industry work. The burning of so much coal produced large quantities of ash. At the third level the growth of the physical fabric of the city depended on the availability of building materials, stone, cement, gravel and bricks. The building process also required the removal from the built-up area of clay and hard-core from excavations and demolitions.

Rural Middlesex was, not surprisingly, tied closely to the metropolis that dominated it, providing a number of these goods and services. It had the three necessary requisites for a support area of this kind: it was close to London; it had good transport links; and it was the one thing that the built-up area was not, that is, it was rural. Middlesex sent the city much of its food from its fields and market gardens, and hay from its meadows for its cows and horses; in return it accepted and absorbed much of the city's wastes, spreading horse manure, and in the earlier part of the nineteenth century some of its human excrement, liberally on the land, or used it in hotbeds to force the more exotic fruits and vegetables.

Brickmakers also fitted into this relationship with the city. Brickmakers in Middlesex produced bricks for use mainly in London, to fuel that dramatic expansion of the built-up area. In return they gratefully received the city's ashes and breeze, the residues of burning coal in domestic hearths, which were available in very large quantities. These they used to extend and ameliorate the soil from which the bricks were made, and to provide a source of fuel for the clamps in which the bricks were fired. This stimulated the development of a symbiotic relationship between brickmaker and dustman, and a number of men carried on both trades. Brickmaking was profitable enough, and its demand for these waste products large enough, for the collection of ashes and breeze to subsidise the removal and disposal of the rest of the contents of metropolitan dustbins, such that at times contractors were willing to pay vestries for the privilege of collecting their rubbish.

There is certain irony that the elegant buildings of great cities are made from such humble materials, clay, sand and even elements from its own dustbins. There is a further irony that the yellow stock bricks that were widely regarded as impervious to the atmospheric pollution of the city were made in part from the residue of the coal whose

burning caused much of the smog. The transfer of coal through many hands from its first being dug to the point where remnants of it were incorporated into bricks is an example of what Defoe, and some of his contemporaries in the early part of the eighteenth century, thought of as the circulation of trade. In this economic theory wealth was created from the number of hands through which a commodity passed between its point of origin and its final use.[8] In the case of coal the route was a long one: coal dug in the north east of England was shipped to London by North Sea colliers, unloaded, sold on the London market, delivered to individual houses and businesses, and then burnt to provide heat, light and power. The resultant residue in the form of ash and clinker was collected as rubbish by dust contractors, sold to brickmakers who transported it to their brickfields in the counties that adjoined the capital, where it was incorporated into the bricks themselves and used as fuel. The bricks were then carried by river or canal back to the city where they were sold by brick merchants to builders. Each of the many transactions in the chain provided opportunities for profit.

It was convenient to look at the circulation of trade as analogous to the movement of blood within the body, whose operation had been described by William Harvey early in the seventeeth century. Roads, rivers and, later canals and railways, were the arteries through which such trade flowed. [9] Defoe spoke of the Thames as

> The channel for conveying an infinite quantity of provisions from remote counties to London, and enriching all the counties again that lie near it, by the return of wealth and trade from the city

but the later canals offered the same opportunity.[10] Both the Thames and London's canals provided the means by which building materials were brought into the capital from the brickfields, cement works and gravel pits of the surrounding counties.

London stock bricks are often overlooked by virtue of their ubiquity. They were used from the late seventeenth century until the early twentieth, and exhibit considerable variety in colouring. The different sources of clay contributed to this diversity, as did the method of manufacture. Bricks could be red, brown, purple and various shades of

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[8] For a discussion of this theory see D. Trotter, *Circulation: Defoe, Dickens and the economies of the novel.* London, 1988, p.1-7

[9] Ibid, p.5

[10] Defoe, D., *A tour through the whole island of Great Britain*, edited by P. Rogers. Harmondsworth, 1971, p.182

yellow, from golden to greyish. Most have a texture that reflects the hand-moulding techniques by which they were usually produced. [11](see Illus 1.2) In the following chapters there is an examination of the detail of how these bricks were made, how the growth and development of the metropolis stimulated demand for bricks, and how the bricks were transported from their place of manufacture to the building sites. Consideration is also given to that despised class of workmen, the brickmaker, and the particular characteristics of working in this industry.

I came to an interest in brickmaking as a local historian, whose curiosity was engaged in understanding an industry that was frequently referred to, but about which little was known. Although this was the starting point, the focus of this study has changed so that this is an examination of one part of a nationwide industry, how it operated and its relationship to the market that it served. Local historians may be disappointed, therefore, if they cannot trace in these pages a detailed history of any one part of what I have often called, following contemporary practice, the Cowley district. Because it is difficult to find detailed information about the brickmakers in each parish at all decades in the nineteenth century I have assumed a general similarity in the way that brickmaking operated across the district, and used evidence from across the area. This approach is justified because many brickmakers worked in more than one parish either at the same time or at different ones, and because contemporaries seemed to have treated the Cowley district, and certainly its products, as an undifferentiated whole.

What prompts the choice of this geographical area and this historical period? In both cases the Grand Junction Canal is the defining element. Brickmaking occurred in a number of parts of Middlesex, not surprisingly given the widespread presence of brick clays, some within or close to the built-up area of London, others at some distance. I have generally ignored areas like Hammersmith and Brentford, whose access to the Thames provided a route for their products to the London market, and centres like Acton and Shepherd's Bush later in the nineteenth century, whose importance lay in their proximity to the boundary of the built-up area, and their own growth as suburbs. By contrast the focus here is on an area that, because of a rural character, which survived

[11] Cox, A., "A vital component: stock bricks in Georgian London". *Construction History*, vol. 13, 1997, p. 57

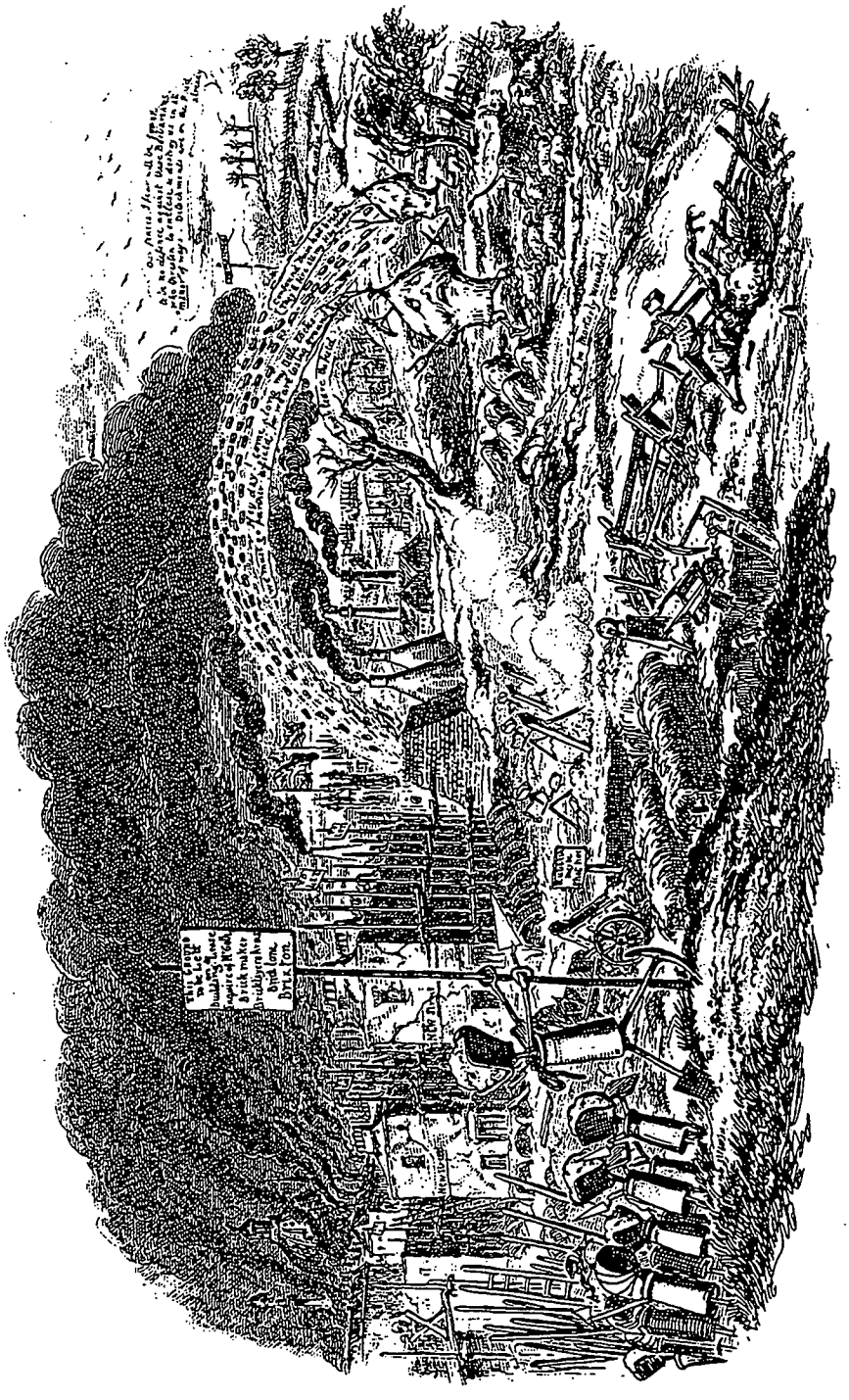
into the twentieth century, generated only a small local demand for bricks, and which was dependant on the canal to distribute its product to more distant markets.

The building of the Grand Junction Canal at the end of the eighteenth century also defines the chronological starting point; although some brickmaking had always taken place in West Middlesex, the industry only became significant once the canal was in operation. Brickmaking was an important industry for only a century and survived, on a much reduced scale, for a further fifty years, and the study ends with its decline and extinction. By the time of its disappearance there was virtually no commercial traffic left on Britain's canals.

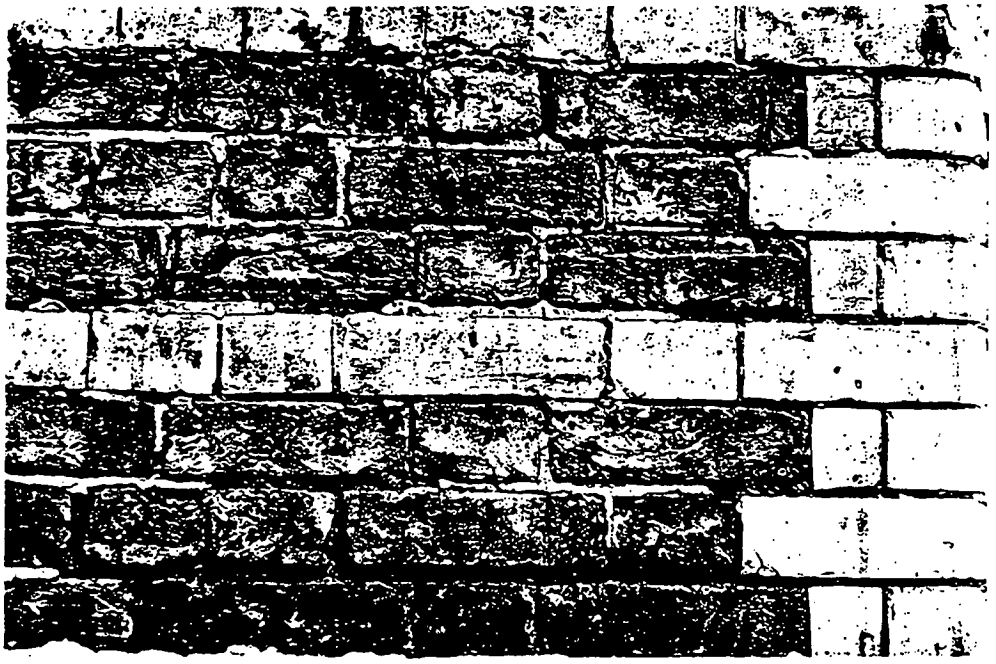
The Cowley district has no precise definition, save the linkage provided by the canal and the presence of Uxbridge as a market town, and a commercial and administrative centre. With the exception of Southall, which had a livestock market and became an industrial town in the course of the nineteenth century, the area comprised a number of agricultural villages in the parishes of, working from east to west, Greenford, Northolt, Norwood, Heston, Hayes, Hillingdon, West Drayton, Yiewsley and Cowley. This last gave its name to the style of brick that was produced – Cowley stocks. These parishes later became part of Greater London, and are now districts within the London Boroughs of Ealing, Hounslow and Hillingdon.

The following chapters consider brickmaking in the broader context of the industry in England and within the London area before 1800 [Chapter 2], the demand for bricks in London [Chapter 3] and the way that demand was met from a variety of sources [Chapter 4]. Later chapters situate brickmaking within the agricultural economy that characterised West Middlesex [Chapter 5], describe the type of processes involved in brick manufacture and the nature of the workforce [Chapter 6], discuss business organisation and the role of the firm [Chapter 7], and study the crucial importance of transport connections [Chapter 8]. The final chapters look at the history of the industry after 1900, its decline and extinction [Chapter 9], and attempt to draw some conclusions about the industry and its significance for the development of its own area and for the growth of London [Chapter 10]. Some of the specialised vocabulary used in brickmaking is contained in the Glossary.

Note. All measurements of area are given in imperial units and money in pounds, shillings and pence.



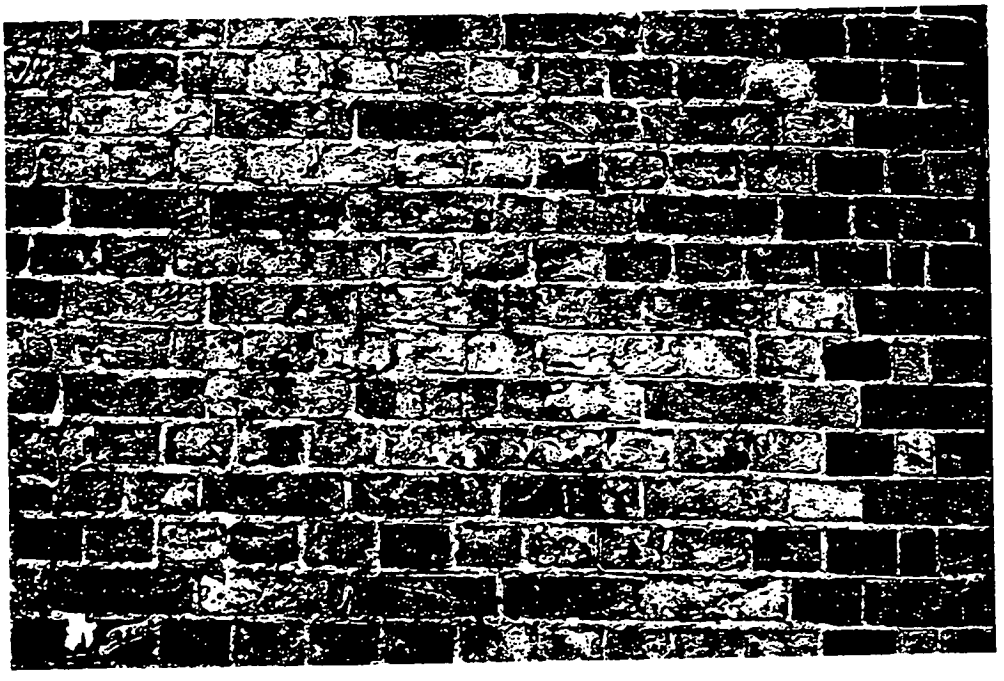
Illus 1.1: Engraving after G. Cruikshank. *London going out of town* (1829)



Illus 1.2: London stock bricks of the 1880s

(a) Peabody Buildings, Farringdon Lane, Clerkenwell. The pale bricks are probably Beart's patent gault bricks.

(b) The Rectory, Greenford. The stocks are likely to be of local origin, but the source of the red bricks is not known.



Chapter Two: Brickmaking in England & Wales: the background

This chapter provides the broader context for this locally focused study, by considering the history of brickmaking, the progress of the industry and the results of mechanisation and innovation in the nineteenth century. It also looks at the way the demand for bricks in London was met up to the eighteenth century, and at factors that affect the location and organisation of industries like brickmaking.

The origins of brickmaking are in the distant past, since clay has been used as a building material since pre-historic times. At its simplest river mud was applied to a wood or reed framework to create a wall; a more sophisticated method involved shaping the wet clay into blocks and drying them in the sun. [1] The Romans are credited with introducing brick building into Britain, and evidence of their use of bricks survives from many sites.[2]

Considerable innovators in building construction and the use of materials, they adapted their methods to suit the different climatic conditions to be found throughout their widespread Empire. So they used brick as well as stone, depending on local availability and structural requirements. They adopted the sun-dried brick common throughout the Middle East, but found that it was less well suited to the climate of their north-westerly provinces. Although originally used for structural purposes concealed beneath facings of stone or stucco, bricks came to be used for decorative effect.[3]

Like many later generations of builders the Romans used brick most readily when there was a shortage of reliable building stone, although even in circumstances where stone was easily obtainable clay products were used for a number of specialist applications, such as roofing and in hypercausts. [4] The City of Londonium grew up on the north bank of the Thames and supplies of suitable brickearth were readily available in the vicinity, particularly on the higher ground adjacent to the Wallbrook stream.[5] By the end of the first century AD buildings in the city were built from a variety of materials, including wattle and daub; Kentish ragstone, which was shipped in large quantities to construct, amongst other things, the city's defensive walls; and the familiar thin red

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[1] Woodforde,, J., *Bricks to build a house.* London, 1976, p. 19-34
[2] For the archaelogical evidence for Roman bricks and tiles in Britain see Brodribb, G. *Roman brick and tile.* Far Thrupp, 1987.
[3] Henig, M.(ed) *A handbook of Roman art.* Oxford, 1983. p.42-43
[4] Brodribb, op.cit., p. 9, 34
[5] Hall,J. and Merrifield, R. *Roman London.* London, 1986. p.18

bricks and curved roofing tiles.[6] Evidence of Roman building is seen in surviving portions of the city walls, where tile courses as well as ragstone was used to face a rubble core. [7]

In the latter part of the Roman occupation of Britain brick and tile seem to have been less used than previously.[8] With the collapse of the Roman Empire in the west in the fifth century brickmaking in Britain fell into abeyance, but the many buildings that remained provided a ready source of materials for later builders. There is no conclusive evidence that the Anglo-Saxons continued to make bricks in the Roman manner, but there are many examples of the re-use of Roman bricks by later generations. Saxon and Norman builders recognised the structural potential of Roman clay products and employed them in a great many buildings, particularly in Essex, Kent and Sussex. There appear to have been plentiful supplies of such materials; at least a hundred Essex churches contain Roman bricks, which make their most extensive appearance in St Botolph's Priory, Colchester.[9]

The evidence from Essex buildings suggests a point in the twelfth century when stone came to be used for those structural elements for which salvaged Roman bricks and tiles had previously been preferred. Whilst this may have been a stylistic development the change may mark the exhaustion of the reserves of undamaged Roman material. [10] The first "new" bricks to be manufactured after the end of Roman occupation were produced in the twelfth century and are found at Coggeshall Abbey in Essex. These were large bricks, so-called "great bricks", and similar ones were found elsewhere in the eastern counties. It is possible that the expertise required to produce such bricks may have come to England through contacts between Coggeshall and other houses of the Cistercian order on the Continent, where the techniques were preserved. [11]

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[6] ibid, p. 20
[7] ibid, p. 28
[8] Brodribb, op.cit. p.49
[9] Wight, J. *Brick building in England from the Middle Ages to 1550.* London, 1972. p. 21; Ryan, P. *Brick in Essex from the Roman Conquest to the Reformation.* Chelmsford, 1996. p. 15-19
[10] Ryan, op.cit. p. 20
[11] ibid, p. 22, 43-44

During the thirteenth century the great bricks were superseded by Flemish bricks, which had proportions similar to modern bricks.[12] There is some debate as to whether this new style of brick was produced in England since it is difficult to be sure whether references in documents to *flanderstiles* relate only to bricks imported from the Low Countries or also to bricks of a similar kind made locally. Whilst there is no evidence of large-scale importation of bricks into England there are examples of the shipment of bricks for particular building projects. For instance over 100,000 Flemish bricks were used in 1283 for the curtain wall of the Tower of London and in 1422 114,000 bricks were brought from Calais for the royal palace at Sheen. The rebuilding of Mercers Hall in the fifteenth century used building materials from a wide variety of sources: York stone, Kentish ragstone, Reigate stone as well as 40,000 Calais bricks. These last cost £7 to buy, and another £7-6s-8d for freight, wharfage and customs. But despite the sizeable quantities involved in these transactions, wholesale importation is thought to have been unlikely considering the ready availability of brickmaking clay in the counties closest to the Continent and the cost of shipment, which, where it can be calculated, accounted for as much as 60% of the total bill.[13]

Certainly by the fourteenth century indigenous brickmaking had been revived in England. In 1303 a municipal brickyard was established in Hull, and sometime later in the century a similar one at Beverley. [14] At the same time that imported bricks were being used at Sheen Palace, bricks were being made locally for repairs to London Bridge, even if the craftsmen were probably Dutch; the bridgemaster purchased brick and tiles from a works at Deptford between 1404-1421.[15] Brickmaking skills seem to have been reintroduced into England by craftsmen from nearby continental Europe, where there was a continuity in brick manufacture after the end of Roman control. Many Dutch and German *brekemakers* have been identified working at sites in eastern England. Here they discovered a familiar raw material, and proof of their expertise has been borne out by

[12] ibid, p.31
[13] Schofield, J. *Building in London from the Conquest to the Great Fire.* London, 1984, p.126; Nightingale, P. *A medieval mercantile community: the Grocers Company and the politics and trade of London, 1000-1485.* London, 1995, p. 408, 409, 413; Smith, T.P. *The medieval brickmaking industry in England, 1400-1450.* British Archaeological Reports, No.138. Oxford, 1985, p.23-25
[14] Smith, op.cit., p.27
[15] Schofield, op.cit.,p.126

modern geological investigation which confirms the similarities between some English clays and those of the Low Countries.[16]

It was some time before brick became a dominant building material in England, unlike the situation in other northern European countries with which it had extensive trading links. The contrast can be explained by differences in economic geography, for whilst England is a small country with a complex geology, the north German plain is a large area where building stone is not readily available. As Smith puts it

> Supplies of all grades of building stone were abundantly available in many parts of the country, and no part of England was so remote from those supplies that transport thereto was entirely unfeasible- at least so far as higher status buildings were concerned.[17]

Following the slow adoption of brick building, the late fifteenth century and the early part of the sixteenth century saw the first great age of English brickwork, when bricklayers were able to deploy a high standard of technical expertise, and to develop imported details into an assured domestic style. This confident handling of the material is evident in major buildings such as Hampton Court, Lambeth Palace and Lincoln's Inn.[18]

Yet brick was still being used mainly for the palaces of the ecclesiastical and secular nobility and for the country seats of the gentry and it had yet to make an impact down the social scale and away from the earliest centres of its popularity in the eastern counties bordering the North Sea. However, during the course of the sixteenth century brick building was extended to Hampshire, Berkshire and the counties around London; elsewhere geology still determined the choice of building material.[19] Nevertheless there were special applications for which brick was preferred: even when buildings continued to be made mainly from less durable materials, stone or brick was prescribed for chimneys as a fire precaution. Regulations to that effect were introduced in London in 1419 and in Worcester in 1467.[20]

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[16] Prentice, J.E. *Geology of construction materials*. London, 1990. p.163-164
[17] ibid, p. 4
[18] Wight op.cit., p.311-312, 314; Moore, N.J. "Brick" in Blair, J. & Ramsay, N. (eds) *English medieval industries: craftsmen, techniques, products*. London, 1991. p.216
[19] Airs, M. *The Tudor and Jacobean country house: a building history*. Far Thrupp, 1975. p.115
[20] Wight, op.cit. p.65

As brickmaking extended to new parts of the country a variety of different types of bricks came to be made, depending on the clays that were available. Clays are essentially weathered rocks, which when mixed with a suitable proportion of water, assume elastic qualities, but such clays are not uniform in composition and can occur in formations of varied geological ages. As Prentice concludes, "as long as some small proportion of clay mineral is present, some kind of brick can be produced".[21]

The clays from these different geological formations are associated with different styles of brick manufacture. For example, the oldest group of rocks, from the Devonian age, produce slaty shales, whilst the once heavily exploited Wealden clays came from the Cretaceous period. [22] Some of these clays were too hard to be processed by hand methods, and their exploitation had to await the invention of grinding and moulding machines. As a result most brickmaking before the late nineteenth century utilised superficial clays – that is, those near the surface of the soil – which were easily worked; by contrast the economics of the modern industry require deep clay deposits which will support large scale production and can be excavated by machinery, and this has caused brick manufacturers to abandon many previously used clays. [23] The discovery of Lower Oxford clay, found beneath superficial deposits that were already being worked, revolutionised British brickmaking after 1880. Oxford Clay, a formation from the Jurassic period, occurs as seams up to thirty metres thick, and extends in a belt from Bedfordshire to Peterborough. The nearby Lincolnshire village of Fletton has given its name to the type of brick produced from this clay. [24]

Brickmaking in the vicinity of London employed clays of the most recent geological age, the Pleistocene. These sedimentary clays are thought to be wind-blown loess deposits, containing only a small proportion of clay minerals but rich in silica, which vitrifies when fired and gives the yellow stock brick the durability for which it is renowned, surviving in the heavily polluted air of the nineteenth and early twentieth century city. These clays are the so-called brickearth that supported the major industry in Kent, Essex and Middlesex,

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[21] Prentice, J.E., *The geology of construction materials*. London, 1990, p.164

[22] For a description of the range of brickmaking clays in the United Kingdom, see Keeling, P.S., *The geology and mineralogy of brick clays*. London, 1963, p.64-75

[23] Prentice, op.cit., p.157

[24] Blunden, J. *Mineral resources of Britain*. London, 1975. P. 151, 155

and should not be confused with London clay [25]. London clay, which underlies the surface layers contains a high proportion of smectite, which makes it liable to excessive shrinkage. It is not thought suitable for modern brickmaking, although, as we shall see, one major firm in West Middlesex was to successfully manufacture bricks from it in the 1930s. [26] A recent survey suggests that London clay

> was more widely used in the past; the vast numbers of bricks used to build the expanding London suburbs in the nineteenth century were the product of weathered London clay blended with street sweepings of grit and cinder. [27]

Brickearth occurs on the alluvial terraces that border the present course of the River Thames; the presence of these is testament to changing water levels over geological time. The border between the river terraces and the northern part of the county where London clay is close to the surface is a meandering east-west line, with Southall and parts of Northolt south of the line, and Harrow north of it. (see map 2.2)

As the volume of Middlesex brickmaking expanded to meet the growing demand for bricks in the capital, so the best clays – the natural malms - were exhausted, and brickmakers increasingly created artificial malms by mixing the soil with chalk and breeze, a technique that will be described in more detail later on. Brickmakers had to decide the brickmaking possibilities of different soils by eye and touch, based on their experience. By the mid-nineteenth century the chemical constituents had been identified, but the chemistry of brick clays is complex and awaited more modern methods of analysis.[28]

It is thought that methods of brick manufacture changed little between the fifteenth century and the nineteenth. The earliest known illustration of brickmakers at work, the much reproduced plate from the *Netherlandische Bijbel* of 1425, purporting to show the Jews making bricks in Egypt, shows methods of manufacture similar to those described and illustrated four hundred years later.[29] Another two centuries elapsed before J.

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[25] Prentice, op.cit. p. 164

[26] see below, chapter 8

[27] British Regional Geology. *London & the Thames Valley.* 4th edition, compiled by M.G. Sumbler. London, 1996. P. 140

[28] An example of the Victorian knowledge of clay chemistry can be seen in Chamberlain, H., "The manufacture of bricks by machinery". *Journal of the Society of Arts*, No.185, vol 4, 6th June 1856. For a more modern description see Keeling, op.cit.

[29] see illustration 1.1 and 1.2 ; Woodforde, op.cit., p. 59; Wight, op.cit, p.112

Houghton set out a full written description of contemporary brickmaking methods in a report to the sheriff of Bristol: he described the digging of the soil; the weathering of the clay over winter; its tempering in the spring; the use of a mould and a moulding bench with the board known as the "stock" – hence stock-brickmaking; the placing of the new bricks on a pallet; the transfer of the bricks to the hackground for drying; and finally their burning in a kiln.[30]

Houghton refers to a kiln, but many bricks were burnt in clamps, from the Middle Ages through to the twentieth century. The clamp was a temporary structure, which was dismantled as soon as the batch of bricks had been fired, and was therefore best suited to those occasions where bricks were made on or adjacent to the building site. [31] Where permanent yards existed, as at Hull, a kiln was probably erected, since it burnt the bricks more quickly and more evenly. However it is likely that in the fourteenth and fifteenth centuries the two terms, clamp and kiln, were interchangeable, and had not developed the distinctive meanings they later had. [32] Although the kiln appears a more efficient device, clamps were preferred by the stock brickmakers of the London area, when producing the characteristic yellow brick.[33] Where these brickmakers also made red bricks, particularly in the late Victorian period to meet the demands of the Queen Anne revival, kilns were essential.[34]

These methods remained largely unchanged until the nineteenth century when there was a great tide of innovation, first to mechanise individual parts of the operation, and then to provide a continuous process. There was, however, a precursor to this major period of change, with the introduction of the pug-mill at the end of the seventeenth century. Pug-mills were barrel-shaped drums, originally made of wood, but later of iron, with a central vertical shaft on which was mounted a series of blades. Clay added at the top was

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[30] Woodforde, op.cit., p.58-60

[31] For a description of clamp building see Dobson, E., *Rudimentary treatise on the manufacture of bricks and tiles.* 10th edition, London, 1899. P. 144-155

[32] Smith, op.cit., p.50

[33] Dobson, op.cit., p.122

[34] Clamps came into a lot of criticism in the mid-Victorian period, the main objection being the different degrees of firing that bricks received, depending on their position in the clamp. This accounts for the bewildering range of types into which clamp bricks were sorted. Chamberlain commented of clamp bricks that "all are made equally well, but are destroyed by the unequal heats to which they are exposed", but as an enthusiast for modern techniques he may be regarded as biased. Chamberlain, H., "On the drying and burning of bricks". *Journal of the Society of Arts*, No.186, vol 4, 13th June 1856, p.517.

mixed with any additives, and extruded from a hole near the base. A horizontal beam attached to the shaft was turned by human or horse power. The pug-mill achieved a more thorough mixing of clay than was possible with a spade, and a single pug-mill could supply more than one moulder. [35] As the supplies of the best quality malms became used up brickmakers had to include a number of additives, such as chalk and ashes, to help correct the problems of excessive shrinkage and cracking. Thorough mixing was, therefore, increasingly important to achieve a homogeneous paste for the moulder and pug-mills probably gained in popularity as a result.[36]

Rising demand following the end of the Napoleonic wars was the stimulus to the many attempts to mechanise brickmaking after 1820. Although firms working with traditional methods could accommodate elasticities in demand by employing more or fewer staff, a number of brickmaking processes presented interesting challenges to inventors. At the heart of the operation the hand-moulding process was intensively repetitive, and there were annoying discontinuities in the drying and firing activities. The newly moulded "green" bricks took some weeks to dry; they had to be turned during the drying process, an activity known as skintling; kilns took time to be loaded or clamps to be built, and each had to be thoroughly cooled before the bricks could be retrieved for sorting and sale.[37]

These challenges were taken up enthusiastically, so that up to 1850 one hundred and thirty one patents were granted for clayworking improvements, and of these eighty three were specifically for machines for shaping bricks and tiles: some of these machines were featured in the Great Exhibition the following year.[38] The existence of such inventions did not necessarily ensure their adoption by manufacturers, unless there was an economic benefit or a competitive advantage to be gained. The first patent for a brick moulding machine had been issued as early as 1741, but a major impetus to innovation came from an unusual quarter – agriculture. Interest in the under-drainage of heavy clay land using clay pipes encouraged a number of inventors, including farmers and landowners, to design machines that were simple to operate and portable, such that they

[35] Woodforde, op.cit.,p. 61
[36] Watt, K.A., *Nineteenth century brickmaking innovations in Britain: building and technological change.* 1990, p.36
[37] Watt, op.cit., p.37-38
[38] Hammond, M. *Bricks and brickmaking.* Princes Risborough, 1971, p.14

could readily be used by unskilled farm labourers. Machines were patented by Robert Beart, Thomas Ainslie, and Lord Tweedale amongst others and were displayed at meetings of the Royal Agricultural Society. The success of these devices, along with the availability of public loans to finance land improvement, encouraged the widespread use of cylindrical clay pipes.[39]

If farmers were keen to use unskilled labourers to make land drains, some brickmasters may have been motivated to introduce machines to reduce their dependence on an ill-disciplined workforce, since their men had a reputation for unruly and drunken behaviour. James Hunt, when demonstrating his newly patented machine to a trade audience, proudly declared that "all the persons employed were common labourers; professional brickmakers were thus not required". [40]

If rising demand was one stimulus to innovation, the repeal of the brick excise duty in 1850 encouraged experimentation, and a further three hundred and sixty four patents for brickmaking machines were granted in the twenty years up to 1873. However the impressive volume of activity was not unique to this industry, but reflected the level of innovation in other sectors of manufacturing.[41]

Some of the successful patentees of tilemaking machines, such as Beart and Ainslie, introduced machines that were able to deal with the different dimensions of bricks. Innovations in mechanical shaping fell into three basic categories. The first type attempted to replicate hand moulding, with a pug-mill feeding a series of moulds. The second group, and initially the most successful, used an extrusion process, in which a plastic clay was forced through a rectangular shaped die, and the extruded column of material cut into brick-sized pieces with a wire. Although a patent for a machine of this type was granted in 1810, it was only in the 1840s that practical wire-cut machines became available. Bricks produced by this method had smoother surfaces than hand-moulded ones, but lacked the indentation known as a "frog". Although such machines produced satisfactory bricks they suffered from the disadvantage that they had to be

[39] Watt, op.cit., p.156; Feinstein, C.H., "Agriculture 1770-1860" in C.H. Feinstein & S.Pollard (ed.), *Studies in capital formation in the United Kingdom.* Oxford, 1988, p. 23-25
[40] Watt, op.cit., p.43
[41] ibid, p. 158; the method of assessing the number of bricks made depended on the inspector viewing the "green" bricks laid out in the hacks. Chamberlain, op.cit., p.519

stopped regularly to refill the clay reservoir. Once the piston that pushed the clay mass through the die could be replaced with an Archimedes screw continuous operation became possible.[42]

The third type of machine was the brick press. Simple hand-operated presses were often used to finish and give a more uniform appearance to bricks produced either by hand moulding or by the wire-cut process. The later development of steam powered presses made it possible to mould several bricks at the same time and to work with clays of a consistency that were unsuitable for hand moulding or the wire-cut devices. New methods were introduced. In the "stiff-plastic" process the clay was ground to a powder, mixed with water and then shaped in power-driven clot moulds. It was the "semi-dry" process, however, in which hard shales were ground, screened and only lightly dampened, before being heavily pressed, which was the basis of the Fletton style of manufacture.[43]

Once a brick had been moulded it spent several weeks in a hack drying before it was sufficiently firm to be loaded into a kiln or built into a clamp. During this period the brick was vulnerable to weather damage, and had to be rotated to ensure even drying; moreover the hack-ground took a large amount of space. There were two possible approaches to the problems of this lengthy drying period. The first was the application of artificial heat; hot floor dryers were introduced in the early nineteenth century, particularly in the Midlands and North of England, using heat from a furnace, or waste heat from the kiln. Robert Beart had proposed the use of gravity fed conveyors to carry the drying bricks over hot air, and the idea of a tunnel drier was tried in Britain in 1845, but an economical and efficient system only became available at the end of the century.[44] The second approach was the elimination of the need for drying by reducing the amount of water added to the clay during moulding, and this was achieved with the semi-dry process.

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[42] Brunskill, R.W., *Brick building in Britain*. London, 1990, p.25; Bowley, op.cit., p62-63; Woodforde, op.cit., p112-116

[43] Woodforde, op.cit., p.121-122; Bowley, op.cit., p.63; Brunskill, op.cit., p.25-26

[44] Brunskill, op.cit., p.26-27

Inventors also gave their attention to the final part of the brickmaking process, the firing of the brick. A number of improvements were made to the design of kilns throughout the century, the main aim being to produce ones that used fuel efficiently and could be operated continuously. Although multi-chambered kilns – one whose individual chambers could be isolated for loading and unloading whilst the remainder were heated – were patented in the 1840s, the type that set a new standard was the Hoffmann kiln, named after its German inventor, Freidrich Hoffmann. This design was quickly adopted in other countries and the first British example was erected at a works near Wakefield, a mere three years after its invention.[45]

There were many later improvements to the basic Hoffman model, and it and its variants dominated kiln design for nearly a hundred years until it was challenged by the tunnel kiln. This type of kiln, first developed in France in 1751, was not taken up for about two hundred years, despite its obvious advantages. It worked on the same principle as the tunnel drier, with cars of green bricks running on tracks, through the cycle of heating, firing and cooling. [46]

Industrial location, particularly in the past, was determined by three main factors: the source of raw materials; the availability of sources of power; proximity to markets and to appropriate forms of transport. Industries which work with inputs that are heavy, bulky or perishable, and whose value is low in relation to their weight, will normally be sited close to the source of those materials. This approach can be refined by looking at what happens during the manufacturing process, and the relationship between the inputs and outputs of particular industries. Weber proposed a materials index, which indicated whether a manufactured product had greater or less weight than the raw materials that went into it. If the index value was greater than one, then there was a weight loss in manufacture and that industry was best sited close to the source of the main raw material. If, however, the index was less than one there was a weight gain in the process and in this case the industry should be placed near to the market it served. When the

[45] Hammond,op.cit.,p.23-24
[46] Hammond, op.cit., p.24; Brunskill, op.cit., p.33

index was equal to one, the industry could be at the source of the raw material, adjacent to the market or at an intermediate point.[47]

Brickmaking falls into the category of industries which have an index greater than one, since part of the weight of the raw clay is lost in drying and firing. However the choice of location is complicated by the nature of brick itself, since it is brittle, bulky and, in any useful quantities, heavy; it is thus difficult to move and incurs high transport costs in relation to its value. These disadvantages suggest that the *least cost location* would be found close to the market. Reconciling these opposing requirements was often possible in the past because of the widespread availability of clays from which bricks could be made. The clearest expression of this principle was the manufacture of bricks on the building site itself, often utilising soil which would otherwise have to be carted away, for example in the construction of cellars in town houses, the bed of canals, sewers and tunnels. This practical approach was adopted for large buildings in the fourteenth and fifteenth centuries, and was still being employed for major civil engineering projects in the nineteenth. At one remove from manufacture on the site itself, municipal brickyards, such as those at Hull and Beverly, served the needs of an adjacent town.

As transport costs reduced the imperative to be close to markets weakened. In the early nineteenth century it became practical to move bricks by canal or river barge, and in the second half of the century to carry them even longer distances by rail. Brickworks continued to be sited near the source of raw materials, but a series of local markets were increasingly replaced by regional ones and finally by a national one. However, even before the transport improvements of the late eighteenth century, bricks were sometimes brought quite considerable distances, but usually only where the bricks had sufficient value to justify this, where there was a shortage in local capacity, or where foreign bricks were available more cheaply. As has been noted brick imports occurred side by side with domestic production, and this pattern recurred in later periods. Specialist bricks, usually prized for particular characteristics of colour or strength, were the earliest to be moved any distance inside the country. (see below, Chapter Eight). With the transition from localised markets to a national one the number of brickworks has reduced, with a

[47] For an explanation of Weber's theory see Bale, J., *The location of manufacturing industry*. 2nd edition. Harlow, 1981, p.46-53

predominance of works utilising one type of clay – the Lower Oxford seams that produce the Fletton brick. In 1830 there were 5473 works in England and Wales, 1770 in 1870 and still 1316 as late as 1939. The concentration in the industry accelerated in the post-war period, so that by 1970 there were only three hundred and sixty.[48]

Apart from the clay the other major input to the brickmaking process was fuel. Wood, or charcoal derived from it, was the main source of fuel for most industries in the Middle Ages, although peat and turves were also used. [49] Wood continued to be used in some places, such as in the Ashburnham Estate brickyard, but coal became the major source of fuel during the eighteenth century, displacing it in brickmaking just as it did in industries such as glassworking, dyeing and brewing. [50] The change from wood to coal was part of what Wrigley has described as the rise of the mineral economy, that is the substitution of inorganic for organic raw materials. [51] This was crucial change for many industries because although it substituted a finite resources for a renewable one, it nevertheless made possible an increased level of industrial production that otherwise could not have been accommodated. [52] It also had a particular impact on the building industry, as Wrigley explains

> Coal could not be used as a direct substitute for wood in the building industry where timber was used not as a fuel but as a building material, but indirectly it was important because its use in the brick industry meant that the production of bricks could be expanded without unit costs of production rising, so that brick became the prime building material of the new age.[53]

As well as providing the heat and power for industry, coal was widely used as domestic fuel. The fuel needs of Londoners were largely met by sea-coal, dug in the pits of Northumberland and Durham and carried by colliers down the North Sea, which could easily be supplied to the brickyards of London, the Thames estuary and the Medway. [54]

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[48] Amount of Brick Excise Duty 1830. PP 1830-31, x, p.443; Clapham, J.H. *An economic history of Modern Britain, vol.2.* London, 1932. P. 119; Blunden, op.cit., p.145

[49] Smith, op.cit.,p.52-53

[50] Woodforde, op.cit., p.164-171; Berg, M. *The age of manufactures, 1700-1820.* London, 1985. P.35

[51] Wrigley, E.A., "The supply of raw materials in the Industrial Revolution", *Economic History Review*, 2nd series, xv, 1962, p. 1-16, reprinted in Wrigley, E.A., *People, cities and wealth: the transformation of treaditional society.* Oxford, 1988.

[52] Ibid, p.78-79

[53] Ibid, p. 79

[54] Sea coal was being brought to London as early as the thirteenth century, probably initially for industrial use. Shortages of wood forced its acceptance as a domestic fuel in the seventeenth century. Daunton, M. *Progress and poverty: an economic and social history of Britain, 1700-1850.* Oxford, 1995, p.207; Brimblecombe, P., *The big smoke: a history of air pollution in London since medieval times.* London, 1987, p.7, 30.

However the brickmakers of the London area developed an ingenious way of using this coal at one remove, by acquiring ash from the domestic fires of the city, which because of incomplete combustion in inefficient hearths, contained residual energy potential. The symbiotic relationship that developed between rubbish collection and brickmaking is a particular characteristic of the London trade, and is examined in greater detail in later chapters.[55]

Elsewhere in the country considerable economies could be achieved where coal could be found in close proximity to other raw materials. The exploitation of coal in Shropshire, for example, encouraged the development of iron, glass, pottery, and brick industries. [56] The presence of brick clays in association with coal seams in the geological formation known as the coal measures, supported a major branch of the industry throughout north-west Europe. [57] These iron-rich shales yield hard red or brown bricks and the clay extraction is carried out in conjunction with the coal mining. Coal measures also provide sources of fire-clay, used to make refractory bricks, and terracotta. In the period after the Second World War coal measures clay accounted for about one third of United Kingdom brick output, and the National Coal Board was the second largest brick producer in the country.[58] Several collieries developed a brickmaking arm, and in some cases later abandoned mining to concentrate on bricks; the Ibstock colliery in Leicestershire, opened in 1825, decided to concentrate on brick production in 1929 in the face of falling profits from coal, and later took over many other brickmaking concerns, many of them based on the coal measures, to form a multi-national operation. Other fuel sources have also been used: some modern kilns use natural gas.[59]

If brick clay was available in many parts of the country, what else determined the location of brickyards. In writing about production methods in the fifteenth century

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[55] Ashes were also used in Manchester brickmaking, but only as a fuel source: unlike the London practice, they were not also added to the clay mix. Chamberlain, H., "On the drying and burning of bricks", op.cit, p.517

[56] Berg, op.cit., p.125

[57] Prentice, op.cit., p.159

[58] Keeling, op.cit., p.66-67; Blunden, J. *Mineral resources of Britain.* London, 1975, p. 147; Stratton, M., *The terracotta revival: building innovation and the image of the industrial city in Britain and North America.* London, 1993, p. 27

[59] Cassell, M. *Dig it, burn it, sell it: the inside story of Ibstock Johnsen.* Slough, 1990. Passim; Hammond, op.cit., p.21; Perks, R.-H., *George Bargebrick, Esq: the story of George Smeed, the brick and cement king.* Rainham, Kent, 1981,p.58

Smith distinguishes two main types of brickyard, permanent (or semi-permanent) and temporary. Permanent yards were run by town corporations, as at Hull, or privately owned, but provided bricks to meet the regular needs of the town or locality. In dealing with a number of customers these works contrasted with the temporary yards, which could be operated either short term or long term, but were designed to provide bricks for a particular project or projects. Whilst such temporary yards were linked to a building scheme, they sometimes generated a surplus which could be sold to third parties.[60] Records of only a few permanent brickyards have survived, and their incidence was probably low; most medieval brickmakers were itinerant craftsmen, able to take advantage of the ready availability of superficial clays. Where bricks were required, say for a country house, they entered into an agreement with the landlord, who provided the raw materials and a location for the works, usually adjacent to the building site. The brickmaker supplied the specialist skills – the assessment of the clay, its preparation, the moulding of the bricks, and the building of kiln or clamp – and recruited labour locally for the less skilled jobs.

The presence of both temporary and permanent yards concurrently in the fifteenth century blurs the tidy distinction of successive stages in the organisation of brick manufacture made by one recent historian. Clarke, following Jorn Janssen, and working within a Marxist framework, identifies four distinct phases in the economic organisation of brickmaking up to the end of the eighteenth century: brickmaking by task; brickmaking by measure; brickmaking for sale; and brickmaking by wages. The first style, *brickmaking by task*, the most common method in the early centuries after the revival of domestic brickmaking, existed where the agreement between the brickmaker and the landowner was designed to provide sufficient bricks for a particular building job. This earliest form of contract evolved during the fifteenth and sixteenth centuries into *brickmaking by measure*, in which the brickmaker worked on a piece rate per thousand bricks and the raw materials were provided, as before, from the landowner's estate. The brickmaker supplied his own equipment, and had to have access to some working capital of his own; as in the earlier brickmaking by task, additional labour was hired locally.[61]

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[60] Smith, op.cit., p.60-70
[61] Clarke, op.cit., p.52

From the mid-sixteenth century, Clarke argues, these early methods were replaced by *brickmaking for sale*, a change that also denoted a shift in the role and status of the brickmaker. No longer just a skilled workman the brickmaker had become a tradesman, free to sell his own bricks, and also, therefore, to influence the price of the finished article. Especially on the outskirts of London, where there was a steady demand for their products, this form of business was well established in the early 1700s. Ultimately in the eighteenth century, as the volume of brickmaking increased, the brickmaker became the owner of a business and hired the necessary labour, or at least the skilled element in his workforce. This style of production might be termed as *brickmaking by wages*, with the brickmaker now an entrepreneur, sometimes owning more than one brickfield. [62]

Each brickfield was organised into a series of stools or berths – the benches on which the bricks were moulded – each worked by a moulder, with a team of assistants, the moulder acting as a sub-contractor for his team. The number of such stools on a brickfield determined the scale of the operation and the probable level of production.[63] This element of sub-contracting continued throughout the nineteenth century, although a proportion of the employees of a brickyard, particularly the *setters* (those who built the clamps or put bricks into the kilns), and those who loaded the barges or carts, were employed directly by the owner on terms different from the moulding gangs. The persistent element of sub-contracting undermines the strict concept of brickmaking by wages, which implies that all workers were employed directly by the owner of the brickyard; it also accounts, in part, for the ambivalence of the term *brickmaker* in the nineteenth century, which was used both to describe the owners of brickmaking businesses as well as moulders. [64]

The sub-contracting system was weakened by mechanisation as the primacy of the moulding gang, who did most of the tasks required in producing the 'green' bricks, gave way to the employment of new specialists, such as engine drivers, and the substitution of

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[62] ibid, p.74

[63] Dobson, op.cit., p.141-2

[64] These difficulties of nomenclature are, of course, not limited to brickmaking. It was a problem for Census enumerators, and also makes it difficult for historians using the Census to distinguish the different types of brickyard worker. See below, chapter six. See Armstrong, W.A., "The use of information about occupations" in E.A. Wrigley (ed.), *Nineteenth century society: essays in the use of quantitative methods for the study of social data.* Cambridge, 1972, p.194

machine minders for hand-moulders. However, in Kent, Middlesex and elsewhere, the older methods of production survived, sometimes side-by-side with the new. [65]

The progress of innovation and mechanisation in brickmaking produced an increasingly capital intensive industry. There were a whole series of new machines; the application of steam power to pug-mills, tramways and conveyors; and finally the introduction of mechanical diggers at the clay-getting stage. Brickyards needed to be of sufficient size and potential longevity to justify large-scale investment in plant and equipment. As we shall see the particular characteristics of the London stock brickmaking industry generally inhibited intensive mechanisation until the twentieth century. There was a trade-off, however, between fixed capital and working capital: the increase in fixed capital required by the purchase of plant and equipment was to some extent offset by the reduced need for working capital. Traditional methods of manufacture restricted the moulding season to the summer months and bricks had to remain several weeks in the hacks and a further period in the clamp. It was, therefore, well into the season before the first batch was ready for sale and dispatch to market, and the supply came in a few, relatively large batches. Mechanisation particularly using the semi-dry process, made year round manufacture possible, and with Hoffmann-style kilns, made continuous production easier to achieve.

If in the fourteenth century some provincial towns had brickyards, it was probable that London, with its greater extent and scale of demand, would have supported a number of brickmakers on its outskirts. The earliest suburbs that grew up to the east of the city, and outside its walls, were the location for a number of industries. In the fifteenth century there were brickfields and limekilns on land belonging to the episcopal manor of Stepney, and there were several brickmakers in the Whitechapel area. A century later John Stow described a field in Spitalfields as "broken up for clay to make bricks".[66]

Like most crafts London brickmaking became subject to regulation by a City Company, though much later than many other trades and professions. This is not surprising, since the earliest City Companies had been formed in the twelth century, before brickmaking

[65] Willmott, F.G. *Bricks and brickies*. Rainham, Kent, 1972, p. 23
[66] McDonnell, K., *Medieval London suburbs*. London, 1978, p.122-113

had been re-introduced into England. When regulation of the industry came it was introduced by the end user; the Tilers & Bricklayers Company was incorporated in 1568, and was given a monopoly of the supply of bricks, and the powers of search and fine within an area of fifteen miles of the city.[67] Whether this implies that many bricklayers and tilers were also manufacturers of the materials that they used is not clear; what is more likely is that the building craftsmen were better organised than the men who supplied them.

Despite the jurisdiction the Company enjoyed, brickmaking remained a poorly regulated trade. The Company's records contain a few examples of brickmakers being bound as apprentices, but this kind of craft organisation does not seem to have been strongly established. Indeed brickmaking was specifically excluded from the apprenticeship regulations under the Statute of Articifers of 1563; these apprenticeship clauses, in any case, were discontinued in a great many trades long before the Act itself was repealed in 1814 [68]. The comments of Campbell in the mid-eighteenth century appear to confirm this; he equated a moulder with a journeyman, " if they can properly be called so, who are paid by the master at so much a thousand". He states that "although they take no apprentices, they hire boys by the week, who learn the business as they grow up". [69] This accords with descriptions of nineteenth century organisation, with the employment of large numbers of children working as part of team with the moulder, and presumably picking up the techniques of the job. (see below, Chapter Six)

In the seventeenth century a boost to the demand for bricks in the City came from worries about the hazards of fire in closely-packed streets of mainly wooden structures, a common problem in cities of this period. As a means of reducing the spread of such fires an ordinance of James I in 1607 decreed that new buildings in the London and its suburbs should be built of brick or stone.[70] Controls on the brickmaking industry came in the following reign; a proclamation of Charles I in 1625 established a standard size for

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[67] Inwood, S., *A history of London.* London, 1998, p.106; Bell, W.G., *A short history of the Worshipful Company of Tylers & Bricklayers of the City of London.* London, 1938, p.18-19

[68] Clarke, op.cit.,p/71; Daunton., op.cit., p.275.

[69] Campbell, R., *The London tradesman, being a compendious view of all the trades, professions , arts... now practised in the cities of London and Westminster.* London, 1747; reprinted Newton Abbot, 1969, p..169

[70] Proclamation touching new buildings and inmates, 12th October 1607 cited in Clarke, L., *Building capitalism: historical change and the labour process in the production of the built environment.* London, 1992, p.48

bricks and fixed their price at 8s per thousand. It also set out in some detail a timetable for the annual cycle of production, with the soil being dug between Michaelmas (29th September) and 21st December, and turned before the end of February. The moulding season was specified as between 25th March and the end of August. These regulations applied to an area of five miles surrounding the city, and brickmaking was completely excluded from an area of one mile from the gates of the City, and a similar distance of the Palace of Westminster, a clear indication of the nuisance value presented by smoking kilns or clamps, and an early example of the difficulties of accommodating brickmaking within urban areas. [71] A later proclamation, amongst a number of other requirements, decreed that brickmakers and limeburners were not to let their operations become a public nuisance, which meant that they had to be at some distance from inhabited buildings.[72] Despite these attempts at regulation brickmaking continued to give offence; a major source of evidence of brickmaking activity on the outskirts of London during the century comes from complaints about the smoke from brick kilns. There were a number of brickworks in the area of Tottenham Court Road, and north-east of the City in places like Hackney [73]

As bricks were now required in larger numbers than previously the City monopoly was weakened by increasingly available supplies of material from brickmakers further out in the suburbs over which the company could not exercise the same control. A new Brickmakers Corporation was licensed in 1636 with powers to admit brickmakers, to regulate abuses in the trade and to bind apprentices. For this privilege it paid the Crown a royalty, but found it difficult to exert an appropriate degree of control on the trade, petitioning the King in 1638 to take action against "divers gentlemen and others [who] take upon them to make bricks and tiles as for their own use, to be employed in their own building, but really for sale... whereby his Majesty loses his 6d per thousand, petitioners are beaten out of their trade, and the public suffer by bricks and tiles deceitfully made". Such complaints, however, proved ineffectual and its charter was

[71] Knowles, C.C. & Pitt, P.H., *The history of building regulation in London, 1189-1972.* London, 1972, p.21-22
[72] Brett-James, N.G., *The growth of Stuart London.* London, 1935, p.109
[73] ibid, p.111-12

revoked after only three years, but its demise did not assist the Tylers & Bricklayers in reasserting their former monopoly. [74]

James I's claim in 1615, that "we found our Citie and suburbs of London of stickes, and left them of bricke, being a material farre more durable, safe from fire and beautiful and magnificent" and the subsequent attempts to control illicit and jerry building did not prevent the destruction of much of the City in September 1666. [75] Over 13,000 houses were lost in the Great Fire; the enormous enterprise of rebuilding put great demands not only on the ranks of building craftsmen, whose numbers had been depleted by the recent outbreak of plague, but also on the producers of building materials which were required on a scale hitherto unknown. [76]

There was a danger that the rebuilding of the city would be chaotic and provide easy opportunities for profiteers, so the process was heavily policed. Commissioners of Rebuilding, a distinguished group including Christopher Wren, were appointed soon after the fire; the Rebuilding Act of 1667 both defined standards for the construction of new buildings, but also regulated the supply of building materials to prevent excessive profit-taking. [77] The Act stipulated that the exteriors of houses must be built of brick or stone, and laid down the number of stories and the thickness of walls of different classes of houses. Section XVI dealt with the supply of building materials. This was necessary in order to prevent the cost of materials, occasioned by their shortage, from rising to a level that deterred builders; it had been alleged that as early as November 1666 escalating costs had forced up the cost of a small house by three or four times.[78] Worries about this scale of exploitation caused MPs to legislate to allow the City to appoint an inspector to regulate the supply of bricks and tiles. Although this particular proposal was later dropped, a similar measure was incorporated in the main rebuilding act.[79] The efficient supply of some materials was inhibited by the war with the Dutch, which was ended by the Treaty of Breda in July 1667. Dutch ships had interrupted the transport of timber

[74] *Calendar of State Papers, Domestic. Charles I, 1637-1638*, p. 388; Clarke, op.cit. p.48
[75] Brett-James, op.cit., p.89-90
[76] For the fire and its aftermath, see Reddaway, T.F., *The rebuilding of London after the Great Fire.* London, 1940 and Porter, S., *The Great Fire of London.* Stroud, 1996.
[77] Porter, op.cit., p.73
[78] ibid, p.110
[79] Porter, op. cit., p.111

from the Baltic and the sea-trade in coal from the north-east to London; the shortage of coal had an impact on the production of bricks.[80] Such was the demand for materials that the Navigation Acts were relaxed to allow bricks and tiles, as well as timber, to be carried in foreign ships. [81]

However most of the bricks required for the rebuilding were undoubtedly supplied from the neighbourhood of London. Because of the seasonal nature of brickmaking there was a lag before the increased level of production became available, no earlier, presumably than the summer of 1667. So one Henry Tindall, who was given a licence to dig clay paying a rent of £20 and a royalty of 1s on every thousand bricks made, achieved only 6,400 in the 1667 season, but about 1.4 million in the next two years, and 2.7 million in 1669-70. Other entrepreneurs, keen to get into this potentially lucrative market, were less successful; the diarist John Evelyn lost £500 in an abortive venture. [82] Although it is difficult to know where all the bricks came from, there is evidence of manufacture in areas such as St Giles in the Fields, Moorfields and Islington, where the road from Old Street past the Pesthouse was damaged by the frequent passage of brick carts.[83]

The aftermath of the Great Fire was important to the brick industry in two ways. It created a large short-term demand for bricks, and determined, after the smaller impact of earlier attempts, that London would henceforward be a largely brick built city. Secondly, the shortages, particularly of coal for fuel, may have led to the introduction to the practice of "soiling", which set a pattern for the manufacture of bricks in the London area for the next two centuries. Soiling was the addition of ashes, collected from domestic hearths, and chalk to the brick clay, in a mixture known, for reasons that do not seem to be understood, as *Spanish.* It was later said that the practice originated in the manufacture of bricks for the new Royal Exchange, where "clear sea-coal ashes" were used. Ashes had the dual purpose of extending the clay and adding a fuel element inside the brick, reducing the need for fuel in kilns and clamps. The process was widely used,

[80] Reddaway, op.cit., p. 114
[81] ibid, p. 127
[82] Porter, op.cit., p. 125
[83] Reddaway, op.cit., p128

but was often decried, since the addition of too much Spanish reduced the strength of the bricks.[84]

During the eighteenth century brickmakers worked on the edge of London, in areas which were eventually overtaken by the outward spread of the built-up area. Their presence close to fashionable housing estates was a continual irritant, both from the smoke the clamps created and the passage of the brick carts. Writing in 1720 Defoe noted that "Brick Lane, which is now a long well-paved street, was a deep dirty road, frequented by carts fetching bricks that way into Whitechapel from brick kilns in those fields, and had its name on that account".[85] Writing forty years later Jonas Hanway complained of the way Londoners had despoiled the outskirts of their city. "We have taken pains to render its environs displeasing both to sight and smell. The chain of brick kilns that surround us, like the scars of the smallpox, makes us lament the ravages of beauty and the diminution of infant aliment."[86] In similar vein, but in verse, Charles Jenner lamented the northward spread of the city since "Where-ere around I cast my wand'ring eyes/ Long burning rows of fetid bricks arise".[87]

Brickfields established in areas further from the city than the inner suburbs, probably developed in response to local needs. There were, for example, tile kilns in Hampstead, then a separate village, in the sixteenth century, and brick clamps on the Heath in 1665.[88] Even further afield still a visitor to Brentford in 1774 noted that the houses thereabouts were built of brick.

> "The fields round the town are most of him (sic). Dug out for clay they call it but it is sand and they mix it up together in the fall of the year, let it by all the winter before it will be fit to work. They don't burn them in kilns as we do here (i.e. in Hampshire), but they put them in a pile with coal and straw at the bottom with coal at every layer of bricks".[89]

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[84] Porter, op.cit., p.162. It was also suggested that the advantages of soiling were discovered by accident, when clay was dug from fields on which ashes had previously been deposited. Cox, op.cit., p.4.
[85] Defoe, D., *A tour through the whole island of Great Britain*, abridged and edited by P.N. Furbank and W.R. Owens. London, 1991, p.138
[86] Jonas Hanway, quoted in George, D. *London life in the Eighteenth century*. Penguin edition, Harmondsworth, 1966, p.106.
[87] Charles Jenner quoted in Porter, R., *London: a social history*. London, 1994, p. 94
[88] Victoria County History. *Middlesex, vol.IX: Hampstead and Paddington parishes*. Oxford, 1989, p.124
[89] *Diary of the visits of John Yeoman to London in the years 1774 & 1777*, edited by M Yearsley. London, 1934, p.48. Spelling modernised.

Areas on the outskirts of the built-up area, like Islington, were the natural location for brickworks, being near enough to the sites of building activity to keep transport costs to a minimum. Clarke has detailed the brickmaking activities that took place at the end of the eighteenth century, when James Leroux was developing Brill Farm and the surrounding area in Somers Town. Here brickmaking was an integral part of estate development, with as much as forty acres of land available for clay extraction, capable of making one hundred and twenty million bricks, enough to build some four thousand houses. Large scale brickmaking was taking place at the same time in the Kingsland area of Hackney on the Tyssen estate. [90] It was at the end of the century that pressure on these areas as the building line advanced pushed brickmaking for the London market further afield, into the then outer suburbs, such as Notting Hill, and into Kent, Essex, and those parts of rural Middlesex that form the area of this study. In these last there had never been a high level of local demand, in parishes that only contained a few hundred inhabitants.[91]

There are, perhaps not surprisingly, only scattered references to brickmaking in West Middlesex before1800. In Norwood a London bricklayer and tiler, Robert Browne, was working a three acre field at Bulls Bridge in 1697; in West Drayton sixteenth century field names "Brickfield" and "Brick-kiln" testify to the presence of the industry. The street name "Brickfields Lane" in Harlington, at some distance from the canal, probably refers to pre-nineteenth century activity. [92] There is some evidence that land at Northolt was dug up for clay in the fourteenth century, but whether this was to make brick, tile or pottery is not known.[93] However, it is unlikely that there was an established brick industry in the parish, because when the Manor House was rebuilt in 1534, over 30,000 bricks and 15,000 tiles were brought to the site.[94]

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[90] Clarke, op.cit., p.129-138; Victoria County History. *Middlesex, Vol X: Hackney*, edited by T.F.T. Baker. Oxford, 1995, p.96

[91] Estimates based on the 1664 Hearth Tax put the population of Hillingdon (including Uxbridge) at 754, Heston (including parts of Hounslow) at 549 and Greenford at 246. Shoemaker, R.B. *Prosecution and punishment: petty crime and the law in London and rural Middlesex, c.1660-1725.* Cambridge, 1991. Appendix III, p.327-329.

[92] Victoria County History. Middlesex, vol. 3, p.268 (Harlington); vol. 4, p.47 (Southall); p.199 (West Drayton)

[93] In 1370 Alice Franceys was accused of acts of waste and destruction at Northolt Manor, which included digging up and selling two acres of clay. Hurst, J.G., "The kitchen area of Northolt manor, Middlesex". *Journal of Medieval Archaeology*, vol v (1961), p.220

[94] ibid., p.222

As will be seen below it was only when the Grand Junction Canal opened up links with a number of these places at the end of the eighteenth century, that the demand factors of the London market were brought to bear on the brickmaking potential of West Middlesex. These demand pressures will be considered in more detail in the next chapter.

It is part of the aim of this study to look at the relationship, both spatial and economic, between brickmaking and urban development. Brickfields were often located on the edge of built-up areas, in order to be close to the districts where building and estate development was taking place and to minimise transport costs. Brickmaking, however, was an unwelcome neighbour in fashionable districts, because of the nuisance caused by the smoke from kilns and clamps. As we have seen, a number of writers commented on the atmospheric pollution that resulted.

Geographers like to envisage the city as a series of zones, and have developed increasingly sophisticated models to explain some aspects of urban morphology. A simple model might view the zones as concentric circles around what would now be termed the central business district, the individual zones having a different social or economic character. Engels described the social and economic composition of Manchester in this way in 1844, anticipating Burgess's well-known model of Chicago in the 1920s. Both these models described the way in which social and economic segregation occurred within the city and the mechanism by which zones were subject to change as the city continued to expand. [95]

The zonal approach can also be applied to differences in land use. Brickfields occupy a zone immediately beyond the one where residential development is taking place, supplying builders with their raw material. The clay in these fields is used up within a few years because the superficial seams are quite thin, and the ground then becomes available to the next phase of building. This mechanism, of course, only worked as long as there continued to be suitable brick clay on the periphery; in London the underlying geology

[95] Engels, F., *The condition of the working class in England* (Penguin Classics edition by Victor Kiernan), Harmonsworth, 1987, p. 85-86; Burgess, E.W., "The growth of the city" in R.E. Park et al, *The City*. Chicago, 1925 reprinted in J.Rayner & E.Harris (ed), *The City experience*, London, 1977, p.27-38; Dennis, R., *English industrial cities of the nineteenth century*. Cambridge, 1984, p. 83

determined that the outward growth of the city eventually reached the divide between the brickearth and the heavier London clay, from which it was much more difficult to make bricks. As London clay encroaches more closely to the north of the city, this encouraged a switch to brick production to the east and west of the city. The simple succession of brickmaking to building broke down if the brickfield continued to yield brick clay even when the line of building had reached it; building might then go round it leaving the brickfield within a fringe belt. Such fringe belts were characterised by low building densities, and are the place where parks, cemeteries, and institutions such as schools and hospitals were found. [96]

Two contrasting examples of the interaction between brickmaking and building development can be seen in West London. An example of the simple transition from one to the other over a short period of time can be seen in the Acton area in the 1880s. By the middle of the 1870s the westward spread of the metropolis had reached Kensington. The next area west constituted, in part, a fringe belt, since the land north of the Uxbridge Road included Kensal Green Cemetery, Wormwood Scrubs prison, the nearby recreation fields and a number of intersecting railway lines. South of this the cluster of brickfields on the east side of Acton eventually were built over as the expansion of Acton itself joined up with the westward expansion of the metropolitan built up area, but the area to the north retained its fringe belt characteristics.[97] Importantly though, most of the brickmaking activity took place within about two decades, after which the land was taken over for industry or housing. Brickmaking on the urban fringe thus provides a transition between agricultural use and residential development.

Brickmaking in the Cowley district, however, followed a different pattern. Although closely linked with the nineteenth century development of London, the main market for its product, the industry was in existence for over a hundred years, and because of its position was not necessarily followed by building development. The particular

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[96] Whitehand, J.W.R., *The changing face of cities.* Oxford, 1987, p. 81

[97] *A new large scale Ordnance atlas of London suburbs...* London, Bacon, 1888 reproduced in Hyde, R. (ed.), *The A to Z of Victorian London.* Lymphe Castle, Kent, 1987, p. 85-86; Harper Smith, A. & T., *The brickfields of Acton.* 2nd edition, Acton, 1991, p. 23

characteristics of the West Middlesex industry, and the role that it played in the development of the area, are explored in the chapters that follow.

Pursuing the zonal approach, there is a contemporary analysis of land use in London and Middlesex at the beginning of the nineteenth century, from two sources. Thomas Milne drew a land-use map of London and the surrounding area in 1800 and ten years later Henry Hunter wrote his *History of London and its environs.*[98] By combining the two works, since Hunter did not provide a map to accompany his analysis, more recent writers have been able to compile a map of the London area showing particular types of land use. (see map 2.3) [99] These differentiated areas all relate in some way with the metropolis in providing food and other products, but each is determined by its soil type as well as its distance from the centre.

Hunter, like other commentators, identified a clay-pit zone surrounding the urban nucleus, where "the face of the land is deformed by the multitude of clay pits, whence are dug the brickearth used in the kilns that smoke all round London to the great annoyance of the neighbouring inhabitants"[100] (see Illus.2.3) Outside this zone was an area of pasture, which was "almost solely in the possession of the cow keepers, who supply the metropolis with milk." [101] The broadly concentric nature of these zones is broken by that occupied by market gardens, which extended both on the north and south banks of the Thames as far west as Hampton, some fifteen miles from the centre; from Milne's map this area approximated to the flood plain terraces of the Thames Valley.[102] The outermost zone was mainly given over to producing hay to feed London's horses, and occupied the land in the north of Middlesex, and beyond, which was on the London clay.[103] Hunter also noted a transitional area, though he did not give it that name, which was one where mixed farming still prevailed; this strip, which broadens as it goes westward, took in an area between Acton and Uxbridge. (see map 2.3) "Towards

[98] In part, though lacking the mathematical model, Hunter anticipated the zonal concept of land use devised by Henirich von Thünen in his book *Der Isolirte Staat* (1826); Waugh., D., *Geography: an integrated approach.* London, 1990, p.387; Wrigley, op.cit., p.83-84.
[99] Bull,G.B.G.,"Thomas Milne's land utilization map of the London area in 1800". *Geographical Journal*, vol. 122 (1956), p. 25-30
[100] Hunter, H., *A history of London and its environs.* 2 volumes. London, 1811. Vol .2, p.3
[101] ibid
[102] Bull, op.cit.p..29
[103] Hunter, op.cit, p. 4-5

the south-western angle the arable prevails, and some of the parishes are known for the excellence of their grain". [104] The soils that are present in this district, which are lighter in character than the London clay, are of first class agricultural quality, but also, as we shall see, were suitable for brickmaking. The tension between these two uses is a theme explored in later chapters.

There is a large literature on brickmaking, but it is patchy in character. Most economic history surveys contain little or no coverage of brick production, in contrast to the treatment of an industry like brewing. This almost certainly relates to the lack of academic studies of brickmaking, which in its way grows out of the nature of the industry. Ironically, perhaps, medieval brickmaking has received more academic attention than the later industry. [105] There are a number of problems with source material for the historian. Few brickmaking businesses before the twentieth century were of any size, and left any records of their activity; the industry was small scale and widely distributed.

Other avenues of investigation also prove disappointing: brickfields without permanent buildings and without kilns leave little physical evidence for the industrial archaeologist. There was some contemporary literature, mainly of a technical nature, and towards the end of the nineteenth a number of trade journals, of which the most important was the *British Clayworker*, but the industry was not subject to the same level of scrutiny as were, for example, textile factories. Brickmaking does make a small appearance in official documents, the Government's limited interest in brickmaking taking two forms; first, a financial one, during the sixty-five years that there was an excise duty levied on production, and secondly, a social and educational one, with concerns over child labour.

The historian of brickmaking is unlikely to find substantial bodies of documents relating to the activities of particular firms, and must use a wide range of sources. Particularly in a rural area, such as West Middlesex was in the nineteenth century, brickmaking is situated in an agricultural economy, and one of the major sources of information are the leases and rentals that estate offices created. This study makes use of these, along with local newspapers, trade journals, directories and maps.

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[104] ibid, p.5

[105] For an extensive bibliography, see Smith, op.cit; Salzman, L.F. *English industries in the Middle Ages*. 2nd edition, London, 1923; Moore, op.cit.

If academic historians have fought shy of brickmaking as a subject of research, there has been a keen interest from other quarters: historians of architecture and building; enthusiasts of the craft and its background; and local historians. In the first category, Brunskill's study of brick building has a good introduction to techniques and machinery, and touches on issues such as transport. Muthesius's study of terraced housing also has useful sections on the way brick was employed, and the way that the distribution of bricks changed in the nineteenth century as a result of transport developments. The related clay product, terracotta, often made in association with bricks, but not made extensively in the London area, receives a thorough treatment, particularly strong on the buildings side, from Michael Stratton.[106]

There are a number of studies of individual brickmaking areas in different parts of the country, but London has been poorly served. [107] A useful overview of the supply of bricks to the metropolis after the Great Fire has been provided in an essay by Alan Cox.[108] Of the areas that supplied London with bricks in the nineteenth century, Bedfordshire and Kent have received greater attention that Essex and Middlesex. [109] The survival of Kent stock brickmaking to the present day, and the large size of some of the long-lived businesses, has made it more likely that this area would receive more attention than other areas. Two of the major Kent brickmaking firms, who both built and ran large barge fleets on the Thames and Medway, Eastwoods and Smeed, Dean, have been studied. But the different districts were not entirely separate: a number of firms like Rutters and Eastwoods were active in West Middlesex as well as Kent.[110]

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[106] Brunskill, R.W., *Brick building in Britain.* London, 1990; Muthesius, S., *The English terraced house.* London, 1982; Stratton, M., *The terracotta revival: building innovation and the image of the industrial city in Britain and North America.* London, 1993.

[107] E.g. Young, D., "Brickmaking in Dorset". *Dorset Natural History & Archaeological Society Proceedings*, vol 93 (1971),p. 213-42; Beswick, M., *Brickmaking in Sussex.* Midhurst, 1993.

[108] Cox, A., "Bricks to build a capital" in H.Hobhouse & A. Saunders (ed.) , *Good and proper materials: the fabric of London since the Great Fire.* (London Topographical Society series, No.140). London, 1989.

[109] Cox, A., *Survey of Bedfordshire. Brickmaking: a history and gazateer.* Bedford, 1979; Preston, J.M., *Industrial Medway: an historical survey.* 1977; the same author contributed a chapter "Industry 1800-1914" to A. Armstrong (ed.), *The economy of Kent, 1640-1914.* 1995.

[110] The combination of bricks and barges is guaranteed to appeal to two groups of enthusiasts. For Eastwoods see Willmott, F.G., *Bricks and brickies.* Rainham, Kent, 1972; for Smeed, Dean see Perks, R.-H., *George Bargebrick, Esq; the story of George Smeed, the brick and cement king.* Rainham, Kent, 1981.

The principal areas of brickmaking nearer the centre of London have not received the attention they deserve, and the best study of an individual area is of Acton.[111] Most local historians writing about parishes in West Middlesex make some reference to the brick industry, whose importance is often acknowledged without the necessary documentary detail. Bate's history of Heston and Hounslow devotes several pages to brickmaking and mentions a number of different brickworks and their owners. Much of this detail comes from personal recollections, or from conversations with long-time residents.[112] There are two histories of Hayes written in the nineteenth century: Elizabeth Hunt, writing in 1861, was dismissive of brickmaking as an "employment carried on by profane workmen"; Mills in the following decade noted the importance of the industry to the parish and something of the way it was conducted, but says nothing of the individual businesses and the works they controlled.[113] An early history of Uxbridge, written shortly after the industry had become established, comments on the scale of the industry, but is, like Hunt, particularly concerned about the behaviour of the labourers. [114]

Of modern histories the best treatment of Middlesex, rather than London, brickmaking is found in Robbins' book, which discusses the importance of the industry in general, and notes the presence of brickfields in individual parishes. He is also aware of the morphological impact of clay and gravel extraction in the transition from an agricultural economy. It is worth quoting him at length:

> The brick and tile industry occupies a special and primary place in the economic history of Middlesex because it was the only manufacture that sprang directly from the physical composition of the county. It also had a profound influence on the topography of large areas from about 1750 to 1900, as the level of the soil was constantly altered while the earth was being extracted. This was particularly marked around Heston during the 1860s, when the brickearth belt, extending on each side of a line between Yeading and Hounslow, was being exploited most actively.[115]

Although there have been a number of local studies of the parishes in this area since Robbins wrote, there has been no detailed study of brickmaking within any of them, nor one covering the whole area. In the context of a concise history, Kelter covers

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[111] Harper Smith, A. & T., *The brickfields of Acton.* 2nd edition, Acton, 1991.
[112] Bate, C.E., *And so make a city here: the story of a lost heathland.* Hounslow, 1948, p.282-285.
[113] Hunt, E., *Hayes, past and present,* 1861; Mills, T., *History of the Parish of Hayes,* 1874, p.42
[114] Redford, G. & Riches, T.H., *The history of the ancient town and Borough of Uxbridge.* Uxbridge, 1818; reprinted 1885.
[115] Robbins, M., *Middlesex (A new survey of England series).* London, 1953, p. 49

brickmaking in Hayes efficiently in two pages, drawing on the earlier histories and on the *Victoria County History*, successive volumes of which have summarised brickmaking in each parish in turn.[116] Earlier volumes covered the outer London boroughs, and more recent ones of the continuing series now deal with areas within the LCC area, such as Hampstead, Paddington, Hackney and Stoke Newington. Brickmaking, and the supply of bricks more generally, also receives mention in the more recent volumes of the *Survey of London.*[117]

There is still a need, therefore, for parish histories that provide more detail than is currently available in published work. However, the approach in this study is not parochial. West Middlesex brickmaking in the nineteenth century took place along a stretch of the canal that passed through eight parishes. The boundaries between these probably meant little in economic terms, and were confused by the building of the canal which often cut across them. Some brickfields straddled boundaries, and brickmakers worked sites in different parishes at different times, and sometimes concurrently. It seems useful to consider the area as a whole, especially since contemporary commentators gave it an identity as the "Cowley district".

There is another practical reason for working in this way. It became apparent as research progressed that the primacy sources are more plentiful for some parts of the district than for others. For this reason I have treated the Cowley district as a whole, although I have also attempted to identify as many individual sites as possible. Here again information is patchy; as some sites are well-documented, whilst for others there may be only the name of a brickmaker and date.

Because of its location in small rural locations the brickmaking industry in Middlesex was dependant on the expansion of the metropolitan area to provide continuing demand for its products. The following chapters examine the nature of this demand and chart the fluctuations that occurred during the course of the nineteenth century.

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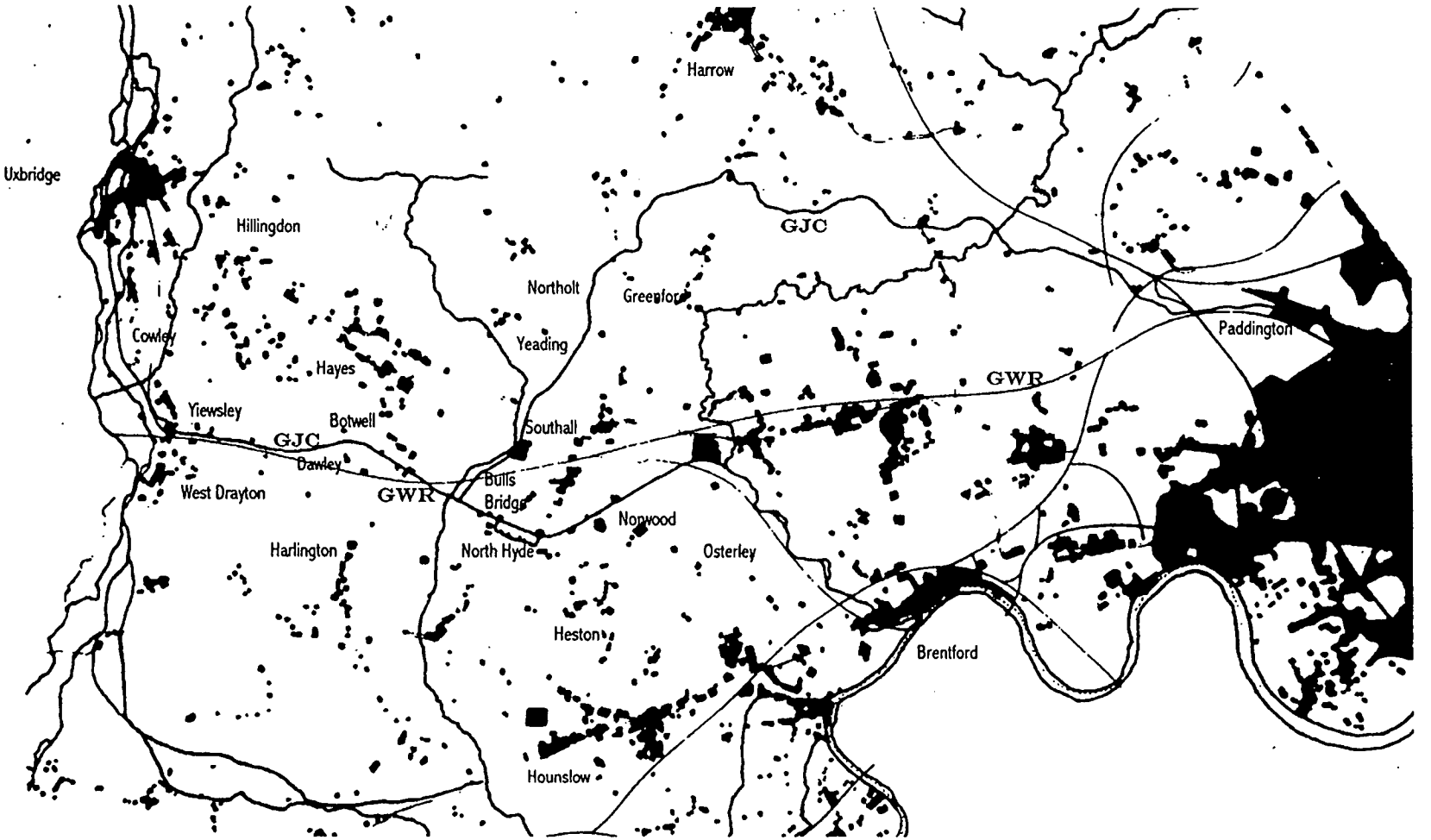
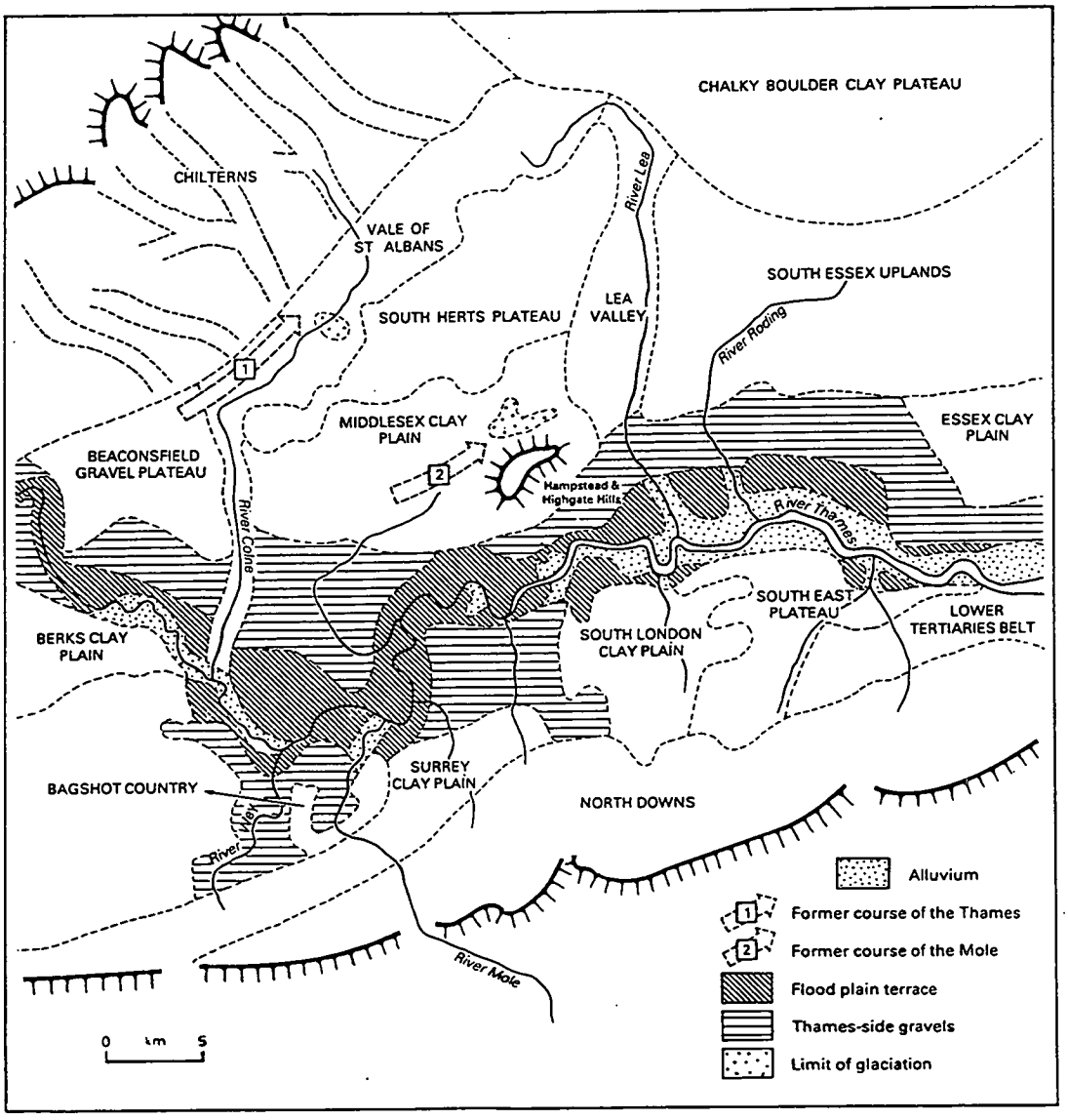
[116] Kelter, C., *Hayes: a concise history.* Uxbridge, 1988, p. 38-39

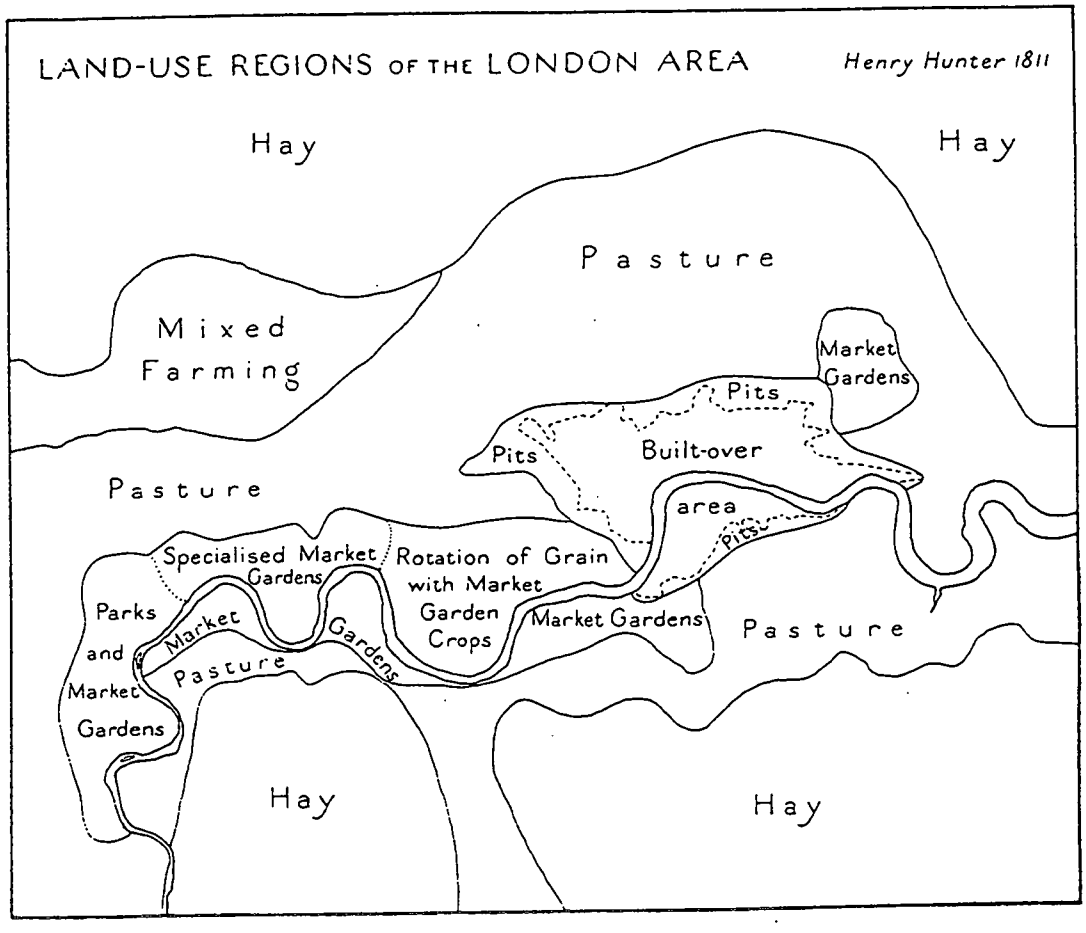
[117] *Victoria County History. Middlesex.* Vol. 3. 1962; Vol 4. 1971; Vol.9. 1989; Vol.10. 1995; Vol.11. 1998; *Survey of London. Vol XXXVI: Northern Kensington.* 1973; *Vol XLII: Southern Kensington,* 1986; *Vol XLIII: Poplar, Blackwall and the Isle of Dogs.* 1994



Map 2.1: Middlesex showing the Cowley district and principal rail and canal links.
(Based on Ordnance Survey 1864 with roads omitted)



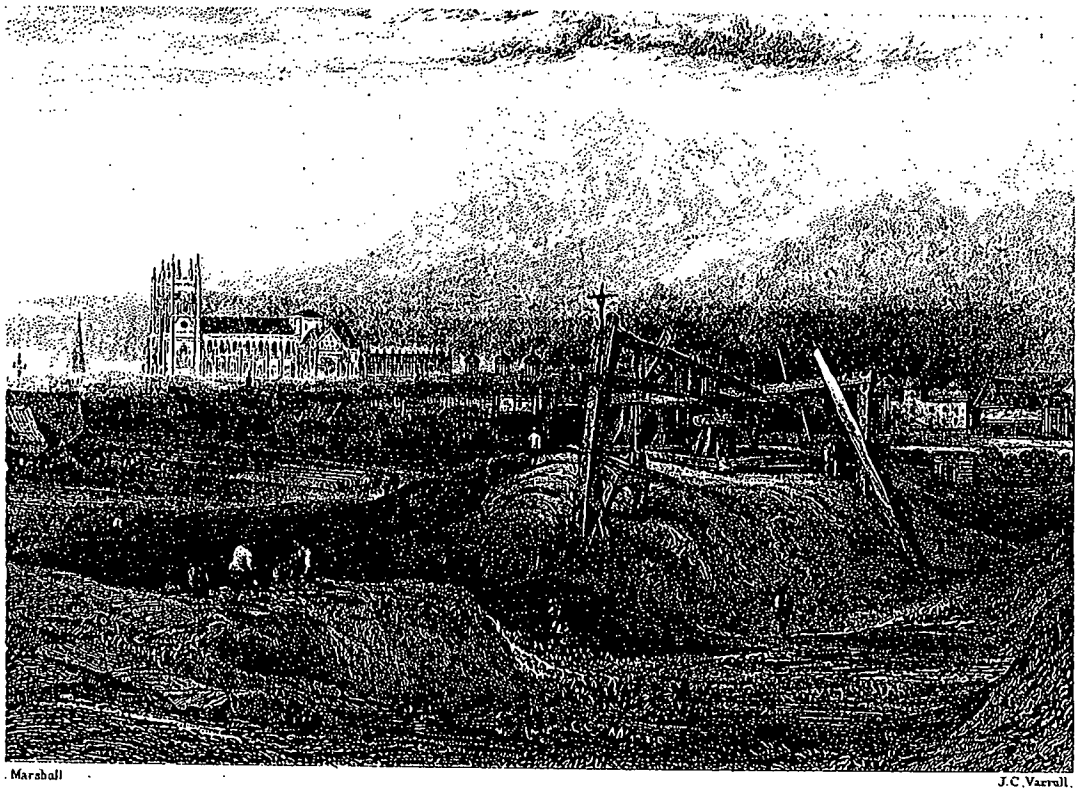
Map 2.2: Main geological areas in the London region.
(Source: Clout, H. & Wood, P. (ed.), *London: problems of change*. Harlow, 1986, p.12)



Map 2.3: Land use zones of the London area c.1800
(Source: Bull, G.B.G., "T.Milne's land utilisation map of the London area in 1810". *Geographical Journal*, vol.122, 1956, p.27)

Illus 2.1: Brickmaking in the Netherlands in the fifteenth century. The picture is intended to represent the Jews making bricks in Egypt.
(Source: *Nederlandische Bjibel*, Utrecht c.1425 reproduced in J.Woodforde, *Bricks to build a house.* London, 1976, p.58)

Illus 2.2: Rural brickmaking in nineteenth century England.
(Source: Pyne, W.H., *Picturesque groups for the embellishment of landscape*. London, 1854.)



Illus. 2.3: View of the clay pit zone. Chelsea Fields in the 1830s.
(Source: Trotter, W.E., *Select illustrated topography of thirty miles around London.* London, 1839, p. 108.)
Trotter's commentary on this view is

> Our view presents in the distance a variety of objects, of which the most prominent and striking are the towers, nave, south transept and choir of the venerable and stately Abbey... In the intermediate distance are the gas works, with part of the pestilentiary of Millbank; and the foreground presents a remaining portion of the fields, with the machinery and process of the work, which is rapidly going on for their complete annihilation. (p.109)

Chapter Three: The demand for bricks in London

As we have seen, the area that comprises modern Greater London is one that has no suitable building stone, and all London buildings constructed of or faced with stone have utilised materials brought some distance. Because of its cost stone was mainly used for those buildings that required a prestigious or defensive exterior. Some buildings, such as the Tower of London, combined both requirements, and justified the import of Caen stone from northern France, a material with which William I and his masons were familiar. Most other buildings in the medieval city of London were built of wood or reused materials from the Roman buildings, including bricks and tiles.

After the Great Fire of 1666 much of the City had to be rebuilt. Whilst stone continued to be preferred for the most important buildings, if only for external cladding, brick became the basic material for building in London. So by 1724 London had become, or gave the appearance of, a largely brick-built city, as Defoe noted:

> I should mention , for the information of strangers, &c. that the buildings of this great city are chiefly of brick, as many ways found to be the safest, the cheapest, and the most commodious of all other materials; by safe, I mean from fire, and as by Act of Parliament, every builder is bound to have a partition wall of brick also, one brick and half thick between every house, it is to be found, indeed, in case of fire.[1]

During the following century the aims of the building code in force in London were applied in extra-metropolitan areas, especially as a number of provincial towns were themselves ravaged by fire. Brick or stone replaced timber, the choice depending on the local availability of materials; whilst the fashionable terraces and squares of a town like Bath were constructed almost exclusively from the local sandstone, Birmingham was a brick-built town. [2] Brick became fashionable as well as functional, and many older timber-framed houses were encased in brick, or hung with mathematical tiles, to give the same appearance.[3] It also became cheaper to build in brick rather than wood, because of the increasing shortage of timber.[4]

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[1] Defoe, D., *A tour through the whole island of Great Britain*, edited by P.N. Furbank and W.R. Owens. London, 1991, p.152

[2] Chalkin, C.W., *The provincial towns of Georgian England: a study of the building process 1740 – 1820.* London, 1974, p. 189

[3] Brunskill, R.W., *Brick building in Britain.* London, 1990, p.156

[4] Chalkin, op.cit, p. 189

Although the physical evidence of surviving eighteenth century buildings testifies to the popularity of brick building, it is difficult to measure the demand for bricks. In order to investigate the scale and progress of the West Middlesex industry, it is important to have some understanding both of the size of the demand for bricks in the London area, long term trends and short term fluctuations. In terms of the first of these requirements it is necessary to find a series of statistics that provide an absolute measure of demand; two series, however imperfect, may be used as proxies for any direct measure of demand. The first is the count of the number of houses, both inhabited and uninhabited, that were undertaken as part as the decennial census of population from 1801 onwards. By comparing one census with the next it is possible to calculate the net increase in the number of houses over the decade; unfortunately, without knowing the number of demolitions, we cannot know how many new houses were built. Nevertheless the net figure provides an indication of the size of demand. The increases in the number of houses in England and Wales between censuses are shown in Table 3.1

There is another limitation to the usefulness of these figures. Clearly by no means all the houses in England and Wales were built of brick, nor were all the buildings similar in size, and therefore, in their requirement for constructional materials. Nevertheless if we adopt as a rule of thumb that 30,000 bricks were required to construct a fourth-grade house in London, as Clarke suggests [5], then about 645 million bricks were required in each year in the first decade of the nineteenth century and 2,520 million in the first decade of the twentieth.[6]

A second series of statistics, from the collection of Inhabited House Duty from 1851 onwards, also make it possible to estimate the quantity of bricks required in a given year, although these figures are also open to many of the objections that can be levied at the use of the census returns. The increase in the number of houses from one year to the next can be calculated, but again we are presented with net increases, with no easy way of determining the scale of demolition. The other major problem with this series arises

[5] Clarke calculates this from figures provided in R.Neve, *The City and Country Purchaser and Builder's Dictionary.* London, 1703; Clarke, L., *Building capitalism: historical change and the labour process in the production of the built environment.* London, 1992, p.101

[6] Whilst these figures appear large, it must be remembered that a team of brickmakers (a stool or berth) could make as many as a million bricks in a season, enough to build thirty three houses; Clarke, ibid

from the nature of the tax, which did not apply to houses with an annual value of less than £20; houses that fell below the threshold were not counted until after 1875.[7] Figures are available for England and Wales and Scotland from 1852, and regional ones after 1875; those for London and the Home Counties are set out in Table 3.2.

By comparing the figures for the greater-metropolitan area with those for England and Wales it is possible to provide an estimate of the significance of the London market in the national context. In 1875-76 the national demand for bricks was 3,030 million, that for the London area 342 million (11 percent); in 1885-86 1,920 million and 648 million (33 per cent); in 1895-96 2,340 million and 654 million (28 per cent); and in 1905-06 4,500 million and 1344 million (30 per cent).[8] Three conclusions can be drawn from this analysis of the Census and Inhabited House duty statistics: first, and not surprisingly, the London region accounted for a large proportion of the national demand for building materials; secondly, there was a general upward trend in the number of houses built and consequently the demand for bricks throughout the nineteenth century; lastly, within this overall rise there were wide fluctuations from year to year.

If there are obvious difficulties in establishing the absolute demand for bricks, are there ways of measuring these fluctuations in the volume of demand? Economic historians have made use of two kinds of indicator, on the one hand the output statistics for other types of building materials, on the other measures of activity in the land or housing markets. Industrial output was not routinely measured until the twentieth century; in the eighteenth and early nineteenth centuries statistics of building materials produced were only compiled where the state had a direct interest in recording them, usually because a tax or duty was collected. The materials for which statistics are available are glass (1746-1845) on which an excise duty was charged, slates (1811-29) on which a sea-borne customs duty was payable, and imports of timber from the Baltic on which an import duty was imposed (Deal 1714-, Fir 1788-1841). [9]

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[7] Mitchell, B., *British Historical statistics*. Cambridge, 1988, p.462-7

[8] Figures for England & Wales from Mitchell, ibid; those for the London region from Table 3.2.

[9] Mitchell op.cit., p. 462 (timber); 417 (glass); Cairncross, A.K. & Weber, B., "Fluctuations in building in Great Britain, 1785 –1849, *Economic History Review*, vol. 9 , 1956 (slates)

Where these series overlap chronologically they generally move together; where there are discontinuities, such as with the dramatic fall in timber imports in the period between 1805-1810, external factors may have been involved. In this case the Continental blockade imposed by Napoleon interrupted the supply of Baltic timber but had no direct impact on the largely domestic production of glass. The many wars of the eighteenth century, culminating in those of the Revolutionary and Napoleonic period, exercised a considerable check on construction. The use of these supply statistics as a measure of demand is open to a significant objection; although the material may have been assessed for tax or duty in a particular year, there is no record of when the materials were actually used. There may have been a lag between changes in the level of demand and the supply response. Despite this, and in the absence of more precise methods of measurement, historians have accepted that these series provide an acceptable record of the shape of the building cycle even if they are not entirely reliable for a given year.[10] The figures for timber imports are shown in Graph 3.1.

The plotting of the cycle in the eighteenth century relies on the duties levied on building materials; however, with the removal of import duties, as part of a general movement towards free trade in the 1840s, these indicators are no longer available. They are replaced for the second half of the century by the indices of housebuilding that Parry Lewis and Weber have constructed from the records kept by local authorities as part of their planning and regulatory functions. [see Graph 3.2] These are national series and do not always reflect the particular fluctuation in building activity in a particular region of the country. Local studies suggest that London followed the national series quite closely, and more faithfully than some other large towns, particularly after the peak at the end of the nineteenth century.[11] For part of the period a local perspective was provided by J.Calvert Spensley who studied the houses built in the Metropolitan Police District for the period from 1871 until the First World War, and Cooney who studied the fees paid

[10] Cairncross & Weber, op.cit. ; Lewis, J.P., *Building cycles and Britain's growth.* London, 1965; Sheppard, F., Belcher, V. and Cottrell, P., "The Middlesex and Yorkshire deeds registries and the study of building fluctuations". *London Journal*, 5 ,1979, p.176-217

[11] Lewis,op.cit; Saul, S.B. "Housebuilding in England, 1890-1914", *Economic History Review*, 2nd series, vol.xv (1962), p.119-137; Rodger, R. *Housing in urban Britain, 1780-1914.* Rev.ed, Cambridge, 1995, p.17

to District Surveyors in London. [12] [see Graph 3.3] Whilst the Parry Lewis, Spensley and Cooney indices generally follow the same cyclical movement there are differences both in the timing of booms and depressions and in the scale of the peaks and troughs.

Fortunately for the study of the London area there is a further measure of building activity in the form of the records of the Middlesex Deeds Registry. These Deed Registries existed only for Middlesex and the three Ridings of Yorkshire. The first to be established was the West Riding in 1704, but Middlesex followed soon after in 1709 and was in operation officially until national Land Registration was introduced in 1891 and effectively until 1899. The deeds registered do not provide an absolute measure of building since a sale of land might require more than a single deed; the building of a house in Middlesex often required three registrations - the building lease, mortgage and assignment. There is also a potential problem in the lag between the land transaction and its registration, but a sampling by Sheppard, Belcher and Cottrell determined that while delayed registrations did occur the proportion of these was unlikely to distort the time series. On the positive side, the requirements for registration did not change significantly over time; thus the fluctuation in the number of deeds from year to year provides an indicator of the state of the property market and, by extension, of movement in the volume of housebuilding and in the demand for building materials. The area of the registry's jurisdiction included all of London north of the Thames, with the exception of the City. Whilst this is usually taken to be an accurate mirror of building in London as a whole it is particularly relevant to the study of demand for building materials in north and west London, which drew, at least in part, on the brick and gravel works of rural Middlesex. [13]

Using these indicators it is possible to chart the fluctuations in the level of activity in the construction industries and assess the changing level of demand for bricks. The Middlesex Deeds registry provides continuous data for two centuries whilst the other series only cover part of the period. [see Graph 3.4] Underlying these movements in the

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[12] Spensley, J.C., "Urban housing problems". *Journal of the Royal Statistical Society*, LXXXI, March 1918; Cooney, E.W., "Capital exports and investment in building in Britain and the USA, 1856-1914".*Economica*, new series, xvi, No.64, 1949, p.354

[13] Sheppard, F., Belcher, V., and Cottrell, P. "The Middlesex and Yorkshire deeds registries and the study of building fluctuations". *London Journal*, 5, 1979, p.176-217

volume of building are fluctuations in the credit available to builders and developers, measured by changes in interest rates. Since nearly all building, then as now, relied on credit, the building industry was highly sensitive to changes in these rates. Most housebuilding was financed by mortgages, which, before the establishment of building societies in the nineteenth century, were provided by individual investors and facilitated by solicitors, who brought together likely investors with those in need of funds.[14] The major alternative outlet for such funds was government stocks, known as Consols (consolidated stock) and whenever government borrowing was high, finance for building was reduced, a mechanism known to economists as "crowding out".[15] Government borrowing rose whenever an administration's need for finance to prosecute war, or subsequently to pay off debts, absorbed funds that might have been used to finance building. Between 1700 and 1832 this effect was exacerbated by the intervention of the Usury Laws, which acted in the government's favour by setting a ceiling of 5 per cent on the interest payable on loans, but did not apply to the government's own borrowing. [16] The price of Consols generally moved in line with the other indicators; it fell whenever the government was anxious to secure funds, effectively increasing the rate of return to investors, and investment in building reduced as a consequence.

Activity in the building and construction industries is thought to follow a cyclical pattern, as does activity in the economy as a whole, moving from expansion to recession and back again. An explanation for this is that boom conditions lead to "overheating", a situation in which there are shortages of labour, capital and stock and a consequent rise in costs. Once prices have reached a certain point a recession occurs which is characterised by falling output, reduced profits, rising unemployment and stocks, and the stabilising of prices. This then provides the potential for a further upswing. In the case of building, boom conditions lead to a shortage of materials and labour, coupled with rising costs; this results in the bursting of speculative bubbles and a movement into

[14] Olsen, D.J., *The growth of Victorian London.* London, 1976, p.155-7
[15] The "crowding-out" mechanism was described in Bacon, R. & Eltis,W., *Britain's economic problem: too few producers.* 2nd edition, London, 1978. The hypothesis has been questioned in relation to the economy as a whole in Daunton, M.J., *Progress and poverty: an economic and social history of Britain, 1700-1850.* Oxford, 1995, p.153-155.
[16] Mathias, P. *The first industrial nation: an economic history of Britain, 1700-1914.* 2nd ed. 1983 p.44

recession.[17]

Such cycles in the economy were first described by the economist Juglar in 1860, who identified trade cycles lasting between eight and nine years. His work has been the subject of much refinement and argument, and other types of cycle have been proposed by later economists, principally the "Kuznets swing" and the "Kondratieff long wave". The Kuznets swing is longer than the trade cycle, and depending on the author describing it, lasts for between fourteen and twenty-two years. Long swings are observed in a number of different economic indicators, for example in agricultural output, the balance of payments and migration.[18] More controversial are the long waves identified by the Russian economist Kondratieff in the 1920s, based on his study of output and price series. He conceived of a long wave of fifty to sixty years, which had two phases, an upswing of twenty to thirty years when economic growth was rapid and a downswing of similar length when growth was retarded. Later writers have refined the Kondratieff wave into a four-phase sequence, with a movement from prosperity to recession through depression and into recovery.[19] Explanations of the Kondratieff have relied heavily on the importance of innovation in promoting each upswing; the four cycles that have been identified have been given the names Industrial Revolution (1787-1842), Bourgeois or Railway (1842-97), Neo-mercantilist (1897-1947) and Consumer Durable (1947-date).[20] The concept of the long wave, however, has its critics: many economic historians find that empirical evidence does not support the presence of such long waves, or has to be treated selectively to achieve a close fit.[21]

How do these cycles relate to building and the demand for building materials? Some cyclical patterns are observable in building over the two centuries 1700-1900, notably in the twenty years between the peaks in Parry Lewis's housebuilding index of circa 1880 and c.1900, but these movements are punctuated by other checks which are attributable to political and financial events. The following paragraphs are a commentary on graphs 3.2 and 3.4, suggesting how both the major cycles appear to operate and where specific

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[17] Price, R., *Masters, unions and men: work control in building and the rise of labour 1830-1914.* Cambridge, 1980, p.99

[18] Solomou, S., *Economic cycles: long cycles and business cycles since 1870.* Manchester, 1998, p.83-85

[19] Ibid, p.83-85, 124

[20] Lloyd-Jones, R. & Lewis, M.J., *British industrial capitalism since the Industrial Revolution.* London, 1998, p.2-9

[21] Solomou, op.cit, p.85-95

financial crises intervene.

In the eighteenth century it is thought that housebuilding conformed to a general trade cycle, but was also sensitive to the many outbreaks of warfare. In the case of London an upswing in building activity followed the Treaty of Utrecht in 1713 and peaked in the mid-1720s. The volume of building deeds registered in Middlesex reached a peak in 1725 and did not return to the same level for another forty years. [22] The low level of building activity that followed may have been part of a general stagnation in the London economy, itself prompted by a slowing down in the growth of London's population and the consequent reduced demand for housing, but this economic depression may have been a nationwide phenomenon. [23]A second building boom in the capital has been identified in the 1760s, following the end of the Seven Year's War, and may have been encouraged by Acts of Parliament promoting street improvements in the capital in 1760 and 1761. [24] Such was the demand for materials in the decade that there was a shortage of bricks; complaints were made that their quality was being compromised by the addition of too much ashes or rubbish to make the clay go further, or that they were being delivered to bricklayers before they were cool enough to be handled.[25] This upswing was interrupted by the American War of Independence which caused the yield on Consols to pass the critical point for investors. Building virtually ceased and in 1779 more than 1100 houses were unoccupied in the City of London. Once the war was over a period of rapid expansion in the 1790s was halted by the French War in 1793.[26]

All the indicators of building activity show a significant upward movement in the late 1790s, a trend which continued into the next decade only to be checked once again by the effects of war, whose impact was most severe on timber imports. The Middlesex Deeds show a reduction in registrations from a peak of 1810-11 which was gradual rather than steep, and the architect John Nash attributed this fall-off to the interest being paid on public funds diverting investment away from building promotions.[27] When the

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[22] Summerson, op.cit p.98; Schwarz, L D. *London in the age of industrialisation: entrepreneurs, labour force and living conditions, 1700-1850.* Cambridge, 1992 p.79
[23] Schwarz, op.cit, p. 82-83
[24] Summerson, op.cit. p123; Lewis, op.cit p.21
[25] Schwarz, op.cit. p.84
[26] Lewis,op.cit p.22-23
[27] Sheppard, F. et al, op.cit, p.194

long period of war finally ended at Waterloo in 1815, there was a steep rise in building, a falling back in demand between 1818 and 1821, and a dramatic rise to a peak in 1825; the level of demand in that year was not exceeded until 1846-47.

In the period after 1815 the operation of the economy and the financial markets was more complex than it had been in the eighteenth century. The long period of war with France caused a major disruption in European trade and allowed London to supplant Amsterdam as the world's major financial centre. The price of Consols no longer had the dominant impact on the economy that it had once had because of the development of other, and more profitable, outlets for investment. Extensive trade links had grown up with the Latin American colonies of Spain during the period when it had been unable to supply them because of the British blockade, and after the war the newly liberated states were a major area for investment. [28] The repeal of the Bubble Act of 1720 in 1825 helped stimulate a boom in company promotions and foreign loans; when this collapsed there occurred the worst financial crisis of the century. Uncertainty continued into the following year with the failure of a number of country banks. The downturn in construction activity that followed persisted throughout the late 1820s and early 1830s and is matched by a long-term upward trend in exports.[29]

The census figures (see Table 3.1) provide another way of looking at the situation at the end of the 1820s. Between 1821 and 1831 the net growth in the number of houses in Great Britain was 440,000 units, an increase in the housing stock of 20 per cent, whilst the population only grew by 15 per cent. This suggests a degree of overbuilding in the 1820s which is confirmed by the proportion of uninhabited houses available in 1831, some 8 per cent.[30] The period between the trough in the mid-1830s and the next major trough in 1857, as shown in Graph 3.4, appears to be a single long cycle, but during it there was a marked divergence between the number of Middlesex Deeds registered and the volume of timber imports. Both series rose in the late 1830s but the upward movement of the indicators was interrupted in 1837 because of a severe downturn in the

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[28] Dawson, F.G. *The First Latin American debt crisis: the City of London and the 1822-1825 Loan Bubble.* 1990. p.6-21

[29] Checkland, S.G., *The rise of industrial society in England, 1815-1885.* London, 1964, p.13; Kynaston, D., *The City of London, volume 1: A world of its own, 1815-1890.* London, 1994, p.65-73; Lewis, op.cit., p.34

[30] Lewis, op.cit.p. 35-36; Sheppard et al, op.cit p. 195

American economy, and its effect on City firms with substantial investments there, one of the first examples of the interdependence of the transatlantic economy. [31]

The years 1842-3 constituted one of the worst periods of the century during which internal demand collapsed at the same time as depression had come to the export trades, and this is marked in the timber series. Despite widespread economic distress, activity in the Middlesex land market continued to rise. [32] Climbing from a low point the timber figures soared to a new high in 1847, and the Middlesex deeds returned to their 1825 level, but a year earlier in 1846. This dramatic increase in timber consumption may be linked to the railway building boom of the 1840s, as new lines used timber in large quantities for sleepers; this would have had a smaller effect in London than in the country as a whole, and not be reflected so markedly in the Middlesex deeds. Generally, the volume of building materials required for a railway project were not reflected in the quantity of deeds registered, since an extensive line could be registered with relatively few deeds.[33] The fall after 1847 was severe, the result of the financial crisis of that year, when the railway mania that had reached its height in 1845, when some 121 railway securities were being traded on the London exchange, collapsed. The immediate cause of the crisis was the Irish potato famine and the need to import wheat in ever greater quantities at increasing prices, with the consequent drain of gold abroad. A number of mercantile firms and country banks crumbled in the aftermath. [34]

With the removal of the taxes on a number of commodities, as part of a general movement towards free trade, the basis of assessing the volume of building changes. So instead of inferring building activity from movements in the volume of materials used, as has been done for the period 1785-1849, the indices of housebuilding constructed by Parry Lewis and Weber may be used as pointers to the fluctuating demand for materials. Since bricks were the primary building material until well into the twentieth century these indices must act as proxy for the demand for bricks.[35] The period between 1855 and the First World War appears as an "M" with twin peaks in the late 1870s and around 1900,

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[31] Kynaston, op.cit., p.107-110; Sheppard, et al, op.cit., p. 196
[32] Mathias, op. cit. p.214; Sheppard et al, op.cit, p.196-197
[33] Sheppard et al., op.cit., p.195
[34] Kynaston, op.cit p. 151-9
[35] Lewis, op.cit.

and the bottom of the trough in 1890.[36] How is this apparent cyclical movement, which approximates in periodicity with a Kuznets swing, explained? Some commentators have looked at the increasing importance of an individual nation's performance within a world economy. Fluctuations in the British domestic economy, and more particularly in housebuilding, have been linked to the outflow of capital into lucrative foreign investments. This mechanism has been explained by the "Atlantic Economy" hypothesis, formulated by Cooney, Cairncross and Brinley Thomas.[37] The theory argues that an alternating mechanism operated, with long cycles of twenty years between peaks, whereby buoyancy in the US economy encouraged large-scale emigration and an export of capital from the United Kingdom. This outflow of resources impeded domestic investment, both in industry and in construction. When the US economy went into recession investment levels in the UK picked up. Thus the peak years in the US building cycle (1853, 1871, 1890, 1909) coincided with troughs in the UK cycle (1855, 1869, 1886, 1912) and the troughs in the US (1864, 1878, 1900, 1918) with the peaks in the UK (1863, 1876, 1899, 1920).[38]

This explanation has not gone unchallenged. Whilst most historians accept that there is an inverse relation between the fluctuations in construction in Britain and America, there may be alternative explanations. Habbakuk argued that activity in UK housebuilding is more likely to have been prompted by domestic economic factors, and that the Atlantic economy thesis only operates effectively for the period after 1870, following the dislocations of the American Civil War, during which the US economy had developed independence from Europe.[39] Lewis argued that the home market in the 1880s may have been depressed following the outward movement of labour and capital, but alternatively resources may have gone abroad because they could not find employment at home.[40]

The "M" shape of the long cycle of the Parry Lewis housebuilding index may provide

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[36] ibid. p.144

[37] Cooney, op.cit., p.347-354; Cairncross, A.K., *Home and foreign investment 1870-1913*. London, 1953; Thomas, B., *Migration and economic growth: a study of Great Britain and the Atlantic economy*. 2nd edition, London, 1973

[38] Thomas, op.cit., p. 175

[39] Habbakuk, H.J., "Fluctuations in housebuilding in the Britain and United States in the Nineteenth century". *Journal of Economic History*, 22, 1962.

[40] Lewis, W.A. *Growth and fluctuations 1870-1913*. 1978. p.51

a good fit with the US index, but regional studies in the UK show that some provincial cities experienced very different fluctuations.[41] [See Graph 3.5] The London housebuilding cycle however has the same overall shape as the national cycle, but the first peak occurs in 1882, rather than 1878, and there is a less obvious trough between the twin peaks of 1898 and 1903.

The Middlesex deeds follow a similar pattern, although the "M" is distinctly lopsided, with significantly more activity in the market in the peak of 1898 than that of 1880-82, and the intervening trough is shorter, with demand beginning to pick up from 1886. As important as the cyclical movements, however, is the steep upward trend of demand from the 1850s to 1880, punctuated by responses to financial crises. The first of these occured in 1857, as a result of the collapse of banks and railroads in the United States.[42] Less than a decade later the failure of discount house Overend & Gurney in 1866 resulted in the worst panic in the City since 1825, but the effect on the Middlesex Deeds was not seen until the following year when the growth in registrations was checked and in 1868 when there was a marked fall.[43] When demand picked up all three indicators record a spectacular rise, which is checked in the early 1870s as far as the Spensley and Parry Lewis indices are concerned, whilst the Middlesex deeds had yet to move out of its post-1866 trough. The subsequent building boom peaked in the national index in 1878, but in 1880-82 in the Spensley index and the Middlesex Deeds.

Between this peak and the next in 1898 there was a long trough, and this is related to a depression in the economy as a whole, which contemporaries thought of as the "Great Depression", a concept that later historians have sought to revise.[44] Arguably this was not a depression in the usual sense, which would imply a short term phenomenon in the trade cycle, since within this period of twenty years (1875-1895) there was a series of individual trade and investment cycles. The sector where depressed conditions were most marked was agriculture, but historians argue about other movements in the economy. However all three indicators show a marked fall in activity, which unless there was a compensatory growth in non-residential building, must have caused a major

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[41] Rodger, op.cit., p. 17
[42] Checkland, S.G. *The rise of industrial society in England, 1815-1885.* 1964. p.38-39
[43] Kynaston, op.cit., p.236-241
[44] Saul, S.B., *The myth of the Great Depression 1873-1896.* London, 1969.

recession in the building trades and those industries that supplied them with materials.

There is evidence that by the 1880s the British economy had run out of steam and that the innovations that had driven the industrial revolution were exhausted. Leadership and innovation in many areas had passed from Britain to Germany and the USA.[45] Britons invested more abroad than at home, not because of a significantly better return to be had, although with UK interest rates falling during the 1880s, this was often the case, but because there was more capital available than could be utilised at home.[46] One indicator of the problems in the industrial economy was unemployment, particularly in engineering, metal working and building which in 1886, the worst year in the decade, had reached more than 10 per cent.[47]

As far as London was concerned the 1880s were thought by contemporaries to be a crisis decade. Many of the old-established industries were depressed, including metals, shipbuilding, engineering, chemicals, textiles and printing. The agricultural depression had its impact on many of the luxury trades in London that were dependent on the expenditure of the rich, much of whose wealth came from landed estates. Many London industries were already in decline and the depression exacerbated this trend; the building industry remained slack for almost the whole decade and experienced an exceptional trough in 1886-87.[48]

The 1880s also saw some of the worst winters of the century, and this put a further dampener on many industries including construction. Whilst activity always slowed down in the winter, and construction was one of many nineteenth century industries where there was a marked seasonality of employment, a particularly hard winter could bring work to a halt, causing much distress, and have a short-term impact on the demand for materials such as bricks. The coldest month of the decade was in the winter of 1885-86,

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[45] There is much scholarly debate about the onset of Britain's economic decline; see Lewis, W.A. op.cit., p.117; Lloyd-Jones, op.cit., p. 82f

[46] Ibid, p.115-116

[47] Lewis, W.A. op. cit .p.53; Saul, op.cit., p. 51

[48] Jones, G. Stedman, *Outcast London: a study of the relationship between classes in Victorian society.* (London, 1974). Harmondsworth, 1984, p.281-282

when the mean temperature in February was a mere 33.9 degrees Farenheit.[49]

The economy began to improve from the mid-1890s and this upward movement was reflected in the housebuilding index. The trough in the Parry Lewis index occurred in 1890-91, but the following steep rate of growth was checked between 1893 and 1895 before rising very steeply to a peak in 1898. In Spensley's London figures, the trough occurs in 1891, but growth is slow until 1896, then rises to equal the 1882 peak in 1900. The Middlesex deeds sequence hits bottom in 1887 but the rise to the 1898 peak is checked both in 1889-91 and 1892-5. The first of these downturns, which is mirrored in the Spensley figures, may have been a reflection of the Baring crisis of 1890, when a consortium of bankers guaranteed the ailing merchant bank when it became overexposed in its Argentine investments.[50]

The continuing fall from the heights of 1898 to the First World War is dramatic in all the indices, although the Middlesex deeds cannot be used beyond 1900 because of the change in registration procedures.[51] In the Lewis series the index value for 1913 is less than a third of the value at the top of the cycle in 1898, and had fallen to its lowest point since 1862 (index 1913 = 40.5; 1898 = 140.3). Such a fall in demand must have had a considerable impact on the building industry and on the companies that supplied them with materials, particularly in the London area, since the national index is dominated by building in London and some other regions of England did not experience the "precipitate decline" in the decade leading to 1914.[52]

Whilst building was subject to cyclical peaks and troughs the underlying trend throughout the two centuries that have been reviewed was upward. The pressure behind this was population growth which created a demand for housing; the Middlesex deeds and the Parry Lewis indices are a measure of this demand. During the period 1700 to

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[49] Drummond, A.J. "Cold winters at Kew Observatory 1783-1942" *Quarterly Journal of the Royal Meteorological Society*, Vol 69, 1943 p.17-32; Stedman Jones, G op.cit. p.46; Solomou, S. "Economic fluctuations ,1870-1913" in R.Floud & D.N.McCloskey (eds), *The Economic History of Britain since 1700, vol.2.* 2nd edition, Cambridge, 1994, p.260-264

[50] Kynaston, op.cit, p. 424-435

[51] Sheppard et al, op.cit p. 177

[52] Saul, S.B., "Housebuilding in England 1890-1914". *Economic History Review*, 2nd series, xv,1962, p.122. For a further discussion of this period see below chapter 8.

1914 the population of London grew both in absolute terms and as a proportion of the total population of England and Wales. In 1600 when London's population was 200,000, this represented 5 per cent of the national total; in 1700, 575,000 accounted for 9.6 per cent; in 1801, 959,000 was 10.8 per cent; in 1901 4,536,000 was 14.75 per cent. [53] This tendency continued until the peak for the Greater London area was reached in 1971 with 26.8 per cent. Since then counter-urbanisation has seen both the proportion reduce, and the absolute size of London's population fall.[54]

The City of London and its adjacent parishes contained an estimated 400,000 people in 1650 and 675,000 in 1750. The increase in numbers over this period required an average annual increase of 2,750 people. Since during this century the crude death rate in London always substantially exceeded the birth rate, although the gap between the two varied, this growth rate could only be sustained by large-scale migration into London, which may have involved as many as 8,000 people a year. This suggests that London may have absorbed the natural increase of a population of 2.5 million. In this respect, as in many others, London dominated the national economy, and had a progressively dampening effect on the natural population surplus in the rest of the country.[55]

It was only at the end of the eighteenth century that London's population became self-sustaining. This change was part of a significant rise in the population of England and Wales between 1791 and 1831 from 7.74 million to 13.28 million, an average rate of increase of 1.4 per cent per annum. Whilst the evidence of a large population rise was recognised by the compilers of the first national census in 1801, the reasons for it have been the subject of much debate. The explanation that the main contributory factor was a lower mortality rate held sway for many years but has been modified by more recent research. This proposes that whilst the death rate fell over the period 1670 to 1830 - the "long eighteenth century" - and the crude birth rate rose, the main determinant of the dramatic population rise was a lowering in the age of first marriage (from 26 years to 23) and an increase in the proportion of women who married.[56]

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[53] Clout, H. and Wood, P. (ed.) *London: problems of change.* 1986. p. 17

[54] Hoggart, K. & Green, D.R. (ed), *London: a new metropolitan geography.* London, 1991, p. 162

[55] Wrigley, E.A. *People, cities and wealth: the transformation of traditional society.* 1987. p. 134-6

[56] George, D.T., London life in the eighteenth century.(1925). Harmondsworth, 1965, p.38-40; Wrigley, op.cit., p.222-224. The "new explanation" is set out in E.A. Wrigley & R.S. Schofield, *The population history of England, 1541-1871: a reconstruction.* London, 1981.

In 1500 the population of London was essentially those living within the City itself, but by 1811 only about 10 per cent of Londoners were resident inside City limits. Although this share continued to fall, the resident, or "night-time", population of the Square Mile increased until 1851 when it reached its peak at just under 130,000 before falling rapidly to 51,000 in 1881 and only 27,000 in 1901.[57] In a similar way inner London (i.e. the administrative area of the London County Council) contained its highest number of residents in 1901, some 4.5 million. From then it lost population, whilst the suburban fringe outside the LCC area continued to gain numbers during the first half of the twentieth century. Within these broad groupings the population of individual districts grew, and, in many cases, subsequently contracted at different times, generally in line with their distance from the centre. Westminster, close to the centre of London, reached a peak in 1871 with half a million, whilst Kensington, slightly further west, peaked thirty years later with half this number.[58]

Individual areas on the fringe of the metropolis experienced very high levels of population growth during the nineteenth century, but at different times. Table 3.3 shows the rate of population increase in parishes on the outskirts of London, which became incorporated into the built-up area, in the decades when they experienced their highest level of growth.[59] It is these areas to the west of the city that are likely to have provided the demand for the bricks being produced on the brickfields of Middlesex further out. In some cases areas had their own brickfields, which supplied part of the demand; for example, in the 1880s Acton had some sixteen brickfields, but Ealing, its neighbour to the west had none.[60] This contrast relates not only to the availability of brick clay but perhaps, more importantly, to the relative social character of the two areas.

The parishes in west Middlesex in which brickfields were situated provided some local demand, but this is likely to have been small, since these were largely agricultural districts, with an aggregate population in 1901 of less than 50,000. The larger centres of population were the towns of Uxbridge in Hillingdon, and Southall in the precinct of

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[57] Sheppard, F. *London 1808-1870: the infernal wen.* 1971. p. 22; Waller, P.J. *Town, city and nation: England 1850-1914.* 1983. p. 28

[58] Clout & Wood, op.cit., p.52

[59] Waller, P.J. op cit. p.3; Population tables from *Victoria County History of Middlesex, vol.2.* 1911. p. 112-119

[60] Harper Smith, op.cit., p.22

Norwood, and they were only incorporated into the continuous built-up area of London after the First World War .[61] [see table 3.4]

The population of London did not grow at a constant rate during the nineteenth century, and these fluctuations had an impact on the building cycle and, therefore, on the demand for bricks. Growth rates of 20 per cent were recorded in four decades - 1811-21, 1851-61, 1861-71 and 1871-81, but population growth slowed down significantly after 1891 falling to just over 10 per cent between 1901 and 1911.[62] These growth rates are reflected in the building cycle. In the 1830s when population growth was comparatively low at 17.41 per cent, the upward curve of the building index was shallow; in the 1870s when population growth reached its highest level of the century at 22.62 per cent, the index moved much more steeply upward. The fall in the Lewis index after 1898 is matched by a much lower rate of population growth in the decade 1901 to 1911. When the growth rates in the Inner London area began to fall in the 1880s and 1890s, there was some compensation in the high levels of growth of the population of Middlesex (52.51 per cent in the 1880s and 40.46 per cent in the 1890s). (See Table 3.5)

The relationship between population growth and the building index is not a simple one. Whilst the highest growth rate in Middlesex occurred in the 1880s, the decade experienced a prolonged trough in building; however the population increase may have generated a build-up in unmet demand that contributed to the peak in the building cycle that followed in 1898, once the economic climate was more conducive. The consequent dramatic fall in building between 1900 and 1913 may be a reaction, at least in part, to overbuilding in the preceding boom, since housebuilding was a largely speculative activity. [63] The impact of population on the demand for houses depended on a number of factors, including the age profile, mobility within the capital, and the availability of housing at affordable prices. As Brinley Thomas puts it:

> The demographic factor is of course not the sole determinant of the building cycle: there are other factors on the demand and supply side - for example, income levels, the stickiness of rents, the rate of interest, the quality of houses, the rate of demolitions, and the organisation of the building trades.[64]

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[61] Victoria County History. *Middlesex, vol.2.* London, 1911, p.112
[62] Mitchell, op.cit., p. 25
[63] Saul, *Housebuilding....* op.cit. p125
[64] Thomas, op.cit., p.221

The extension of the built-up area and the development of new estates, although ultimately responsive to underlying demographic pressures, was determined by other factors. Because of its speculative character, housebuilders were sensitive to the availability and cost of credit, and new commuter suburbs only prospered if suitable transport links were provided.[65] The migration of most of its resident population, as the City was redeveloped for offices and warehouses in the second half of the nineteenth century at the expense of residential accommodation, was only possible if suitable housing was available elsewhere, and if public transport existed to bring the workforce back during office hours.[66]

The conversion of the City into primarily a business district reflected London's increasing role in international trade and finance, and the larger transformation of London into a city of distinct zones, although these were never as rigidly differentiated as the American models of urbanisation would suggest. The movement of the wealthy from the city centre to the suburbs is a characteristic of the modern city, according to the model produced by Burgess in 1925. Drawing on American experience, particularly that of Chicago, he described the city as a series of concentric rings, with a Central Business District at the hub, which was continually expanding into the adjacent mixed land-use zone. Thereafter the successive zones have an increasing quality of housing and higher status the further they are from the centre. This is not a static arrangement because as the city grows the wealthy continually move outwards, and there is a process of invasion and succession as migrants to the city centre move outwards to the next zone producing a knock on effect on the outer zones. [67]

The Burgess model has been applied by some urban geographers to a number of nineteenth-century British cities, but the idea of representing land-use in cities as a series of concentric zones was not a new one. Many of these models are simplistic or un-

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[65] Dyos, H.J., "The speculative builders and developers of Victorian London", *Victorian Studies*, XI, 1968, p. 641-690; Reeder, D.A., "A theatre of suburbs: some patterns of development in West London, 1801-1911" in H.J. Dyos (ed), *The study of urban history*. London, 1968, p.253-271; Robbins, M., "Transport and suburban development in Middlesex down to 1914 " *Transactions of the London & Middlesex Archaeological Society*, 29, 1978, p. 129-136

[66] Kynaston, op.cit. p.244-47

[67] Burgess, op.cit; Short, J.R. *An introduction to urban geography*. London, 1984, p. 128. Engels described a similar mechanism in Manchester. Engels, op.cit., p.86

historical in character, and fail to take account, for example, of the subtle gradations in social and economic status between classes, or the influence of topography on development.[68] A modification of the Burgess thesis was suggested by Hoyt in his model of sectoral land-use. He argued that high-status residential districts form sectors which radiate outward from the Central Business District. This concept is of some relevance when considering the impact of mass transport on the development of suburbs, and does take account of topographical variation.[69] Both Burgess and Hoyt assumed that the city had a single nucleus, whilst many cities, London included, developed from several separate nuclei, which grew individually and eventually joined up. When London, originating with the twin nuclei of the City and Westminster, expanded outwards, it did not take over uninhabited countryside, but absorbed nearby villages, which in their turn had started to grow, largely because of their proximity to London. Geographical models which have attempted to explain the character of cities like London, such as that of Ullman and Harris in 1945, are much more complex than that of Burgess, and tend to be descriptive rather than predictive in nature.[70]

Whatever the shortcomings of such geographical models when applied to London, some of the elements they identify are to be found in the development of the metropolis. There was an extensive growth of the built-up area in the nineteenth century and, whilst the overall population of the conurbation continued to grow well into the twentieth century, the City was converted into a business district with only a small resident population, and the inner suburbs were mostly losing population in the last decades of the century. Although not as distinct as the geographers' models would suggest the metropolis developed a series of distinct zones.

Until the end of the nineteenth century industry in London, much of it small-scale, was concentrated in an inner-ring surrounding the City, particularly to the east, whilst the outer suburbs beyond the LCC area had become essentially middle-class residential districts.[71] In the older inner city suburbs working class districts existed in close

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[68] Dennis, R. *English industrial cities in the nineteenth century.* 1984. p.83-84, 200f
[69] Short, op.cit., p.130; Dennis, op.cit., p.238
[70] Waugh, D., *Geography: an integrated approach.* London, 1990, p. 354-55
[71] The ring is closer to being a crescent, open at the north-east. Hall, P."Industrial London: a general view" in J.T. Coppock & H.C. Prince (ed) *Greater London.* London, 1964, p.226-7

proximity to fashionable squares and not in clearly demarcated zones, and the affluent estates of Westminster and Bloomsbury had small enclaves of slum housing along their borders.[72] During the nineteenth century this pattern was subject to considerable change, with large-scale movement of people within the London area, caused by metropolitan improvement schemes, and the construction of railway lines. The more affluent could choose to move to the new outer suburbs, provided housing and transport was available, but the working class was denied the opportunity.

The transfer of the wealthy from the City to the West End had begun in the seventeenth century and the areas that they vacated were taken over by those of lesser means. The earliest of the new residential estates, Covent Garden, had ceased to be fashionable in the eighteenth century, and degenerated into a slum.[73] In contradiction of the ripple effect of the Burgess model, however, there was not a continuous outward movement of the wealthy, many of whom continued to occupy the fashionable squares and terraces of Westminster and Kensington. The establishment of many new middle class suburbs in Middlesex and Surrey, based on older village centres, was fed in part by migration into the London area from elsewhere in England and Wales, not exclusively by outward movement from the centre. By the middle of the nineteenth century the proportion of population born in London was markedly higher in the older inner suburbs (69 per cent London born in 1861, 73 per cent in 1881) than in the outer ring of the LCC area (58 per cent and 59 per cent respectively). [74]

Whilst much of the movement of the middle classes from the centre of the city was facilitated by the new railways, some population dislocation was directly caused by railway construction and improvement schemes. The building of railway lines through the inner suburbs to termini on the edge of the central area - it is noteworthy that few main-line stations were built in the City itself - had profound effects on London's geography. Except where agricultural land or open space was available railway companies usually chose to cut their way through residential property, since it was generally cheaper to purchase and demolish houses than industrial or business premises. Much of the land

[72] Olsen, D.J. *Town planning in London: the eighteenth and nineteenth centuries.* 1964. p. 209
[73] George, op.cit., p.92
[74] Stedman Jones, op. cit . p. 138-141

on the periphery of London was in the hands of large proprietors who let out their properties; the tenants in such circumstances had no rights to object and it was cost-effective for the railway companies to negotiate with a small number of large owners. Few objections were raised where such demolitions swept away insanitary slums.[75] Some 800 acres in central London were required for railway uses in the course of the nineteenth century and Dyos estimated that some 76,000 people were displaced by such schemes between 1853 and 1901; in the longer period 1840-1901 as many as 120,000 members of the "labouring classes" were evicted.[76] Dock construction in the Port of London had a similar effect, although the major dock schemes were concentrated in a smaller geographical area and took place some decades earlier than the start of railway building. Nevertheless these schemes had a high impact in some localities and in the peak years of activity between 1800 and 1805 some 1,300 houses were demolished.[77]

The other major cause of the demolition of inner city residential property was the pursuit of metropolitan improvements. The building of Westminster Bridge in the late 1730s inaugurated a series of improvement schemes, involving the widening of existing streets, the creation of new thoroughfares and the repair and replacement of bridges. In the course of these improvements many old and over-crowded properties had to be demolished.[78] This process was continued and expanded in the next century, when a variety of schemes displaced large numbers of the working class, but far fewer middle class residents. Most of the schemes were for new streets to provide through routes and to improve traffic flow. The first such major scheme had been the building of the New Road between 1756 and 1761, later to be renamed the Marylebone and Euston Roads, which provided a byepass to the north of the city; this, unlike many later road schemes, had been built on open land, and for the remainder of the eighteenth century defined the northern limits of the built-up area.[79] Later schemes were designed to improve access into the central area, but were often built through slum areas. New Oxford Street (1830-56) cut through the rookeries of St Giles and displaced more than 5000 persons; Farringdon Street (mid-1830s) dispossessed as many as 40,000. These were two of the

[75] Kellett, J.R. *The impact of railways on Victorian cities.* London, 1969, p.331-35
[76] Ibid, p.327-8
[77] Stedman Jones, op.cit., p.164
[78] Summerson, op.cit. p.122-23; George, op.cit. p113
[79] Prince, H.C. "North-west London 1814-63" in Coppock & Prince, op.cit., p.84-86

many schemes put through by the City Corporation, the Metropolitan Board of Works (1855-88) and the London County Council. [80]

Many of the schemes contained an element of social engineering; the demolition of slums and the dispersal of their inhabitants was an underlying aim of many plans, prompted by social and sanitary anxieties.[81] Legislation increased the scope of local authorities to instigate improvements; the Torrens Act of 1868 granted powers to force owners to maintain their property, and where they failed to comply, to demolish insanitary dwellings. [82] The provisions of the Artisans Dwellings Act of 1875 (the Cross Act) enabled extensive slum clearance and rehousing programmes in the course of which a further 20,000 people were dispersed.[83]

Suitable alternative accommodation was not usually offered to those made homeless by these schemes. Although some philanthropic housing was provided this was not always appropriate to the needs of the poor, nor within their means. The assumption, either genuinely or cynically held, that working people once ejected from the slums of the central districts, would migrate to the suburbs, was not borne out in reality, since such dispersal never actually happened. The mobility of the working class in London was heavily circumscribed, because of the location and nature of their employment. Nearly all the work in manufacturing was located in the old inner suburbs, particularly to the north and east of the City; the service sector depended on its close relationship to the fashionable residential areas. For those at the bottom of the labour market proximity to the sources of casual labour was crucial, and this limitation determined the concentration of settlement, and increased overcrowding in areas close to those that had been demolished. [84]

Until the end of the nineteenth century public transport did not offer the working class the opportunity to move out of the centre yet continue to work in the inner city. The introduction of the electric tram made such commuting a more realistic possibility, but

[80] Stedman Jones, op.cit. p.167
[81] Ibid, p.166
[82] Ibid., p.188
[83] Ibid, p.199-200
[84] Ibid, p.171-73

by then new industries and new industrial areas had begun to develop away from the city centre.[85] How then had transport innovations contributed to the shaping of the metropolis? The electric tram was only the latest in a series of transport developments that had begun with boats on the Thames. The river had provided an important link between the City, the Court at Westminster, the royal palaces at Greenwich and Hampton Court, and such towns as Brentford and Chiswick. River transport remained important for passengers and freight until well into the eighteenth century.[86] Road transport, however, had a greater impact on the settling of suburbs and the extension of the built-up area. For the purposes of this study it would be unhelpful to look at all the roads leading out of London, so I have restricted this survey to the major routes in the north-west quadrant: the main ones were the Oxford Road (Uxbridge Road), the Bath Road (Great West Road) and the Holyhead Road (Edgware Road).

The Oxford Road ran from Tyburn (later Marble Arch), north of Hyde Park, through Kensington, Shepherds Bush, Acton, Ealing and Southall to Uxbridge, effectively the fringe of the greater London area, and thence to Oxford and the west Midlands. From Tyburn the road continued eastwards to the City along Oxford Street. The stretch of road between Tyburn and Uxbridge was turnpiked as early as 1715 and carried substantial numbers of long-distance and short-stage coaches. The starting point for these was usually Holborn and destinations included Oxford, Banbury, Cheltenham and Worcester.[87] South of this the Bath Road ran from Hyde Park Corner, south of the Park, through Kensington, Hammersmith and Chiswick, to touch the Thames at Brentford, where Kew Bridge was built in 1759 linking Middlesex and Surrey. Thereafter the road continued westwards through Hounslow and Staines. An established route in Roman times, the Silchester Road, it was turnpiked as far as Cranford in 1717 and Maidenhead in 1727. Northwest from central London the Holyhead Road (Edgware Road) was also originally a Roman road (Watling Street). From Marble Arch its route took it through Maida Vale, Cricklewood, Hendon and Edgware to St Albans and on to Chester. The first section between St Giles Bridge and Kilburn Bridge was converted

[85] Stedman Jones, op.cit., p.170; Coppock and Prince, op.cit.p.225f
[86] John Yeoman describes journeys from Brentford to Westminster and Vauxhall in 1774; *The diary of the visits of John Yeoman to London in the years 1774 and 1777*, edited by M.Yearsley. London, 1934, p.22, 32.
[87] Albert, W. *The turnpike road system of England 1663-1844*. 1972. p.225

into a turnpike in 1721.[88]

The towns and villages situated on these trunk roads grew as a result of the passing trade and the possibilities of commuting they offered the better off, particularly those who could afford private carriages. The coaching inns that served the long distance traffic in central London, the precursors of railway termini, and at the stopping points along the route, were themselves substantial centres of economic activity.[89] However, the towns that were major staging points, like Uxbridge, were on the edge of the London sphere of influence, and too far from the centre to influence the outward growth of the built-up area. In addition to long distance coaches such towns were also served by short-stage coaches which plied between central London and the suburban fringe; a number, for example, linked Holborn with Uxbridge, and it has been calculated that in 1825 there may have been as many as six hundred of these coaches operating out of London, between them making 1,800 journeys each day.[90]

In 1829 the coaches were joined by the omnibus, introduced by George Shillibeer after he had seen them operating in Paris. Their success was rapid and within ten years there were some six hundred licensed vehicles operating in the London area, encouraged by the abolition of the hackney cab monopoly in 1831. The buses improved on the short-stage coaches by having greater capacity, with all of the passengers being carried inside, and considerably lower fares. Whilst the greatest concentration of routes was in the inner districts, some routes went well out into Middlesex. There were buses from Brentford in 1836 and three operating between Ealing and Bank in 1838, in addition to five short-stages on the Uxbridge Road.[91]

So even before the railway age some towns and villages on these main roads acquired residents who had interests in central London, and who were able to travel back and forth. By contrast the villages that lay between the major routes remained isolated and avoided by developers, although other geographical factors, such as heavy clay soils or a

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[88] ibid, p.226
[89] Chartres, J.A. "The capital's provincial eyes: London's inns in the early eighteenth century", *London Journal*, 3, (1977) p.24-39
[90] Barker, T.C. & Robbins, M., *A history of London transport*, vol.1. London, 1963, p.4-7
[91] Robbins, M. *Middlesex*. 1953. p.74; *Cary's Commercial Traveller 1838*

shortage of available water, contributed to their neglect. Like their precursors the stage coach, the earliest railway lines to cross Middlesex into London were designed to be main trunk routes and carry long-distance rather than suburban traffic. The first was the London & Birmingham Railway (later LNWR), whose section between Euston Square and Boxmoor was opened in 1837 the route "passing not very close to Willesden, Sudbury, Harrow and Pinner". [92] A station at Harrow was provided with the opening of the route and stations at the other places in 1844. Suburban traffic was not encouraged, and no connecting branch lines were built before 1860.

The London & Birmingham was joined the following year by the Great Western Railway, running from Paddington to Bristol with stations at Ealing, Hanwell and West Drayton in 1838 and Southall a year later. Further stations were added in 1864 at Hayes and Harlington, at Acton in 1868 and at West Ealing in 1871. The GWR, like the LNWR, offered little opportunity for commuting, with few early trains; its London terminus at Paddington was not ideally placed for travellers to the business districts in the City. Although the presence of the GWR undoubtedly stimulated some developments in the districts through which it passed, the growth of places like Ealing in the first two decades after the opening of the line was somewhat limited. The GWR also failed to open up any districts that had previously been missed by the road system, since it ran roughly parallel to and at no great distance from the Uxbridge Road, coming close to it at Ealing and Hanwell. Between the GWR and the LNWR there was a large wedge-shaped area where villages like Northolt and Greenford remained isolated and undeveloped into the twentieth century. The third major route to cut across West Middlesex was the London & Windsor (later part of the LSWR) which was opened from Richmond across the southern part of Hounslow Heath in 1848. Two years later a new branch was built between Hounslow and Barnes through Brentford.

The process of filling the gaps left by these early trunk routes took many decades. Although railways were subject to planning control through private Acts of Parliament, they were business undertakings in competition with each other and route proposals were made for commercial benefit and to take advantage of existing traffic flows. Established companies often opposed plans for competing new lines, as the GWR did

[92] Robbins, op.cit., p.78

with the Metropolitan District's proposed branch to Ealing.[93] There was, as a result, a lack of co-ordinated planning of railway services whose legacy remains: most of London's railways, with the exception of the Circle Line and the North London Line are radial and despite several proposals a connecting outer circle was never built.

Fares on the major lines into London were never low enough to enable the working class to travel from the outer suburbs, and regular suburban travel was confined to a relatively small number of middle class commuters until the 1860s.[94] The railway companies resisted cheap fares, in part because of the operational and economic difficulties they presented; the concentration of demand in rush hours is a problem with which railways still have to contend.[95] In most cases where companies did introduce workmen's trains and low fares they did not anticipate demand, but responded to it. In 1906 it was argued that low fares did "not have the effect of distributing the population....[but were] a boon... to an existing population in the locality".[96] Only where the really cheap twopenny fares were in operation did the railway have an impact on dispersing the urban working class and reducing overcrowding in the inner suburbs. [97]

The Great Eastern Railway, in order to get approval to run its lines into Liverpool Street in 1864, had to agree to provide workmen's trains to compensate those dispersed by the building of the station.[98] The north eastern suburbs served by the GER saw the greatest influx of working class residents as Edmonton and Walthamstow saw their population grow tenfold between 1861 and 1901. [99] The GWR and LNWR which served the north western quadrant of London suburbs were slow to provide workmen's trains, even after the Cheap Trains Act of 1883; the GWR only began to issue workmen's tickets in 1890 and to operate a specifically workmen's train in 1893, and at the end of the century the LNWR was still arguing that there was no necessity to run them as its

> London and suburban district is generally not working class, and there is no probability that the adoption of facilities for that class would make it otherwise.[100]

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[93] House of Lords Record Office. *Metropolitan District railway (Ealing Extension Bill)* 1877. Minutes of evidence.
[94] Kellett, op.cit., p.365
[95] ibid, p. 373-4
[96] ibid, p. 379 quoting the Royal Commission on London Traffic 1906
[97] ibid, p.380
[98] Coppock & Prince, op.cit., p.65
[99] Kellett, op.cit. p.376
[100] Peacock, T.B. *Great Western suburban services.* Rev.edition, 1970, p.91; Kellet, op.cit., p.406

Immigrants to the growing suburbs were more likely to come from outside the metropolitan area, than from the inner city districts, and middle class estate proprietors were anxious to protect the value of their investments, and to that end buildings below a certain value were often prohibited.[101]

The cheaper alternative to the train was the horse tram, but early developments were confined to the areas immediately north and south of the City. The earliest route in West London was along a short stretch of the Uxbridge Road between Shepherds Bush and Acton, opened in 1876. The extension of this route westwards to Southall was thwarted by the Ealing Local Board, which argued before a House of Lords Committee that a tram route passing through their area would dilute the social character and encourage jerry building. This opposition held up the extension of the service until 1901, when the tram, now electrified, reached Southall, the Ealing Councillors having bowed to the inevitable. The fears they had expressed were largely borne out by subsequent events; the decade up to 1911 witnessed an unprecedented rise in the size of Ealing's housing stock (expressed in absolute rather than percentage terms) at a time when the housebuilding market was generally in recession, and the development of new areas with houses of much lower rateable value.[102]

The construction of the Grand Junction Canal across Middlesex to Paddington had a much smaller impact on the creation of new areas of housing than did railways, buses or trams. Although the GJC did carry some passengers in its early years this traffic was short-lived and quickly withdrawn, and never presented a serious opportunity for commuting. The canal had a much more significant impact on the industrial and commercial development of the parts of London and Middlesex through which it passed, and this aspect will be considered in a later chapter.[103]

Whilst the development of new suburbs often depended on the availability of suitable transport links, their progress was also influenced by the geography and geology of the Thames basin. As we have seen, the soils of the London area vary considerably and encompass heavy clays and lighter gravels. The stiff London clay underlies practically all

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[101] Kellett, op.cit. p. 408-12
[102] Wilson, G., *London United Tramways*. London, 1971, p.20-27, 37-51, 63, 67, 99-101
[103] Faulkner, A. H. *The Grand Junction canal*. 2nd edition, 1993. p.54

of greater London, but near the surface it becomes progressively more sandy and this material can be used to make tiles, bricks and drainage pipes. The River Thames formed two low gravel terraces in addition to the present flood plain. Here the heavy clay was eroded and later replaced with silts, clays, sands, gravel and brickearth[104]

These variations in soils both determined the style of farming and affected the speed and character of suburban development. For the farmer there was a clear distinction between the clay lands on one hand and the alluvial soils of the river terraces on the other, the boundary between the two running east-west in a line just north of the Uxbridge Road.[105] Settlement took place earliest on the alluvial soils, which, because lighter, were easier to work, and drained better, as well as yielding water more readily, an important consideration before the provision of a piped mains supply. Indeed the suburbanisation of the clay plains surrounding London

> had to wait for the development of the steam pump and the iron pipe, prior to which villages were limited to the outcrops of water-bearing strata adjacent to and overlying the clay.[106]

It was only in the twentieth century

> that modern Middlesex has assumed the form it now presents largely because modern techniques and transport have enabled men to ignore the natural features of the soil.[107]

The City of London initially occupied Thameside terraces, and was able to expand northwards over a level well-drained area. Further west, the growth of towns like Hammersmith and Brentford owed much to the alluvial soils on which they were built and to their riverside location, since they benefited from passenger and freight traffic on the Thames.[108] Generally the westward expansion of London was more likely to occur on the lighter soils near the river than on the heavier clay lands further north and west. Thus the building outwards from Westminster took place along the Taplow ridge between the Edgware Road and Regent's Park where the gravels also provided the raw material for brickmaking. In contrast the extent of the built-up area of 1800 shows the

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[104] Brown, E. "Land under London" in H.Clout & P.Wood (ed), *London: problems of change*. Harlow, 1986, p.7-8
[105] Robbins, op.cit p.195
[106] Brown, op.cit., p.6
[107] Robbins, op.cit. p.195
[108] ibid, p. 63

inhibiting effect of the wedge of heavy clay that broke into the Taplow gravel near Kings Cross.[109]

In many places the terrace gravels were overlaid with brickearth, a mixture of silt and clay, which may be several metres thick. Despite its name brickearth was also very fertile, and provided the basis of the substantial market gardening industry, which flourished by virtue of its proximity to the metropolis. Such uses were not compatible, although brickmaking could co-exist with less-intensive agricultural uses such as meadow and pasturage, and in south-west Middlesex these useful soils were the subject of severe land use competition.[110]

By the end of the eighteenth century contemporary commentators had identified a series of generalised land-use zones within the greater London region, which in part reflected the distribution of soils.[111] The inner suburbs had been built on land where the raw material for brick manufacture was generally available, but in some places the built-up area had reached the edge of the brickearth zone. The continued growth of the metropolis and the construction associated with railways, canals, and docks outstripped the possibilities of brick manufacture within its immediate vicinity, and, having approached the limit of local production, forced brickmakers to look much further afield for suitable sites. The response of brickmakers to this growing requirement is studied in the next chapter.

As we have seen the fluctuating demand for bricks for houses can be charted by reference to the indices of housebuilding and by the growth of population; it is less easy, however, to measure the demand that came from other sources, particularly from the major civil engineering projects associated with canals, docks and railways. Large-scale works such as aqueducts, viaducts, dock walls and warehouses required bricks in unprecedented quantities. Whilst some 30,000 bricks were used in a modest town house, ten times this number could be needed for an ordinary road bridge, and fourteen million

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[109] Spate, O.H.K. "The growth of London A.D.1660-1800" in Darby, H.C. (ed.) *Historical geography of England before 1800.* 1936. p.533

[110] Brown, op.cit., p.10; see also Bennett, L.G., *The horticultural industry of Middlesex.* Reading, 1952. Land use issues in West Middlesex are considered in more detail in Chapter 5.

[111] See Chapter 2 above

per mile of tunnel. The Welwyn viaduct, built by Thomas Brassey for the Great Northern Railway in 1850 is 520 yards long and absorbed thirteen million bricks. [112] The first warehouses erected at the West India Dock each required over two million bricks and the scale of building in the docks was such that a contract for forty million bricks was let in May 1800.[113]

There is no precise measure of the number of bricks required for such projects in a particular year, but it is possible, using a range of different indicators, to identify periods when demand from these sources was high. For canals, the number of private Acts of Parliament authorising construction are a crude guide to the amount of canal building [see Graph 3.6]. The so-called Canal Mania occurred in the first half of the 1790s and the extent of this boom is more marked if the number of initial promotions, rather than the total number of acts passed, is taken as the guide. Amongst the schemes floated at this time was the Grand Junction Canal, built in the 1790s and early years of the nineteenth century, which crossed West Middlesex on its way to Brentford and Paddington. By the time it was completed the enthusiasm for canals was waning, suppressed by the inflationary effect of the French wars and the resultant difficulty in financing such schemes. Although there was renewed activity between 1810 and 1815, this did not compare with the earlier boom and after 1830 no more major canals were authorised.[114]

The first important dock building schemes in London occurred in the first decade of the nineteenth century. A rapidly growing volume of trade put pressure on the existing facilities and prompted calls for more legal quays, and for secure and bonded warehouses. New docks were constructed by companies holding monopoly rights in certain trades: in 1803 the West India dock of 60 acres; in 1805 the London dock; in 1806 the East India dock; the Baltic, Norway, East Country and Commercial docks all followed in the next few years. A further group of docks was opened in the 1820s, including St Katherine's Dock, so that by 1830 London possessed docks covering 170

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[112] Clarke, op.cit., p. 101; Woodforde, J. , *Bricks to build a house.* London, 1976. p.131
[113] *Survey of London, vol. XLIII. Poplar, Blackwall and the Isle of Dogs*; edited by S. Porter. London, 1994, p.254
[114] Duckham,B. "Canals and river navigations" in Aldcroft, D. and Freeman, M. (ed.) *Transport in the Industrial Revolution.* 1983, p. 106-109

acres, just over half the national total, which had cost over £7 million to construct.[115] [see Map 3.1]

The construction of the railway network took place over a much longer period, but here too there were periods of intense activity. The indicator used to show the fluctuation in building is the length of line opened each year, which of course is not a precise measure of the construction taking place, but should be adequate to identify the main cycles. [see Graph 3.7] [116] There were considerable fluctuations. The first boom in railway construction occurred in the late 1830s, when the large mileage sanctioned in 1836-37 was taking shape. But this early period was eclipsed by the railway mania of the late 1840s. With the housing market flat and trade generally depressed railway building dominated the construction activity of the decade.[117] The next boom occurred in the 1860s, but the level of activity was lower than that of the 1840s. By 1870 the main network was completed and though some new lines were built during the remainder of the period, and there was some variation from year to year, the number of miles was far smaller than in the boom years. In line with housebuilding, activity in railway construction was at its lowest point in the early 1890s.

Whilst consideration has been given to a number of sectors which together made up the demand on the construction industry in England and Wales, and consequently on their materials' suppliers, no attempt has been made to relate them to each other. Feinstein has calculated the amount of capital invested in different areas of the economy and his figures are reproduced in Table 3.6. His estimates of fixed capital formation confirm that expenditure on canal building was at its peak in the 1790s; in dock schemes in the first decade of the nineteenth century; in residential developments in the 1830s; in railways in the 1840s; industrial, commercial and public buildings in the 1850s.[118] These emphases correspond with the patterns of activity in these different sectors that we have already observed.

The proportion that these sectors contributed to the total demand for building

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[115] Jackson, G., "Ports" in D.Aldcroft & M. Freeman, op.cit., p.202-3
[116] Mitchell, B.R. *British historical statistics.* 1988. p.541
[117] Mathias, P. *The first industrial nation: an economic history of Britain, 1700-1914.* 2nd edition, Harlow, 1983, p.257-8
[118] Feinstein, C.H. "Capital formation in Great Britain" in *The Cambridge Economic history of Europe, vol VII:*

construction, and the way that the balance changed from one decade to another, is important in determining the nature as well as the volume of demand. Building railway and canal infrastructure, for example, created different demands on the brickmaking industry than housebuilding did, mainly as a result of the contrast in the scale of operation. Construction companies usually found it more convenient to make bricks on the building site or by opening up brickfields nearby, especially when the route was in remote area. This is unlike the way most house builders worked. With the exception of major developments like those of Cubitt, and a few other large firms, most houses in nineteenth century London were put up in small groups by small firms or individual craftsmen. It was been calculated that during the period 1840 to 1870 eighty per cent of building firms built six houses per year or fewer.[119] Such builders would not usually have found it convenient to make bricks on site, or to operate their own brickfields, to produce the number of bricks required for that level of building. It was builders such as these who purchased from brick merchants or from the manufacturers. In the period studied by Feinstein residential building accounted for over forty per cent of the construction sector until 1830; however in the 1840s it accounted for only twenty-three per cent and had fallen from £10.28 million per annum in 1831-40 to only £7.6 million in 1841-50, when most attention was focussed on railways.

These fluctuating levels of demand suggest that the position of builders and contractors over the century and half between 1761 and 1911 was a difficult one, and the same uncertainties must have been felt by the suppliers of goods to the building trade, and most particularly by brickmakers as brick was the most widely used material throughout the period. Brickmakers were working against a background of rising demand for building materials, but this trend was subject to periodic fluctuations, and punctuated by several severe depressions. How did this shifting pattern of demand affect the brickmaking industry, and how did brickmakers respond both to the underlying upward trend in demand, as well as to the cyclical fluctuations? The changing levels of demand determined both the number of bricks required, but also their market price. In later chapters the effects of such changes in building activity on the volume of bricks produced, their selling price, and the scale of the industry will be considered.

The industrial economies: capital, labour and enterprise, edited by P. Mathias and M.M. Postan. 1978. p. 41

[119] Dyos, op.cit., p.659-660

Table 3.1: Increase in the number of houses between decennial Censuses of Population England & Wales, 1801-1911

Census years	Increase (000s)	Est.annual demand for bricks (mill)
1801-1811	215	645
1811-1821	309	928
1821-1831	444	1331
1831-1841	516	1547
1841-1851	314	943
1851-1861	492	1476
1861-1871	596	1788
1871-1881	698	2094
1881-1891	606	1818
1891-1901	886	2658
1901-1911	840	2520

Source: Cairncross, A.K. & Weber, B. op.cit; Mitchell, B.R. *British Historical statistics*. Cambridge, 1988, p. 389

Table 3.2: Inhabited House Duty, London and Home counties 1875-1910

	Houses subject to duty (000s)		Increase per year (000s)		Number of bricks (millions)		
	London	H Coun	London	H Coun	London	H Coun	Total
1875	479	370	6	5	189	153	342
1876	485	376	6	37	165	1,110	1,275
1877	491	413	10	-27	306	-822	-516
1878	501	385	13	9	375	273	648
1879	514	394	7	17	213	498	711
1880	521	411	15	13	456	402	858
1881	536	424	8	14	225	420	645
1882	543	438	13	22	396	651	1,047
1883	557	460	13	16	378	477	855
1884	569	476	4	14	108	411	519
1885	573	490	7	15	213	435	648
1886	580	504	2	12	48	351	399
1887	582	516	10	11	294	321	615
1888	591	526	10	14	285	420	705
1889	601	540	13	10	375	294	669
1890	613	550	-1	10	-18	288	270
1891	613	560	12	10	369	303	672
1892	625	570	5	-570	162		162
1893	630		6	0	189	0	189
1894	637		-1	601	-27		-27
1895	636	601	6	16	177	477	654
1896	642	617	2	19	51	561	612
1897	643	635	9	15	261	459	720
1898	652	651	17	32	507	957	1,464
1899	669	683	4	31	120	939	1,059
1900	673	714	9	31	267	933	1,200
1901	682	745	8	31	225	930	1,155
1902	689	776	11	28	327	825	1,152
1903	700	804	11	37	330	1,110	1,440
1904	711	841	15	28	438	837	1,275
1905	726	868	13	32	375	969	1,344
1906	738	901	4	22	132	669	801
1907	743	923	2	13	48	387	435
1908	744	936	7	29	210	855	1,065
1909	751	964	5	20	135	594	729
1910	756	984					

Home Counties are Essex, Hertfordshire, Kent, Middlesex and Surrey

Source: Thomas, B. *Migration and urban development*. London, 1972, p.45-58

Table 3.3: Highest growth rates of selected parishes in North and West London

	1861	1871	1881	1891	Growth
Acton	3151	8306			163.60%
Ealing	11963	18189			52.04%
Hammersmith	24519	42691			74.11%
Hampstead	19106	32281			68.96%
Islington	155341	213778			37.62%
Kensington	70108	120299			71.59%
Paddington	75784	96813			27.75%
Willesden	3879	15869			309.10%
Stoke Newington		9841	22781		131.49%
Tottenham		22869	46456		103.14%
Enfield			19104	31811	66.51%
Fulham			42900	91639	113.61%

Source: Victoria County History. *Middlesex, vol II*. London, 1911, p.112-119

Table 3.4: Population of parishes where West Middlesex brickfields were located, 1801-1901

	Cowley	W.Drayton	Harlington	Heston	Hayes	Hillingdon (inc Uxbridge)	Northolt	Norwood (inc Southall)	Total	Intercensal growth
1801	214	515	363	1782	1026	3894	336	697	10628	
1811	382	555	461	2251	1252	4663	392	875	12642	18.95%
1821	349	608	472	1810	1530	5636	455	1124	13805	9.20%
1831	315	662	648	3407	1575	6885	447	1320	17090	23.80%
1841	392	802	841	4071	2076	9246	653	2385	22307	30.53%
1851	344	906	872	5202	2076	9588	614	2693	24146	8.24%
1861	371	951	1159	7096	1650	10758	658	4484	28988	20.05%
1871	491	984	1296	8432	2654	11601	479	5882	33690	16.22%
1881	498	1109	1538	9754	1891	12641	496	6681	36489	8.31%
1891	525	1118	1542	10389	2651	13776	538	7627	40057	9.78%
1901	601	1246	1690	11690	2594	14895	589	12499	47705	19.09%
Increase 1801-1901	387	731	1327	9908	1568	11001	253	11802	37077	

Source: Victoria County History. *Middlesex, vol.II*. London, 1911, p.112-119

Table 3.5: Population of Greater London and extra-metropolitan Middlesex 1801 - 1911

Year	Greater London (a)		Middlesex (b)	
	Population	Intercensal growth	Population	Intercensal growth
1801	1,117,000		71,411	
1811	1,327,000	18.80%	84,140	17.82%
1821	1,600,000	20.57%	99,346	18.07%
1831	1,907,000	19.19%	113,146	13.89%
1841	2,239,000	17.41%	131,637	16.34%
1851	2,685,000	19.92%	140,975	7.09%
1861	3,227,000	20.19%	175,671	24.61%
1871	3,890,000	20.55%	253,197	44.13%
1881	4,770,000	22.62%	369,929	46.10%
1891	5,638,000	18.20%	564,192	52.51%
1901	6,586,000	16.81%	792,476	40.46%
1911	7,256,000	10.17%	1,126,465	42.14%

a = City plus the rest of the Greater London area. Source: Mitchell, B.R. *British Historical Statistics.* Cambridge, 1978, p.25

b = extra-metropolitan county. Source: General Register Office. *Census 1961, England & Wales: County Report Middlesex*. 1963, p.1

Table 3.6: Gross domestic fixed capital formation, GB 1761-1860 (constant prices)

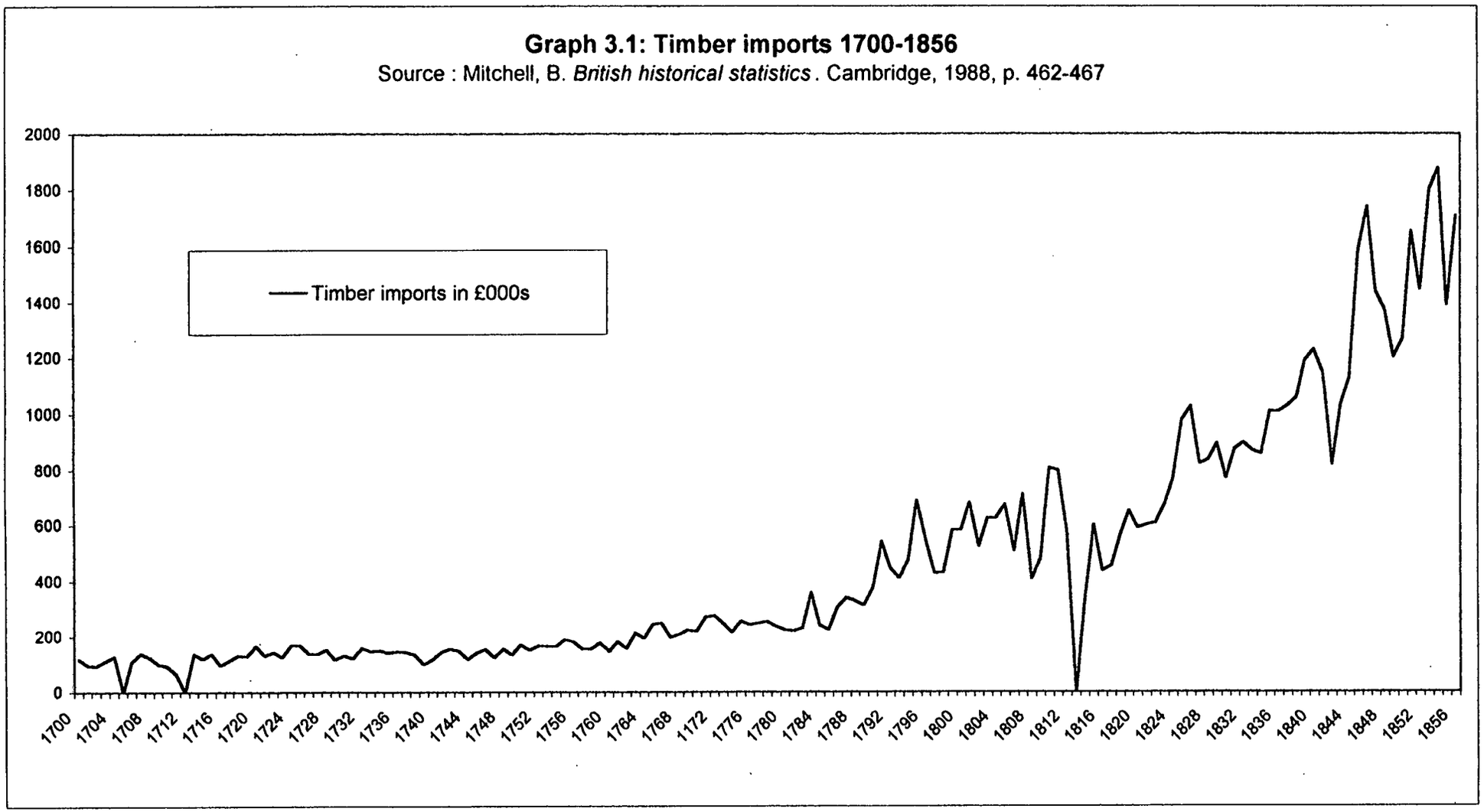
(£m p.a., decade averages at 1851-60 prices)

	Construction Sector												Total of all sectors
	Residential		Non-residential				Infrastructure						Total	
	Houses	% of whole sector	Public buildings	Industrial Commercial buildings	Total Non-residential buildings	% of whole sector	Railways	Canals	Roads/ bridges	Docks/ Harbours	Total Infra-structure	% of whole sector	Total Construction sector	
1761-70	1.49	44%	0.15	0.97	1.12	33%		0.22	0.53	0.02	0.77	23%	3.38	6.64
1771-80	1.38	42%	0.14	0.73	0.87	26%		0.50	0.52	0.04	1.06	32%	3.31	7.05
1781-90	2.17	41%	0.22	2.13	2.35	44%		0.25	0.53	0.05	0.83	16%	5.35	11.12
1791-1800	3.35	45%	0.33	2.20	2.53	34%		1.04	0.49	0.07	1.60	21%	7.48	14.31
1801-10	4.58	46%	0.46	3.04	3.50	35%		0.70	0.47	0.68	1.85	19%	9.93	16.57
1811-20	5.82	47%	0.58	4.16	4.74	38%	0.10	0.57	0.78	0.42	1.87	15%	12.43	20.51
1821-30	8.91	47%	1.07	6.81	7.88	42%	0.10	0.52	1.15	0.30	2.07	11%	18.86	28.29
1831-40	10.28	39%	1.54	8.52	10.06	39%	3.67	0.47	1.19	0.45	5.78	22%	26.12	38.59
1841-50	7.60	23%	1.52	8.15	9.67	29%	14.11	0.19	1.02	0.85	16.17	48%	33.44	49.43
1851-60	10.25	30%	2.05	10.99	13.04	38%	8.78	0.17	1.01	1.46	11.42	33%	34.71	57.99

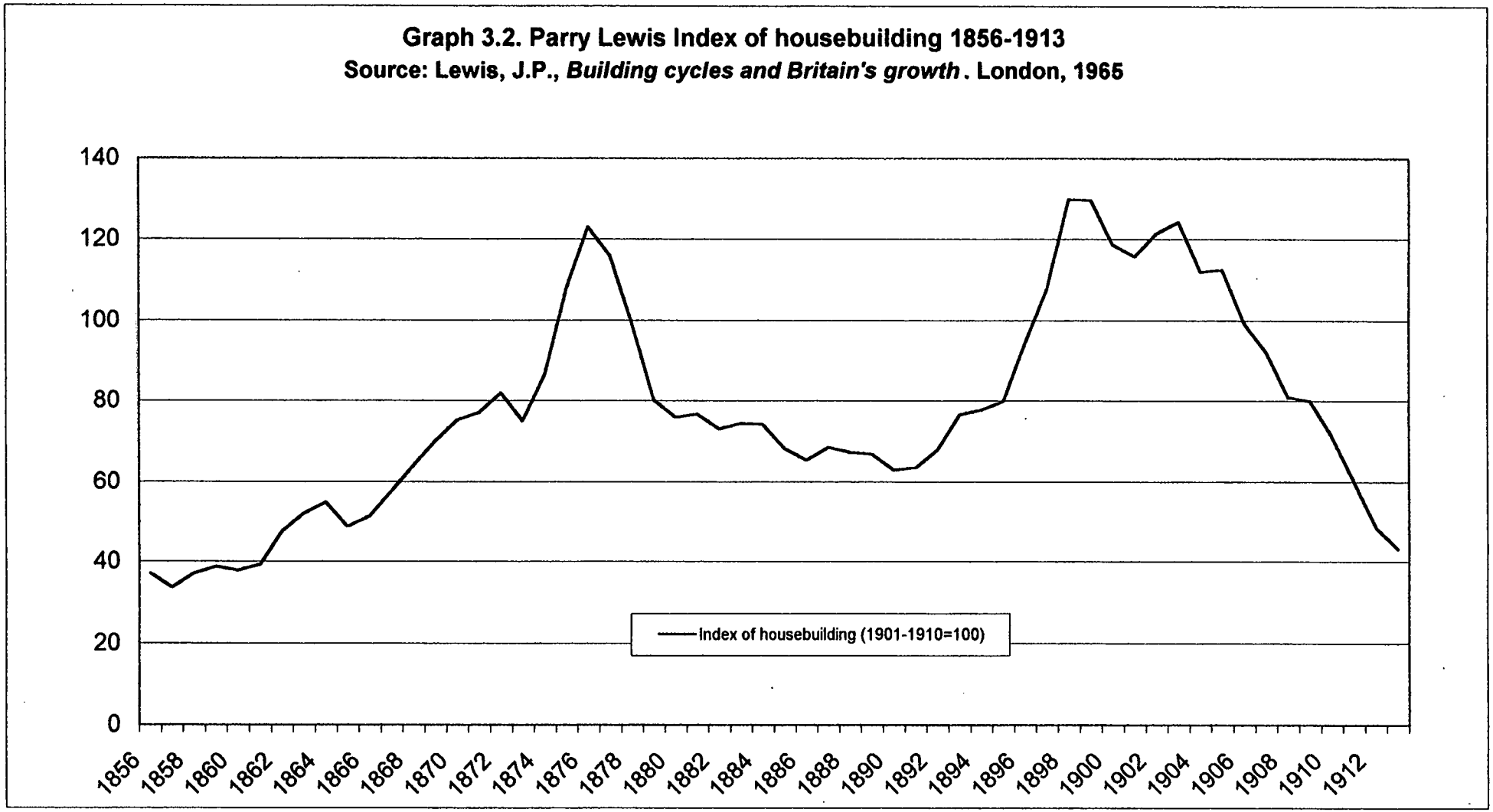
Source: Feinstein,C.H. "Capital formation in Great Britain" in *Cambridge Economic History of Europe, Vol.vii*. 1978. p.40

Graph 3.1: Timber imports 1700-1856

Source : Mitchell, B. *British historical statistics*. Cambridge, 1988, p. 462-467

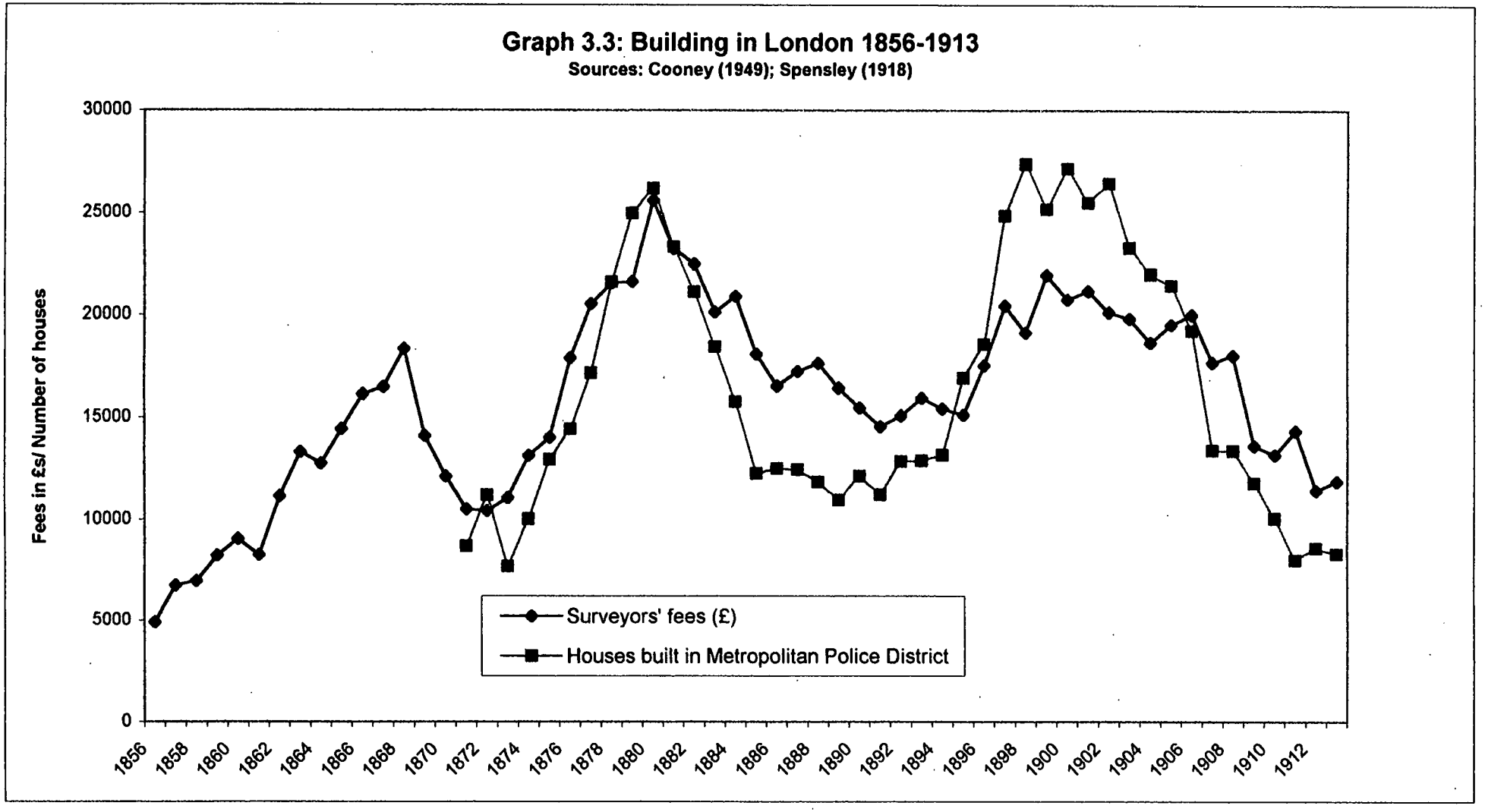


Graph 3.2. Parry Lewis Index of housebuilding 1856-1913
Source: Lewis, J.P., *Building cycles and Britain's growth*. London, 1965



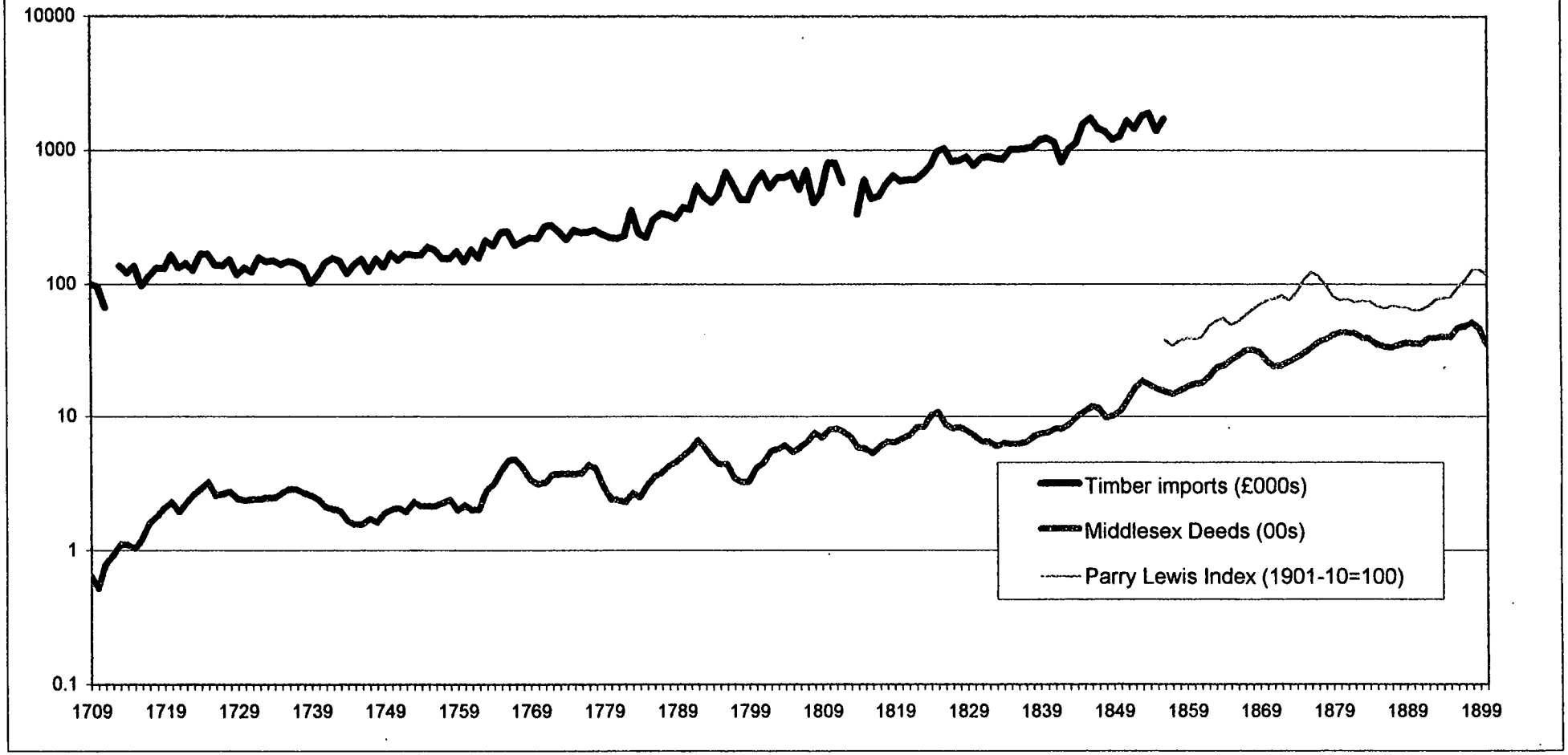
Graph 3.3: Building in London 1856-1913

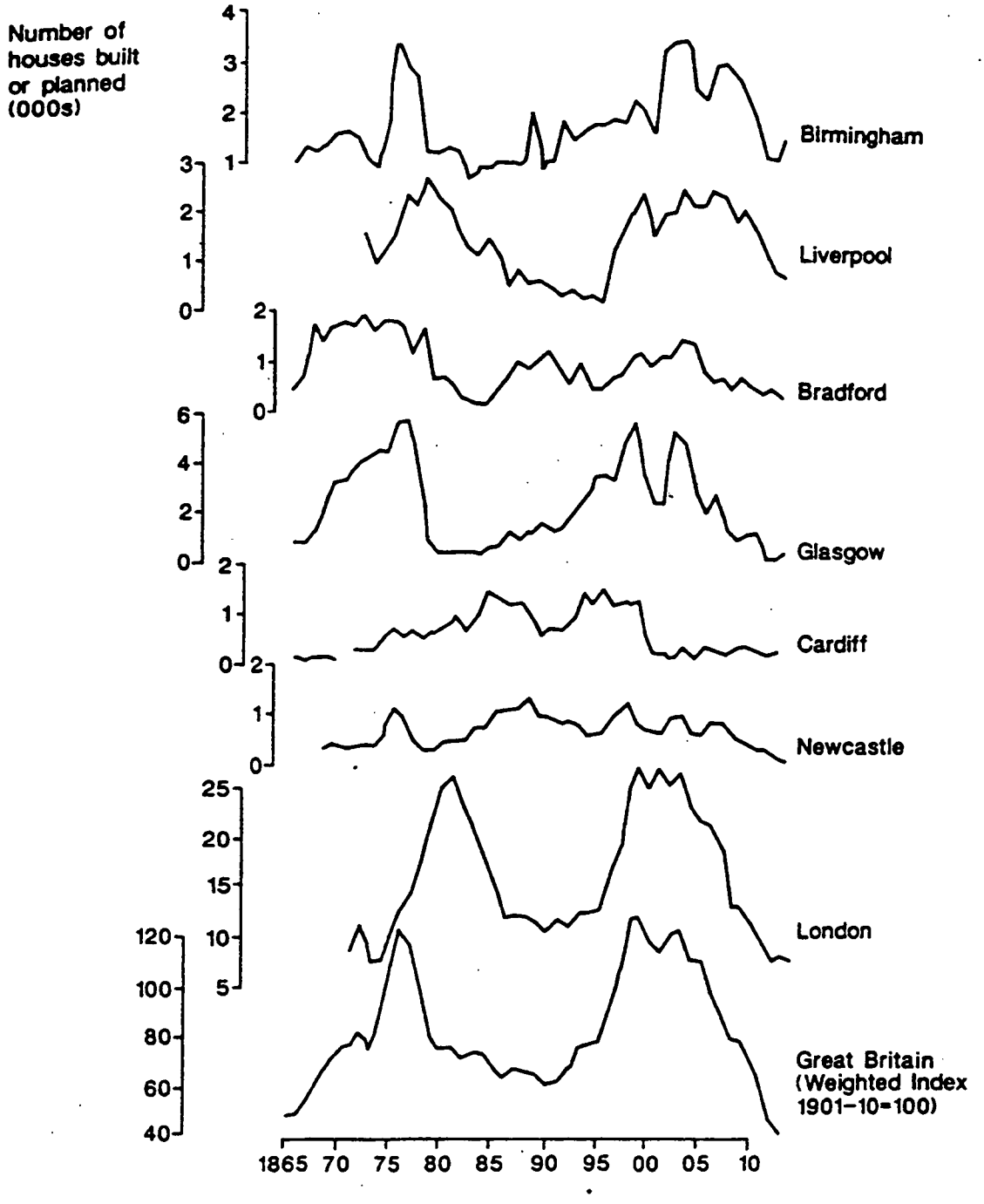
Sources: Cooney (1949); Spensley (1918)



Graph 3.4: Middlesex Deeds, timber imports and Housebuilding 1709-1900

For sources, see text



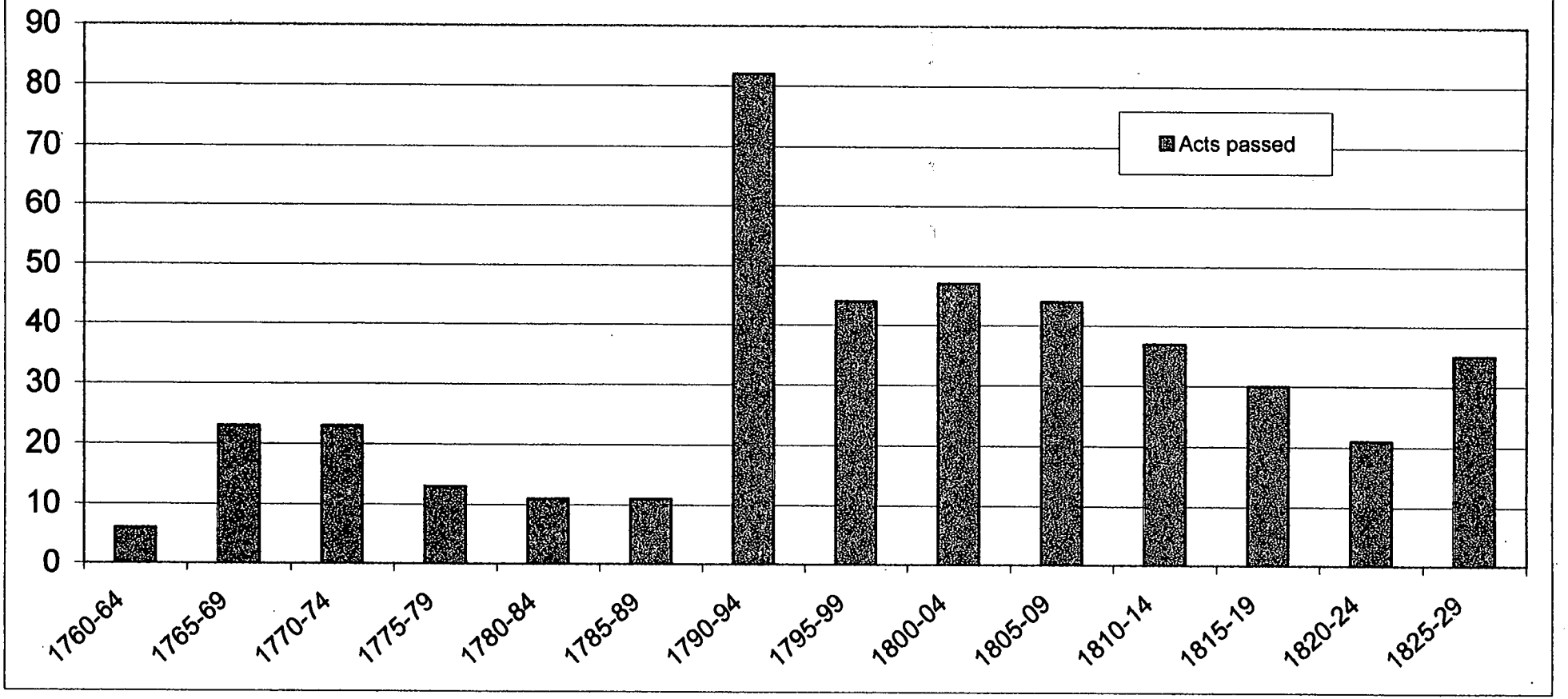


Graph 3.5: Building cycles, London and provincial cities.

Source : Rodger, R. *Housing in urban Britain, 1780-1914.* Cambridge, 1995, p.17

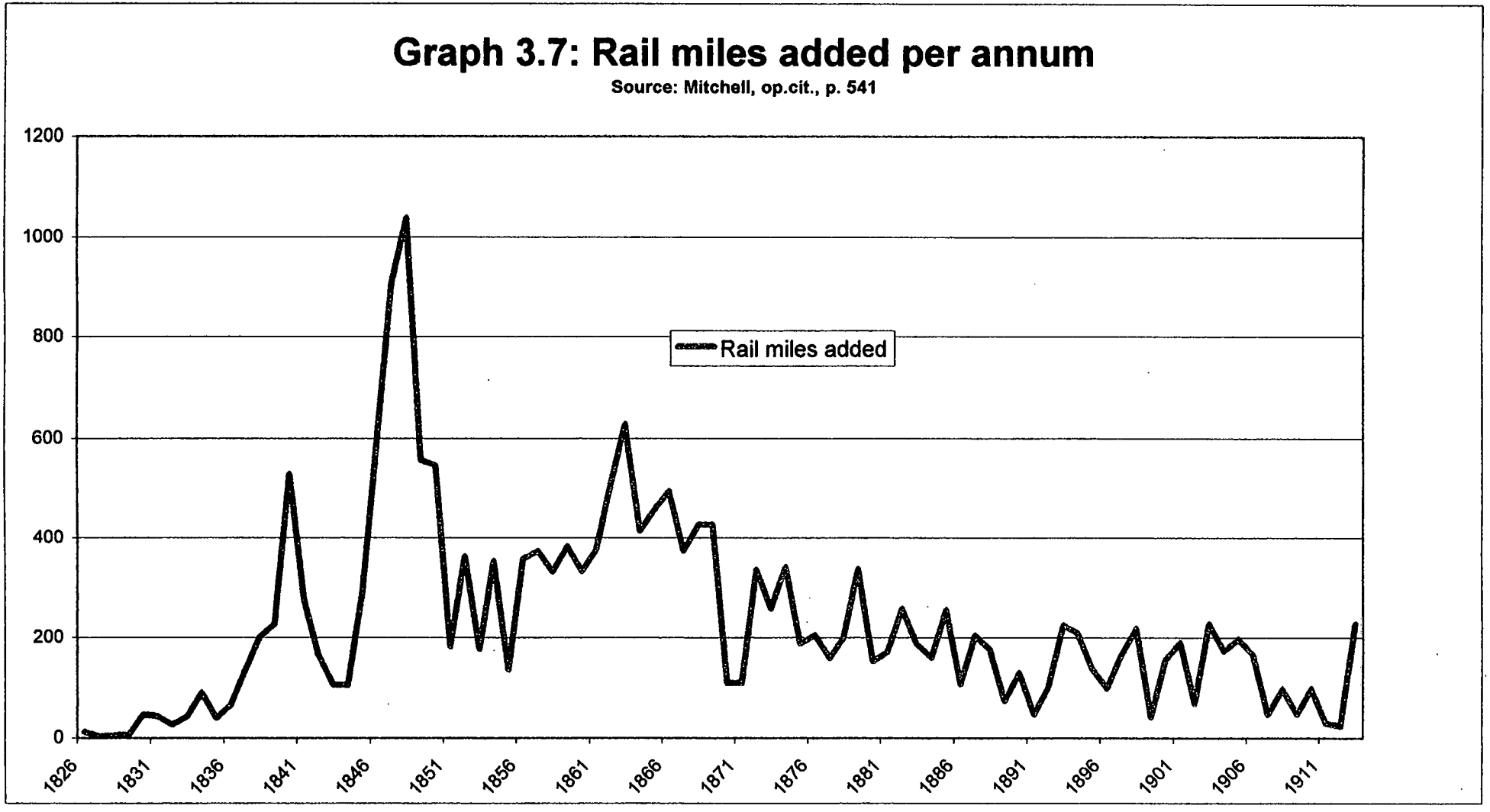
Graph 3.6: Acts for Inland navigations 1760-1829

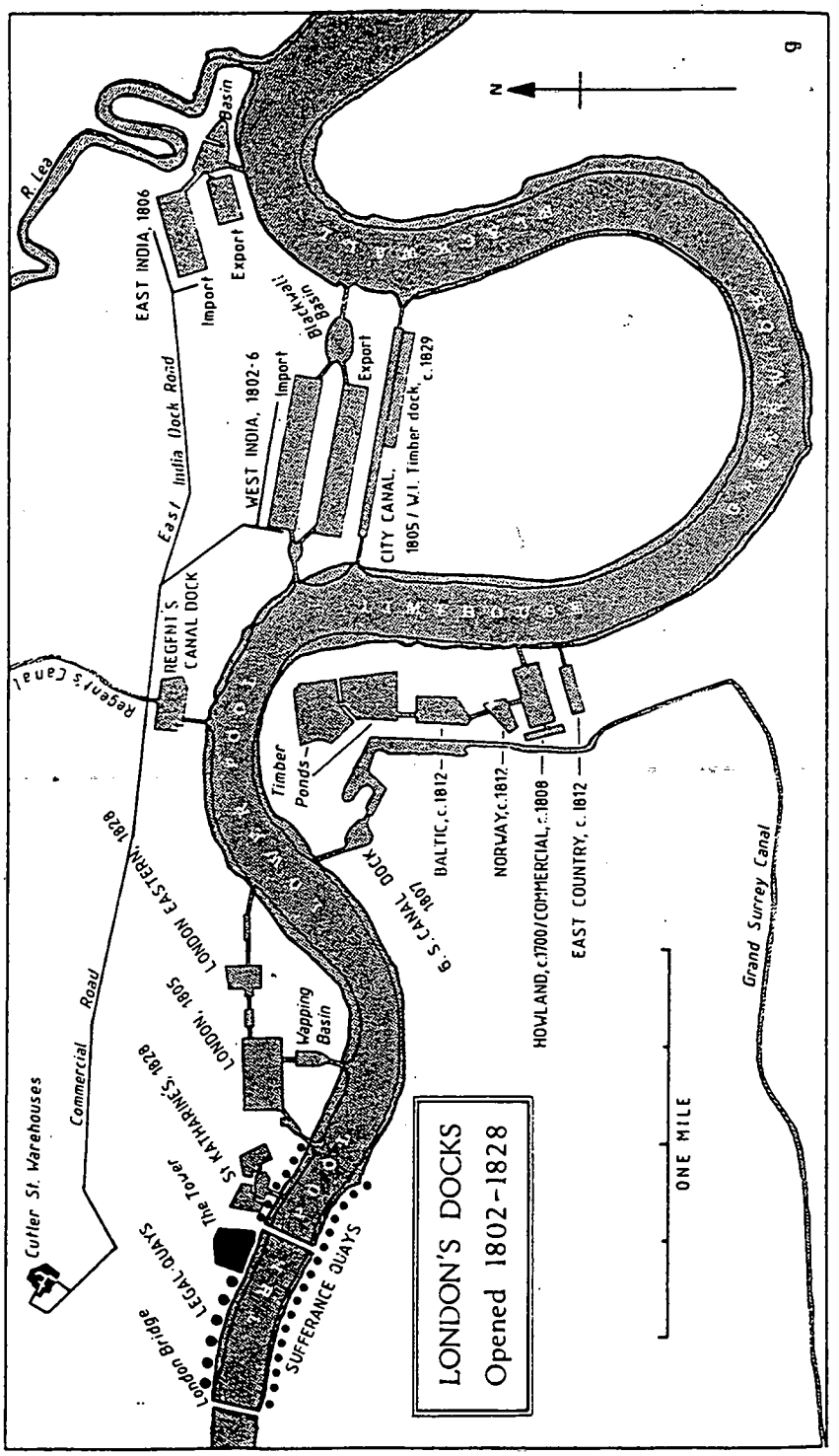
Source: Duckham, B., "Canals & river navigations" in D.Aldcroft & M. Freeman (ed) Transport in the Industrial Revolution. Manchester, 1983, p.106



Graph 3.7: Rail miles added per annum

Source: Mitchell, op.cit., p. 541





Map 3.1: London docks opened 1802-1828.
(Source: Aldcroft, D.H. and Freeman, M.J. (ed), *Transport in the industrial revolution.* Manchester, 1983, p. 204)

Chapter Four: The supply of bricks to the London Market

This chapter examines how the demand for bricks, identified in the last chapter, was met and how the industry evolved during the course of the nineteenth century to cater for changing needs. As a result of technological improvements structural ironwork had become viable for use in major components by the 1840s, and found a particular application in the bridges and trainsheds of the new railways, and reinforced concrete was introduced at the end of the century; nevertheless, brick was the dominant building material during the period, particularly in domestic construction[1]. More and more bricks were required. As we have seen new types of civil engineering projects such as canals, docks and railways, and large-scale industrial buildings and warehouses, created a significant additional demand for bricks. Furthermore reduced transport costs, as new methods made it possible to move bulky loads more easily, encouraged the use of bricks in geographical areas that previously had relied on local stone. [2]

There were three possible sources of supply for bricks: secondhand material from demolished buildings; imports from continental Europe; and domestic production. Bricks were imported at various times, but there is no evidence that foreign bricks contributed significantly to the total required. There were, however, fears about the import of bricks which could be produced more cheaply abroad, either because of a more benign tax regime, or because of more efficient style of production. (see below and Chapter Nine).

As regards the recycling of material from old buildings, it is again difficult to know what proportion of the demand was met from this source. Second-hand bricks came on the market in fairly large quantities as a result of metropolitan improvements, such as the building of the early underground railways, whose cut-and-cover technique required the demolition of property, or the construction of new roads through built-up areas. So at the same time that the new works created demand for bricks with which to construct, for example, retaining walls for railway cuttings, site clearance made old bricks available. These were usually sold at auction, and adverts appeared in trade journals such as *The*

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[1] Dixon, R. and Muthesius, S. *Victorian architecture.* 2nd edition, London, 1985. p.94ff; Service, A. *Edwardian architecture: a handbook to building design in Britain, 1890-1914.* London, 1977. p.133

[2] Dixon and Muthesius, op.cit. p.15

Builder. In 1860, the building of the Metropolitan railway produced a series of sales of materials; one sale in May that year included half a million stock bricks from a row of houses in the Marylebone Road.[3] A week earlier the Metropolitan Board of Works sold 400,000 stock bricks which had come from demolitions in the Borough.[4] An even larger amount – one million bricks – came on the market with the demolition of the old Chelsea Waterworks. [5] It is possible at those periods when large quantities of reclaimed bricks came on the market, that the demand for new bricks may have been reduced, or that their price may have been driven down. What is not clear is whether builders used second hand stocks for exterior work, or whether they substituted them for the cheaper place bricks used for interior walls.

As a result of the uncertainty about the number of bricks that came from these two sources, the discussion in this chapter will assume that most of the demand was met from domestic production. If there was a good match between the demand measures that were used in the last chapter, and supply, this should be apparent in the fluctuations of brick output. There are limitations on the information available to historians, however, and a supply/demand correlation can only be attempted with any certainty for a part of the period under consideration. There is little statistical data for the number of bricks made in England, Scotland and Wales before the end of the eighteenth century, and most figures relate to the number made for particular building schemes. In 1785 Pitt's government, in need of funds at the end of the American War of Independence, introduced an excise duty on bricks, having noticed that brick output in the vicinity of London alone was running in excess of 200 million per annum, and that a tax of 2s 6d per 1000 bricks would yield the Exchequer an annual revenue of £50,000.[6] The tax remained in force until 1850, and for the interval of 65 years data are available for brick production. Whilst the yield of a tax can often be an imperfect measure of actual output of a commodity, in the case of bricks these figures are thought to be a reliable indicator, since the mechanics of collecting the tax - which was assessed on the bricks in their raw

[3] *The Builder*, 17th May 1860

[4] Ibid

[5] *The Builder*, 5th May 1860

[6] *An Act for granting to his majesty certain rates and duties upon bricks and tiles made in Great Britain and for laying additional duties upon tiles imported into the same;* Brunskill, R.W., *Brick building in Britain.* London, 1990, p.192-3

state at the yards, with an allowance made for breakages and poorly-fired ones - made it quite difficult to evade.[7] In the rules of the Excise Office

> the officer is enjoined to survey each brickmaker in his residence once every day, Sundays excepted, and those out of it five times a fortnight at the least, and on each survey he must show the date and minute of his visit, the number of moulders at work, the particular flat or hack on which the bricks etc. are laid... and the number of bricks in the height of each hack.[8]

The owners of the brickfield were expected to confirm the officer's figures by means of the return they were required to make every six weeks. In view of the large number of brickmakers and the number of inspectors required to carry out such regular inspections the Commissioners concluded that the cost of collecting the tax, which they thought the Excise Department grossly underestimated, was disproportionate to the yield of the tax. The cost was said by the Excise Department to be only 11s for each of the 5711 brickmaking concerns, a total of £3100, whilst the receipts amounted to just over £395,000, or £70 per brickyard.[9]

The statistics of brick output and duty collected survive as national totals, but also as a series of regional counts, since the duty was collected through more than fifty local offices. The national totals were published in a widely cited article by Shannon and some regional figures have been used by other researchers.[10] The annual yield of the duty was recorded in The Returns of Brick Duty, published in Parliamentary Papers, and for the period 1829-49, the annual report contains figures of the sums collected from individual centres.[11]

The national totals are useful in determining the overall level of production, but can be misleading if there were significant local variations. The local totals for the London area

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[7] Shannon, H.A., "Bricks – a trade index, 1785-1849". *Economica*, 1, 1934; reprinted in E.M. Carus-Wilson (ed.), *Essays in Economic History, vol.3*. London, 1962, p.188.

[8] *18th Report of the Commissioners.. into the establishment of the Excise Department*, PP 1836, xxvi, p.149

[9] The Commissioners commented, "this does not seem to be a realistic estimate of the true costs". ibid

[10] Shannon, op.cit.; Cairncross, A.K. & Weber, B., "Fluctuations in building in Great Britain, 1785-1849", *Economic History Review*, 2nd series, 9, 1956; reprinted in E.M.Carus-Wilson (ed.), *Essays in Economic History, vol.3*. London, 1962, p.318-332

[11] *Returns of Brick Duty*. See for example PP 1837-8, xlv, p.5; PP 1846, xxv, p. 212; PP 1847-8, xxix, p.267. A summary of the national receipts of the tax for the period 1785-1831 was printed in PP 1830-31, x, p.445

should allow a greater degree of precision when set against the indications of demand provided by the Middlesex Deeds (see above). For the West Middlesex brick industry the collection centre was at Uxbridge, which operated only until 1843. Why the office was closed in that year is unclear, but may have been related to the fall in production that characterised the early 1840s. Unfortunately the figures from the Uxbridge office cannot be used to give a precise measure of the output of the Cowley area, because the office was responsible for a wide area that included parts of Hertfordshire, Bedfordshire, and Buckinghamshire. The likely balance between production in the immediate vicinity of Uxbridge and the larger area of the office's jurisdiction can only be estimated, perhaps by reference to the number of brickfields.

London had its own office, responsible for collecting the duty in the central area, comprising the cities of London and Westminster, and the other parishes within the Bills of Mortality, together with Marylebone and St Pancras. This included some major brickmaking districts, such as Islington and Hackney. In Hackney there was a long tradition of brick manufacture, and it was estimated that as much as a 1000 acres had been used for brickmaking. [12] But by the early decades of the nineteenth century it seems likely that many of the bricks used in the London area were imported from outside. Cox argues that three factors were at work here; firstly the fact that good transport links by the Thames or the canals made it relatively easy to bring bricks to London; second, the dictates of fashion, which required a variety of colours, not all of which could be produced in London; and lastly that the size of London's demand outstripped the local sources of supply. [13] A further incentive to move production out of London itself was probably the high cost of brickfields in the developing suburbs; according to one contemporary the rent of brickfields had trebled in a period of twenty years to £300 an acre, and the Tyssen estate in Hackney was asking £500 per acre in 1803.[14] Many of London's bricks were, therefore, produced in the adjacent counties, and an attempt will be made to estimate the relative contributions of the Metropolitan brickyards and the fields in the surrounding counties. The other areas associated with the manufacture of

[12] Victoria County History. *Middlesex, vol X: Hackney.* London, date, p. 96; Middleton, J., *View of the agriculture of Middlesex.* London, 1798, p.19

[13] Cox, A., "Bricks to build a capital" in H.Hobhouse and A.Saunders (ed.), *Good and proper materials: the fabric of London since the Great Fire.* London, 1989, p.11

[14] VCH Middlesex, vol.X, op.cit., p.96; Brayley, E.W., *London & Middlesex, vol. I.* London, 1810, p.7

the London stock brick were served by offices in Surrey, whose area included Brentford on the Middlesex bank of the Thames, in Essex, and at Rochester which handled the extensive brickyards beside the river Medway .[15]

It is therefore possible to examine brick output on the national and local level and to relate brick supply to the indicators of brick demand that were investigated above. National brick production will be considered first. During the first year of the tax some 358 million bricks were charged with duty in England and Wales and this figure had risen to 1,462 million in its last year (1849), an increase of 308 per cent over 65 years, representing an annual growth rate 4.74 per cent. Shannon compares the level of brick production to demographic trends, finding that for the period 1786-1816 bricks tended to keep pace with population, but for the period 1817-1849 brick output was increasing faster than population by a factor of a third. This suggests that after 1817 a greater proportion of brick output was being used in non-domestic construction, or that there was an improvement in the quality of the housing stock as part of the post-war optimism.[16] However the overall growth in production masks sizeable fluctuations in output from year to year. For example, in the peak year of 1847 production totalled 2193 million bricks, but fell by a third in the following year. [17] These variations in brick output are taken to correspond to peaks and troughs in the building cycle, as Shannon puts it:

> Over the whole period [1785-1849] brick-making and consequently building show the spasmodic outbursts of activity and subsequent stagnation common to all construction trades.[18]

The movements of brick production are plotted against the indicators of demand identified in Chapter 3, and are shown in figure 4.1 Significant peaks in brick output occurred in 1793, 1811, 1819, 1825, 1836, 1840 and 1847, with obvious troughs in 1797, 1816, 1832 and 1843. For the period after 1815 there is a close correlation between the brick and timber series, but for the earlier period there are some discrepancies, probably

[15] PP 1836, xxvi, p.155, 463-4
[16] Shannon, op.cit, p.196-197
[17] Ibid., Table A, p. 200-201
[18] Ibid., p.190

attributable to the interruptions in timber imports occasioned by the wartime Continental blockades, which did not have the same impact on domestic brick production. The boom years of 1825 and 1840 are clear in both series; the steep increase in the late 1840s has a similar shape but there is a short lag with brick output peaking a year later than timber (1846/47). This is to be expected as brickmaking, because of its seasonal nature, and its year-long production cycle could not respond very quickly to changed levels of demand.

Although the trend in the national brick production was upward the severe cyclical fluctuations must have been difficult for the industry to accommodate. For example in the space of eight years from 1820 output doubled and then fell by almost as much. This reduction in numbers probably represents a real cutback in production rather than a stockpiling of manufactured but unsold bricks, as the duty was levied on bricks in the yards rather than on sales. These extremes, observable in the statistics, should have left an impression in other records, in terms of unemployment among brickmakers and building workers, and business failures. It is one of the aims of this chapter to try and identify these effects.

There is a good match between demand indicators and brick output on a national level; does the same correlation exists between the registrations at the Middlesex Deeds Registry, and brick output in the vicinity of the capital? These series are shown in figure 4.2. The London brick figures and the Middlesex Deeds move generally in step, but after the steep rise to a peak in 1825, mirrored nationally as we have seen, the fall in brick output is more dramatic and longer sustained than the corresponding reduction in the number of deeds registered. It may be that there were factors operating in this particular instance that affect the fit between the indicators of demand and supply. Major civil engineering schemes could generate a sizeable demand for bricks, as occurred with the building of the new docks at the beginning of the century (see Chapter 3 above), but make only a small impression on the number of deeds registered. There were few such schemes, however, in the late 1820s; railway construction did not start in earnest before 1830, the number of new canals was less than in the peak years at the end of the eighteenth century, and the only major dock scheme of the decade was St Katherine's

Dock, completed in 1828. The fall in brick output in this period is mirrored in the series for timber and for glass.[19]

For the period 1829 to 1849 for which figures for the London excise office and a combined total for the collection centres of Essex, Surrey, Uxbridge and Rochester are available, the suburban output moves closely in phase with Middlesex Deeds.[see Graph4.3] However the movement in the London figures is slightly less marked than those in the suburban centres, which may suggest that elasticities in demand were most easily met by regulating the supply from suburban brickfields. During the steep rise in demand in the mid-1840s the output from the suburban centres exceeded that from the London brickyards, a probable indicator that brick output in the centre of the capital was constrained by the dwindling availability of suitable sites, whilst there were plenty of green field sites in the rural home counties. The peak in demand shown in the Middlesex Deeds coincided with the peak in suburban production in 1846, but the London and national brick series both reach their highest point a year later.

Comparisons between the national series of brick production and that for London itself make it clear that though both show a similar peak in the 1820s, after the subsequent trough the rise in London output is smoother than the national one, which experienced twin peaks in 1836 and 1840, and a steeper upward curve to the highest point in 1847. It may be that these peaks in extra-metropolitan demand come from the first boom in railway construction which had a much greater impact in the provinces than in London. Cairncross and Weber concluded that nationally the decade 1840-1850 was a period of little housebuilding and that a larger share of bricks was used in other types of construction, especially railways.[20]

From 1835 the area served by the Uxbridge office was the biggest producer of bricks of the five offices that contributed bricks to London, but this only continued until 1839 when Uxbridge was eclipsed both by Rochester and London. This situation persisted until the Uxbridge collection office was abolished in 1843, for reasons that remain unclear. The sudden leap in receipts at the Surrey office, nearly doubling between 1842

[19] Cairncross & Weber, op.cit., p.321-322
[20] Ibid, p.323

and 1843, suggests that this centre, which already served parts of Middlesex, may have taken over at least part of the Uxbridge area. This hypothesis is given more weight as 1843 was a difficult year for brick producers in the London area, with a marked dip in production, which is mirrored in the national figures.[21]

Manufacturers argued that the high rate of duty charged on bricks had an effect on production and made the domestic product uncompetitive with bricks produced abroad. Different rates of duty applied to bricks that were larger than 10" x 3" x 5" and to polished bricks, but otherwise the rate was the same. Such a fixed rate of duty, unrelated to the different prices charged for different qualities of brick, proved particularly severe on the producers of the basic building bricks, of which the London stock brick is an obvious example. Introduced originally at 2s 6d per thousand, the duty was raised to 4s in 1794 and 5s in 1796, to help meet the needs of the Exchequer in wartime, and finally to 5s 10d in 1805.[22] At this level, the highest rate that the tax reached, the cost of brickwork had risen from £7-15s per rod to £12-0-0, significantly raising the cost of building.[23] Moreover it also encouraged manufacturers to release sub-standard bricks on to the market, since if losses at the works exceeded the 10 per cent assumed by the tax, they would otherwise be paying tax on bricks that could not be sold.[24] In Germany, by contrast, there was no tax and bricks were much cheaper, 15s in comparison to 35s, but it is not clear whether there were direct imports from there into England, even though suggestions were made that bricks were exported from Hamburg to English colonies.[25]

After 1850 there are no brick output figures but we may assume that as brick production fits quite well with the Middlesex Deeds between 1832 and 1849, that this relationship continues. This indicates generally rising usage interrupted by a series of cyclical peaks and troughs, including a longer flattening of demand from the mid-1880s until the mid-1890s. This sustained trough persisted in the Parry Lewis index of housebuilding with

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[21] *Returns of Brick Duty.* PP 1846,xxv, p. 209
[22] *Returns of Brick Duty.* PP1830-31,x, p. 445; Brunskill, op.cit., p. 192
[23] Report of a delegation to the Board of Health on the effects of the excise duty on the brick trade. Evidence of Mr Godwin, architect. *The Builder*, 2nd February 1850, p.56
[24] Mr Rhodes, a major London brickmaker, argued for the allowance to be raised to 20 per cent in his evidence to the Commissioners of Enquiry. *18th Report of the Commissioners*....op.cit., p. 171
[25] Report of a delegation to the Board of Health... op.cit. Evidence of Mr Lindley. *The Builder*, 2nd February 1850, p.56

activity only recovering to its 1876 level in 1898, a period associated with the so-called Great Depression in agriculture.

Although there are no official figures for brick output between the removal of the brick excise duty in 1850 and the earliest figures from the Census of Production introduced in 1907 a number of estimates were made of production in the intervening period. The most authoritative of these was that made by Robert Hunt, Keeper of Mining Records at the Geological Survey, who investigated the state of the industry in 1860, and produced a figure of 2,503,004,500 bricks made by a total of 1400 productive units. This suggested that in the decade after the lifting of the tax, output increased by 71 per cent; this significant rise of 100 million a year may well confirm contemporary opinion that the excise duty had retarded the development of the industry, both by increasing the selling price of bricks and discouraging innovation.[26] In 1886 an anonymous contributor to the trade press provided an estimate of the average annual output for each decade between 1820 and 1880, as well as an estimate for the current year.

Table 4.1 Estimates of Brick output 1820 –1886

1820-30	1210 million
1830-40	1330 million
1840-50	1662 million
1850-60	1884 million
1860-70	2070 million
1870-80	2490 million
1886	3000 million

Source: *Brick & Tile Gazette*, 11th May 1886

[26] Watt, K.A. *Ninteenth century brickmaking inventions in Britain; building and technological change.* Unpublished PhD thesis, University of York, 1990, p.158

These estimates are charted against the figures from 1785 to 1849 from the Brick Excise reports, and those from the Census of Production from 1912 onwards to show the overall upward trend. [see graph 4.5] [27]

Other writers estimated the number of bricks that were being used in the London area. In 1892 it was thought that about 800 million bricks were being supplied to London from a number of different brickmaking districts, of which Cowley was one, contributing about twelve per cent of the total. These figures, however, by their nature, appear to be rough and ready estimates, and can only provide a guide to the relative importance of each of the districts.

Table 4.2: Estimates of the origin of bricks supplied to London c.1890

Sittingbourne yards (Kent/Medway)	250 million
London yards	150 million
Peterborough and Great Northern Railway yards	100 million
Shoeburyness and Sheerness (Essex)	100 million
Cowley and Grand Junction Canal yards	100 million
Great Eastern Railway yards	100 million
Total	800 million

Source: *British Clayworker*, November 1892

Another trade journal in 1898, one of the peak years for demand both nationally and in the metropolis, anticipated that brick production for the London market that year would reach 1000 million.[28]

Although these figures confirm a general upward trend in production, we have identified cycles of fluctuating demand throughout the nineteenth century. Firms had to respond

[27] Richardson, H.W. & Aldcroft, D.H., *Building in the British economy between the wars*. London, 1968, Table 13, p.141
[28] *Builders Merchant*, March 1898

to these cyclical changes, and employment conditions within brick manufacture may have helped accommodate these variations. In an industry which relied on relatively little capital investment for much of the century, and was therefore heavily labour-intensive, elasticities in demand could be met by increasing or reducing the number of moulding gangs. Whilst this flexibility was advantageous, the timing of adjustments could be critical. The danger was to respond too quickly to a fall in demand or a drop in prices, and too slowly when conditions began to improve; as a commentator noted in the 1880s brickmakers sometimes failed to build up sufficient stocks before limiting production. Whilst brickfield owners benefited from the extensive use of sub-contacting, and the reserve pool of unskilled labour provided by agriculture, they were constrained by the seasonality of their mode of production. In the traditional style of hand brickmaking there was a lag of about nine months between digging the earth one autumn and the sale of the finished bricks in the following summer. If insufficient bricks were stockpiled at the end of one season there would be no bricks to sell in the spring when building work resumed after the winter layoff.[29]

Manufacturers, therefore, had to determine in the autumn of one year the amount of clay that needed to be dug for the following season's make. Of course clay could be dug at times other than the autumn, but then it would not benefit from the weathering action of the winter frosts and rains. At times when demand exceeded supply and high prices ruled, it was tempting to produce bricks as quickly as possible. Purists complained that such short cuts damaged the quality of the resulting bricks; Joseph Lockwood identified the dangers:

> One great cause of the inferiority of bricks is the unwarranted haste in which they are made; the field is often now bought, the earth prepared, and the bricks made ready for use in a few weeks; in fact as many months are required to prepare the earth properly as we now take only weeks to make.[30]

There were dangers in over-production, since this was likely to have a detrimental effect on cash flow. Whilst the excise duty was still in force, bricks were taxed during the production process, and payments were required every six weeks.[31] Moreover

[29] *Brick, Tile & Builders Gazette*, 9th August 1887, p.71
[30] *The Builder* 1845 p. 136
[31] *18th Report*... op.cit., p.170

manufacturers complained that the ten per cent allowance allowed for damage and breakages was insufficient. Although much of the damage occurred in loading and unloading clamps, bricks left standing on the brickfield over the winter months awaiting sale the following spring could be cracked by frost.[32] With the Excise Duty falling on production rather than sales, and accounting for about twenty per cent of the sale price, there was little incentive for the manufacturer to stockpile bricks against future demand.

Even after the repeal of the tax brickmakers were faced with another major outlay that inhibited speculative production. Most brickfields were held leasehold rather than freehold, and their operators were required to pay royalties to the landowner on the number of bricks made in addition to the ground rent.[33] Royalty payments were usually required to be made annually, at the December quarter day, on the previous season's production. As with the Excise duty brickmakers were faced with paying for bricks they might not sell until the following spring. Such outgoings required access to some working capital, and this is a subject we return to in Chapter Seven. Royalty payments, at about five per cent of the selling price, were a much smaller imposition than the tax, but were fixed for the duration of the lease, which might be up to twenty one years, and so were a greater burden when demand fell.

It is difficult to observe in the documentary record the type of adjustments in the size of their labour force that manufacturers might make from year to year to control production. In what other ways might the level of activity in the West Middlesex industry be observed? There are a number of possible indicators. The first is the number of entries for firms in trade directories; the second the number of brickmaking leases; the third the number of companies registered, but this is only really effective after the passing of the Limited Liability Act of 1862; the last the number of bankruptcies among producers which might suggest the impact of adverse trading conditions. The usefulness of these indicators can be tested for that period when the brick duty was still in force and for which we have output statistics. For example, if we examine the peak of demand in the mid-1820s, production in the London area was over 200 million bricks, which

[32] Ibid, p.171
[33] For a discussion of landholding and brickfield leases see Chapter Five below.

represented the activity of at least 250 moulding gangs, assuming that a gang could make about 700,000 bricks in a season. There could thus have been 1900 people employed throughout the London area.

The cycles of fluctuating demand during the century are matched by fluctuations in the price of bricks. Graph 4.4. has been compiled from prices published in the annual builders' price books, which tend to underestimate the volatility of market prices. The data for these price books was assembled annually, but at some periods prices changed from month to month. The edition of the 1898 edition of one price book urged caution on its readers as he counselled that at "certain times of the year bricks have secured abnormally high prices, such increase being due to the excess of demand over supply".[34]

Surprisingly, there is a notable lack of documentary evidence about brickmaking in the Cowley and Yiewsley areas in the early decades of the nineteenth century, although it seems likely that this part of the district was the first to be exploited after the opening of the canal. Its early prominence might explain why "Cowley stocks" became the generic name for the products of the West Middlesex brickfields.[35] One contemporary source suggests that the industry was well established before 1820; writing in 1818, Redford and Riches claimed that "several hundred persons are employed" in the Uxbridge area, and that clay-bearing land was changing hands at high prices, but how can this be corroborated?[36]

Trade directories are often used by historians to measure the size and location of particular business sectors.[37] In the case of brickmaking they do not substantiate a high level of activity in Cowley and Yiewsley but their reliability at this point may be questioned as there are very few entries for brickmakers at all. In 1823 the only brickmakers recorded in extra-metropolitan Middlesex were two at Brentford; in 1826 two were listed at West Drayton and one at Harlington; two years later one at Brentford

[34] *Laxton's Builders' Price Book*, 81st edition, 1898, p. xxiv
[35] The term "Cowley stocks" was being used at least by 1845. Sale notice in *The Builder*, 13th Sept 1845
[36] Redford, G. & Riches, T.H., *The History of the Ancient Town of and Borough of Uxbridge*. Uxbridge, 1818 (reprinted 1885), p.75
[37] A recent example of the use of directories can be found in Barnett, D., *London, hub of the Industrial Revolution: a revisionary history, 1775-1825*. London, 1998.

and one at Heston.[38] Other more reliable evidence makes it clear that there were five brickfields in Hayes alone in 1827, covering a not insubstantial forty-five acres.[39] One of these was owned by the architect John Nash, who had purchased eight acres of copyhold land and acquired a manorial licence to make bricks in 1826, at a time when he was occupied with rebuilding Buckingham Palace, and continuing his development of Regent's Park.[40]

There is some correlation between brickmakers whose activities are known from land transactions and those who appear in trade directories, but there are both a few brickmakers whose existence is only known from a directory entry and some for whom only a single lease remains. The omissions from directories may confirm certain characteristics of the industry, particularly in the first half of the century, that it was predominately small in scale and transitory in nature. The fact that a number of farmers were also brickmakers may also help explain some of the missing manufacturers; farmers who had freehold land would not need to apply for licences to make bricks, and would leave no estate records; and they might simply be recorded as farmers in the directories.[41]

Although the demand for bricks may have been the main determinant of the amount of activity in West Middlesex brickmaking, the exploitation of particular areas was subject to local circumstances. It seems likely that land was not easily used for brickmaking until after enclosure had taken place, since the fragmentation of ownership made granting licences difficult. Enclosure made different types of land use possible and encouraged innovation. [42] This could explain why Tunlow field in Northolt, the site of much of that parish's brickmaking, began to be used immediately after enclosure took place in 1835.[43]

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[38] Pigot & Co. *London & Provincial New Commercial Directory* 1823/4; 1826/7; 1828/29

[39] L.B. Hillingdon Heritage Service. *Hayes Valuation, 1827*

[40] LMA Acc. 180/174; Summerson, op.cit.p.184, 202

[41] The incidence of farmers owning the freehold of the land they occupied was, however, low by the nineteenth century, no more than ten percent of the total nationally. Overton, M., *Agricultural Revolution in England: the transformation of the agrarian economy 1500-1850.* Cambridge, 1996, p. 168. Thomas Shackle, who is shown as owner and occupier of a brickfield in Hayes, may have been a customary tenant of the manor of Hayes rather than a freeholder. L.B. Hillingdon Heritage Service. *Hayes Valuation, 1827;* LMA Acc. 538/1st dep/42/14

[42] ibid, p.162-164

[43] LMA Acc 289/454

Enclosure operated at a parish level but similar stimuli could affect individual landed estates. Landowners could refuse or encourage the exploitation of brickearth in their land. Although one brickmaker was working land at North Hyde, Heston at least as early as 1842, the provisions of the Passingham Estate Act of 1844 undoubtedly stimulated large-scale brickmaking. This act empowered the trustees of Jonathan Passingham to increase the income for the beneficiaries of his will specifically by granting licences to make bricks.[44] Within the next few years there were nine leases to James Hunt, Edward Westbrook and Ann Burchett.[45]

In the late 1820s and early 1830s, when demand and output were continuing to fall, evidence of new brickmaking firms, in the form of new leases, is hard to find. The trough in production was reached in 1832, whilst the Middlesex Deeds series touched bottom a year later. Estate records, however, provide a different impression: there were a number of brickmakers working land on two farms owned by Hubert de Burgh in Hillingdon in 1832. On Colham Manor Farm Messrs Stroud, George Stapleton, William Heron & Company, and William Buckland were operating; on Philpots Bridge Farm John Rutty, John Mills, William Hinds and Heron & Co. were established. Yet no leases survive for these businesses, at least not for this period, in the otherwise substantial de Burgh estate archive. As far as trade directories are concerned only William Hinds is listed, first as a farmer and brickmaker in Harlington (1826/7) and then in Heston (1828/29), but no brickmakers were identified in Hillingdon in either of these directories. [46]

Two brickmakers are recorded as operating in West Drayton in 1826, but neither appear to be in business two years later, and nothing more is known of William Burton or Samuel Townsend.[47] The trade directories do not list any brickmakers in Hayes before the 1830s, despite the presence of at least four in 1827.[48] Of these Thomas Shackle was a

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[44] Sale of North Hyde Depot estate 1842, LMA Acc .328/18; Passingham Estate Act 1844 (7 & 8 Victoria c.22)

[45] Schedule of deeds relating to the Passingham Estate, 1851. LMA Acc. 328/31

[46] The different locations may be just an example of topographical inexactitude. Pigot & Co. *London & Provincial New Commercial Directory* 1826/7; 1828/9

[47] Pigot & Co. *London & Provincial New Commercial Directory,* 1826-7; 1828-9

[48] *Hayes Valuation, 1827*

member of a prominent family in the area; he may also have been a brewer.[49] Mr Nias was probably the builder, Thomas Nias of Heston. [50] Nothing further is known of Isaac Seabrook. The fourth brickmaker is recorded in the Valuation simply as Hickman, without initials or forename, and this was almost certainly Henry Hickman, of Edgware Road, who had an interest in a brickfield in Botwell. He was a brickmaker for at least six years, and went bankrupt in 1831 with debts of over £1,500, although the cause of his failure may not be related to the difficult market conditions then prevailing, but rather to a lack of business acumen.[51]

The same fate also befell Robert Dove of Paddington, who operated a brickfield in Southall Green for five years up to 1829, and had made losses of nearly £3,500 in the period 1826-9. Dove, however, recommenced brickmaking and is the only brickmaker to be listed in Southall in 1834.[52] A third casualty of this period was Stephen Watkins, brickmaker and builder, whose home address was Portland Town, Regents Park. It is difficult to tell where his brickfield, of whose equipment there is an extensive inventory, was situated, but is likely that this is the same Stephen Watkins, who worked some years later at West Drayton. His debts were enormous, amounting to over £22,000, and his creditors received only sixpence in the pound, but his losses appear to relate as much to his building ventures as to his brickmaking enterprises, since his assets included a number of uncompleted houses.[53] However, although these three business failures might be taken to indicate difficult trading conditions in this period, we should not place too much reliance on them. The survival of bankruptcy records can be rather arbitrary, and many classes in the Public Record Office contain only sample or particularly interesting cases. Yet having said that, there may be clues in these bankruptcy files of the difficulties that brickmakers experienced; the accounts in Dove's file show bricks being sold at a

[49] Kelter, C., *Hayes: a concise history*. Uxbridge, 1988, p. 37
[50] *Kelly's Directory of Middlesex 1845*
[51] PRO B3/2572. Hickman appears in partnership with William Hickman,as brickmakers in St Pancras. Pigot & Co. *London & Provincial New Commercial Directory*, 1823-4
[52] PRO B3/1447; Pigot & Co. *London & Provincial New Commercial Directory, 1834*
[53] PRO B3/5292; *Kelly's Directory of Middlesex 1845*. Stephen was the son of George Watkins, who had owned land at West Drayton, part of which had been let in the 1820s to the builders Bennett & Hunt as a brickfield when they were engaged in building warehouses at St Katherine's Dock. The land was subsequently purchased by Samuel Pocock, who sold the land, once the brickearth was exhausted, to Messrs White, manufacturing chemists. Hunt was also a brickmaker in Heston, Bennett in Northolt. PRO RAIL 830/93-95; LMA Acc 328/47; WAM N107

loss in both 1826/7 and in 1829.[54]

By 1838 when demand and production were rising again there were seven entries in the directory for brickmakers including Heron, Stapleton and Stroud. We may perhaps assume that these firms were operating throughout the 1830s but there is little information, as far as leases are concerned, of any new firms starting up in this period; this contrasts with the 1840s when there were a number of leases from most parts of the Cowley district. Nor are there many indications of the scale of brickmaking that was taking place; an isolated account for Northolt recorded a Mr North making a combined total of 2,950,000 bricks in the 1835 and 1836 seasons, suggesting quite small levels of production. [55]

1836 was a peak year in brick production in England and Wales as a whole and in London and each of the suburban collection centres. Part of the large production in that year, up by twenty three per cent on the previous one, may be related to the building of the Great Western Railway; its route out of London went through the Cowley district, passing close to the canal and requiring the use of some land that would otherwise have been used for brickmaking. Construction of the line commenced with the building of one of its major engineering works - the Wharncliffe viaduct at Hanwell (1836-7) - but there is no direct evidence pointing to where the many millions of bricks used in it were made. It may have been possible to make them on site, but the proximity of the canal meant that they could easily have been brought from brickfields further west.

The period 1838-43 saw a major fall in brick output, both in the series for London and that for England and Wales generally. This is not surprising, perhaps, in the context of a economic depression nationwide; there was considerable unemployment, and much distress. There were different perspectives on the cause of this imbalance in the economy, which has been described as a "structural crisis", some blaming it on overproduction, others on under-consumption.[56] There are few brickmaking licenses

[54] PRO B3/1447
[55] LMA Acc 289/457
[56] Lloyd-Jones, R. and Lewis, M.J., *British Industrial Capitalism since the Industrial Revolution.* London, 1998, p.51-61

from the first half of the 1840s; Messrs. Heron & Rutter leased a 28 acre field at Botwell in February 1842, and J.W. Norton had a substantial holding at Yeading.[57] In Hillingdon James Hunt leased two fields on Philpot's Bridge farm in 1842, one of which had been worked by John Rutty (see above).[58]

The impression of the later 1840s is different, and output rose steeply from 1843 to 1847. As we have seen the exploitation of the Passingham estate occasioned a number of brickmaking agreements after 1844 in the Heston area. Both Thomas and Edward Shackle were active in Hayes and Joseph Bennett in Northolt.[59] The 1845 directory lists three brickmakers at Yiewsley, one at Cowley and one at West Drayton but was published too early to include entries for the six new leases at Heston that year.[60] The brickmaking industry underwent a significant change at the end of the decade. The removal of the brick excise duty in 1850 was not an isolated event, but part of a general liberalisation of trade that had started in the 1820s. The Peel government in the 1840s used the cushion of a budget surplus to remove a large number of duties, including those on a number of building materials; the duty on imported timber in 1841; that on glass, imposed as early as 1746, in 1845. The duties on the sea-borne shipment of stone and slates, introduced in 1794 as a result of complaints of unfairness by brick and tile manufacturers, had already disappeared in 1823 and 1831 respectively.[61]

A delegation of architects, builders and brickmakers complained to the Board of Health in January 1850 of the injurious effects of the high rate of tax, which when bricks were selling for about 30s 0d per thousand, made up twenty-five per cent of the price.[62] Once the Chancellor had acceded to these demands and announced that the duty was to be abolished, there was a need for consultation over the transitional period, because brickmakers held unsold stock on which the duty had already been paid and would be at a considerable disadvantage trying to sell them against newly made bricks on which duty was not being levied. Following a meeting of brickmakers at the London Tavern a

[57] LMA Acc.538/2nd dep/3501; L.B. Hillingdon Heritage Service. *Hayes Rate Book, 1842*
[58] LMA Acc 1386/96
[59] LMA Acc 180/181; 180/182; WAM N107
[60] *Kelly's Directory of Middlesex 1845*
[61] Cairncross and Weber, op.cit, p.319-320
[62] *The Builder*, 2nd February 1850 p.56; *18th Report* op.cit., p.173

number of them went to speak to the Chancellor. The delegation included some familiar names, with brickfields in London or Middlesex, or both: Messrs Heron and Rutter; Mr Bennett; Mr Hunt; Mr John Rutty; Mr Rhodes; Mr Bird; and Mr Pocock.[63] The Chancellor agreed to a drawback of 50 per cent on stock in hand, and decided to make the repeal of the duty immediate. He also agreed a drawback for those manufacturers who had recently entered into contracts at the old prices.[64]

The repeal of the tax on bricks had two effects, one anticipated, the other less certain. The expected fall in prices occurred within a few weeks with a reduction of five or six shillings in the price of stocks; Ward & Co., a Bankside merchant offered Cowley stocks at 35s in March 1850, and at 29s in the barge alongside in May, with the headline "Duty off bricks".[65] Strangely, however, Henry Dodd, who advertised regularly that year, held his prices at their January level right through the summer.[66] If the fall in prices was the desired result of the lifting of the tax, the stimulus to the trade that this occasioned cannot have been entirely predictable to contemporaries. Business benefited both from the removal of the restrictions to innovation that the duty had imposed (see above) and a bouyant market for the product. The growth in the number of deeds registered in Middlesex suggests that demand was rising quite steeply at the end of the 1840s. The first half of the 1850s saw a number of brickmaking leases granted in the Cowley district. Rudolph de Salis let land at Dawley to two London firms; one brickfield to Rutty and Verey, and adjacent land to Messrs Rhodes, both in 1853.[67] Further east the Passingham Estate trustees let the extensive Heston Farm to Messrs Heron and Rutter in May 1850, and a 27 acre brickfield at North Hyde to Samuel Tildesley in May 1851, which he extensively exploited over the next twenty years.[68] By contrast no leases survive for Hayes and Southall for this period. This may not be a reliable indicator of the amount of activity in this part of the Cowley area since there is a suggestion that Lancelot Shadwell,

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[63] *The Builder*, 23rd March 1850

[64] *The Builder*, 30th March 1850 p.49

[65] Ibid , 2nd March 1850; 11th May 1850

[66] Ibid, 5th January 1850; 17th August 1850; 28th September 1850. By August Dodd should have had new supplies of bricks on which the duty had not been levied.

[67] LMA Acc 969/62 & 63

[68] The brickearth was described as exhausted in 1871. LMA Acc 328/59 [1863] (citing an earlier lease); Acc. 328/105

a Northolt landowner, was looking enviously at brickmaking being carried out on land adjacent to his own - which was probably over the parish boundary in Hayes - and wishing to have a part in this lucrative opportunity, commissioned a feasibility study (see below Chapter Five.) [69]

The second half of the 1850s were less propitious for the trade, after a peak in demand in 1853 and a subsequent five-year fall. Symptoms of this were seen in the brickmakers' reduced need for ashes and breeze to use as fuel; in 1855 it was reported that they were reluctant to take up contracts for rubbish collection in the city, and were thus causing a serious problem for the local vestries. This hesitation was attributed to "a stoppage in brickmaking, and the lull in trade".[70] Nonetheless it was at this time that Samuel Pocock, who had been making bricks at Hillingdon from 1849, obtained a lease on a very large piece of land for an unusually long period (100 acres for 40 years) on the De Burgh estate. In 1856 the estate received royalties on brickmaking amounting to £700, on a make of nearly nine million bricks supplied by six manufacturers. Conditions improved in 1857 when royalty income was over £900, and again in 1858 (over £1000), but dipped the following year to £670, recovering to £1164 in 1860.[71]

The low make in 1859 reflects the trough seen in 1858 in both the Middlesex Deeds and Parry Lewis' national building indices. These conditions had their impact on prices, for in 1860 an architect complained of the high price of bricks, and argued that builders should refuse to build until bricks could be had at 35s per 1000. In reply an unnamed correspondent to *The Builder* lectured him on the workings of the market and explained that

> in the early parts of 1859, when depressing influences were working to contract the demand, but when the supply was plentiful, stock bricks were sold at the unremunerative prices of 23s and 24s per 1000. At the present time when demand is large, and the supply is limited, bricks are dear, and so they will remain until the conditions which make them so are altered.[72]

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[69] LMA Acc 289/129a

[70] *The Builder*, 14th April 1855

[71] The six manufacturers were William Clayton, D & C Rutter, John Rutty, James Stacey, John Taft and Samuel Tildesley. Pocock, however, paid no royalties until 1860. LMA Acc 1386/384

[72] *The Builder* 26th May 1860; 2nd June 1860

This suggests that brickmakers, faced with a surplus from the 1858 make which they found difficult to sell except at much reduced prices, adjusted production in the following season causing the resultant shortage and high prices at the beginning of 1860.

The Middlesex industry appeared busy in the 1860s, although there were fewer new leases, perhaps because many leases granted in the 1850s for terms up to 21 years, remained in force throughout the next decade. On the De Burgh estate brick royalties remained at over £1000 per annum until 1868 when they plunged to £631. In 1871 royalties were only £221, coming from just two brickfields, suggesting that the other brickmakers had gone out of business, that their leases had expired, or even that the brickearth was now exhausted.[73]

A number of Middlesex brickmakers were interviewed by H.W. Lord, an inspector for the Children's Employment Commission in 1866. As a result there is more detailed information about the local industry at this period than for many others. In his evidence Mr Tildesley estimated that there were about 250 stools at work in the district between Slough and Southall. Based on the output of one firm, whose eighteen stools produced 12 million bricks, the whole area had a potential annual make of 1,666 million bricks. Tildesley himself with 30 stools operating was making around 20 million bricks. Lord also reported on Messrs Stroud, Holland & Company, and the Southall Brickmaking Company, all at Southall, and Smythe's at Dawley. These were substantial undertakings: Holland's, the smallest, had five stools, Smythe's eight, Stroud's fourteen and the Southall Brickmaking Company eighteen. A number of makers were active in Hayes parish: Henry de Bruno Austin, who was at the same time developing a large estate in West Ealing, operated a brickfield with nine stools, and Edward Shackle one with eight stools, both at Botwell, whilst Henry Dodd had twenty stools working at Yeading.[74] In 1867 Matthew Newman, described as a farmer at Hayes Court Farm, purchased 26 acres of land for the sum of £3120, proposing to make bricks on it.[75]

Demand declined quite sharply after 1868. As we have seen with the De Burgh estate a

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[73] LMA Acc 1386/384
[74] L.B. Hillingdon Heritage Service. *Hayes Valuation, 1865.*
[75] L.B. Hillingdon Heritage Service. Minet Archive N477

number of brickmakers may have given up by the end of the decade. None of the firms interviewed in 1866 appears to have been operating four years later, suggesting either that they had responded to poor market conditions and ceased trading, or that the very successes of the earlier part of the decade had resulted in the exhaustion of the available brickearth. Of the surviving brickmakers Samuel Pocock, who it is known was operating at Hillingdon many years later, was not listed in the 1870 trade directory. The other, D & C Rutter, was also still operating at Heston. Whatever the apparent market conditions the trade directories suggest a good number were still operational. Shackle and Maynard continued to work fields at Hayes, there were four firms in Hillingdon, two each at Northolt (Chapman and Nutman) and Cowley and one at Greenford (MacGuire).[76]

Despite the trough in demand there were new entrants to the rank of producers at the end of the 1860s. Frederick Henry Cooper took over in 1868 what appears to have been an existing brickfield at Yiewsley, on land that was adjacent to Heron's.[77] In the following year one of the first limited companies in Middlesex brickmaking commenced operations; the Cowley Brick Company Ltd, which was listed in the 1870 Directory, operated until it was voluntarily wound up in 1880.[78]

In the 1870s the national buildings index indicates rising demand to mid-decade, then a falling away at what was the start of the Great Depression. The Middlesex Deeds index, by contrast, rises smoothly throughout the decade and only enters the long trough after 1881. At the beginning of the new decade many familiar names were still operating - Rutter and Studds at Heston, Stacey at Yiewsley and Shackle at Hayes. Other brickfields had changed hands. The Cowley Brick Company had been dissolved but its erstwhile manager, Herbert Barlee, was listed as a brickmaker at Cowley, perhaps operating from the same field. Thomas Maynard, later Maynard, Son & Co., had bought in 1873 the lease to the Dawley brickfield previously operated by Rutty and Verey (1853-1870) following the latter's bankruptcy. [79] John Minter had taken over some of Tildesley's

[76] *P.O. Directory of Six Home Counties 1870; P.O. Directory of the Building Trades 1870.*
[77] LMA Acc 1368/108
[78] PRO BT31/1458/4374
[79] LMA Acc 969/66

interests. The site that Holland & Harman had used in the 1860 had reverted to agricultural use.[80] Samuel Pocock does not appear, but a George Pocock is listed as a brick merchant at Yiewsley.[81] Other merchants who made an appearance were Osborne, Stevens & Company, based at Uxbridge, who had leased a Southall brickfield in 1878 at a fixed royalty of £337-10s per annum and a ground rent of £67-10s; Eastwood & Co., the established Kent and Essex brickmaker and merchant, had opened a depot at Yiewsley.[82]

There is evidence that in 1881 the Earl of Jersey was keen to exploit parts of his Heston and Southall estates, which were close to his house at Osterley. Much of this land did not have immediate access to the canal, and bricks made there had to be carted to a wharf at Windmill Lane, Southall. This inconvenience would seem to make this land unattractive to brickmakers, but its exploitation at this time may have been occasioned both by the strong growth in demand in the 1870s and the high prices that resulted, and by the fact that many of the more obviously accessible canalside sites were worked out after several decades of activity. One lease that Jersey granted was to the firm of L. Normand et Companie, from Hesdin near Calais, the only example of a foreign firm entering the English market, though there is no further evidence that this firm actually produced any bricks at this site.[83]

The long trough in demand associated with the Great Depression had an impact on one of the major figures in Middlesex brickmaking. Samuel Pocock, bankrupt in 1871, was back in business by 1875, and took up a new lease in 1882, only to go into liquidation the following year. His interests were purchased by a Paddington-based builders' merchant Broad & Harris for £1500 in 1884.[84] Another casualty at this period was J.H. Harrison, whose brickfield at North Hyde, Heston, was put up for sale in April 1883; there is little information about this manufacturer, but the inventory of his property

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[80] LMA Acc 405/1

[81] This George Pocock is most likely the son of Samuel Pocock, who appears to have been running the business by 1880. He appears before the Uxbridge Petty Sessions on a charge of infringing the Factories Acts by employing boys without medical certificates. *The Times*, 19th October 1880, p.6

[82] LMA Acc 1103/6

[83] LMA Acc 405/7

[84] Guildhall Ms 12335; *Times*, 21st and 31st March 1883

includes a steam engine and a brickmaking machine, as well as a barge and several carts.[85] There are few estate records for this period. In 1886, at the bottom of the recession, seventeen brickfields were still operating in the Cowley district: four each in Hayes and Southall, two each in Cowley, Harlington and Hounslow, and one each at Heston, Hillingdon, and West Drayton. There does not appear to have been any activity in Northolt. There was a mixture of long established manufacturers such as Edward Shackle, J. & A. Stroud and D. & C. Rutter, and newer businesses such as James Burchett & Sons, Henry Odell and Broad, Harris.[86]

Brickmaking in the Cowley district may have been partly protected from the full effects of the recession by the cutback in production in London's inner suburbs. "Brickmaking in the immediate vicinity of London has almost ceased", claimed a trade journal in April 1886, as the result of a number of pressures. Not only had much of the workable brickearth been exhausted, but local sanitary authorities were more strictly enforcing the nuisance regulations against smoking brick clamps, and cheaper carriage rates were making it easier to bring bricks to the capital from farther afield. Even before the London County Council passed a bye-law in 1890 designed to prevent brick, tile and similar burning being carried on in ways that caused a nuisance, there was antagonism to stock brickmakers in built up areas.[87] Paddington Vestry received complaints about noxious fumes in 1859 and 1861.[88] Chiswick Local Board had taken action against a brickmaker at Stamford Brook whose operations had caused offence to the residents of nearby Bedford Park, occasioning an editorial that suggested that brickmakers could reduce the unpleasantness of clamp burning if they more carefully separated the breeze from the vegetable matter with which is was often mixed.[89] The problem was such that it was predicted that "the outcry against clamp burning in brickyards near London suburbs...will probably drive the trade eventually into more rural spots...or compel an alteration in the method of manufacture".[90] If brickmaking in inner London was under pressure, away from the centre of town many brickmakers were still operating, sixty

[85] Sale notice. *Uxbridge Gazette & Middlesex & Bucks Observer*, 21st April 1883
[86] *P.O. Directory 1886*
[87] *Brick, Tiles & Potteries Journal*, 11th November 1890, p.1
[88] City of Westminster Archives. Paddington Vestry Sanitary Committee 5th October 1859, 6th June 1861
[89] ibid, 8th July 1890, p.2-3, 7
[90] *British Clayworker*, February 1893, p. 218

makers north of the Thames, and forty-five on the south side.[91] The difficult conditions for brickmaking had an impact elsewhere; the removal of rubbish from the centre of the city was inextricably tied to brickmakers' need for ashes, and by the end of 1885 rubbish was beginning to accumulate at the London refuse wharves as "a consequence of the great depression in the brickmaking trade".[92]

At the same time prices were falling; stocks were selling for 40s per 1000 in July 1885, and 42s 6d in December of that year, but their price had fallen to 31s in February 1886, and to only 25s a month later. These prices prevailed for the remainder of the year and throughout the following one. [93] Faced with diminishing returns manufacturers reduced the rate they paid to moulders for each thousand bricks, from 4s 8d to 4s 2d in 1884 and by a further cut of 2d in 1886.[94] Some manufacturers had cut their rates even earlier, occasioning a strike of brickmakers at Southall in 1883.[95] The previously prevailing rates had been in place since 1876, but the prices of consumer goods had been falling since the early 1870s, generally improving the standard of living for many workers.[96]

If conditions were difficult in 1886, brickmakers were more confident in the following season as demand levels gradually improved, even though they did not return to 1881 levels until the mid -1890s.[97] This improvement continued in 1888 when an extra 4d was added to the rate for moulding, restoring half the amount lost earlier in the decade.[98] Better market conditions stimulated the trade union action of the following years, and the long strike in the Cowley district in 1891.[99]

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[91] *Brick & Tile Gazette,* 20th April 1886

[92] Mr A.Allen, Surveyor to the Vestry of St Luke's, Shoreditch. Ibid, 12th January 1886

[93] Ibid, 15th July 1885; 8th December 1885; 9th February 1886; 9th March 1886; 12th July 1887; 13th December 1887.

[94] *Brick, Tile and Potteries Journal* 9th June 1891

[95] Ibid, 28th April 1883, 5th May 1883

[96] For a discussion of the evidence for a lowered cost of living see Fienstein, C. " A new look at the cost of living 1870 - 1914" in Foreman-Peck, J. (ed) *New perspectives on the late Victorian economy: essays in quantitative economic history 1860 - 1914.* 1991

[97] *Brick, Tile and Builders Gazette,* 9th August 1887

[98] *Brick, Tile and Potteries Journal* 9th July 1891

[99] see below Chapter Six

After the industrial relations problems of 1891, 1892 proved a successful year, not least because of good weather conditions.

> In the Cowley brickmaking district the season proved an uneventful one, the long strikes of the previous year having had the effect of demonstrating the folly of "killing the goose which lays the golden eggs". Work steadily proceeded from the commencement of moulding, which started on April 4th and terminated on September 15th. The weather was exceptionally favourable for brickmaking operations and an unusually good burn was the result. The demand was fairly good, being stimulated by the suspension of all brickmaking operations in Shepherds Bush and Acton..... The Cowley brickmaking industry having suffered so severely from a long series of seasons of depression, it is hoped that better times are ahead; but the constantly recurring labour question checks all spirit of enterprise, and effectually stifles any desire to extend brickmaking operations.[100]

Concerns over industrial action were such that a new clause was inserted in some leases that provided an exemption from the minimum quantity requirements, that were a feature in almost all agreements, if the manufacturing season was disrupted by stoppages. In 1895 D & C Rutter obtained a new lease on the De Burgh estate that reduced the minimum royalty payment from £350 to £150 in circumstances where there was "a general strike or lockout in the district....for any period exceeding two calendar months".[101]

By 1890 the number of brickmakers had reduced slightly from those operating four years previously. Although many firms were the same, both the fields in the Botwell area of Hayes appear to have ceased production.[102] Brickmaking in Middlesex was now becoming more difficult, with competition from the Fletton producers on the Lower Oxford Clay added to that already provided by the stock brickmakers of Kent and Essex. The brickearth of many sites had become exhausted: in 1889 the Rutter brickfield on Heston Farm had ceased production and the land reverted to agricultural use, with the exception of a five acre field let to Brown & Mecklenburg.[103] The Earl of Jersey continued to let plots for brickmaking, but these were generally fields that did not have immediate access to the canal, and the terms of these leases became shorter, for between

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[100] *British Clayworker*, January 1893

[101] LMA Acc 1386/382

[102] Two directories published by Kelly & Co have slightly different information, one listing fifteen brickmakers in 1890, the other sixteen. *Kelly's Directory of Middlesex, 1890; Kelly's Directory of Uxbridge, West Drayton, Southall... for 1890.*

[103] LMA Acc 405/1

four and seven years. [104] In some cases the period could be even less, especially near Southall, where land was being sold for building; in 1910 F.C. Reed took up a brickmaking lease on an annual renewal.[105]

Demand rose through the decade reaching a peak in 1898. The Cowley industry suffered relative to the Kent and Essex stock makers and to the Fletton producers because of the industrial disputes, not only in 1891 but also two years later. [106] Despite this the 1893 season was notable for its good weather and work was less interrupted than in 1891.[107] 1895 was also a good year for the Cowley makers, with weather again fair, resulting "in an all-round average of bricks of excellent quality". Prices, however, had not yet risen to a level to allow manufacturers to make good profits, and it was felt that "a stimulus was needed to place this industry on a sound commercial footing". [108] There was optimistic talk that the brickfields in Heston, which in earlier decades had made a major contribution to the output of the Cowley district, were to reopen, under the control of Paul Mecklenburg.[109] It was in that year that the New Patent Brick Company of London Ltd was formed to manufacture bricks using the Invicta patent machine at Northolt.[110] But amidst this optimism a brickfield on Rose Farm, Isleworth was sold by order of the receiver.[111]

Demand outstripped supply in the spring of 1897, to the point, a journalist on the *British Clayworker* reported, that "London is crying aloud for bricks". Bricks were required not only for a busy housebuilding sector, but also for civil engineering projects. It was alleged that the needs of the Great Central Railway, the last major trunk route in England, and Central London Railway, had used up most of the available supply of bricks, causing prices to rise by two or three shillings per thousand, and threatening a brick famine. The mild winter of 1896/7 had also meant that building work was far less curtailed than usual and stocks of materials were being used up before the new season's

[104] Mecklenburg (1890), Hiscock (1896) LMA Acc 405/7; Watson (1898) Acc 405/1
[105] LMA Acc 405/1
[106] *British Clayworker*, May 1893, p.32
[107] Ibid, January 1894, p.203
[108] Ibid, January 1896, p.237
[109] Ibid, September 1896, p.152
[110] Ibid, August 1896, p.124
[111] Ibid, September 1896, p.xxi (sale notice)

make came to market.[112]

In 1898 the peak in the demand that we have seen in the housebuilding index was echoed in the views of contemporary commentators. One trade journal estimated that the demand in the London area had now reached one thousand million, and enthused that

> Possibly at no time in the history of the brickmaking industry has there been such a large and steady demand in London for bricks...At present very small quantities are being offered, all the present stock on hand being held for higher prices. It is felt that, owing to the extraordinary demand, that even when the new production ie, Season 1898, comes on the market, there will not be much reduction in the price. [113]

The price of stocks had risen from 24s per thousand to 40s 6d in a matter of two years.[114]

But, whilst demand had been strong in the 1890s, there were warnings from contemporary commentators, who recognised that the nature of the industry had changed and that Cowley makers had to contend with competition from other districts, particularly from machine-made bricks. Fletton bricks were being brought to London in large quantities.[115] Certainly the manufacturing methods still in use in parts of the West Middlesex industry appeared primitive compared to those being used elsewhere in the country. [116] There were also complaints about the quality and appearance of hand made bricks. The Queen Anne revival school in architecture had encouraged the use of red rather than yellow bricks, and these could not be made by the methods traditional in Middlesex.[117]

In 1899 there were fourteen brickmakers working in the district, although several of these had fields in more than one parish. For example Broad & Co. were established in North Road, Southall and at West Drayton, James Day Burchett Ltd at Harlington,

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[112] ibid, April , May 1897. Messrs Studds, with brickworks on the canal at Iver, just west of Uxbridge, had extensive contacts to supply the Great Central. City of Westminster Archives. Paddington Vestry Works Committee, 23rd January 1896.
[113] *Builders Merchant* vol.1, March 1898
[114] Ibid
[115] *British Clayworker*, January 1898, p.244-5
[116] See the article describing Broad & Co.'s Cowley works: *British Clayworker* October 1898, p. 195-6.
[117] Cox, op.cit., p.14; red bricks had to be fired in kilns. Ward, H., "Brickmaking". *Institution of Civil Engineers, Minutes of Proceedings*. Session 1885-86, part iv., p.7

Dawley and Hounslow. Allowing for these pluralists it is likely that as many fields were being worked as in the past, but predominantly by larger firms.[118]

The problems the Cowley industry faced became more obvious once the building cycle went into its downward phase in the early years of the new century. Already in 1899 trade was of an "unexciting character", and prices were beginning to slip from their peak of the previous year (40s.6d). The outbreak of the South African War in October caused a general depression in trade. There were difficulties in two particular areas; on the one side was the cost of the stock brickmakers' traditional source of fuel - the ashes collected as part of the capital's rubbish - on the other the failure of the owners to regulate output, prices and wages. In the case of fuel one of the advantages available to the Fletton producers was the high carboniferous content of the Lower Oxford clay, which reduced the quantity of additional fuel required, and contributed to the lower cost of raw materials. Theoretically the ashes used in stock brickmaking, as a waste product, were inexpensive, but in 1900 the balance had tipped in favour of using coal dust. In one respect the Cowley trade was the victim of its success in the 1890s. The increase in output had increased demand for ashes, forcing prices up, and had inflated production. The relative inefficiency of ashes as a source of fuel, because it only retained residual calorific value as a result of incomplete combustion, meant that they were required in much greater quantity than was the case with coal dust; 7 cwt of house dust was required to burn 1000 bricks, as against only 2.5 cwt of coal dust, a cost, at 1900 prices, of 4s 6d against 3s. [119]

The trade press suggested that failure of the Cowley producers to establish an effective employers' organisation put them at a disadvantage in the market place. The Cowley district, they claimed

> presents a striking illustration of the immense loss to the manufacturers of a district, through the lack of an effective trade combination. In the old days it was an accepted fact that Cowley stocks always sold at two or three shillings per thousand above Kent stocks; but the Cowley markets [sic] have for some time past seen Kent bricks selling for two or three shillings per thousand above the price realised by Cowley bricks - an object lesson which, it is hoped, will have some effect in emphasising the advantages of combination.[120]

[118] *Kelly's Directory of Middlesex, 1899*
[119] *British Clayworker*, January 1900, p.313
[120] Ibid, p. 311

The Kent and Essex Association had by then been in operation for a decade, having been formed in an attempt to forestall the collapse of the industry in the face of wage demands from the men and low selling prices. The objects of the Association were to fix the minimum selling price, to restrict output when demand was slack and to regulate wages.[121]

If the Cowley trade was suffering in 1900 for want of an employer's trade association, this cannot have always been the case, since the Kent and Essex Brickmakers' Association claimed to have collaborated with a Cowley Brickmasters' Association during the industrial disputes of 1891 and 1892.[122] Moreover during the long strike of 1891 the Cowley masters evidently acted in concert (see chapter 6 below). In 1900 stiff competition from the Fletton producers brought about a severe crisis for the stock brick manufacturers in Middlesex, Kent and Essex. The Fletton industry had grown rapidly in the boom years of the late 1890s, when nine new companies were started in the Peterborough area. When demand fell both in London and nationally there was considerable overproduction and consequent falling prices. The stock brickmakers suffered because of the large quantities of Fletton bricks in circulation, causing Kent and Essex firms to have over a million more bricks in hand in October 1900 than they had had at a similar time in the previous season. The Kent and Essex Brickmakers' Association encouraged makers in Kent, Essex and the London districts to reduce wages to 1896 levels and to restrict output.[123]

How were the bricks made in the Cowley district sold to builders? There were three likely routes: the manufacturer sold direct to customer from his brickfield; the brickmaker sold through his own office at a railway station or canal wharf nearer the city; or he supplied his goods to a brick or builders' merchant. In earlier times it appears that most bricks were made by the person who used the bricks, from material found at the building site, or they were carried to the site by cart from a local brickmaker. Some bricklayers and builders were also brickmakers, and the brickmaking side of the business

[121] *British Clayworker*, October 1990, p.251
[122] Ibid
[123] ibid

was designed to provide bricks of the quality, and in the quantity, required to fulfil contracts. One of the best known of such combined operators was Stephen Bird, who was based in Kensington; he was one of the London brickmakers who gave evidence to the Commissioners investigating the excise duty on bricks in 1836. Bird had a brickfield in the Potteries area of Notting Hill, and on the Edwardes estate in South Kensington.[124]

The ability to source bricks from one's own field could be important, in cases where the construction site did not provide a suitable brick clay to allow bricks to be made there, and when major contracts produced a demand for bricks that could not easily be met from the smaller local brickworks. Such problems were experienced in one of the major projects of the early years of the nineteenth century, the building of the West India Dock. The contract for much of the construction of warehouses and dock walls was awarded to Messrs William Adam, Alexander Robertson and Daniel Robertson, a firm that combined materials supply with building. They operated their own timber wharf, brickyards and quarries. However they found the clay on the Isle of Dogs was unsuitable for brick production, and the results were inferior. The dock company, faced with a shortfall, had therefore to source bricks from a major supplier, using the long established business of William Trimmer whose brickyards were in Brentford and Hammersmith. [125]

The building industry in the nineteenth century experienced a number of changes, one of which was the appearance of the general contracting firm, providing all the disciplines of building work previously supplied separately by carpenters, bricklayers and plumbers. One of the earliest such contractors was Alexander Copland, who employed seven hundred men at the end of the eighteenth century. These large firms were a response to two developments. The first the increasing size of building contracts, not only major civil engineering projects such as docks and railways, but also public institutions such as workhouses, asylums and hospitals. Copland had earned over £1 million building barracks. [126] The second was the change in the method of awarding contracts, particularly for government buildings. By the early nineteenth century competitive

[124] Survey of London. Vol. XXXVI. *North Kensington.* London, 1973, p.71, 342; Vol. XLII. *Southern Kensington: Kensington Square to Earl's Court.* London, 1986, p.243; *18th Report...*, op.cit., p.158
[125] Survey of London. Vol. XLIII. *Poplar, Blackwall and the Isle of Dogs: the parish of All Saints.* London, 1994., p.254
[126] Powell, C., *The British building industry since 1800; an economic history.* 2nd edition, London, 1996, p.18-19, 31

tendering had been adopted and it was found more efficient to contract for whole buildings rather than make separate agreements for each trade. By mid-century *contracting in gross* was in widespread use, and encouraged the development of multi-disciplinary firms.[127]

These major contractors, of which Thomas Cubitt is the best known and most thoroughly documented, set up their own works to provide materials and fabricate many of the components used on their projects. In addition to a major works on the bank of the Thames, and the brickfields attached to his many estate developments, Cubitt also purchased a brickfield at Burnham in Kent.[128] Among the other large firms were those of George Myers, who had workshops at Ordnance Wharf, near Westminster Bridge and probably a brickfield in Ealing in the 1850s, and Holland & Hannen, who operated a brickfield in Southall in the 1860s.[129]

The growth of the builder's merchant or brick merchant, was less to do with scale of operation, than with the transport of materials from some distance into London. Because London had a plentiful supply of locally-made bricks but had always to bring stone at some distance to the capital, it is likely that agencies grew up first in the stone trade. If stone was being brought a considerable distance into London, it made commercial sense for the quarry owner to appoint agents to take orders and arrange the local distribution at the London depot to which the stone was shipped, be it a canal port like Paddington or a wharf on the Thames. It is not clear when such agencies first started, but certainly a number were in operation by 1850. By that year at the Devon wharf, Regent's Canal in Mile End there was a depôt for the Devon Haytor Granite company.[130] Such agents might be employees of the company, but it seems more likely that they would work on commission in freelance capacity. Such agents could then take

[127] Ibid, p.28
[128] Hobhouse, H., *Thomas Cubitt, master builder.* 1971. Chapter 14, p.281ff
[129] Spencer-Silver, P., *Pugin's builder: the life and work of George Myers.* Hull, 1993, p. 82,89. The brickfield let on a 21 year lease from 1858 was worked out by 1875 and reverted to agricultural use. LMA Acc. 506/15; 405/1
[130] *The Builder*, 23rd February 1850

on similar work for other producers of stone or for suppliers of different types of materials. Luard Beedham & Co advertised in the same issue of *The Builder* as the Devon Haytor, and were importing French stone from Failaise and Caen. Of clay-based products firebricks were the first to be sold by agents in London, for two reasons. First, there was no suitable clay for this kind of brick in the vicinity of London, and secondly their higher value compared to common building bricks (at least twice the price of London stocks) made it easier to absorb the transport costs. So firebricks were brought from Stourbridge, Newcastle and Wales by William Ward of Honduras Wharf, Bankside in 1845, and he also sold a variety of other building materials; keen to expand his product range he solicited the business of "country brickmakers wishing to introduce their bricks, white facings and others, in the London market [who were invited to] send samples and prices for cash." [131] Amongst standard building bricks it was again the higher value Suffolk white and red facings that found London agencies. Although they were set up to handle water-borne brick supplies, similar ones operated for bricks brought to London by railway by 1850. The goods yard at Kings Cross housed agencies for a number of brick firms; Robert Beart's company established a London base soon after the formation of the firm, and other companies with offices in the Great Northern goods yard were Joseph Cliff & Son, and William Dennis and Sons (based like Beart at Arlesey in Bedfordshire). [132]

Builder's merchants became important intermediaries in the supply chain between the manufacturer of materials and the builder. Their rôle as wholesalers grew as the distance between supplier and customer increased, especially when many of these customers were small firms. Generally speaking the longer the distances that materials were carried the larger the size of each consignment. If a builder bought from a brickmaker only a mile away, the bricks were delivered by the cartload. When that brickmaker was ten or more miles away and consigning his bricks by the boatload along the canal there was a need for an intervening wholesale function. Boats were unloaded at the merchants' wharf and bricks conveyed by cart in much smaller loads.

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[131] *The Builder*, 2nd August 1845

[132] *P.O. London Directory 1863*

Undoubtedly the brickmakers who worked the canalside sites in West Middlesex supplied some builders direct, whilst sending much of their production to the merchants at Paddington basin. Most of the former were most likely builders working on a small scale in the local villages, or in the larger urban centres of Southall, Uxbridge and Ealing. In the absence of any surviving set of accounts for a Cowley brickmaker it is difficult to go beyond speculation about the nature of these relationships, and the proportions involved.

There was a large increase in the number of builders merchants in the last quarter of the nineteenth century; in 1870 there were 100, but by 1910 there were 1300, the largest of which had outlets in three or four cities.[133] Many London merchants had a number of sites, usually canalside or riverside wharves, to supply different parts of the city; those along the Thames received Kent and Essex bricks brought up by barge, and others on the Regent's Canal were able to receive deliveries via the Thames or the Grand Junction Canal.[134] For example, Messrs W & T.N. Gladdish, had depôts at Belvedere Road, Lambeth, Wharf Road, City Road, Pratts Wharf, St Pancras, and Danvers Wharf, Chelsea.[135] After 1850 a significant number of bricks were brought to the capital by rail and builders' merchants set up yards at railway stations. One such company was Peters Bros, which had depôts at Upper Ground Street, S.E., 7 North Wharf Road, Paddington and the Bricklayers Arms station, Old Kent Road.[136] The inland port that grew up where the Paddington arm of the Grand Junction Canal terminated became an important centre for the building materials business, as it did also for hay deliveries and the disposal of London's waste. In 1863 there were more than forty brick and tile merchants in London, seven of whom were in the Paddington Basin, in addition to those manufacturers such as Tildesley and Rutty who also had depôts there. In the later decades of the nineteenth century a number of these merchants were also manufacturers in their own right; this vertical integration may have been an attempt to secure regular supplies of bricks when demand was high and supplies were short. The firms of Odell & Co., Broad & Co., and William Mead all had wharves at Paddington as well as brickfields

[133] Powell, op.cit., p.87
[134] ibid
[135] *Marchant & Co's Builders and Building Trades' Directory for 1857.* London, 1857
[136] *Post Office Directory of the Building Trades 1870.* London, Kelly & Co., 1870

to the west of London. (see also Chapter Eight)

Coles, Shadbolt was another company which combined manufacture, in this case bricks and cement, with a wholesale business. Their cement works were at Harefield, just north of Uxbridge, and they had depôts at sites in London, Middlesex and elsewhere in the country. Some idea of the rôle that such firms played can be inferred from a list of creditors identified in the documents setting up the limited company in 1904. There were 225 creditors recorded, owed a total of over £7000, including a number of brick, gravel and cement firms, amongst them the Arlesey Brick Company, Broad & Co. Ltd., two fletton producers B.J. Forder & Son Ltd. and the London Brick Company, Odell & Co. Ltd, and W.J. Studds.

It is not yet clear when the first advertisements for bricks appeared. Newspaper advertising grew considerably in the early part of the nineteenth century but up to 1848 was subject to excise duty. Advertising was sensitive to economic and fiscal pressure, and the volume of adverts reduced when the duty was raised in 1815, and expanded rapidly when it was reduced again in 1833. [137] Advertising was responsive to the business cycle and there were obvious peaks in 1825 and 1847.[138] However trade journals were not subject to the duty and advertisers could make use of outlets like *The Lancet* (1823), the *Mining Journal* (1835), the *Chemical Gazette* (1835), and *The Builder* (1843). The first adverts for bricks appeared in *The Builder* soon after its launch.[139] A few manufacturers advertised their own bricks, but only rarely are these Cowley brickmakers. For example, Henry Dodd, who was based in Hoxton, advertised regularly in 1850, H. Kyezor, of Spring Grove near Hounslow in 1870. [140] A number of brick merchants advertised the range of products they supplied, including cement and bricks from different parts of the country. One such was Benjamin Gough of Newington Butts, who offered his customers white and red Suffolk facing bricks as well as "Cowley and Kent bricks of all descriptions". [141]

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[137] ibid, p. 29
[138] Nevett, T.R. *Advertising in Britain: a history.* 1982. p. 26
[139] ibid, p. 43
[140] *The Builder*, 5th January 1850; 25th June 1870
[141] *The Builder*, 9th February 1850

The London stock brick was a basic building product, produced in large quantities across a wide area surrounding the capital. If customers were looking for stock bricks did they distinguish between the types of bricks produced in the different brick areas? As we have seen the bricks from Cowley makers sometimes seem to have sold at a premium compared to those from Kent and Essex, but this differentiation seems not to have extended to the level of distinguishing between the output of particular makers. No individual brickmakers in the Cowley area appear in brick merchants' advertisements, only a generalised "Cowley stocks". By contrast, some manufacturers in Kent are identified specifically. In 1860 Eastwoods advertised Cowley, Kent and Essex bricks, but had also an exclusive agency for a number of named Kent brickmakers, among them Messrs Butcher of Halstow and Otterham. [142] [see Illus. 4.1]

The idea of brands was slow to be established for bricks, perhaps since bricks were such a basic material, and the possibilities of differentiation were limited. One of the first branded bricks was the Beart perforated gault brick, which was the subject of a patent and licensed to other brickmakers; architects sometimes asked for them specifically. Builders on an estate in Kensington in the 1870s were required to use Ipswich, Suffolk, Gault or Beart's Patent Bricks, presumably to ensure a paler look than yellow stocks would have provided.[143] In this case the product was readily identifiable not by its colour and texture - there were other types of gault brick - but by the perforations. A patent was an important way of distinguishing a product, especially in the period before the Trade Marks and Designs Act of 1875 made it possible to register a trade mark. This was the case with cement. Cement seems to have been the building material where sales of named brands were established early, perhaps because the need for effective hydraulic cements to cater for the civil engineering needs of Victorian builders produced several patented processes.

As well as sales direct from the brickyard and sales through builders' merchants, it was not uncommon for bricks to be auctioned, and notices of auction sales appeared regularly in the press. The background to these auction sales is not always clear, although

[142] *The Builder*, 5th May 1860
[143] Survey of London. Vol XLII, op.cit., p.170

some must have resulted from the bankruptcy of the brickmaker, or cash-flow problems. In 1860 "120,000 very sound place bricks" were advertised at Uxbridge with free use of the wharf for loading into canal boats.[144] In 1875 E.P.Newman auctioned five million bricks produced on the fields of Waring Brothers at Southall.[145] Twenty years later the same auctioneer sold two million bricks on behalf of Messrs Burchett & Son.[146] As well as sale notices from brickmakers and auctioneers, there were also "wanted" advertisements. In 1860 a Dalston builder or agent was in the market for 325,000 stock bricks to be delivered to Hounslow Barracks. [147] The sampling of the trade press has not been thorough enough to provide conclusive evidence, but it may be that these types of sales became less common later in the century as the number of merchants grew and there was more vertical integration between manufacturers and wholesalers.

Throughout the nineteenth century, and again in the twentieth, when, in addition to the operation of the business cycle there were the major disruptions of two world wars, brickmakers had to adjust to considerable fluctuations in demand. There were also major changes in the market in which they operated, which opened out from a local to a regional, and finally to a national one, as the newer transport facilities increased the distances over which supplies could economically be distributed. The growth of long distance trade created a need for links in the supply chain, and the number of builders' merchants increased considerably in the late nineteenth century. There was a trend towards vertical integration, with brickmakers and wholesalers combining. Firms grew in size, and introduced varying degrees of mechanisation; these changes are discussed in later chapters, particularly Chapter Seven.

Despite increasing sophistication in organisation, increases in size and the application of machines methods, brickmaking firms continued to depend on the supply of suitable clay, and this nearly always meant the acquisition, by lease or purchase of a piece of clay-bearing land. At the start of all brickmaking activities was a real estate transaction and the next chapter looks at how brickmakers obtained, and landowners supplied, the necessary land.

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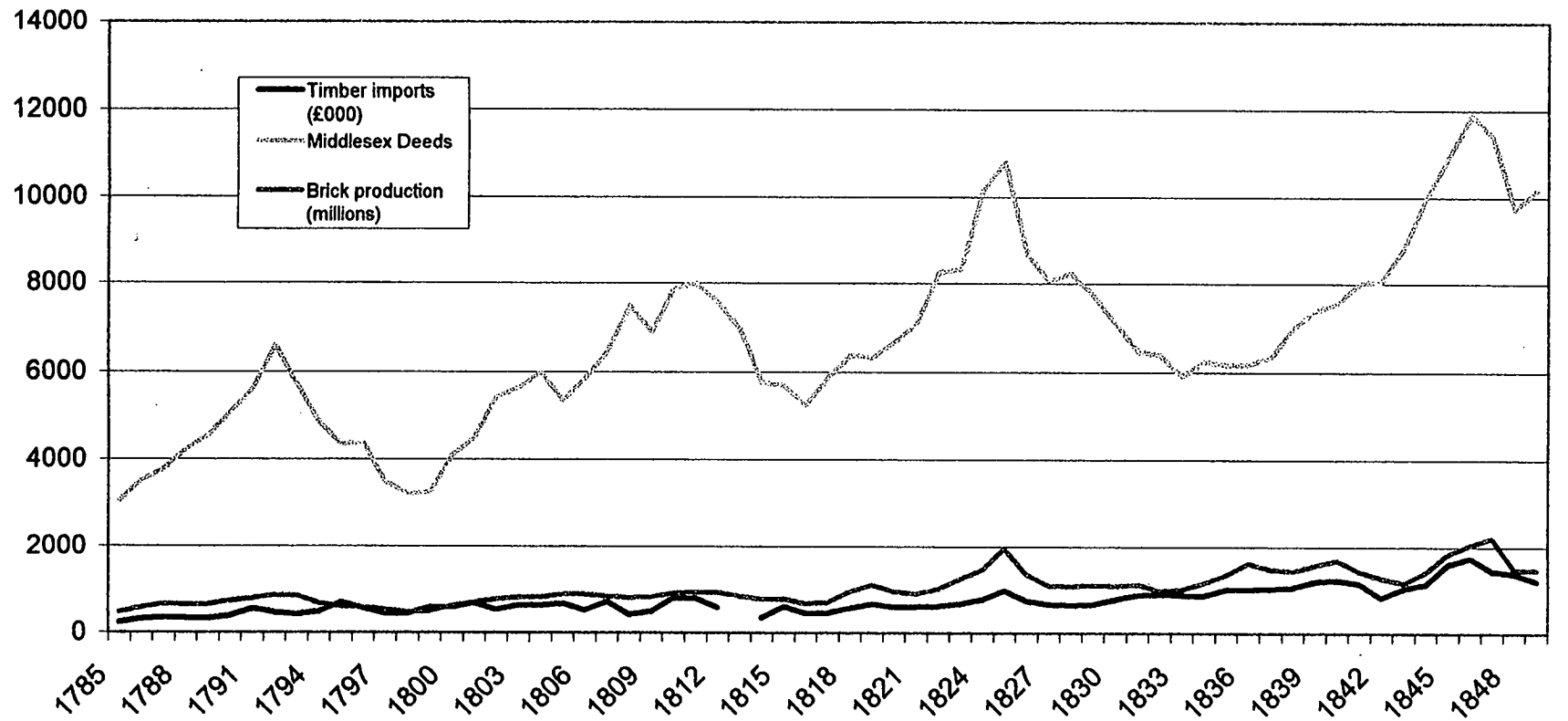
[144] *The Builder*, 12th May 1860
[145] *The Builder*, 10th July 1875
[146] Presumably stock left over from the previous year's production. *Middlesex Chronicle*, 6th April 1895
[147] *The Builder*, 18th August 1860

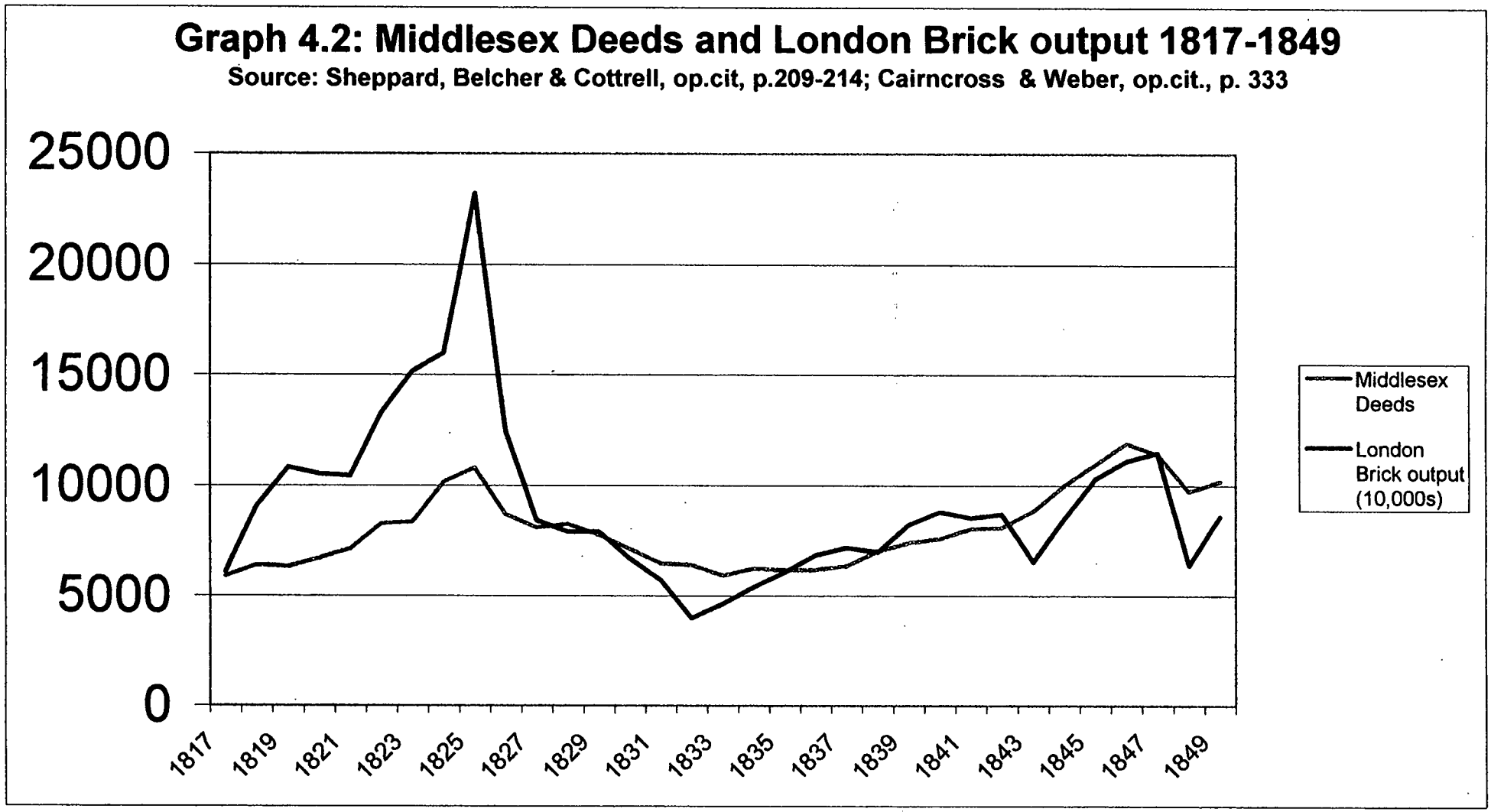
Graph 4.1: Middlesex Deeds, timber imports and brick production 1785-1849

Source: Mitchell, B.R., op.cit, p. 385, 462f.; Sheppard, Belcher & Cottrell, op.cit., p.209-214



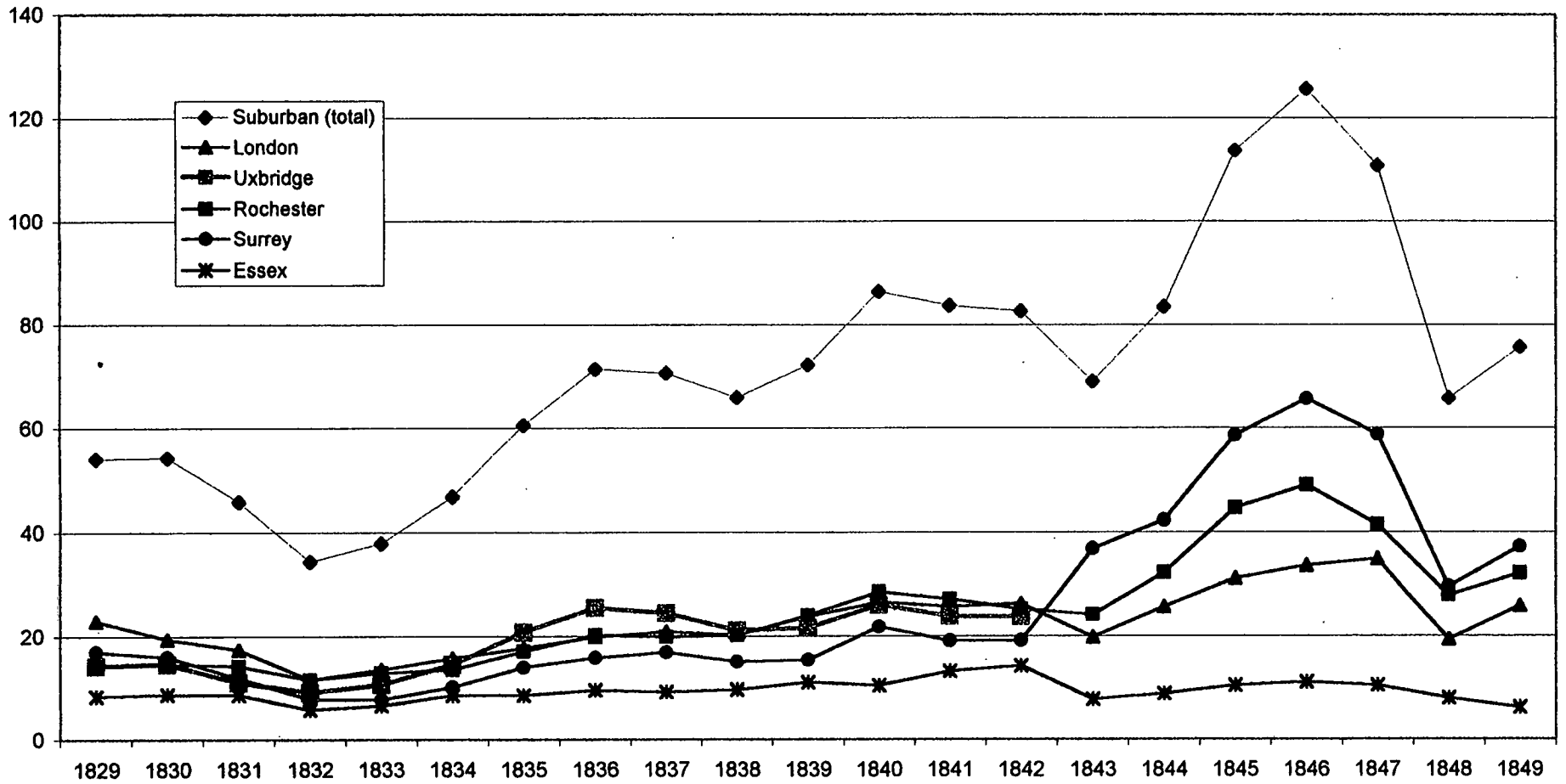
Graph 4.2: Middlesex Deeds and London Brick output 1817-1849

Source: Sheppard, Belcher & Cottrell, op.cit, p.209-214; Cairncross & Weber, op.cit., p. 333



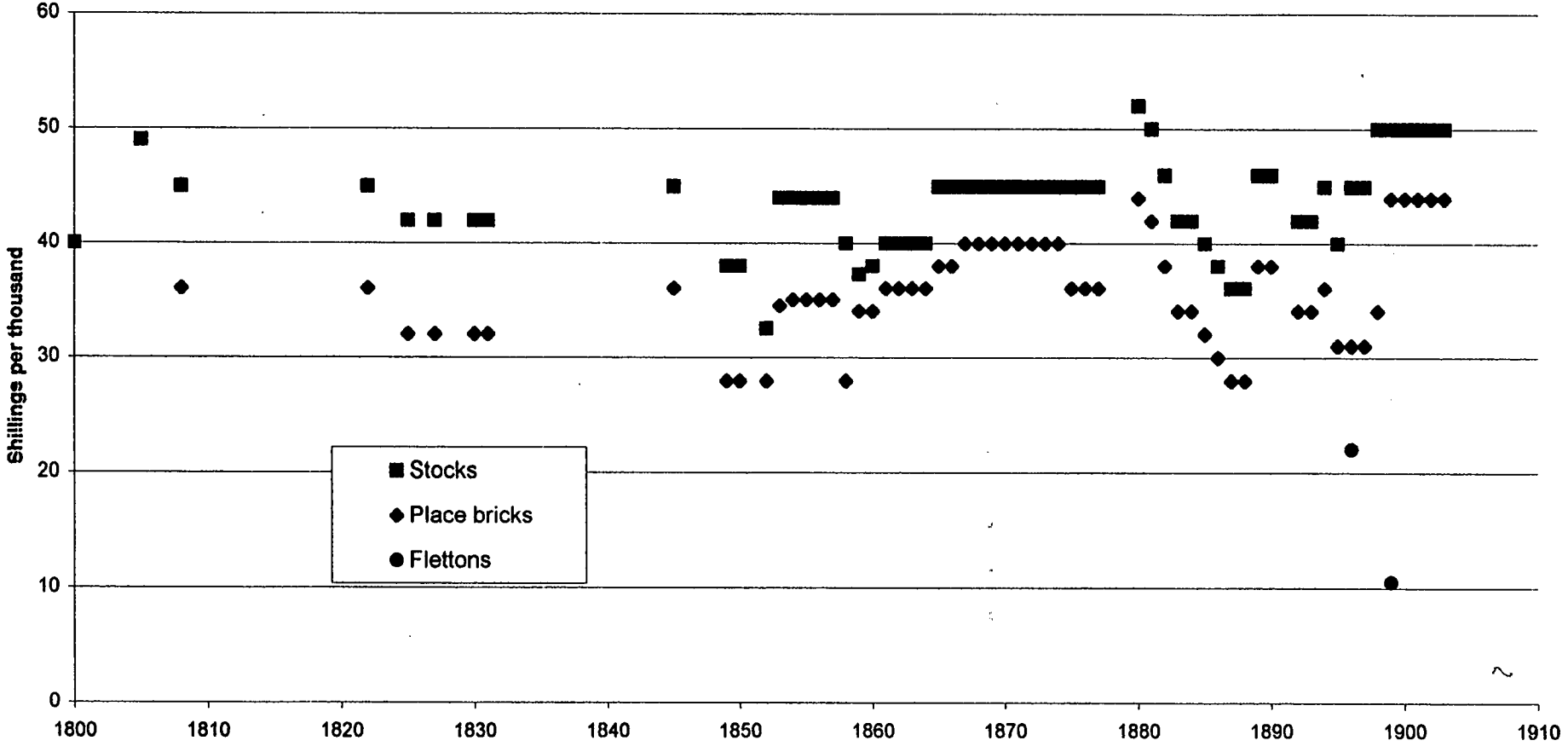
Graph 4.3: Brick output at regional centres 1829-1849 (£000)

Source: Annual Parliamentary returns of brick duty



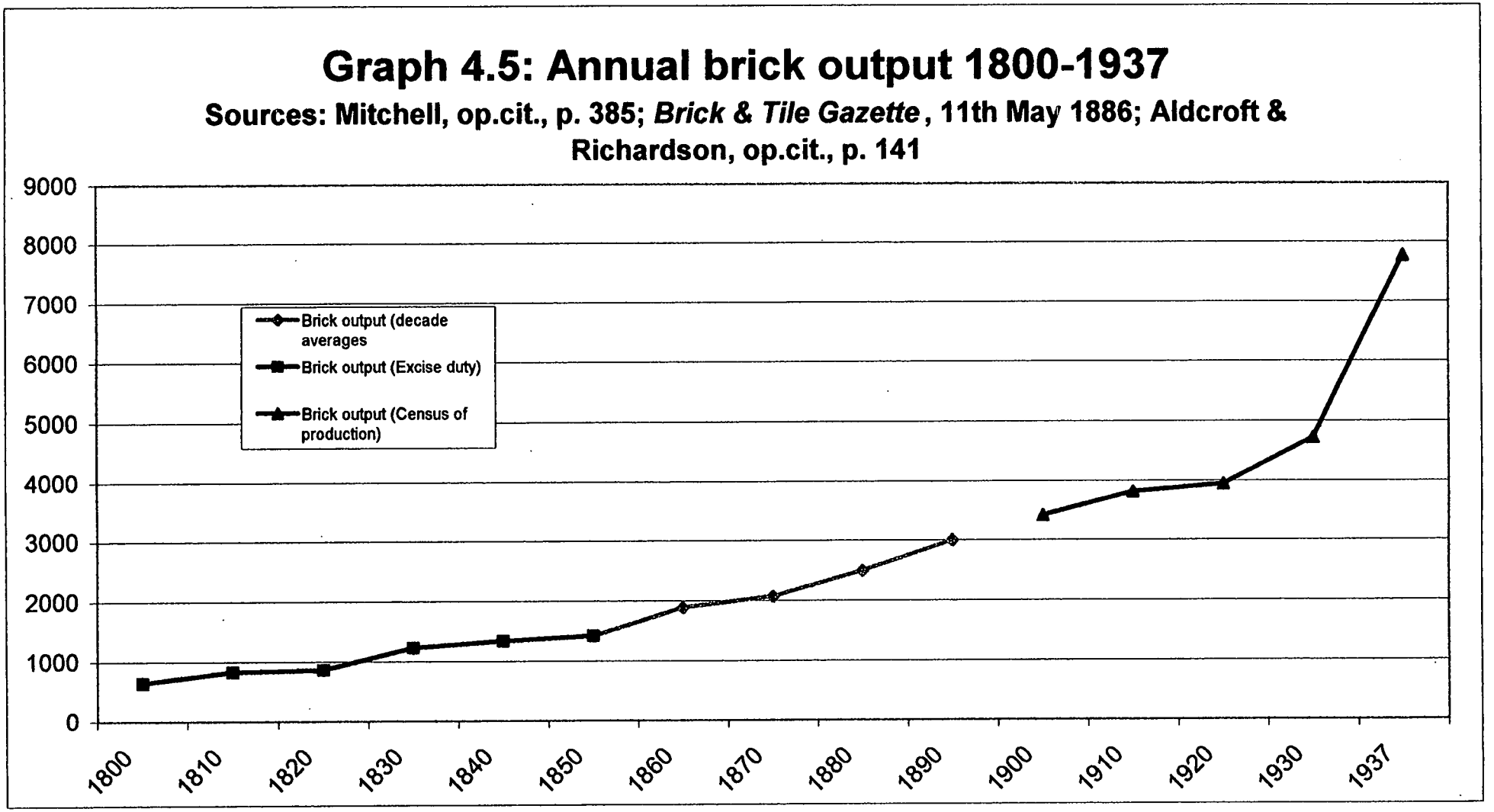
Graph 4.4: Brick prices 1800-1903

Source: Clarke, op.cit., p.166 (1800,1805); Taylor's Builders' Price Book (1808, 1825,1827,1830,1831); Laxton's Builder's Price Book (1845, 1852-3, 1856-1903)



Graph 4.5: Annual brick output 1800-1937

Sources: Mitchell, op.cit., p. 385; *Brick & Tile Gazette*, 11th May 1886; Aldcroft & Richardson, op.cit., p. 141



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PORTLAND & ROMAN CEMENTS,

CONYERS QUAY;

Manufacturer of Malm Cutters, Facings, Seconds, Stocks, &c.

LONDON OFFICE AND DEPÔTS:

BRUNSWICK WHARF, VAUXHALL,

AND

6, SOUTH WHARF, PADDINGTON BASIN.

Cowley and Kent Bricks, per barge, alongside, or delivered in any quantities, direct from Wharfs.

Superior White Suffolk Facings, Splays, Door-Jambs, Coping Bricks, Stable Clinkers, &c. Moulded Bricks made to order.

Dark Red Facings, Rubbers, Splays, Paving Bricks, &c.

Bright Yellow Malm Facings, and Cutters, of the best quality. Mean and Pale Malm Seconds, Pickings, Paviors, &c.

Black Headers, Glazed and Unglazed.

Staffordshire Blue Vitrified Bricks, and Channelled Stable Bricks. Red, Blue, and Buff Terro-Metallic Paving Tiles. Plain Flanged, Rolled-top, and Ornamental Grooved Ridgings, &c. Broseley Tiles.

Adamantine Clinkers. White Glazed Bricks.

Fire Goods. Newcastle, Stourbridge, and Welsh Fire Bricks. Tiles, Lumps, Fire Clay and Flue Linings; any pattern Brick, &c., made to order.

Terra-Cotta Chimney-Pots, Vases, Trusses, Garden Border Edging, &c.

Slates, best quality, from the Bangor Quarries.

Yorkshire Stone. Tooled Paving, Sills, Steps, Sinks, Coping, &c. Sawn Slab for Hearths, Jambs, &c.

Tiles. Pan, Plain, Ornamental Roofing, Paving, Oven, Corrugated, &c. A great variety of Red and White Goods always kept in Stock.

Glazed Vitrified Sewage Pipes, Closet Puns, Syphons, Stench Traps, &c.

Grey Stone and Chalk Lime.

Blue Lias Lime, Ground or in Lump.

Blue Lias Lime Stone for Exportation.

Cements. Roman, Portland, Parian, Lias, Bath, Keene's, & Crowe.

Plaster of Paris, fine and coarse, of best quality, at reduced prices.

Hair, Laths, Sand, Ballast, &c.

IMPORTER OF DUTCH CLINKERS.

All kinds of Building Materials sent by Rail the same day as ordered.

Landing Wharf and Drawing Dock at Vauxhall.

F. ROSHER & Co.,

Lime, Cement, Brick & Tile Merchants

AND MANUFACTURERS OF

ARCHITECTURAL & GARDEN ORNAMENTS IN ARTIFICIAL STONE.

LONDON WHARVES.

OLD JAMAICA WHARF, UPPER GROUND STREET, BLACKFRIARS, S.E.
KINGSLAND BASIN, KINGSLAND ROAD, E.
KING'S ROAD, CHELSEA, S.W.
LIMEKILN HILL, LIMEHOUSE, E.

Messrs. ROSHER & Co. *promptly execute from the above Wharves on reasonable terms, and of the best quality, orders for the following Building Materials:*

Grey Stone, Chalk, Flare, and Blue Lias Lime.
Roman, Portland, Lias, Keene's, Martin's, and Parian Cements.
Bennett's Patent Indurating and Quickening Solution for Cements.
Cowley and Kent Bricks, by cart or by barge. Wall Copings, &c.
White and Red Suffolk Facing Bricks, Door Jambs, and Splays.
Ditto and ditto Moulded Bricks made to any design.
Yellow and Pale Malm Cutters, Pickings, Paviors, and Seconds.
Red, Black, and White Rubbers and Perforated Bricks.
Staffordshire Blue Bricks, plain and shaped.
Staffordshire Ornamental Paving Tiles, in red, blue, and buff colours, suitable for conservatories, entrance-halls, balconies, churches, &c.
Mosaic and Tesselated Pavements of very enriched designs.
Roofing Slates of all sizes from the best Quarries.
Blue Terro Metallic Roofing Tiles, Ridging and Crest Ornaments.
Red Ridge Tiles and Cresting, and many varieties of Red Roofing Tiles.
Terro Metallic and other Grooved Stable Bricks of great durability.
Dutch and Adamantine Stable Clinkers, also Brimstone Paviors.
Yorkshire Pantiles, Plain tiles, Ridge tiles, Paving tiles, and Bricks.
Chimney tops of Terra-cotta, Flue Linings, and Wind-guards in great variety.
Gothic Chimney Shafts in Terra-cotta and Artificial Stone.
Trusses, Balustrading, Wall Terminals, and Copings in ditto.
Glazed Stoneware Drain Pipes, Traps, and other Sanitary Goods.
Red Drain Pipes, Drain Tiles, Yard Sinks, and Chimney Pots.
Welsh, Newcastle, and Stourbridge Firebricks, Lumps, and Tiles of every description and size; also Fire clay.
White Glazed Tiles (English & Dutch) for lining dairies and larders, fireplaces, baths, shop walls, &c.; also Minton's Coloured Porcelain Tiles.
Garden Edging Tiles in Terra-cotta and Terro-metallic Ware, Red Ware and Glazed Stoneware, of various patterns.
Garden Vases, Figures, Fountains, &c., in Artificial Stone.
Plaster of Paris (coarse and fine), Whiting, Hair, Laths; River, Pit, and Silver Sands, Gravel, and other building materials.

*** *Goods forwarded by Railway with despatch.*

SHIPPING ORDERS PROMPTLY EXECUTED.

Lime Works, Chalk, Flint, and Ballast Wharves—NORTHFLEET, KENT.
Portland and Roman Cement Works—SITTINGBOURNE, KENT.

Illus. 4.1: Advertisements for F.Rosher & Co. and Charles Richardson

Source: *Laxton's Builders' Price Book* , 1874

Chapter Five: Landowners and the availability of clay for brickmaking

By the early nineteenth century Middlesex, and the other counties surrounding London, were showing signs of the land use specialisation that is characteristic of areas on the margins of great cities. Even in the sixteenth and seventeenth centuries London had become a major centre of consumption that influenced the nature of agriculture in the neighbouring areas, and encouraged the development of market gardening.[1] The rapid growth of London's population in the next century increased the city's needs for food, fuel and the other necessaries of daily life, and encouraged the process of specialisation. It is dangerous, however, to oversimplify the nature of this specialisation; Middlesex was not converted, as one recent study asserts, to a "monoculture of hay", and this chapter suggests that though hay production was undoubtedly significant, and was the dominant crop in some places, many other agricultural and horticultural uses continued.[2] Although the pull of the London market was a major consideration in determining land use, other factors such as different soil types, communications, and patterns of land ownership were also important.

As well as needing supplies of food, water and fuel, the expanding city also needed building materials, and the counties surrounding the metropolis became suppliers of bricks, gravel and cement. The use of land for these purposes could conflict with agricultural and horticultural uses. Moreover the boundaries were not static, as the built-up area of the capital expanded and rural Middlesex contracted. Within that remaining area individual towns and villages themselves grew bigger until the point in the twentieth century when it might have seen that the whole country would become one suburban sprawl, had not the geographical size of London been fixed by the designation of green belt areas in the London Green belt Act of 1938. [3]

In the nineteenth century and until the Second World War Middlesex had the open land to absorb a number of types of land use that could no longer be accommodated within the metropolis, either because of lack of space, or because of the high value of the land.

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[1] Wrigley, E.A., "A simple model of London's importance in changing English society, 1650-1750" in *People, cities and wealth.* Oxford, 1987, p.142

[2] Garside, P.L., "London and the Home Counties" in F.M.L. Thompson (ed.), *The Cambridge social history of Britain, 1750-1950; volume1: Regions and Communities.* Cambridge, 1990, p. 476

[3] Hoggart, K. & Green, D., *London: a new metropolitan geography.* London, 1991, p.6

Writing of this rôle in the 1950s Robbins could argue that "if there were no such place as Middlesex, it would be necessary to invent something very much like it merely to keep London going".[4] In addition to market gardening, agriculture and the supply of building materials, Middlesex provided space for schools, mental hospitals, playing fields, cemeteries and rubbish dumps.

This chapter considers the way the brickmaking industry fitted into the predominately agricultural economy of West Middlesex. It is concerned less with the mechanics of the production process, and more with the way that clay, the main raw material, was acquired. At the start of most brickmaking operations was a land transaction, and the documents that each of these produced provide much of the evidence for brickmaking that has survived. Most land that was used for brickmaking was leased, not freehold, and brickmaking was often a transitory feature in a longer history of agricultural use. These land transactions are considered from the landowner's perspective and this involves investigating the other options owners had when deciding whether to use their land for brickmaking or gravel extraction, and the financial returns that could be derived from such activity. The contribution of the purchase or lease of land to the overall costs of brickmaking will be considered in a later chapter.

There were a number of major landowners who leased much of the land that was used for brickmaking in the Cowley district, and whose names will become familiar in the following pages: Hubert de Burgh in Hillingdon and West Drayton; the Earls of Jersey, whose Middlesex estates were based on Osterley House and incorporated parts of Heston and Southall; Jonathan Passingham and the trustees of his estate, with land in Heston; the de Salis family in the parish of Harlington, particularly in the area known as Dawley; the Shadwell family in Northolt. The surviving rentals, leases and accounts for these estates are the main source for the discussion that follows, but information is partial and coverage is uneven. The absence of leases for some sites can present a distorted picture; for example in the otherwise rich De Burgh archive there are no leases of the brickmakers William Clayton, John Taft and Samuel Tildesley, although the appearance of their names in rentals and royalty statements indicates that they were

[4] Robbins, M., *Middlesex*. London, 1953, p. 27

active in the late 1850s and early 1860s.[5]

The brickmaking process requires three main inputs: fixed capital in the form of equipment, which can vary from the most basic hand tools to sophisticated brickmoulding machines; labour; and a number of raw materials of which the most important is clay. In practice the extraction of clay from the ground and the manufacture of bricks are operations that are rarely separated. Raw clay, being a bulky and low-value commodity, is hardly ever transported far from clay pit to point of production, although in some modern large-scale plants the clay pits are at a distance from the moulding machinery. A rare exception to this rule was the barging of clay to Thomas Cubitt's Thameside works in 1852. Cubitt made bricks at a number of sites in London to supply his estate developments and presumably had the skilled labour force in the capital, but suffered a shortage of suitable clay as his original sources were worked out or built over. Faced with either bringing in finished bricks or raw clay he chose the latter on this occasion, prompted perhaps by the ready availability of barges, the ease of access for loading and unloading and the presence of skilled workers in London. He was later to open his own brickfields in Kent.[6]

Since there was no market for the sale of raw clay for brickmaking the establishment of a brickworks necessitated the purchase or lease of a suitable piece of clay-bearing land. In the early parts of the nineteenth century when the machinery used was limited and small-scale, brickmaking took place in close proximity to the clay excavation, and, once a field was worked out, the equipment could be dismantled and moved to a new site. The ability to transfer operations from one brickfield to another was made easier by the use in Middlesex of the clamp rather than the kiln to fire bricks. Whilst a kiln was a permanent structure, clamp firing required only the stacking, albeit carefully and with a degree of scientific understanding, of the bricks themselves, to incorporate a series of flues and air holes. After the clamp had burnt through and cooled, it was dismantled and the only remains were the over- and under-fired bricks which were unsaleable but could be used as the basis of the next clamp.[7] Later in the century, once machinery came to be used

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[5] LMA Acc 1386/ 384-5

[6] Hobhouse, H. *Thomas Cubitt, master builder.* London, 1972, p.291

[7] For a detailed description of clamp construction see Dobson, E., *An elementary treatise on the manufacture of bricks and tiles.* 10th edition, London, 1899, p.144-145

more intensively in the brickfield, and steam engines were used to provide motive power, it was more economic to work larger brickfields over a longer period and the clay might have to be moved several hundred yards from clay pit to the manufacturing area. Four possible methods were employed to accomplish this: extensions to existing canals or docks, often known as "cuts"; horse drawn carts; tramways using horse power or stationery steam engines; or pumping a solution of clay and water through pipes. Examples of these methods will be discussed in more detail below.

The methods by which bricks are made depend in part on the type of clay, the thickness of the clay layer and the depth within the soil at which it is found. Clay seams can be very thick and much modern brickmaking in England relies on deposits of Lower Oxford clay in Bedfordshire and Cambridgeshire which is extracted mechanically. Such sites, exploiting seams up to thirty metres deep, resemble quarries and these large clay pits provide material for decades of production, but leave excavations that require sensitive management and landscaping.[8] These deep deposits were not exploited until the end of the nineteenth century and could only be utilised once the technological means of working the harder clays were available. For most of the period under consideration brickmakers made use of superficial deposits, that is the clays that lie on or near the surface of the soil, the major exception being the clay found in association with coal seams in the geological formation known as the Coal Measures. Superficial deposits of brick clays occur in many parts of the country and until the advent of rail transport brickmakers usually supplied a local market, except where a particular colour or style of brick was required for aesthetic or engineering reasons.[9]

In the West Middlesex area the workable clay was only a few metres thick and of variable quality. Trial borings on the land of Rudolph de Salis in Dawley in 1849 revealed that the brickearth was mostly from two to four feet in depth, but the maximum depth encountered was 6ft 9ins. Its quality was "in general very good".[10] On the de Burgh estate in West Drayton a surveyor estimated that fields contained between 4ft 6in and 5ft of workable clay. [11] The depth of the clay was not the only consideration; the

[8] Blunden, J., *Mineral resources of Britain.: a study in exploitation and planning.* London, 1975, p.154-155
[9] Prentice, J.E., *The geology of construction materials.* London, 1990, p.156-164
[10] PRO RAIL 830 / 94
[11] Report by William Thompson to Messrs Palmer, Bull & Fry, 26th November 1875. LMA Acc. 1386/262

composition of the brickearth had important economic implications. The best soils - the malms - could be worked without any additives; inferior soils needed screening to remove gravel, which was often found in proximity to brickearth, and the addition of chalk and ashes to produce a malleable clay. The mixing of chalk into the clay was known as "malming", the object being to produce an approximation to naturally occurring malms.[12] But the amount of additives required inevitably increased production costs and could influence the decision to exploit a particular field for brickmaking. When a Northolt landowner commissioned a feasibility study of the brickmaking potential of part of his estate, prompted by the brick production already taking place on a neighbour's land, he received a report from his agent that the clay in his field was of inferior quality and that even in good times its use would not offer a good return. In the then depressed state of the market it could not be exploited economically, because to make it malleable a "full admixture of chalk and sand would be necessary". The agent commented

> In fact if the brickearth in your field had been of medium quality it would not have produced you any income at present because the building trade is not sufficiently flourishing to raise the price of bricks to such an amount as will pay the cost of making bricks from any clay which is not of decidedly superior quality.

This described the conditions operating in 1857, a year of financial crisis, triggered by commercial failures in the United States, when there is a noticeable but short-term check in the housebuilding index, rather than a cyclical trough.[13]

Within a known brickearth area there were variations in the quality of the clay and this was important in determining the viability of brickmaking. Moreover profitability was linked to the prevailing price of bricks which varied considerably in relation to demand, as we have seen above [Chapter Four]. When the price of bricks was very high the use of clay of inferior quality could be justified, in the same way that marginal land had been brought into cultivation during the Revolutionary Wars when wheat prices had risen steeply.[14] However with the volatility of brick prices such production could rapidly become a liability both directly to the brickmaker and ultimately to the landowner who

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[12] Dobson, op.cit, p.119-120
[13] Letter from John Oakley to Lancelot Shadwell, 18th August 1857. LMA Acc289/192a; see graph
[14] Chambers, J.D. & Mingay, G.E., *The agricultural revolution 1750-1880*. London, 1966, p.117

was reliant for his income on a royalty on the number of bricks made to supplement the ground rent.

The presence of brickearth was a selling point when land was put on the market, since it suggested that potential owners could obtain a better return on their investment than agriculture alone offered. As early as 1805, a few years after the opening of the Grand Junction Canal, an estate at Botwell came up for sale, which included an arable field, then under wheat, which was close to the canal and "deemed exceeding good brickearth". This particular lot was purchased by a Mr Mercer who paid £787-10s for the ten acres, but there is no direct evidence that he subsequently used the site for brickmaking.[15] The 1827 sale of Northolt Manor and other lands included a meadow abutting the canal and the catalogue claimed that "it is supposed there is some valuable brickearth in this lot".[16] Much later in the century land sold in Southall for building often included information about the availability of brickearth, which would presumably be used by the purchaser to make the bricks to build the houses. A sale in 1871 of freehold building land about a mile from Southall station advertised the availability of valuable brickearth whilst the sale of part of the Osterley estate in 1919, described as "well situate and ripe for immediate building development", included not only a "valuable bed of brickearth" but also "unequalled deposits of sand and gravel".[17]

Some brickmakers purchased freehold land. Samuel Pocock's earliest brickfield in West Drayton was a freehold purchase in 1834 but he disposed of it after about fifteen years, and his next operation was on leased land.[18] The Southall Brick Co Ltd, about which little is otherwise known, owned a freehold estate of seventy-six acres in 1858, whilst Odell Ltd, one of the largest operators in the area, had forty-four acres of freehold land, but a much larger acreage of leasehold land, some 167 acres.[19] By contrast, all the extensive brickfields of James Day Burchett & Son in the 1890s were leased, from a number of different owners, but totalling 138 acres.[20] Because of the transitory nature of

[15]LMA Acc 538/1st dep/42/11
[16] Sale particulars Northolt Manor estate 1827. WAM N.73
[17] LMA Acc 180/507; LBE Local History Collection, uncatalogued document
[18] PRO RAIL 830/95
[19] PRO BT41/638/3491; BT31/5649/39405
[20] PRO BT31/6615/46552

brickmaking it was likely that prospective brickmakers, who may not have had access to the capital required to purchase land, would look to lease it. But the availability of land either to purchase or to lease depended on the willingness of landowners to make the land available for brickmaking.

Landowners had a number of options for the use of their land. Some major landowners, such as the Duke of Bedford, had sizeable incomes from their urban estates in London and other cities; others, like the Marquess of Londonderry, derived substantial revenues from the coal deposits on their land. Most owners, however, earned the greater proportion of their income from farm rents.[21] Middlesex had no mineral deposits that landowners could exploit, but, especially if their land was close to the canal, there were a number of land use options - agriculture, horticulture, building development, industry, brickmaking or gravel extraction. In Middlesex at the end of the eighteenth century, 23,000 acres of the county's total of 179,200 were being cultivated, but a further 75,000 acres were under grass.[22] Specialisation in land use was determined in general terms by the demands of the London market, but conditioned as to specific location by the varying nature of the soils. To the north of the county, on the higher ground away from the Thames, grass was grown on the heavier clays to provide hay for the city's animal population. In many cases increasing specialisation meant the replacement of mixed farming by meadow; in Greenford, for example, the proportion of arable in the parish acreage fell from 37 per cent in 1775 to 18 per cent by 1843. Greenford was just north of the dividing line between the heavy clays and the lighter soils of the gravel terraces.[23]

This specialisation was recognised by contemporary observers. Henry Hunter, as we have seen, identified a series of zones around the built-up area of the metropolis: the clay pits, the pasture land used by the cowkeepers, and the fertile strip along the banks of the Thames which was occupied by market gardeners and nurserymen.[24] Wheat was grown on only 7000 acres in the county in 1798 but Middleton observed that this acreage had

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[21] Thompson, F.M.L., *English landed society in the Nineteenth Century.* London, 1963, p.264-268
[22] Middleton, J. *View of the agriculture of Middlesex with observations on the means of its improvement.* 2nd edition, 1807. p.202, 226, 374
[23] A survey of the parish of Great Greenford in the County of Middlesex, by Richard Binfield. Cambridge University Library Mss; Tremenheere, H., "Agricultural and educational statistics of several Middlesex parishes", *Journal of the Statistical Society of London*, vi, 1843, p.120-130
[24] Hunter, H., *History of London and its environs.* London, 1811. p.3-5

increased between the two editions of his book in response to the high grain prices which ruled during the Napoleonic Wars. He identified Heston, which had long been renowned for the quality of its wheat, Cranford and Norwood as the main wheat growing areas, and Hunter similarly noted that

> towards the south-west angle the arable prevails, and some of the parishes are known for the excellence of their grain.[25]

There was a pronounced geographical divide in the west of the county, which arose out of differences in character of the soils, and their suitability for particular crops. Clutterbuck identified the Uxbridge Road as marking the boundary between the heavier clays to the north and the lighter soils of the brickearth belt to the south. Most of the land between Harrow and Uxbridge was given over to grass, whilst the lighter alluvial soils of the Thames terraces were very versatile, being suitable for arable farming, horticulture or brickmaking.[26] Market gardening was an alternative to arable farming that became more attractive as the outward development of the metropolis submerged other horticultural areas under bricks and mortar. The acreage of gardens increased considerably: Lysons had estimated that there were 3,300 acres within ten miles of London in 1795. By 1872 there were 8,076 acres in Middlesex and by 1895, 14,915.[27] At the time that Middleton wrote, market gardening was concentrated in Kensington, Hammersmith, Chiswick, Brentford, Isleworth and Twickenham, mostly close to the Thames. Successive waves of building forced market gardeners further away from central London and by the 1890s places like Heston, Hounslow and Isleworth were becoming attractive, especially since there was no immediate expectation that these areas would be overrun by developers.

> South, east and north London expanded more rapidly than west London during the closing decades of the last century so that horticulture lingered longest in the western outskirts.[28]

Some horticulture persisted in these western Middlesex parishes well into the twentieth century. In 1931 855 men and 109 women were still employed in agriculture or

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[25] Middleton, op.cit., p.202; Hunter, op.cit., p.5. On the quality of Heston's wheat most later writers refer to John Norden's *Speculum Britanniae*, 1593. Clutterbuck, J.C., "The farming of Middlesex", *Journal of the Royal Agricultural Society of England*, 2nd series, vol.5, 1869, p.7; Robbins, M. *Middlesex*, London, 1953, p.32-33

[26] Clutterbuck, op.cit., p.9; Robbins, op.cit., p.40

[27] Bennett, L.G., *The horticultural industry of Middlesex*. Univ of Reading, Dept of Agricultural Economics, Misc studies No.7. 1952, p.17-18

[28] Ibid, p. 11-12

horticulture in Heston & Isleworth, and 424 men and 51 women in Hayes, although these represented only just over one and two per cent respectively of their total populations.[29] Whilst the expansion of London increased the demand for fruit and vegetables and pushed horticulture further west, other developments also influenced land use in Middlesex. The repeal of the Corn Laws in 1846, though not triggering the mass import of grain, as opponents had argued, helped undermine arable farming and encouraged the keeping of cattle. [30] The growing of wheat largely disappeared in some parishes; Northolt, which was on the boundary between the clay soils and the alluvial terraces, was almost entirely under grass for hay or to provide grazing for over two thousand cattle by 1867. Heston, by contrast, retained a higher proportion of arable land.[31]

Although the land in this area was ideally suited to arable farming and market gardening, its position put it continually under threat from the attentions of brickmakers and gravel diggers. [32] So whilst the expansion of London provided the growing market for horticultural produce it also created a requirement for large quantities of bricks, sand and gravel for house building and road construction. Contemporaries recognised the tension that existed between these different uses. Owners of land were tempted by the greater returns to be had from brickmaking and the ease with which bricks could easily be transported to London, to participate in "robbing the south-west limb of Middlesex of its fertile sandy loam".[33]

The third option, the sale or lease of land for building, was not taken up on a large scale since the population of this part of Middlesex did not experience the dramatic rates of growth that were a feature of areas on the fringe of London. The largest settlements were Uxbridge, which had a commercial position, and Southall, which developed as a manufacturing district.[34] The Earls of Jersey, whose Osterley Park estate included parts of Southall, had, by the last quarter of the nineteenth century, let some parcels of land on

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[29] Census 1931
[30] Overton, M., *Agricultural revolution in England: the transformation of the agrarian economy 1500-1850.* Cambridge, 1996, p.146
[31] Crop returns, 1867. PRO MAF 68/136
[32] Bennett, op.cit., p.22
[33] Clutterbuck, op.cit., p.8
[34] Robbins, op.cit., p.353-5, 326

building leases, but the rent from these represented only a small part of the estate's total income. [35] Most parts of the Cowley district were not subject to the encroachments of building development; on the other hand these thinly populated rural areas were attractive to those types of industry that might not be welcomed in a built-up area; an early example of this kind of use occurred on a canalside site in Heston, which was used during the Revolutionary Wars as a munitions works. It later became an important brickfield, and was advertised in 1832 as being suitable for a depot for canal carriers or wharfingers or as a bleaching ground. [36] Other industries that were established beside the canal included vitriol works at Southall, the Perkin dyeworks in Greenford, and a manufacturing chemist, this last on an old brickfield in West Drayton.[37]

Brickmaking, and its allied extractive process of gravel digging, offered a short term advantage to the landowner, providing an opportunity which could only be enjoyed once; but it did not prevent a subsequent agricultural use, and could co-exist in a largely agricultural economy. Not only was it possible to return land, whose brickearth had been exhausted, to agricultural uses, but brickmakers often became involved in farming part of their land. This was necessary because they usually acquired extra land in order to secure future supplies of clay, and kept the currently unused portion in cultivation or as grazing land. Whether land that had had several feet of brick and gravel removed could be as fertile as before remains in doubt, but it was an assertion that was made on a number of occasions. Writing in 1807 of the brickfields near to London, Middleton commented that

> The brickfields lie close to the town, where manure is to be had in any quantity; and as the carriage costs are but little, they are repeatedly dressed, by which means they soon recover their former fertility.[38]

Clutterbuck, half a century later, was not so easily convinced:

> It is manifest that there must be a deterioration of the land, though the manure conveyed from London as back carriage by the canal boats in some measure replaces the natural by the introduction of artificial fertility.[39]

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[35] Rental of the Jersey estate in Middlesex. LMA Acc.506/25
[36] LMA Acc328/9a-b
[37] Victoria County History. *Middlesex,* vol.3, p.214; vol.4., p.47; PRO RAIL 830/93-95
[38] Middleton, op.cit. p.26
[39] Clutterbuck, op.cit., p.8

Yet when land at North Hyde, Heston, which had been in use as a brickfield for twenty-five years, was sold in 1871 one field that was now arable land had

> formerly contained a large quantity of brickearth which is now exhausted. The surface has, however, been levelled and restored to its original agricultural uses.

This field, however, still contained a bed of gravel which had yet to be exploited.[40] Certainly there is the implication that land used for brickmaking offered the landowner the best of all worlds - a short term profit because of the higher return that brickmaking provided and subsequently a continued value as agricultural land. William Heron suggested that land at Philpott's Bridge Farm, Hillingdon could be successfully exploited for brick production and pointed to "several fields in the neighbourhood [that] are now in nearly as good a state as before they were dug." In a later part of the same report he argued that "some fields that have been dug out have now as fine crops as any in the country and are let at upwards of 40s per acre." [41] These rents are a subject to which we will return.

Unless a brickmaker was operating on a large scale with a number of moulding stools (i.e. several teams of brickmakers at work), the amount of land being worked at any one time could be quite small. The rule of thumb calculation used by brickmakers was that an acre of brickearth could yield a million bricks for every foot depth of soil. With a moulding team able to produce between 750,000 and a million bricks a year, and with about four and five feet depth of soil being usual, an acre of land would keep a small brickmaker in raw material for at least a couple of seasons, since most brickmaking leases stipulated levels of production of no more than two million bricks per season. [42] Leases were generally for larger pieces of land, because the period of the lease was often as much as twenty-one years. Brickmakers had to find uses for the land not currently required for clay extraction, and this tactic is discussed later in this chapter.

The terms of brickmaking leases were designed to safeguard the land for the future, and followed a standard pattern. Brickmakers, if left unsupervised, were inclined to neglect the long-term requirements of the land. As early as 1807 a Colonel Clitherow

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[40] Sale particulars, North Hyde Farm and Depot estate. LMA Acc 328/105
[41] LMA Acc 742/105
[42] Middleton, op.cit., p.25

complained that despite

> the ease with which manure is procured from London... it does not appear that sufficient attention is paid to the quality of the manure, neither does it appear that the lands are properly drained.[43]

Prior to digging the brickearth, the top soil was to be carefully removed, a process known as "uncallowing", put aside, and replaced at the end of the lease. Such requirements appear in leases as well as in licences granted by manorial lords to copyright tenants. [44] The depth of top soil that could be removed is occasionally specified, eighteen inches in the case of Mecklenburg's Heston lease of 1890.[45] The main disadvantage with brickmaking was that it lowered the level of the ground and could interfere with drainage, leaving the land liable to waterlogging. The problem was made more acute by poor management, as Middleton noted:

> There is generally difficulty in getting the brickmakers and gravel diggers to level the mounds occasioned by their works, and in leaving the soil dry; in a very few instances they have even sunk the surface so much, as to occasion ponds of small extent. The best remedy for this, and other matters of like nature, would be for the owner of the soil or his agent to make the most especial agreements or leases; and afterwards to give such attention as would secure the covenants being duly executed.[46]

The problem became more acute when gravel was removed after the brickearth, since the gravel stratum was usually thicker than the brickearth layer, and gravel could be expected to help drain the soil. The particular characteristics of gravel extraction are considered in more detail below. The importance of drainage is also covered in leases which often stipulate that water is not to be left standing; other covenants relate to the maintenance of hedges and ditches. Joseph Bennett's lease of Tunlow Field in Northolt in 1847 is a specific example of the requirements landowners imposed on brickmakers. He was allowed to

> to dig for brickearth and level the said field as aforesaid as to preserve a sufficient fall for spring or surface water from west side to east side and shall and will during the said term use his and their best means and endeavours to make and secure to the same Charles Shadwell his heirs and assigns a sufficient and proper drainage by means of proper ditches and other watercourses...[47]

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[43] Middleton, op.cit. p.24

[44] E.g. Pocock's lease at Hillingdon in 1855. LMA Acc 1386/101; Daniel Rutter's leases at North Hyde in 1864. LMA Acc 328/60. For a manorial licence see Thomas Shackle's from the Manor of Hayes in 1848. LMA Acc 180/182

[45] LMA Acc 405/7

[46] Middleton, op,cit., p. 24

[47] Westminster Abbey Muniments N.107

Not everyone observed the terms of their lease. One landlord was forced to remind his tenants that they had not returned the land to the condition required in their lease, and "in order to prevent litigation" he asked for the brickmakers to appoint an arbiter with whom he could negotiate the necessary remedial measures.[48]

One use for old brickfields was as osier beds, since the removal of the brickearth had brought the water table nearer the surface.[49] The osiers were used to make the baskets in which the market gardeners packed their produce. A number of osier beds were to be found in the Cowley district, for example at North Hyde as early as 1842, Hayes in 1865 and West Drayton in 1875.[50] Another use for old brickfields or gravel pits was as watercress beds. A field at Osterley, which had been used by the Great Western Railway for ballast, was a watercress bed in 1872, and there was another one at Yiewsley in 1864.[51]

Leases did not usually require the replacement of the excavated brickearth by other material, such as manure or rubbish, though the ready availability of town manure from Paddington suggests it may well have been used. Farms in Middlesex was often treated with manure from this source: land at Southall was "well manured with stable dung procured from London" in the 1840s and at the end of the century a Northolt farmer, whose land abutted the canal, was taking loads of "Mack", the mixture of dung, rubbish and stones swept from the streets of the capital, which though unpleasant to use was easy to obtain.[52] Not all worked-out brickfields were well-managed; brickmaking on one site in Northolt left a pond of over an acre in extent, which from the point of view of future use was a considerable nuisance.[53]

Despite the presence of some brickmaking in West Middlesex before the end of the eighteenth century (see above, chapter Two), the industry only became prominent after the building of the Grand Junction Canal. The rôle of the canal in stimulating

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[48] This occurred at the end of a 21 year lease in 1862. The landlord was Thomas Shackle, the tenants Messrs Heron & Rutter. LMA Acc 538/2nd dep/3501
[49] Clutterbuck, op.cit., p.8
[50] LMA Acc 328/18; Hayes Valuation 1865; LMA Acc 1386/262
[51] LMA Acc 1401/27; Acc 742/32
[52] Tremenheere, op.cit, p.122; *The life story of F.W. Crees*, edited by C.H. Keene, Ealing, 1979, p.5
[53] Valuation Office, Field Book, Northolt. PRO IR58/29130/ Schedule No. 107

brickmaking is a complex one; it had an economic importance in providing the means of transporting bricks into London, and this aspect will be considered in a later chapter. Its effect on determining land use is of significance here. Were landowners already aware of the value of the brickearth on their estates, but exploited it only after the arrival of the canal, or did the excavation of the canal itself reveal the presence of brickearth on their land, either directly in the cross section of the bank, or by the use to which the canal builders put it? The latter seems most likely, as Middleton noted.

> The cut shewed the soil to be a most fertile loam of from one to five feet in depth, on loamy, flinty gravel, six or eight feet; then leaden coloured clay.

Middleton was writing at the time that the canal was being constructed, and he observed that

> Bricks are everywhere ready (being made near the sides of the canal) for supplying its own needs.[54]

Certainly as early as 1798 bricks from North Hyde, Heston, were being transported north for the construction of a stretch of the canal between Berkhamsted and Tring.[55] The decision to build the Paddington arm of the canal without locks, which of course contributed to its economic usefulness, meant that it had to follow a contour line, in this case the 100ft line. This helped determine the geological strata through which it passed. So between Paddington and Uxbridge, and also along the branch of the canal from Uxbridge to Slough, the land beside the canal is part of the river terraces of the Thames.

The first part of the area to be extensively used for brickmaking was the extreme west, where by 1818 a contemporary observer informs us that

> The neighbourhood of Uxbridge is remarkable for very extensive brickfields, in which several hundred persons are employed. The soil to the south and south west of the town is peculiarly adapted to this purpose. The brickearth extends for several miles through the parishes of Hillingdon, Cowley and West Drayton and has been a source of great emolument to the proprietors. Some portions of the land have been known to sell as high as between £500 and £600 per acre.[56]

Although there is no detail about its operation a brickfield was in use at Wood End,

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[54] Middleton, op.cit., p.531-532

[55] Faulkner, A. *Grand Junction Canal.* 2nd edition, 1993 . p.14

[56] Redford ,G, & Riches, T.C., *The history of the ancient town of Uxbridge; being a reprint of the original edition published in 1818.* Uxbridge, 1885, p.75

Hayes by the Stroud family, in the early years of the nineteenth century, although this was at some distance from the canal.[57] Thereafter brickfields were opened up on both sides of the canal along much of the stretch of the main arm between Heston and Uxbridge, and along the Paddington arm in Southall, Hayes, Northolt, and, and to a smaller extent, Greenford. The timing of individual developments, however, was determined partly by the state of the market, as discussed in the previous chapters, but also by the circumstances of the landowners, both large and small, whose land was required.

Landowners depended largely on rents for their income. Rents reflected the movement in agricultural prices, farmers' demand for land and the state of the economy as a whole. Whilst farmers enjoyed increased profitability when there was a steep rise in agricultural prices, landowners might not always benefit, if the land was let on long leases. On the other hand landowners had to make allowances for farmers who found that falling prices for produce left them unable to meet rents that had been agreed when prices were high. This happened after the end of the Napoleonic Wars when prices fell from their inflated war time values, leaving farmers struggling with rents that had doubled during the war years. Initially landlords were generally unwilling to reduce their income and tenant farmers were squeezed between falling prices and high rents. Nevertheless practical realities necessitated some concession by landlords and in the 1830s some were forced to make substantial reductions in rents, by as much as twenty five per cent. The shift to shorter leases made tenants more vulnerable to rent increases as landowners responded to changing prices.[58] To achieve the rents of the "High Farming" era of the middle of the century landowners often made considerable investment in improvements, which might involve land drainage, often using clay pipes, new farm buildings, or enclosure.[59]

Landowners, when the soils on their estates had the potential to be used for brickmaking or gravel extraction as well as farming, were theoretically in a position to make strategic decisions to maximise their incomes. We might expect there to be a correlation between

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[57] Hayes Manor quit rents 1801-1807. LMA Acc 264/106-111

[58] Chambers & Mingay, op.cit., p.129; Daunton, M.J., *Progress and poverty: an economic and social history of Britain, 1700-1850.* Oxford, 1995, p.53-54

[59] Chambers and Mingay op.cit. p. 167; Feinstein, C.H., "Agriculture 1770-1860" in C.H. Feinstein and S. Pollard (ed), *Studies in capital formation in the United Kingdom, 1750 –1920.* Oxford, 1988, p.9-27

the level of agricultural rents and landowners' interest in brickmaking since it would be logical to favour the latter when the returns from farming were poor. Rents themselves were a reflection of the prices being paid for agricultural produce; similarly brickmakers were only willing to pay high rents and royalties if they believed there would be a sustained demand for their products, and that prices would remain high or continue to rise.

If this mechanism was to operate effectively and allow owners to make clear choices, agricultural prices and brick prices needed to move inversely, but it is apparent that this was not always the case, particularly in the 1880s and 1890s when there was a fall in agricultural prices accompanying a trough in house building. The movement in farming rents in England in the nineteenth century is plotted in Graph 5.1 using data from the recent index produced by Turner, Beckett and Afton. [60] From this chart it appears that rent rose until about 1820, was largely static for the next thirty years, then rose again from the late 1850s to around 1880, before falling sharply until the mid-1890s. This trough then bottomed out at about the twenty shillings per acre mark, very similar to the level prevailing in the 1820s and 1830s. By comparing this pattern with the indices of demand for bricks used in Chapter Three [Graph 3.4] it seems, though the fit is not precise, that there is not an inverse correlation between the demand for bricks and for agricultural land.

In reality landowners did not seem to balance the fluctuating demands for brickmaking and for farming. Indeed the way that land was let was not generally conducive to the kind of short term adjustments that would be required to take advantage of price changes. The length of leases given by landlords to brickmakers were often of fourteen or twenty-one years, which meant that they spanned the usual trade cycle (Juglar) of nine years. More importantly, brickmaking leases were usually for longer periods than farming tenancies. We may speculate that landowners anticipated that, following a single agreement, all the brickearth in their land would be exhausted, accomplishing that unrepeatable opportunity to exploit it.

[60] Turner, M.E., Beckett, J.V and Afton, B., *Agricultural rent in England 1690-1914*. Cambridge, 1997.

Ground rent was only one element. A large part of return that landowners enjoyed by sanctioning brickmaking on their estates came from the royalty their tenants paid rather than the rental. They often wrote into their leases either a fixed monetary payment, or a minimum output of bricks; with these requirements the tenant was squeezed if demand for his product flagged or prices dropped. These royalty agreements made some allowance for the vagaries of the market and the problems of the weather, since the minimum output could be adjusted between seasons. James Hunt's lease of land at Heston in 1844 required him to make two million bricks per season; however if that figure was not reached the full royalty was payable, but he could make more bricks in subsequent years without additional payment, the aim being to produce two million bricks per annum on average.[61] A clause in another Heston lease suggests a sensitivity to the fluctuating demand for bricks, since the minimum output of one million bricks could be reduced if on the 25th March in any year, a quarter days on which rents were payable which fell at the beginning of the moulding season, half a million bricks "remain on the ground". In that case the minimum output was to be halved.[62] A clause such as this, however, is unusual.

In the few cases where we can compare the terms of the original lease with the actual royalty payments it seems probable that landowners adopted a pragmatic approach to underpayment. On the tenant's side the leases did not make any reference to the state of the market in determining payments, but there was usually a clause that allowed the tenant to terminate the lease once all the brickearth had been exhausted, which assumed that the landowner had already enjoyed a good return on the bricks that had been made. This was a realistic approach since until he started to dig out the brickearth the tenant could not be certain about the depth of material he would find. Where leases were for long periods and for large acreages the brickmaker would have let out some of the land to a farmer, for grazing probably, since it was unlikely that brickmaking would occur on more than a few acres at a time. The larger amount was required to provide resources for future years, and perhaps more importantly to allow access to the canal. Assuming that brickmakers worked those fields nearest the canal first, after a number of years they would be working land a hundred yards from the canal to which access was still required.

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[61] LMA Acc.328/47
[62] LMA Acc.328/43

When a landowner decided to grant brickmaking leases he anticipated an income greater than the return he could expect from the use of the land for agriculture or horticulture. The income was made up of two elements: the royalty on bricks made and a ground rent, which seems to have been at a rate similar to the prevailing agricultural rent. For example, an 1864 lease at Dawley of about thirty-eight acres brought the landlord a rent of £154, that is roughly £4 an acre, but prospective royalty payments in the region of £400, that is 2s 0d per thousand on a make of four million bricks.[63] Direct comparisons between the returns from brickmaking and those from agriculture, however, are difficult to make from the available evidence, especially since agricultural rents themselves varied considerably, depending on the nature of the soil and the use to which it had been put. Tremenheere noted that in Southall the land south of the Uxbridge Road, which was light loam and gravel, produced rents 20s per acre higher than the land to the north, which was heavy clay.[64] Land laid to permanent grass appears to have been more valuable than arable land, reflecting the greater profitability of dairy cattle or hay growing. The land of Frogmoor Farm, Hayes, was valued in 1838 at rates of 30s, 25s and 20s per acre for the arable fields, but 40s, 30s and 25s for the meadows.[65] In 1858 the lands on the Shadwell estate in Northolt were being let at values between 25s and 40s per acre for agricultural use, but a Northolt brickmaking lease of 1848 valued the land at 40s.[66] A surveyor's report on Philpot's Bridge Farm valued it at 50s per acre, but the adjacent Colham Manor Farm at the same time was only worth 40s. A Hillingdon lease of 1849 valued the land at £3 per acre but in Heston in 1889 the 195 acre Heston Farm was let to James Robinson for agricultural use only at a rent of 70s per acre. A Heston brickmaking agreement a few years earlier had included 20 acres at 70s per acre.[67] It seems, therefore, that rents charged to brickmakers were at the high end of the prevailing agricultural rents.[68]

Royalties were paid on the number of bricks made expressed in shillings and pence per

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[63] Lease from Shackle to White and Stacey. LMA Acc.538/2nd deposit/ 3517
[64] Tremenheere, op. cit., p.122
[65] LMA Acc 180/ 211
[66] LMA Acc.289/194; WAM N.107
[67] LMA Acc 1386/98; Acc405/ 7
[68] It will be apparent that the rents prevailing on these Middlesex estates were much higher than the national average, as provided by Turner, Beckett and Afton. This reflects two factors (a) the paucity of readily available data from Middlesex, and (b) the impact of the proximity of the metropolis on the use and value of land.

thousand, the range of such rates extending from 1s 3d (De Burgh estate, Hillingdon 1855) to 2s 6d (Villiers estate, Southall 1898).[69] There is, however, no obvious trend in these figures, as Graph 5.2 shows. What then determined the level of royalty payments? Was it the quality of land and the anticipated costs of making the bricks? Was it the level of demand for bricks or the prevailing market price? Whilst the high value of 2s 6d in 1898 corresponds with the peak of demand in that year, and the 2s 3d charged in 1878 could relate to steeply rising demand in the late 1870s, the same cannot be true of the 2s 6d rate required in 1849. This last appears in a lease by Hubert de Burgh to James Thornton for a modest piece of land, only just over six acres, with a relatively short term of sixteen years. The rent was only £19 and the land had been worked as a brickfield so the landlord's expectation may have been that of intensive working for only a short period.[70] After asking this high rate, the same landlord, a few years later, charged one of the lowest (1s 3d) to Samuel Pocock, but in this case the term of the lease was forty years and the parcel of land involved was about one hundred acres. Here the landlord expected steady income over a long period, with a smaller amount of royalties.[71] In other cases there was a greater consistency of approach. De Salis's three leases in 1853 all had the same royalty rate, as did those for adjacent pieces of land let by Passingham in 1844 and 1845.[72]

It would have been difficult for landowners to relate their royalty rates to prevailing levels of demand or brick prices because of the length of leases. Leases were often for twenty-one years, whilst demand and prices could fluctuate widely within this period. Only perhaps in 1898, where the Jersey estate leased twenty-eight acres to Thomas Watson for the short period of seven years, might the landlord have been taking advantage of the peak demand of that year.[73] No lease contained a mechanism by which royalty rates could be increased if circumstances changed during the term of the lease; landowners benefited from increased royalties if market conditions encouraged brickmakers to increase production, but that, of course, would not ultimately increase the potential income of the site, which was ultimately fixed by the depth of brickearth in

[69] LMA Acc.1386/ 101; 405/ 1
[70] LMA Acc 1386/98
[71] LMA Acc 1386/101
[72] LMA Acc 969/62-64; Acc 328/47, 49, 51
[73] LMA Acc 405/1

the land.

In almost all cases the landowner attempted to guarantee the royalty income by stipulating in the conditions of the lease a minimum number of bricks to be made each year, although the tenant could usually average out under-production in one year with greater production in another. Such minimum quantities ranged from one-and-a-half million (Passingham estate, Heston 1845) to six million (Ecclesiastical Commissioners, Hillingdon 1882) thus guaranteeing income of £150 and £450 respectively.[74] In a few cases the minimum quantity was expressed as a cash sum, for example, £337-10s, the equivalent of three million bricks at 2s 3d per 1000 (Hambrough estate, Southall 1878), but production in excess of this was charged at a rate per thousand.[75] In this instance the two rates were the same, but in others there was a differential royalty, production in excess of the prescribed minimum being charged at a lower rate; Messrs Rigby's lease of land at Dawley in 1854 stipulated a minimum of four million bricks at 1s 9d a thousand, producing £350, but production in excess of five million was charged at only 1s 6d.[76]. In another case the royalty increased from year to year assuming a steady growth in production, although the underlying rate remained the same.[77] It is difficult to know whether these royalty levels were consistently achieved, and whether landowners took action when tenants fell short of their agreements. Occasionally the quantity of bricks produced is known. In the case of Thomas Watson, he was expected to pay £250 in 1899, £375 in 1900 and £500 in the following year, but his actual production would only have generated royalties of £296, £264 and £299, which may have been further reduced by allowances for waste.[78]

Landowners had expectations of the income they would receive from the use of their land for brickmaking. When the de Salis family wished to exploit their brickearth at Dawley in 1849 they were advised that the brickearth was very good and that there was sufficient to make eighty-three million bricks at a rate of about three million per annum. At a royalty rate of 2s 3d this could yield the estate £337 per annum in addition to the

[74] LMA Acc 328/51; Guildhall Mss 12335
[75] LMA Acc 1103/6
[76] LMA Acc 969/64a
[77] LMA Acc 405/1
[78] LMA 405/1

ground rent.[79] Unfortunately it is difficult to gauge what returns owners actually received. When the surveyor William Heron reported on Philpot's Bridge Farm and Colham Manor Farm in 1832 both were already being worked for their brickearth, and Heron thought that the land might be worth £400 to £500 per acre as brickfields. [80] Although Middleton had noted that an acre of brickearth could be worth from £300 to £500 - and this was theoretically possible since an acre of soil with a clay seam five feet thick could produce five million bricks, which charged at a royalty of 2s per 1000 would produce £500 - there is little evidence that such output was often achieved. The brickmaking lease in Heston in the 1880s that valued the twenty acre site at 70s per acre and set a royalty of 2s per 1000 with a prescribed minimum output could have produced a return for the landowner of £400 per annum over a 14 year term.[81] The few examples where records of the landowners' income survive are considered below.

Leases were of variable length, ranging from less than five years (Odell 1891, Hiscock 1896) to forty years (Pocock 1855), but twenty one year leases were most common. In the 1870s James Burchett held Wood Lane brickfield in Osterley on a yearly tenancy, but annual arrangements of this kind were unusual. [82] These leases also involved parcels of land of very different sizes, from a few acres to as much as a hundred (Pocock,1855).[83] It might be expected that the longer leases would be for larger parcels of land, the shorter ones for the smaller, but this does not always seem to have been the case. Actual clay digging was unlikely to take place on more than a few acres at any one time, since the manufacture of a million bricks per annum required only an acre of brickearth a foot deep, which, assuming deposits of five feet depth, necessitated the opening up of one fifth of an acre. Few brickmakers made more than two to three million bricks per annum and they must often have used only a small proportion of the land that they had leased. Pocock leased about 100 acres from Hubert de Burgh in 1855 for a forty year term and paid his first royalty payment in 1860 of £312-10s-7d on approximately five million bricks at a royalty of 1s 3d per thousand. His annual rental was £350. The assumption must be that he sub-let a substantial proportion of the land, until it was

[79] PRO RAIL 830/93-95
[80] LMA Acc 742/105
[81] LMA Acc 405/7; Middleton, op.cit., p.25
[82] LMA 506/15
[83] PRO BT31/5649/39405; LMA Acc 405/7; LMA Acc 1386/101

required for clay digging. Limitations on the area to be dug were sometimes specified in a covenant, mainly as an attempt by the landlord to maintain the appearance of the land whilst brickmaking continued. Mecklenburg's lease from Villiers in Heston stipulated that he could only work one and a half of his five acres at any one time, Pocock only two from a thirteen acre lot in 1875.[84]

Long leases assumed price stability since the rental and royalty payments were fixed, but the brickmaker was at risk if the price of bricks fell or demand was low. Some shorter leases might take into account that brickmaking had already taken place on the land and that the remaining brickearth might be exhausted within a few years. In a few cases the land could be surrendered piecemeal when the brickearth had been worked out and the top soil replaced. Rigby's lease from de Salis in 1854 allowed land on his forty-nine acre brickfield to be surrendered in blocks of two acres.[85] In one case F.C. Reed was not required to pay the royalty once the brickearth was used up but had to continue to pay the ground rent.[86] Sometimes the terms of the lease could be varied if the brickearth proved not to be of sufficient depth to make its exploitation economic. Edward White's lease at Hayes in 1873 referred to " fair average brickearth quality and where not less than two feet deep."[87] A lease to D.& C. Rutter in 1895 allowed land to be surrendered, in parcels of at least an acre, either when the brickearth was exhausted or if there was found to be less than three feet depth of workable clay. [88]

Leases were sometimes assigned by one brickmaker to another, usually as a result of the bankruptcy of the original lessee, tending to confirm that brickmaking, like the building trades to which it was allied, was a precarious business. Examples of such transfers include Thomas Maynard's purchase, in 1873, of the lease of a brickfield at Dawley from the liquidator, following the bankruptcy of the firm of John Rutty and Company. Maynard was a brick merchant at Paddington basin.[89] A neighbour in South Wharf Road was the firm of Broad and Harris, who in 1886 acquired the brickfields of Samuel

[84] LMA Acc 405/7; Guildhall Mss 12335
[85] LMA Acc 696/64a
[86] LMA Acc 405/1
[87] LMA Acc 538/1st Dep/42/15
[88] LMA Acc 1386/382
[89] LMA Acc 969/66

Pocock in Hillingdon, again as the result of insolvency. [90]

Gravel was often found in association with brickearth, mostly below the clay seams. There was a steady demand for it, and it was widely used in road making and other civil engineering purposes. Many London Vestries let annual contracts for the supply of gravel and hoggin, a form particularly suited to road making. Pocock was able to sustain a contract with Marylebone Vestry for the year 1859-60 largely from the material that was dug out whilst extending the dock, at West Drayton, to serve the parts of his brickfield farthest from the canal, nearly 20,000 tons.[91] Messrs Studds won a tender to supply sifted and unsifted gravel to Paddington Vestry in 1857; forty years later Odell & Company Ltd was supplying sifted gravel and hoggin. A small number of contractors appear regularly bidding for these contracts; some sourced their gravel from the Thames estuary, others from West Middlesex. [92]

Gravel layers were often exploited in brickfields once the brickearth had been used up. The royalty on gravel extraction was charged on a different basis from brick production, sometimes on the weight or volume of gravel extracted but otherwise on the acreage of land being worked: this latter represented a gamble on the part of the contractor that there was sufficient depth of gravel available to make the operation economic. When Gibson rented land from the Osterley estate he was on short term leases of a year or less, paying for the land as it was used at the modest ground rent of £2 12s per acre but paying a royalty of 7d per cubic yard removed.[93] The alternative method of payment applied to the Studds' lease of old brickfields at Hillingdon in 1853 which stipulated an additional payment for each acre worked for gravel in addition to the ground already being used. On the seven acre field known as *Long Otters* the payment was £50 for the sixth acre and £69 for the final portion, on the ten acre *Bull Field* the additional charge was £110 for each of the fourth to ninth acres and £157 for the final piece.[94] Messrs Studds seem to have worked the land steadily, despite losing the Paddington contract after a year, paying £110 in 1858, £220 in 1859 and £110 in 1860, but thereafter no

[90] Guildhall Mss 12335
[91] PRO RAIL 830/93-95
[92] Westminster City Archives. Paddington Vestry Minutes 13th March 1857; Works Committee 22nd December 1899
[93] LMA Acc 405/3
[94] LMA Acc 1386/99-100

further payments are recorded before the sequence of accounts ends.[95]

Gravel extraction could be much more destructive than clay digging and strict rules were imposed in leases to ensure that fields were worked in a systematic, safe and tidy way. Depths dug could be substantial. Gibson was required not to exceed a depth of twenty feet, nor to dig within thirty feet of Windmill Lane in his lease of 1896, but Studds could only remove four feet of gravel on one site in Hillingdon in 1853 and six feet in another field the same year.[96] Pocock's lease of land at Hillingdon in 1859 which gave him both brick and gravel rights required him not to disturb more than two acres in a fourteen acre field at any one time, and he had to restore the level of the land to a height "not less than three feet above the accustomed level of water in the canal", presumably to remove the risk of flooding. If Pocock used some sort of infill material, either from rubbish or excavations, it is not clear what it was or where it came from.[97] There was an obvious hazard to humans and animals where deep excavation had occurred in part of a field, and Gibson was expected to provide a proper gradient between the worked and unworked portions of the site.[98]

Even if brickmakers were not subject to the conditions in a lease imposed by a landowner, they might still have to answer to another party. Some land in the area was still held by manorial tenure and in these cases the lord of the manor had a financial interest in any brickmaking undertaken by the copyhold tenants. The lord of the manor of Hayes, Robert Blencowe, took action in 1846 against one of his copyholders, Thomas Shackle, for making bricks without a licence. Shackle had probably been doing this for some time but because he also owned freehold land on which he made bricks it was difficult to distinguish one from the other. The progress of the case, and the result of Blencowe's claim for compensation, is not known, but a licence was subsequently issued to Shackle two years later placing a small royalty of 2d per thousand on future production.[99] A similar rate was charged by the Manor of Northolt on Mr Norton who

[95] LMA Acc 1386/385; Westminster City Archives. Paddington Vestry Minutes 2nd March 1858
[96] LMA Acc 405/3; Acc 1386/100
[97] LMA Acc 1386/102a
[98] LMA Acc 405/3
[99] LMA Acc 180/181-182

paid £24-15s-10d on the 2,950,000 bricks he made in the 1835 and 1836 seasons.[100] Action was also taken in 1859 by the Ecclesiastical Commissioners against Samuel Pocock and his landlord, Hubert de Burgh, for a similar use of Worcester Bishopric land in Hillingdon without their consent, and a sum of 7½ d per thousand was paid thereafter, with arrears for the preceding three years.[101] In another case De Burgh agreed to grant a brickmaking lease only after a parcel of land had been enfranchised. [102]

The larger firms often acquired land in quantities that were beyond anything that could be required for immediate use. Odell Ltd in 1893 owned forty-four acres of freehold land and 167 acres of leasehold on several Middlesex sites.[103] Pocock leased 149 acres from the Ecclesiastical Commissioners in 1875 but was required to make only seven million bricks per annum.[104] The assumption must be that they bought or rented sufficient land to ensure production for several years and that the land which was not immediately required, or which had been worked out, was let for grazing or used as meadow, but little documentary evidence of such arrangements has yet come to light. One example of this is the rights given to Northolt farmer F.W. Crees by the New Patent Brick Company to "use without payment for mowing and grazing purposes until 25th March 1902 such part of the land as has not yet been used of brickmaking purposes".[105]

Whilst there is evidence of land being returned to agricultural use after the brickearth was worked out, it is unclear whether the brickmaker himself farmed the land until the termination of his lease. Some brickmakers, having been farmers earlier in their lives, may have quite naturally cultivated the spare pieces of their fields; others probably came to an agreement with a local farmer. In one case the arrangement went further, as the farmer Joseph Gregory was a partner with Broad & Harris in their operations in Hillingdon, presumably looking after the unworked portions of their extensive landholdings. He later became a major shareholder in Broad & Company Ltd in 1896. [106]

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[100] LMA Acc 289/457
[101] LMA Acc 1386/102
[102] LMA Acc 1386/108
[103] PRO BT31/ 5649/ 39405
[104] Guildhall Ms 12335
[105] L.B. Ealing, local collection. *Sale particulars, New Patent Brick Company of London Ltd, 1901*
[106] LMA Acc 1214/1340; PRO BT31/ 6681/ 46980

It is not yet possible to determine whether the agricultural depression of the 1870s to 1890s encouraged farmers and landowners to develop their land for brickmaking in the face of low prices and falling rents. The dramatic fall in agricultural rents, and the low level that was maintained up to 1914, is clearly visible in Graph 5.1. At the national level the depression encouraged the transfer of land from arable cultivation to dairy and hay production.[107] Unfortunately there is, as yet, no useful index of farming rents for Middlesex, and, given the distortions caused by the dominance of the London market, it may well be that local landowners and farmers fared less badly than those elsewhere. Brickmaking could help compensate for falling agricultural incomes, as well as providing a transition between arable and permanent grass. Land used for brickmaking might, with suitable manuring, be better able to sustain hay meadows or grazing land than arable crops.

Since some areas in West Middlesex were slow to be enclosed the use of the land for brickmaking may have been inhibited. This seems to be what occurred in Northolt. The principal brickmaking area in the parish was Tunlow Field, conveniently placed beside the canal and the main road. Before Parliamentary enclosure in 1835 this had been a common field, divided into a number of strips, and consequently difficult to lease for brickmaking. Operations on the field seem to have started about the time of the enclosure, licenses being granted to Charles Brett in 1834 and Winkworth in 1835.[108] Enclosure also aided the transition from arable to hay growing.[109]

What was the impact of brickmaking and gravel digging on the incomes of landed estates in West Middlesex? Detailed records, unfortunately, rarely survive, but there is useful material for two landowners who have made frequent appearances in this chapter, De Burgh and the Earls of Jersey. Account books for the De Burgh estate in Hillingdon and West Drayton are preserved for a sixteen year period from 1856. Income was derived from rents of agricultural land and brickfields, rents for gravel bearing land currently being dug, and from royalties on brick production. The contributions of rents and royalties are shown in Table 5.1 and Graph 5.3.

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[107] Perry, P.J., *British farming in the Great Depression 1870-1914: an historical geography*. 1974. p.107
[108] WAM Northolt Court Roll; LMA Acc 289/454
[109] Victoria County History. *Middlesex, vol.4*. Oxford, 1971, p.116

There was a general upward trend in the income from rents on the de Burgh estate during the decade-and-a-half of these accounts, and this was in line with the national experience, although there was a dip in some years – 1859, 1862, 1868, and 1871. The lower level of receipts in these years may have been the result of rent owed but not paid in full. Certainly in1862 there was a much higher sum of arrears carried forward to the following year than had been the case in the previous one. [110] In the case of 1871 it is difficult, without the figures for the following years, to know whether this year is one marked by shortfalls, like 1862, or whether it is the start of a downturn. If the latter it seems to occur too early to be related to the depression that started at the end of the decade.[111]

When the ground rent paid by brickmakers can be separately identified, which is only possible for two years, the income from brickmaking is seen to be as high as 46 per cent in 1856 (£593 rental and royalties of £712) and 59 per cent in 1861 (£1099 rental and royalties of £1227). After 1865 royalties on brick production declined sharply, perhaps reflecting the exhaustion of several older brickfields rather than a lack of demand, since the Parry Lewis index of house building shows a steep upward rise in the second half of the 1860s.[112] By 1871 royalties from the remaining two brickmakers amounted to only £221 out of the total income of the estate of £3526. However Pocock's hundred acre holding in Hillingdon produced an annual rent (after tax) of £334 in 1871 although he was only paying the small sum of £170-18s-4d in royalties. In this case, as has been argued above, De Burgh may have looked to a long term and steady income from this major brickfield.

A longer series of accounts has survived for the Earls of Jersey's Middlesex estates that were centred on Osterley Park, and including land in the parishes of Norwood, of which Southall was a part, Heston, Isleworth and Hanwell. The records start in 1810 and continue to 1899, but with a number of missing years in the 1820s, 1830s, 1860s and 1870s. However it is only for the last thirty years that there is useful data for the study of

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[110] LMA Acc 1386/ 385

[111] Thompson, R.J., "An inquiry into the rent of agricultural land in England & Wales during the Nineteenth Century". *Journal of the Royal Statistical Society*, vol.70, 1907, p.587-616; Turner, Beckett, & Afton, op.cit.

[112] Lewis, J. P.,*Building cycles and Britain's growth*. 1965. p.144

land use. [113] For this later period it is possible to identify five ways in which the Jersey derived income from its land: from agriculture; from residential property; from brickmaking; from gravel extraction; and from building leases.

The estate in 1881 included six farms and the rental these produced was the largest element in the income of the estate, £1917 of a total of £3447 for a half-year. Next in importance was property, mostly residential, which ranged from some substantial houses with their own grounds, including Osterley Park itself which was worth £700 per annum, to humble cottages, let on weekly tenancies at 3s 6d. The non-residential element included a butcher's shop, two public houses, and the site of Southall market. This category brought in £1288 in a half-year.[114]

By 1881 the estate had allowed some land to be used for building and these plots, let on leases varying from 60 to 99 years, contributed £33 to the estate's income, a small sum in relation to the income from agriculture and property. Only two sites were let to brickmakers, one to Burchett, the other to the French firm Normand et Cie, producing a combined half-year rental of £53-10s, but there is no evidence of any royalties being paid by either operator. Burchett held his land on an annual tenancy in 1881, but the following year this was converted into a twenty-one year lease at the same rental (£36 p.a.).[115] Normand had taken over their land at Michaelmas 1881 and so paid only a quarter's rent in 1881, and would not have anticipated starting production and paying royalties until the following year. The terms of their lease required a royalty payment of £400 per annum, based on a rate of 2s per 1000 bricks for production of four million bricks. A few years later the brickfield appears to have been transferred to the partnership of Brown and Mecklenberg, but the size of the rent they paid (£471 p.a.) suggests that it included a royalty element. [116]

In 1899 Thomas Watson was paying £85 per annum on a 28 acre field which was leased by the estate to him for seven years in 1898, a rent of just under £3 per acre He was committed to producing two million bricks in his first year and making a payment of

[113] LMA Acc 506/ 1-37
[114] LMA Acc 506/19
[115] LMA Acc 506/32
[116] LMA Acc 405/7; Acc 506/21

£250, the equivalent of a royalty rate of 2s 6d per 1000, the highest rate recorded for any of these west Middlesex parishes. Unfortunately the accounts for the second half of 1899 do not survive, but in the first half year Watson had paid £120.[117] In 1899 brickmaking contributed only £69 10s in rentals for the half year but royalties in the same period amounted to £195. Gravel digging provided a modest £7-11s-3d in rent, but a substantial £313-4s-0d in royalties.[118]

The Jersey estate contained at least one field that had been used for brickmaking and had been worked out, subsequently reverting to agricultural use. Bixley Field had been let to Peter Pearse, a Holborn builder, in 1859 on a twenty-one year lease. This fourteen acre field was near Norwood Green, and a corner of the field abutted the Grand Junction Canal. The terms of Pearse's lease allowed him to construct a dock fifty yards long and twenty-five yards wide.[119] At the end of this term the field was the subject of a new lease to Thomas Jacobs, there having been an intervening occupancy by Messrs Holland and Hannen, a brickmaking firm. They were using the land for brickmaking in 1872, but a year later the land was described as "formerly a brickfield", rented at the original 1859 ground rent of £35 per annum, and no royalties were being paid. [120] Jacobs' lease was purely for agricultural purposes, the field being under arable cultivation, but the accompanying plan shows five cottages and a number of other features, including a chalk crusher, typical of a brickyard.[121]

The other brickfield on the Jersey estates was the Osterley Estate brickfield. This was let to the firm of Brown and Mecklenberg on a fourteen year lease in 1881, but details of the original lease have not been found. However it seems likely that the rent included a royalty element since they were paying the large sum of £244-10s per half-year in 1895 and again in the following year. However it appears that either the brickearth was exhausted or the firm failing, since in 1896 they relinquished the land, owing rent arrears of £130, and a new tenant, Thomas Hiscock, was given a four year lease of the 8½ acre field at a rent of only £9. In the first half of 1899 he paid the estate £4-10s in rent and

[117] LMA Acc 506/37
[118] Ibid
[119] LMA Acc 405/1
[120] LMA Acc 1401/27; Acc 506/15
[121] LMA Acc 405/1

£75 in royalties.[122]

Although the main income for the estate continued to come from agricultural rents and property leases, the value of this type of land was falling in the last quarter of the nineteenth century. It has long been thought that rents fell considerably during this period in the so-called Great Depression. Thompson observed that

> Rents continued to rise until 1878, when a sharp fall occurred followed by a progressive decline which continued until the close of century. ... the average fall in rents between the early seventies and the end of the century was approximately 30 per cent.[123]

However it is debatable how representative Thompson's figures were, since they were based on a sample of estates for which there were a good series of statistics, and did not take account of the marked regional variations that characterised the state of agriculture in this period.[124] The recent index of agricultural rent compiled by Turner, Beckett and Afton, whilst differing from Thompson in detail, confirms the significant fall in rents from the 1880s into the first decade of the twentieth century. Rents fell below twenty shillings an acre in every year, except one, between 1898 and 1904. Moreover rents continued to fall even after prices began to recover. [125] Several problems set in for landlords and tenants at the end of 1870s and these difficulties had not really been resolved by 1914. Although arable farmers were particularly badly hit, the rent indices and the level of arrears suggest that there was a national crisis on a level not matched in two hundred years. [126]

Neither Thompson's nor Turner's work has a strong Middlesex focus, but the Jersey estate records provide an opportunity to test their generalisations in the area that directly relates to this study. These accounts show a significant fall in the rents of most property, not just the specifically agricultural land. Many of the larger farms were let on annual tenancies which made adjustments in rent easier to introduce. If we compare the rents paid for identifiable parcels in 1873, 1881 and 1896 there is a fall in some rents between the first two dates, but more considerable falls between 1881 and 1896.

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[122] LMA Acc506/32; Acc 405/7
[123] Thompson., op.cit p 595-596
[124] For a recent attempt to construct a reliable index of agricultural rents, see Turner, Beckett & Afton, op. cit.
[125] Ibid, p.250-251

As can be seen from Table 5.2 the rent of Warren Farm fell by a third, Park Farm by forty-four per cent, and Wyke Farm by fifty-seven per cent assuming that the size of the farms remained constant during this period. Heston Farm, which was 195 acres in 1889 declined in value from £3.58 per acre in 1873 to £2.71 per acre in 1896, a twenty-five per cent reduction, having been relet in 1895 when it was in a "foul condition" to the market gardeners W.G. and W.J. Lobjoit.

Table 5.2 Rents on the Jersey estates in Heston, Osterley, Hanwell and Norwood.

Half-year values

	1873	1881	1896
	£-s-d	£-s-d	£-s-d
Red Lion PH	90-0-0	75-0-0	75-0-0
Southall Market	140-0-0	140-0-0	117-0-0
Dormans Wells Farm	156-3-0	156-3-0	109-13-0
Warren Farm	449-0-0	425-0-0	300-0-0
Park Farm	126-0-0	110-0-0	70-0-0
Wyke Farm	450-0-0	450-0-0	191-10-0
The Cedars	100-0-0	In hand	50-0-0
Osterley Estate brickyard			235-10-0
Wood Lane brickyard	18-0-0	18-0-0	18-0-0
Heston Farm	350-0-0	350-0-0	265-0-0

Source: Jersey estate rentals. GLRO Acc 506/15, 19, 32

Faced with these falling rents the Jersey estate might have been attracted to brickmaking as a more profitable alternative. However the trough in the housebuilding industry that coincided with the depression in agriculture may have reduced the demand for new brickfields. Certainly the accounts indicate that brickmaking, and gravel extraction, was never a significant element in the estate's income. The failure to encourage brickmaking does not seem to imply an exhaustion of the brickearth, although there is evidence of some sites having been worked out, since the presence of brickearth is recorded in later sale prospectuses. The Jersey experience may not have been typical of the landed estates in the area, because of the proximity to Southall, but all landowners must have been aware of the possibilities of the sale or lease of plots for housebuilding. By the end of the nineteenth century it became more likely that land near to developing suburbs like Southall would be sold for building, and there were a number of sales of outlying parts of the Osterley estate. The fourth such sale in 1919 included a 28 acre field containing

[126] Ibid, p.257

> a bed of brickearth, which has been partly worked, giving the advantage to the purchaser of space for immediate development with material for making bricks whilst the prepared land is being covered.[127]

The following conclusions may be drawn from this study of landowners in the Cowley district. First, brickmaking could provide a significant additional source of income for landowners, providing a royalty income that supplemented the rents brickmakers paid. These rents were, themselves, equal to or greater than the rents that would be paid for strictly agricultural purposes. Secondly, most of the brickmaking leases were for quite long periods, which did not allow landowners much opportunity to adjust rents to reflect the changes in prices for either agricultural products or building materials. Landowners could gain in the short term from high levels of demand for bricks and gravel because this would generate additional royalty payments; however high levels of production caused the brickearth to be worked out more quickly. Thirdly, the royalty payments were much larger than the rent of the land, but it seems probable that the levels of royalty guaranteed in many leases were not always achieved, and the landowners seem to have been tolerant of these failures. The likely explanation is that if landowners turned out brickmaking tenants when the market for their products was low, they would find it difficult to find new tenants to take over, and they would be reluctant to leave brickfields in a partly worked state.

Fourthly, brickmaking does not seem to have provided the major income for any of the landowners we have considered, certainly not in the long term, although the De Burgh estate did quite well in the early 1860s. Lastly, brickmaking in the Cowley district was able to exist within an agricultural environment and land could be used for brickmaking and then returned to some sort of agricultural use. Brickmaking, therefore, offered a one-off opportunity for landowners to profit from their land's potential, and occupied a transitional place between different types of land use.

The acquisition of land by lease or purchase gave brickmakers access to the raw material from which to manufacture bricks and a site for their brickyard. The next chapter considers how raw clay was turned into finished bricks and the type of employment the different processes provided.

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[127] Ealing Local History Collection. *Particulars and conditions of sale ....6th June 1919*

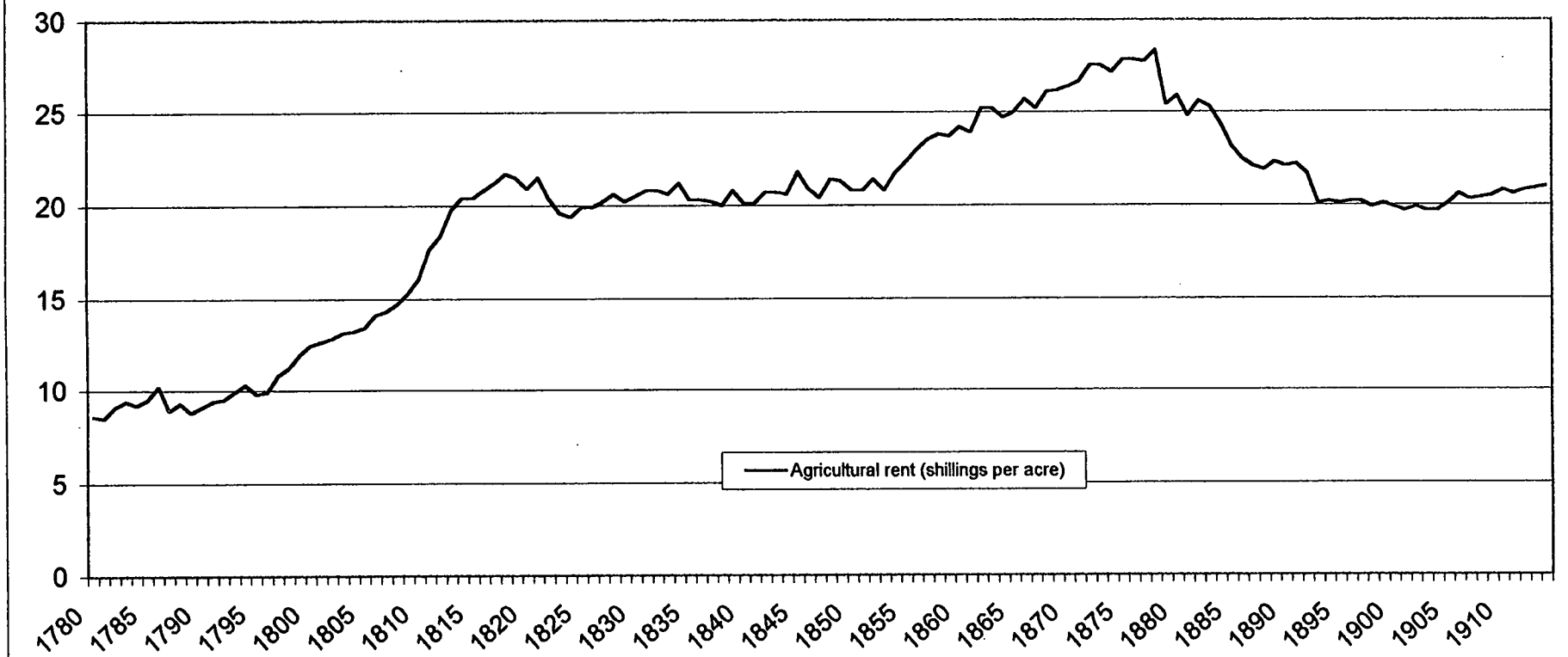
Table 5.1: Income of the De Burgh Estate in Hillingdon & West Drayton, 1856-1871

Year	Rents	Royalties			Total rents & royalties	% of total derived from mineral royalties
	Total	Bricks	Gravel	Brick & gravel total		
	£	£	£	£	£	
1856	2086	712	0	712	2798	25%
1857	2130	908	67	975	3105	31%
1858	2306	1071	145	1216	3522	35%
1859	2242	626	220	846	3088	27%
1860	2650	1147	110	1257	3907	32%
1861	2683	1227	0	1227	3910	31%
1862	2604	1096	0	1096	3700	30%
1863	2645	1092	193	1285	3930	33%
1864	2901	1209	195	1404	4305	33%
1865	2911	1318	195	1513	4424	34%
1866	2794	1087	196	1283	4077	31%
1867	3024	1086	98	1184	4208	28%
1868	3004	631	195	826	3830	22%
1869	3172	766	50	816	3988	20%
1870	3459	674	0	674	4133	16%
1871	3305	221	0	221	3526	6%

Source: De Burgh estate rentals. LMA Acc 1386/385

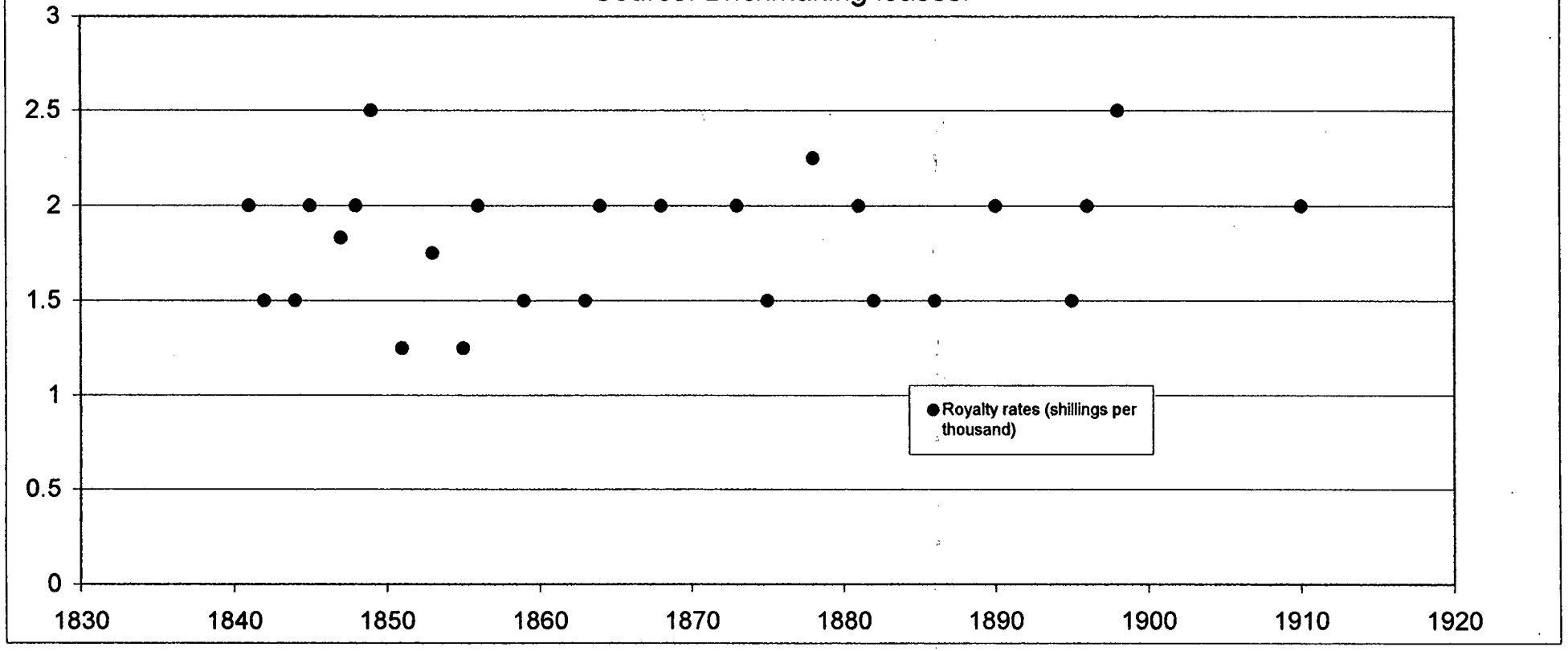
Graph 5.1: Agricultural rent 1780-1914

Source: Turner, M.E., Beckett, J.V. & Afton, B. *Agricultural rent in England 1690-1914*. 1997



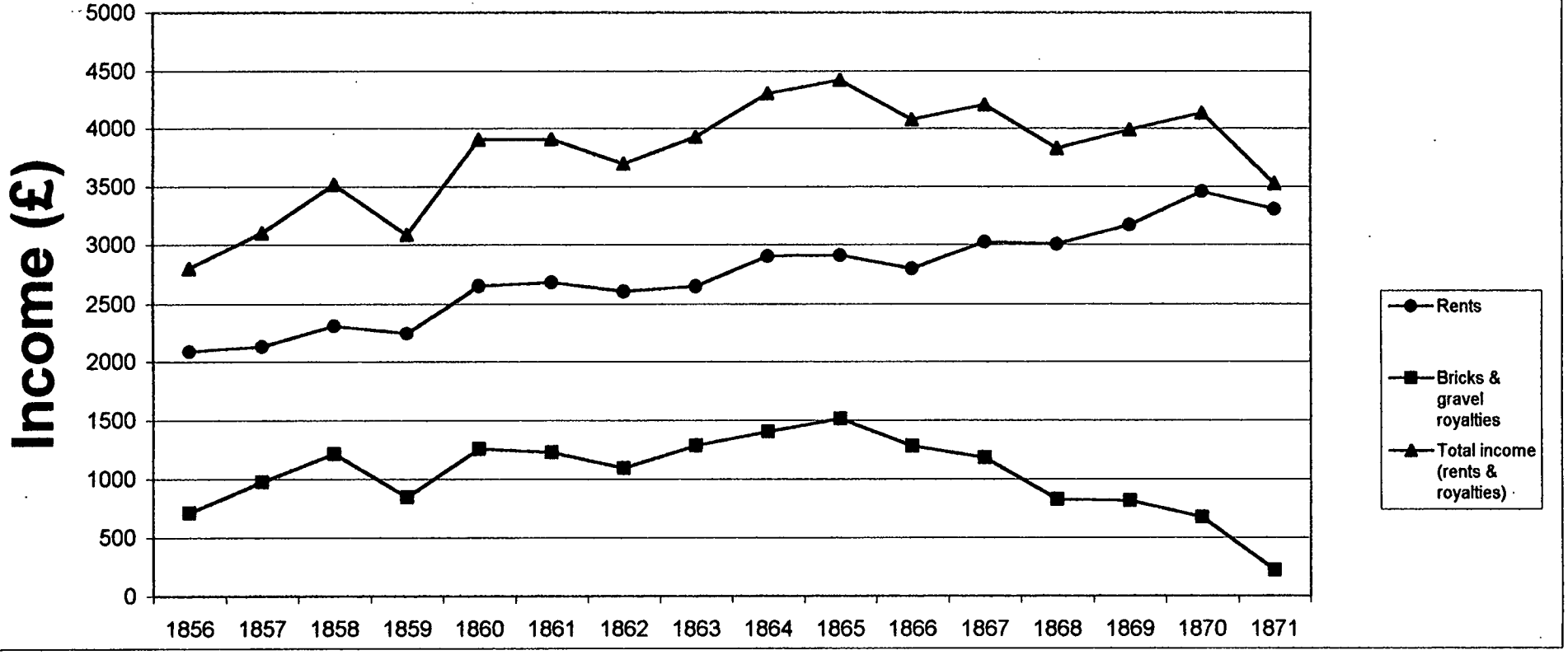
Graph 5.2: Royalty rates on bricks in the Cowley District

Source: Brickmaking leases.



Graph 5.3: Income from De Burgh Estate in Hillingdon & West Drayton

Source: LMA Acc 1386/385



The manufacture of bricks involved a number of different processes, which will be discussed and the demands they made on labour analysed. A number of issues arise from this, some of which bear on areas that have concerned students of Victorian industry: work discipline; the efficiency of different types of organisation, particularly the use of sub-contracting; the dependency of brickmaking on the labour of women and children, and the effect that state regulation of employment conditions had on curtailing this; the seasonal nature of the work, the pressures this put on the workforce and how these were accommodated; the provision of company housing and the extent of truck payments and similar abuses; wage levels; the introduction of machinery and resistance to it; industrial relations, labour disputes and the growth of trade unionism.

At the beginning of the nineteenth century and for much of the next fifty years bricks were mostly made by hand, using techniques, that though perfected over the years, had not changed significantly from those utilised by brickmakers in earlier centuries. In essence some suitable clay was dug, worked into a malleable consistency by a mixture of weathering and mechanical action, moulded into the shape of a brick, allowed to dry until it could be stacked, then fired until it was hard and firm. The final operation was loading the finished brick into a wagon, or barge for distribution.

There were regional differences in detail in these operations, which derived partly from the different types of clay that were used, and partly from tradition. There was a particular style of manufacture in the London area and this seems to have been adopted in the districts that in the nineteenth century were providing the capital with the grey or yellow "stock" brick. This London mode of manufacture was described by Edward Dobson in his influential book, whose first edition appeared in 1850, and which has been drawn on by many modern writers.[1] Certainly it provides a detailed account of the individual processes involved, whose general accuracy is confirmed by other contemporary observers, but there is a danger in assuming that all brickfields in

[1] Dobson, E. *A rudimentary treatise on the manufacture of bricks and tiles.* 1850. Amongst the modern writers you use his descriptions and reproduce his illustrations see Woodforde, J. *Bricks to build a house.* London, 1976; Hobhouse, H. *Thomas Cubitt; master builder.* London, 1978; Cox, A., "Bricks to build a capital" in H.Hobhouse and A.Saunders (ed.), *Good and proper materials: the fabric of London since the Great Fire.* London, 1989.

Middlesex were using precisely the methods that Dobson describes. Fortunately some descriptions of individual brickfields in the Cowley district exist, mostly from the 1860s.[2]

The annual cycle of brickmaking started with the digging of enough clay in the autumn to provide material for the following season. The clay was heaped up so that the frost and rain of the winter months would break it down. Clay was not generally used in a pure state, because it lacked the elastic qualities to make a satisfactory brick. As a naturally occurring substance brickearth varied in quality; the best soils – the malms – required no additives to make a suitably malleable material, but inferior ones were improved by the use of ground chalk . The addition of chalk had three effects: besides producing the characteristic yellow colour – the iron in the clay otherwise giving a reddish hue – it reduced contraction in the drying process, preventing cracking or distortion. It also acted chemically, combining with the silica in the clay to produce a strong and hard wearing brick.[3]

It was thought most effective to grind the chalk and, by adding water, to produce a slurry that could be easily mixed with the clay. As chalk mills, which consisted of a brick lined pit with a central spindle that could be turned by a horse, were among the most permanent structures on the brickfield, their presence is noted on maps and plans. Dobson also described the use of a separate clay mill in which the creamy mixture from the chalk mill was mixed with the clay, but these do not appear on every site.[4] (see Map 6.1)

The other ingredient added to the clay mixture was ashes, or breeze as it was usually known. The terms were used fairly indiscriminately, but there was a distinction; breeze was the harder residue of coal fires, somewhat like clinker, ash the finer and softer. Breeze was more likely to be used as fuel whilst the ashes were mixed with the clay. The

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[2] Brickmaking techniques in the Cowley district were described by the owners of brickfields and their foreman, and the by government inspectors to the Children's Employment Commission in the 1860s and the Factory & Workshops Commission in the 1870s. PP 1866, xxiv, p.135-138; PP 1877, xxiii, p.30. See also Chamberlain, H., "The manufacture of bricks by machinery". *Journal of the Society of Arts*, No. 185, vol iv, 6th June 1856, p.491f; Ward, H., "Brickmaking". *Institution of Civil Engineers, Minutes of Proceedings*, Session 1885-6, part iv, p.1-23

[3] Dobson, op.cit. p. 120-121

[4] Dobson shows the layout of the equipment on a brickfield. Ibid, p.124. Broad & Company used steam powered clay and chalk mills at West Drayton in the 1890s. *British Clayworker*, October 1898, p.195-6

two were separated by screening. Large quantities of each were used, seven cwt of ashes and three cwt of breeze for every thousand bricks.[5] This use of ashes had a two-fold objective: it both extended the clay and incorporated a certain amount of fuel within the brick helping to ensure that it burnt fully through, when, as on many Middlesex fields, the brick was burnt in a clamp rather than in a kiln. The ashes were sieved, and the finer material was mixed with the brickearth, a process known as "soiling" or "tempering", whilst the coarser residue was reserved as fuel for the clamps.[6] There were dangers in oversoiling, and the proportions of ash had to be varied according to the "strength" of the clay. A contemporary of Dobson observed that

> Breeze or ashes constitute a very important element in the manufacture of bricks, for if carefully managed according to the quality of clay, it may be made to produce very effective results both with reference to colour and quality.

Typical proportions of raw materials were 65 per cent clay, 20 per cent breeze and 15 per cent chalk on heavier clays, or 75 per cent clay, 15 per cent breeze and 10 per cent chalk on lighter soils. In some cases a small quantity (2 – 5 per cent) of sand might also be added.[7]

Ashes were delivered to brickfields in one of two states, either relatively clean or contaminated with vegetable matter. The distinction depended on whether the rubbish had already been sifted at the contractor's dust heap, or loaded straight into barges.[8] The ashes themselves were not unpleasant to handle; rotting organic material was much more offensive. Eastwoods' men referred to the unsorted rubbish as "rough stuff" and when it had been unloaded at the brickfield it was left for a year to allow the vegetable constituent to rot away.[9] Dust heaps were, therefore, an unattractive feature of many brickfields. Both Odell & Company and Messrs Studds had what were described as soft core and dust heap tips at their sites in the 1890s. [10]

Once the clay mixture had been allowed to stand and break down during the winter

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[5] *British Clayworker*, December 1898, p.250
[6] Dobson, op.cit, p.122
[7] Joseph Lockwood in an article "Bricks & brickmaking". *The Builder*, 1845, p.182
[8] For a description of the sifting process at a yard beside the Regent's Canal see "Mr Dodd's dust yard" in Greenwood, J., *Unsentimental journeys*. London, 1867, p.60
[9] Willmott, F.G., *Bricks and brickies*. Rainham, 1972, p.22
[10] *Hayes Valuation*, 1897

months it had to be thoroughly mixed to a consistency suitable for hand moulding. If the weather was dry at the beginning of the season the temperer, who was responsible for the preparation of the clay, might need to add water to produce malleability, and this became more necessary as the season went on. The mixing of the clay might be done simply by means of a shovel, or by the use of a "pug mill ". The pug mill was a simple but effective device, widely used; indeed any brickmaker who did not employ a pug mill by the middle of the century would have been regarded as rather primitive.[11] The pug mill was like a large barrel set on end with a vertical shaft passing through it to which were fitted a series of slanting blades; the action of these, in the manner of a food processor, broke up lumps and mixed the clay, the ashes, and the chalk to a smooth consistency ready for the moulder. Usually the raw clay was tipped into the top of the barrel and "pugged" clay extruded from a hole at the bottom. The shaft could be turned, either by a horse walking round in a circle, or later in the century at larger brickyards, by steam power. [12]

The clay coming from the pug mill was collected by the pug boy, who broke off with a fork or "cuckle", a piece of clay sufficient for three or four bricks which he carried to the moulding bench or "stool". [13] At the bench another member of the team, called sometimes the "clotmoulder", or otherwise the "walk flatter", shaped a piece of clay into a wedge, and passed it to the moulder, who "with a sharp jerk, flings the piece of clay...into his mould", which had previously been sprinkled with sand to prevent the brick sticking to it.[14]

The freshly moulded brick, the "green brick", being made of fairly wet clay, was in a fragile state and needed to be handled carefully to prevent it from going out of shape. The moulder placed it on a pallet board resting on a series of rails beside him, and it was the job of the barrow loader to take the bricks one-by-one and transfer them to the long flat-bedded hack barrow. These barrows, which seem to have been of a fairly standard

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[11] This is implicit in the tone of Mr Laleham's report on methods in East Anglia in the 1870s. *Report of the Inspector of Factories for half year ending 31st October 1872.* PP 1873, xix, p.219; report of Sub-Inspector Henderson on brickmaking in West London. *Report of the Inspector of Factories for half year ending 30th April 1877.* PP 1877, xxiii, p.30

[12] Dobson, op.cit, p.125 (description), 132-133 (illustrations)

[13] *Children's Employment Commision.* Report on brickfields by W.H. Lord. PP 1866, xxiv, p.126

[14] ibid; the general layout of a moulding bench is illustrated in Dobson, op.cit. p. 134

design, had a single wheel and could accommodate either twenty-eight or thirty bricks in two rows.[15] The barrows were wheeled by the "pusher-out" to the hack ground, where they were unloaded and the bricks stacked in rows, either in the open air, or under some form of awning to keep off the rain. Dobson suggests that straw or reeds were used, but at some sites wooden hack covers protected the drying bricks. In 1883 "three sets of nearly-new hack boards (about 1800 yards)" were included in the contents of Harrison's brickfield when it was sold .[16]

The length of time the bricks were left on the hack ground varied between three and six weeks, depending on the weather.[17] Part way through the period, when the bricks were half dry, they were "scintled" or "skintled", that is turned at an angle to let air circulate.[18] Once hard enough, and having shrunk in size by the evaporation of their water content, the bricks were moved from the hack ground to the clamp or kiln. Although kiln-firing is the method usually associated with brickmaking, and some sites seem to have had kilns, in the London region clamps were widely used. The clamp style of firing took advantage of the fuel element provided by the fine ash that had been incorporated in the clay; the bricks were built into a tower with a series of flue holes to allow a through draft. The clamp was built on a base of old, over-burnt bricks and was topped off with a layer of similar bricks. Breeze and coal dust were used to start the firing process. The construction of clamps was a skilled task, necessary to ensure both stability in a structure that could incorporate as many as 100,000 bricks, and the proper circulation of the hot gases.[19] [see Illus 6.1 and 6.2]. A separate group of men - the "setters" or "crowders" as they were sometimes called - built the clamps, or where kilns were used, carefully packed the bricks in. [20]

It could take several weeks for a clamp to burn through, a fortnight being the minimum

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[15] Dobson, op.cit., p.136 (description), p. 137 (illustration)
[16] Ibid, p. 143; *Uxbridge Gazette & Middlesex & Bucks Observer*, 21st April 1883
[17] ibid, p.144
[18] ibid, p. 143
[19] Brunskill, R.W., *Brick building in Britain.* London, 1990, p.27
[20] A lengthy description of the construction of a clamp is given in Dobson, op.cit. p.144-154, including illustrations. For a photograph of a clamp, albeit one on a Kent brickfield, which accords with Dobson's illustrations see Perks, R-H., *George Bargebrick Esq: the story of George Smeed, the Brick and Cement King.* Rainham, Kent, 1981, p. 29.

period.[21] Once the bricks had cooled sufficiently to be handled the clamp was carefully taken down and the bricks sorted. It was inherent in the way that a clamp was constructed that some bricks were more heavily burnt than others; some bricks were over-burnt and were not offered for sale but re-used as the basis for the next clamp, others went out of shape and were useless. Some under-burnt bricks were sold as place bricks, that is they were used for internal work, but the remaining bricks were divided into a bewildering number of different categories, the distinctions between which are somewhat difficult to understand.[22] The bricks were then stacked near the wharf ready for loading into barges. Men using crowding barrows - a different design to hack barrows, reflecting the greater resilience of the burnt bricks - wheeled them to the wharf and on to barges.[23]

The nature of these processes determined three aspects of the industry's demand for labour. An obvious element was the seasonality of employment, but this style of manufacture also involved the use of a combination of sub-contracted and direct labour. Lastly different levels of skill were required and these distinctions were recognised in the composition of the moulding teams. These features will be considered in turn.

The methods of hand brickmaking described above were heavily dependant on the vagaries of the weather. The moulding of bricks took place during those periods of the year when the weather was warm enough, and the hours of daylight long enough to allow brickmakers to work outdoors with a minimal amount of protection from the elements. Contemporary descriptions and illustrations indicate that a thatched awning was provided to cover the moulding bench, but this was more likely to have kept off the sun, rather than excluding the rain. When there was heavy rain brickmaking came to a halt. One owner estimated that on average only four days per week were suitable for brickmaking because of the weather.[24] Whilst it was possible to continue moulding in wet weather the newly made bricks laid out in the hacks were vulnerable to heavy rain. They

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[21] Dobson, op.cit., p. 154

[22] Dobson lists fifteen categories; ibid, p.155-156. Willmott suggests that there were five or six. Willmott, op.cit., p. 41. It is likely that the number of categories was reduced in the end of the century.

[23] Perks, op.cit., p. 24, 29 for photographs of crowding barrows in use.

[24] Notes of a visit to the Hayes brickfield by members of the Factory & Workshops Commission; PP 1876, xxix, p.190

could also be damaged by frost. As a result of these constraints the season usually lasted from April to September, but could be extended a week or two into October if the weather stayed fine. The prevailing weather affected both the quantity and quality of that year's *make*, the fine summer of 1892, for example, proving "exceptionally favourable to brickmaking operations".[25] During the summer months the moulding gangs worked during the hours of daylight, the usual hours in the 1860s being from 5am to 8pm. Even these long hours might be exceeded. During the long days of mid-summer the gangs might work from 4am. to 9pm. and these excessively long hours, especially where they were worked by children alongside the adults, became the target of the reformers attempting to regulate working conditions.[26] This is a subject to which we will return.

There were breaks in these long days, but in most cases food and drink were brought to the brickfield, rather than the men going home for them. The stoppages in the day were determined by the management of the works, and were accomplished by resting the horses that turned the mills or by disengaging the steam engine that powered them. The horse was taken off for half an hour at breakfast time and an hour at lunch time; the gang, however, often had a shorter break, making use of clay that had already been pugged out before the break. Where day workers were employed, not part of the moulding gangs, and steam engines were used, the hours of work were 6am to 6pm, and Mr Reed, the foreman at a Dawley brickworks thought that moulders should only need to work the same hours to achieve an acceptable level of production. It was understandable, however, that the moulding gangs should work longer hours to compensate for time lost to inclement weather, the illness of a key member of the team, impromptu holidays or other forms of ill-discipline.[27]

In this respect brickmaking on the gang, or, as it was sometimes described, the family system, largely unmechanised, bore many of the attributes of a pre-industrial style of work discipline, with working hours that were determined not by a factory owner but by the men themselves. At its most extreme this produced a pattern of " alternate bouts of

[25] *British Clayworker*, January 1893, p.218
[26] Mr Trevithan of the Southall Brickmaking Company and Mr Ives, foreman at Mr Tildesley's works to the Children's Employment Commission, 1876; PP 1866,xxiv, p. 136-137
[27] Mr New, Mr Ives, Mr Reed and Mr Trevithan to the Children's Employment Commission, 1866. ibid

intense labour and idleness, and where heavy weekend drinking was common".[28] If men worked excessive hours one week it also certainly reduced their capacity in the following one; "on the Sunday and Monday they are fit for nothing". [29] This was like the custom of "St Mondays" that had been common in domestic industries such as handloom weaving.[30] Irregular holidays were all too frequent in brickmaking too:

> Fairs, races, or fetes of any kind within six miles or more of the brickfields are tolerably sure to empty half the stools for the day at least.[31]

In factories owners or managers used a number of techniques to condition workers to a new kind of work discipline, among which were payment by results and sub-contracting. Internal sub-contracting within the workplace placed the responsibility of supervising workers in the hands of overseers or "butties."[32] Both of these methods were in use within the brick industry, but in circumstances that were unlike the more regulated atmosphere of a factory. It is evident that piece rates did not themselves impose a discipline on the workers, because the seasonality of work in the brickfields and the interruptions caused by the weather had already set an irregular pattern of working.

Seasonality of production was closely tied up in the use of sub-contracted labour. Only about one third of the employees working in the summer months was required in the winter months, when the only tasks undertaken were the digging out and preparation of clay for the following season. On one brickfield in the 1860s the moulders and a few setters worked between October and Christmas; from Christmas to March the temperers and off-bearers were also employed. [33] Before preparations for the new season started there was some tidying up of equipment used that summer; moulds were checked for wear and washed, benches and barrows repaired and put away, machinery such as pug mills cleaned and oiled. Where hacks were covered with wooden louvres, these needed to be taken down and stored and the grass on the hack ground kept short by turning the

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[28] Thompson, E.P., "Time, work discipline and industrial capitalism" in *Customs in common.* London, 1991, p. 370-378

[29] Mr Ives to the Children's Employment Commission, op.cit., p. 136

[30] Pollard, S., *The Genesis of modern management: a study of the industrial revolution in Great Britain.* London, 1965, p.182

[31] Report on brickfields by Mr H.W. Lord, Children's Employment Commission, op.cit., p.131

[32] Daunton, M.J., *Progress and poverty: an economic and social history of Britain, 1700-1850.* Oxford, 1995, p. 182; Pollard, op.cit, p. 189-191

[33] Mr Smythe, brickmaster, to the Children's Employment Commission, 1866; ibid

horses out to graze it.[34]

There is as yet no certainty about where many of the unwanted labourers found work in the winter months. Many of them were not permanent residents in the brickmaking areas, arriving in the season and lodging with the resident brickmakers. Seasonal workers were, of course, not unusual in rural areas. There was a significant influx of workers at harvest time, many of them from Ireland and there were Italian labourers in Greenford in 1881.[35] The seasonal workforce in brickmaking, however, was drawn from the indigenous population, but evidence on how it was recruited has not come to light. Many of the summer workers lived in the same household, or were members of the same family, as the brickmakers who had winter employment. Some workers presumably tried to save enough money from their summer wages, to allow them to subsist during the winter, supplementing this with the back pence deducted by the employer and paid at the end of the season. However, the dissolute habits of many of their colleagues must often have hindered such prudent attitudes. For many workers it was important to find alternative employment.

It has long been suggested that the major occupation for brickmakers in the off-season was in gas works.[36] Gas works were one of the few businesses that had a substantial demand for largely unskilled labour in the winter months, the demand for gas for lighting increasingly significantly in the shorter days of the winter, creating a load three times that of the summer. Since for much of the nineteenth century the retorts in gas works were stoked by hand, the labourers from brickfields, used to carrying heavy weights and working long shifts, were ideally placed to supply this labour demand.[37] It is debatable whether brickmaking was a summer alternative for gas workers, or the other way about; so perhaps this should be regarded as a case of a dual occupation. The close connection between brickmaking and the gas industry was well established, and became institutionalised in the formation of trade unions, particularly in the Birmingham based Amalgamated Society of Gasworkers, Brickmakers and General Labourers in 1889, and

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[34] "Winter in summer season yards", article in *British Clayworker*, October 1896, p. 165

[35] Horn, P., *Life and labour in rural England 1760-1850.* London, 1987, p.74; Census Enumerators Book, Greenford 1881.

[36] Popplewell, F., "The gas industry" in S.Webb & A.Freeman (ed.), *Seasonal trades.* London, 1912, p.160

[37] Hobsbawm, E.J. "British gas workers 1873-1914", in *Labouring men: studies in the history of labour.* 1964. p.161

in the Gasworkers and General Labourers Union formed in London the same year, which recruited heavily in the brickfields.[38] The presence of a large numbers of gasworks in the London area - some twenty works within a five mile radius of the centre - could accommodate a large number of brick labourers. In other parts of the country there were different occupations offering winter employment; malting barley for brewing provided work in the cooler months at Hertford, work in the cement works an opportunity in the Medway towns.[39]

Quantifying the seasonal movement of labourers presents problems. The decennial census, which is so useful for analysing occupation in the nineteenth century, has major disadvantages for investigating seasonal employment, as it records a snapshot taken on a particular day in the year. It is important, therefore, to know when that day was. The census was usually taken in April, and thus at the divide between winter and summer jobs, making it difficult to be certain of the number of summer employees. The exception was that of 1841 which was taken on 7th June in the middle of the harvest and the brickmaking season.[40] In that year the Northolt enumerator noted that "haymakers and mowers, with brickmakers, will make an increase of at least twenty five persons" over the resident population of about six hundred. [41]In 1851 the enumerator for Yiewsley observed that the recorded population was two hundred, "but during the brickmaking season the temporary residents would be nearly three hundred in a busy time".[42]

When brickfields were located in largely rural areas there was little local winter employment, since agriculture or horticulture had similar requirements to brickmaking. Once the harvest had been got in, which made the greatest demand on labour, and mobilised the whole population including women and children, there was much less work until the start of spring sowing. Harvest time, of course, coincided with the height of the moulding season, the long warm days of mid-summer. In the winter months there

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[38] Clegg, H.A., Fox, A & Thompson, A.F., *A history of British Trade Unions since 1889. Vol 1: 1889-1910.* London, 1964, p. 65

[39] Samuel, R.(ed.), *Miners, quarrymen and saltworkers.* London, 1977, p. 5

[40] Drake, M., "The census 1801-1891" in E.A. Wrigley (ed.), *Nineteenth century society: essays in the use of quantitative methods for the study of social data.* Cambridge, 1972, p.29

[41] Census Enumerator's book, Northolt, 1841. (microfilm copy, Ealing Local History Library)

[42] Samuel, op.cit., p.5

was often much economic distress in rural areas, and a marked increase in the numbers entering the workhouse. This was a cause of some resentment, as one temperer explained to a missionary working in Cranford:

> I am obliged to walk to and fro the mile in the burning sun, or not, all day long: am often fit to drop and faint; so lear and sickish like, I can't eat a bit of victuals; but if I give out, the whole gang is throwed. I work like a slave all the time, but as soon as the day comes that I takes home my horse for the last time, 'cos work is struck, there's ne'er another job for me. I may beg, starve, or go to the Union for all as my employer cares.[43]

Brickmakers also kept pigs to supplement their incomes, and at West Drayton a pig was known as the "brickies' bank", his protection against winter distress.[44]

There were some gasworks in West Middlesex, but not the geographic concentration there was nearer the centre of London. A gas works, owned by the Brentford Gas Company was opened beside the canal at Southall, near to Bulls Bridge, in 1869. But further west there was insufficient population in the villages of Hayes, Hillingdon and West Drayton to create enough demand for town gas, but there was a works in Uxbridge, which began production in the 1830s. The proprietor of this works in 1838 was James Stacy, who was also described as an engineer and wharfinger in 1845, and almost certainly the owner of a brickfield on the De Burgh estate in Hillingdon in the 1850s. The original works were replaced by one owned by the Uxbridge Old Gas Company and competition was provided by the Hillingdon Consumers Company in 1854.[45] The two firms merged seven years later. It is difficult to see how the Southall and Uxbridge works would have provided sufficient jobs for the many labourers who had boarded in cottages near the brickfields during the summer months; some must have travelled further afield in pursuit of winter work.

The seasonality of brickmaking, like many fluctuations in industrial activity, tended to produce a pool of labour large enough to satisfy the highest potential demand that might be created; the employer adjusted the size of his workforce to accommodate variations in the level of interest for his product.[46] As we have seen this changed markedly in

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[43] Unnamed workman, reported by Rev J. Dennett to the Children's Employment Commission, 1866. op.cit, p.148-149

[44] Packwood, G.F.L. & Cox, A.H., *West Drayton during the nineteenth century*. West Drayton, 1967, p.67

[45] *Victoria County History. Middlesex*, vol.4. London, 1971, p. 47, 86

[46] Webb & Freeman, op.cit., p.6

response to the building cycle, and because the manufacturing process was labour intensive, the industry altered production levels by manipulating the reserve pool of labour. This did not, however, result in the casualisation of the reserve pool of labour, as happened to dock labour in London;[47] men either moved on to try their luck elsewhere, tried other kinds of work, or became a charge on the Poor rate. This last could have a marked impact on an area; the complete cessation of brickmaking in Heston in the early 1890s, which was not necessarily related to a lack of demand, but may have arisen from the failure of a local business, had, it was said, "an adverse effect on the parish".[48]

The numbers employed in brickmaking in particular parishes fluctuated considerably over the century. This can be illustrated by the population figures for Northolt, the least important of the parishes in the Cowley district. In 1841 thirty-nine people were described as brickmakers or brickfield labourers, and this total excludes wives who may well have worked in the brickfields but who are not given an occupation by the census enumerator. The number had risen to fifty-seven in 1851 and stayed at that level until 1861, but fell to a mere twelve in 1871, before recovering partially to twenty-five ten years later. The size of Northolt's population fell by 175 between 1861 and 1871 and much of this can be attributed to the removal of thirty-five men and their families from the parish. [49]

Workers in brickmaking were almost certainly used to a peripatetic existence. Many workers boarded with other families during the moulding season, and it was easy enough to move from one part of the Cowley district to another. Indeed the boundaries of the census districts meant little in employment terms; brickfields in adjacent parishes were often within easy walking distance. Workers could move home without necessarily changing their workplace, unless of the course they lived in tied accommodation. The cottages provided by owners is a subject to which we will return. George Munns provides an example of movement between adjacent parishes. Born in Clifton in Bedfordshire in 1818 he was living in Northolt in 1841, but moved to the Yeading area

[47] Inwood, S., *A history of London*. London, 1998, p. 473-5
[48] *British Clayworker*, September 1896, p.152
[49] Census Enumerators Books. Northolt, 1841, 1851, 1861, 1871, 1881. Copies at Ealing Local History Library. The Victoria County History statement that "more than 150 labourers engaged in brick making left the parish between 1861 and 1871" is somewhat misleading. VCH. Middlesex, vol.4. op.cit., p.116

of Hayes during the 1840s, returning to Northolt a few months before the census was taken in 1861.[50]

It has not been possible to undertake a full-scale statistical survey of Middlesex brick makers. From a limited sampling of the census returns, however, it seems clear that there was considerable mobility within the Cowley district and between it and brickfield areas in other parts of the country. A few examples will illustrate this point. William Teadaway had been born in Iver in Buckinghamshire and was living in Northolt in 1861 with eight sons, three of whom were also employed in brickmaking. The sons had been born in West Drayton and Hayes. [51] James Trantum, working in Southall in 1851 had been born in Tottenham, his son in Hackney. [52] William Nash, working in Southall in 1881, had teenage sons, one born in Hayes, the other in Heston.[53] George Bell aged 53 in 1881 had originally come from Wycombe in Buckinghamshire. From the birthplace of his sons he had worked in Hertfordshire, then in Norwood, and Slough before arriving in Southall.[54] In 1881 John Pearce, born in West Drayton, had recently arrived in Northolt after at least a decade in Southall.[55]

The Harman family is interesting. James Harman was living in Northolt in 1841 with seven children aged from three months to fifteen years. By 1851 there were a further four children. James Harman senior was born in Marlow (Bucks), the three oldest children in Islington, the others in Northolt. By 1861 the two oldest boys had left Northolt. In 1871 James is described as a pauper aged 61 (actually he was probably a few years older) and his sons Henry and George were still living with him and his wife. In 1881 none of the family were still in Northolt, but Edward, by now fifty years old, was working in Southall with his own children. [56]

Using Census data it is difficult to relate workers to individual brickfields, since there were usually several in each parish and there was nothing to prevent men from working

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50 Census Enumerator's Books Northolt 1841, Hayes 1851, Northolt 1861.
51 Census Enumerator's Book Northolt 1861.
52 Census Enumerator's Book Hayes 1851
53 Census Enumerator's Book Southall 1881
54 Ibid
55 Census Enumerator's Book Northolt 1881
56 Census Enumerator's Book Southall 1881

in adjacent parishes. Where the brickmaster was himself resident in the district the census will usually tell us something of the scale of his operations. Daniel Rutter, living in Hillingdon close to his father Joseph and his brother Charles, both described as brick merchants, was described as a brickmaker with a workforce of 302 men and ten boys, and a farmer of 184 acres, employing a further six. David Milne worked on a much smaller scale in Northolt with eleven men and five boys. John Minter was employing a hundred men and boys at Southall in 1881.[57]

What the census information does not usually do is to show the different types of task that were done by the different members of a gang. Although in some censuses terms like "temperer" and "off-bearer" are used, the usual practice of the enumerators was to use the terms "brickmaker" and "brickmoulder", both of which probably describe the moulder and leader of a sub-contracted gang, and "labourer in brickfield" for all other workers, presumably on the grounds that these were the less skilled members of the gang. In the 1881 Southall census there is greater sophistication: the terms "brickloader", "off-bearer", "mould-filler", "bricksetter", "temperer" all appear. By contrast the Northolt census of the same year only uses the terms "brickmaker", "brickmoulder" and "brickfield labourer".[58] Married women were not usually shown as having any occupation, but this is possibly a convention rather than a clear indication of their activities; it seems likely that some would have worked with their husbands in the brickfield. Unmarried daughters, however, were occasionally recorded as either a "brickfield labourer", making no distinction between men and women's work, or involved in "brickfield work", a form of words not used for male workers.[59]

Much of the labour requirement in brickfields was subject to subcontracting. Bricks were made by gangs led by a moulder, who contracted with the master to make bricks at a piece rate; a brickfield, depending on its size, might provide employment for a single gang or for many. The moulders found the labourers that made up the rest of the gang. In some cases the foreman or a small group of moulders may have been responsible for hiring all the labour used on the brickfield. This may have been what the manager of the

[57] Census Enumerator's Books: Hillingdon, 1851; Northolt, 1861; Southall 1881
[58] Census Enumerator's Books: Southall, Northolt 1881
[59] Ann Harman, aged 13, Northolt 1851; Sarah Lacey, aged 23, Southall 1881. Caroline Collins, aged 16, was described as "occasionally employed in brickfield" Hayes, 1851. Census Enumerators Books

Southall Brickmaking Company was describing when he stated that

> I have nothing to do with the employment of the work people, for the work is let out to two or three subcontractors who provide all the labour, the company providing all materials and apparatus.[60]

At first it might appear that he was referring to his moulders as the subcontractors, but this was a large business with eighteen stools in operation, and, consequently, the same number of moulding gangs. So should we assume that on this field there was an intervening layer of management between the manager and the moulders? The evidence from other brickfields at the same period suggests that this type of organisation was unusual. Subcontracting in brickmaking usually involved an agreement between the owner and the moulders, who like minders in cotton factories employing their own "piecers", or like the "little butty" system which operated in some coalfields, recruited and paid the rest of the gang. [61] Such brickmaking agreements were made on an annual basis, but none have been discovered for the Cowley area, although examples survive elsewhere. The dispute between Pocock and his workers in 1876, discussed in Chapter Seven below, refers to the signing of contracts at the beginning of the moulding season. This may have been a more complex document than the Edmonton example that Woodforde reproduces.[62]

Subcontracting in brickmaking was thus a form of inside contracting, as defined by Buttrick, in which

> The management of the firm provided floor space and machinery, supplied raw material and working capital, and arranged for the sale of the final producer. The gap between raw material and finished product, however, was filled not by paid employees... but by contractors, to whom the production job was delegated. They hired their own employees, supervised the work process, and received a piece rate from the company.[63]

In the style of brickmaking practised in the Cowley district, however, the only part of the manufacturing process that was sub-contracted was moulding. The moulder's gang was

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[60] Mr Trevethian, Southall Brickmaking Company to the Children's Employment Commission,. PP 1866, xxiv, p.137; for similar practices in coal mining, see J.Benson, *British coalminers in the nineteenth century: a social history*. London, 1980, p.72

[61] Daunton, op.cit., p.231; Taylor, A.J. "The sub-contract system in the British coal industry" in L.S. Pressnell (ed.), *Studies in the Industrial Revolution presented to T.S. Ashton*. London, 1960, p.215f

[62] An agreement from Edmonton in 1883 is reproduced in Woodforde, op.cit., p.111

[63] Buttrick, J., "The inside contracting system". *Journal of Economic History*, vol.12, 1952, p.205-221; see also Williamson, O.E., "The organisation of work: a comparative institutional assessment". *Journal of Economic Behaviour and Organization*, vol.1, 1980, p.17

responsible for making the bricks and delivering them in their green state to the hacks. From then on the processes of drying the bricks, moving the bricks to the kiln or clamp and the clamp-setting or kiln loading were undertaken by men employed directly by the owner, but still paid on piece rates. Far less is known about this part of the workforce, but the balance between the moulding gangs and the directly employed labour can be illustrated from a breakdown of the employees at one brickfield. At Mr Smythe's Dawley yard in 1866 there were eight gangs of seven, a total of fifty-six people; in addition twenty-five were employed at the kilns and ten more loading.[64]

A moulder was paid a rate for making a thousand bricks, the standard unit of measurement. It was his responsibility, as the sub-contractor, to supply the labour required to carry out the tasks of feeding him with clay and carrying the new bricks to the hacks, as has been described above. A Middlesex gang was usually seven people, including the moulder; the other members of the team were the temperer, pug-boy, walk-flatter, off-bearer, barrow loader, and pusher-out. The moulder paid the members of the gang from the monies paid to him. [65]

The gang needed to operate effectively as a unit, since the absence or poor performance of any member of the gang could affect the output and thus reduce the earnings of all. In an unusual case a temperer who had been missing for five days, and caused the rest of his gang to be idle, was brought before the Uxbridge magistrates and required to pay a fine of over £4 and costs. [66] Ultimately the success of the gang depended on the skill of the moulder, and more specifically the speed with which he could turn out bricks. There seems to have been a competitive spirit between moulding gangs, which the owners no doubt encouraged. Efficient moulders could produce 50,000 bricks a week, although a target of 40,000 was perhaps more realistic. A Southall owner noted that one gang had made 55,000 in a particular week, and the nineteen stools on his large brickfield had made over thirteen million bricks in the previous year, an average of just under 700,000

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[64] R.M. Smythe to Children's Employment Commission, op.cit., p.137

[65] Sub-contracting was common across the brickmaking industry, but there were regional variations; see Samuel op.cit., p. 50-62. Stock brickmaking in Kent was similar to that in Middlesex, but with gangs of six. Perks, op.cit., p.25

[66] *Marvel & Middlesex Register*, 11th May 1876, p.2

per gang.[67] This was a high figure, but it was possible for a gang to make a million bricks in a season and the exploits of a number of Kent brickmakers who achieved this were recorded. [68] Similar feats must have occurred in Middlesex.

Moulders competed with other gangs in their own field, but also with those on nearby brickfields. This rivalry took a visible form in Hounslow:

> It is an old custom in the brickfields when a gang make 50,000 bricks in a week to hoist a flag over the stool, and the fields about here last Saturday presented quite a gay appearance. The first field to hoist the flag was that of Mr Mills (Messrs Lack & Co), all the stools having exceeded the 50,000. Some of the stools in the adjoining fields belonging to Messrs Kyezor and Burchett, succeeded in making the number to entitle them to the honour of exhibiting the flag, but we believe it was only in Mr Mills' field that all the moulders succeeded in obtaining the distinction.[69]

The brickmaking gang had a hierarchical structure. The moulder, as the skilled man, was the leader of the gang and received the largest share of the piece rate. As the speed and efficiency of the moulder depended on the quality of the clay that was delivered to his bench, the temperer had the second position and the next highest remuneration. The temperer and the moulder always seem to have been adult males in the Middlesex industry but elsewhere, particularly in the Black Country where the male population was employed in the coal pits, there was a tradition of women moulders.[70]

The work of the temperer was both skilled, in that the moulder depended on him to produce well-mixed, malleable clay, and heavy, involving the moving of as much as forty tons of clay in a day.[71] The off-bearer also needed to be strong, wheeling barrows loaded with as much as two hundredweight of green bricks over uneven ground.[72] The other tasks, pugging-out (that is transferring the clay from the pug mill to the moulding bench), walk-flatting (shaping a piece of clay ready for the moulder), and barrow loading

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[67] Mr Trevithan, Southall Brickmaking Company to Children's Employment Commission . ibid
[68] Perks, op.cit., p.26-27
[69] *Middlesex Chronicle*, 10th June 1876
[70] For a highly charged account of the employment of women and girls in Midland brickyards see Elihu Burritt, *Walks in the Black country and its green Border-land.* 1868 quoted in Jennings, H., *Pandaemonium: the coming of machines as seen by contemporary observers.* London, 1985, p. 316 and Smith, G., *The cry of the children from the brickyards of England.* London, 1871, p.12
[71] Rev. J. Dennett to Children's Employment Commission, op.cit., p.149. This seems an overestimate, based on the weight of a green brick being 9lbs. Elsewhere it was said to weigh 6lbs or 7 ½ lbs. Ibid, p. 135, 136, 137.
[72] Ibid, p. 136

were all tasks that were deemed suitable for women or boys. It was possible for all the gang members to be drawn from a single family, if there were grown up sons who could carry our the work of temperer and off-bearer. George Bell was able to call on the services of six sons aged from 10 to 22, all of whom were described as brickfield labourers in 1851.[73] In other cases, a moulder might employ his wife and children but look elsewhere for the temperer. The wife of a moulder at Southall described how three of her sons and a daughter were employed in the same field, presumably working with their father.[74]

There were distinct advantages in finding gang members from within a single family since all the money earned by the gang stayed within the household, and there was at least one, and maybe two, family members working during the close season. Temperers were usually employed during the winter, and, as part of the permanent workforce, could often rent cottages from the owner. The economic benefits of the family gang were significant. The prevailing rate paid to a moulding gang in the 1860s was 4s 4d per 1000 bricks, of which 6d, the so-called "odd pence", was retained until the end of the season. At this period the customary division among gang members gave 1s each to the temperer and the off-bearer, 4d each to the walk-flatter and the pusher-out, 3d to the pug-boy and 2d to the barrow loader. Assuming that half of the payment to the pusher-out came out of the off-bearer's share, as was the case in Smythe's brickfield, 2s 11d was expended on the gang members, leaving the moulder with the balance of 1s 5d. If, however, the moulder could employ his children as pug-boy and barrow loader, and his wife as walk-flatter, the family could earn 2s 2d. [75] Assuming that a moulding team could make 40,000 bricks a week, the gang's income, less the back pence, was about £7-10s a week; the family income could be as much as £4-12s, from which he had to find rent of between 2s 6d and 3s 6d. [76] These were high earnings, particularly in relation to the prevailing level of agricultural wages, but the weekly amount was dependant on the weather. Winter earnings, for those who were employed, were lower.

If a moulder could not provide all the gang members from his family, he found the

[73] Census Enumerator's Book, Northolt 1851
[74] Children's Employment Commission, op.cit, p.135
[75] Mr R. M. Smythe to Children's Employment Commission,1866 ; op.cit, p.137
[76] Ibid

hands from the itinerant workforce that arrived in the brickfields in April. How these summer workers were recruited in unclear: did they arrive on the tramp looking for work and move on if the quota of labourers was filled, or were there pre-existing arrangements that a particular moulder would provide them with employment in successive seasons? However these contacts were made it was customary for the moulder to provide accommodation for his hired help, and this was most easily accomplished by boarding them in his own cottage; this arrangement had the additional advantage of retaining more of the gang's earnings within the moulder's family in the form of the rent the lodgers paid. It was not unusual for brickmakers to have several boarders, in addition to their own children, in a small cottage. A Northolt brickmaker, Thomas Doman, had three sons in the trade and lodged four other labourers. Although it might be expected that these boarders were young unmarried men, it was not always the case. Doman's quartet consisted of a father with two sons and a sixty-eight year old widower.[77] In the same year the two boarders at the home of Robert Richmond were both married, and one had his wife and daughter with him.[78] The decennial census, however, is not an ideal source for investigating whether the labourers returned to the same families year after year. Comparing the 1841,1851 and 1861 Census schedules for Northolt only revealed two boarders who appear more than once. Daniel Wilcox was living with William Lee in 1851, and with George Munns in 1861, Thomas Evans with William Nutt in 1841 and Thomas Prince in 1851. [79]

This practice of lodging seasonal labourers, although economically advantageous, was often resented by the wives who had to cater for extra men, many of them unmarried and of perhaps unruly habits. A moulder's wife complained that boarders were

> a filthy, drunken, lousy lot, and that's the truth, the most of them; at all events those that don't live in the neighbourhood, but just come down for the summer work and then go off, and are never seen again.[80]

Given the modest size of their cottages, with only two or three rooms, and sometimes only a single storey, with very little ventilation, men, boys and girls sleeping together,

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[77] Census Enumerator's Book, Northolt, 1861.
[78] Ibid
[79] Census Enumerator's Books, Northolt, 1841, 1851, 1861
[80] Mrs Serjeant to Children's Employment Commission, op.cit., p.135

conditions could be squalid.

> The bodies of all are greatly exhausted with the profuse perspiration of the day so that neither health, cleanliness nor decency can be much, if at all regarded, and some of the huts are the perfection of untidiness, dirt and dust.[81]

Despite their feelings towards employing their children in the brickfields, moulders and their wives recognised both the financial incentives, in terms of retaining more of the gang's income, and the moral advantages, in the avoidance of the boarding of strangers in their homes, in putting them to work "as soon as they can lift a brick almost".[82] Although most accepted that the work was hard, Mr Ives summed up a widespread belief that brickmakers's children were hardened to it by early exposure when he said that "a moulder's child is born, as the saying is, with a brick in his mouth".[83]

Boarders, for all the inconvenience of their presence in a crowded cottage and their noisy bachelor ways, paid for their keep. Not all the transient workers were put up in brickmakers' homes; some were boarded with other families, or at public houses or beershops. In 1851 an unmarried man, who originally came from Leamington in Warwickshire, was boarding at the *Prince of Wales* at Norwood Green, Southall. At the same time James Macdonald and his wife lodged at the *Bridge House* beershop in Botwell.[84]

Despite the widespread use of sub-contracting, which might have discouraged close relations between employers and men, many masters adopted an apparently paternalistic attitude towards their workforce. One manifestation of this was the provision of cottages for the permanent workers, often on or adjacent to the brickfield itself. Sales, leases and plans of brickfields all refer to cottages at different periods. Heron & Rutter paid insurance premiums on four cottages at North Hyde, Heston, probably in the 1840s.[85] There were many workers' houses in Southall, the Southall Brickmaking Company, which may have employed as many as 150 people in the 1860s, alone owning as many as

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81 Rev. J. Dennett to Children's Employment Commission, op.cit, p.148-9
82 R.M.Smythe to Children's Employment Commission, op.cit., p.137
83 Children's Employment Commission, op.cit., p.136
84 Census Enumerator's Books, Hayes 1851
85 Undated policy document LMA Acc 328/31

thirty- two.[86] In the same period R.M. Smythe had built twelve cottages for his moulders and their families and proposed, he claimed, building a similar number to accommodate the temperers and off-bearers, the other permanent workers. [87] Waring Brothers had more than twenty dwellings, and brickmakers occupied the sixteen Hamborough cottages in 1871.[88]

The picture was similar in other parts of the Cowley district. In Hayes Edward Shackle owned the thirteen units of Austin's Row, named after Henry Austin who leased the adjacent brickfield, and a further ten in Pantile Row in the 1860s. Austin's Row still stood in 1897. There were thirty cottages besides Henry Dodd's brickfield and these later passed into the ownership of Thomas Clayton.[89] In Northolt, which had no identifiable company housing before the 1890s, the New Patent Brick Company built the twelve Invicta cottages, named after the patent brick press they licensed. [90] Many sets of cottages bore the name of the brickmaker, who owned or leased them; Stroud's Row and Stroud's Cottages in Southall; Stacy's Cottages in Stavehall Road, Hillingdon; Rigby's Row in Dawley.[91] Samuel Tildesley, as one of the bigger operators in the district, leased fifteen cottages on a 99 year lease in 1851 and by 1881 there were a number of houses bearing his name, including a group with the address of Tildesley's Bottom. [92]

The brick firms that continued in production in the first decade of the twentieth century were still renting cottages. Broad & Co. owned the old "wooden row", sandwiched between the railway and the canal near West Drayton. Some new cottages were built. Eleven dwellings at Horton Bridge, owned by Thomas Clayton Ltd were said to be newly built about 1910.[93] There is visual evidence in the plans that accompany leases. The undated plan of Maynard's brickfield at Harlington, which shows the layout very clearly, includes eight dwellings beside the field. (Map 6.1) Six cottages are shown on the map of the extensive West Drayton works of Samuel Pocock in 1882. [94] By the 1890s

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[86] Children's Employment Commission, op.cit., p. 137; Southall Rate Book 1863
[87] Children's Employment Commission, op.cit., p. 137
[88] Census Enumerator's Book, Southall 1871
[89] Hayes Valuation, 1865, 1897
[90] PRO IR58/ 29130
[91] Census Enumerator's Book, Southall 1871; PRO IR58/ 39628/ 444-457; IR58/ 39732/ 919-920
[92] LMA Acc 328/ 59; Census Enumerator's Book, Southall 1881
[93] PRO IR58/ 39732/ 951-65; IR58/ 39731/ 875-885
[94] LMA Acc 969/69; Guildhall Ms 12335

the large brickmaking concerns that dominated the Middlesex industry had impressive real estate and property holdings; Odell Ltd owned thirty cottages at Yeading, six at Northolt, and a further nineteen at Dawley. [95] In some cases the brickmaker owned the freehold of the cottages, but quite often he only leased them, and then rented them to his workers. Wooden Row was leased by Broad & Co on a twenty-eight year lease in 1903 from the Ecclesiastical Commissioners.[96] Rigby's Row in Dawley was owned by the de Salis family, but leased by Thomas Clayton in 1899, and his company was responsible for upkeep and repairs.[97]

The proximity of these houses to the brickfield was no doubt highly desirable for workers whose summer hours were extremely long, often dawn to dusk, but it also gave the employer a degree of control over his labour force. The use of tied accommodation also meant that a proportion of the wages he paid returned to him in the form of rent. This tendency was carried a step further, and closer to illegality, by the opening of beershops, on or close to the brickfield. Beershops were an inevitable adjunct to a brickfield, since the workers, performing heavy work with little shelter during long hours, and without any on-site facilities, needed regularly to replenish lost fluids. When beer had to be fetched many times during the day it was convenient for the beershop to be close to the site. A *Brickmakers Arms* still stands on Horton Road at Yiewsley. An unnamed beershop stood on Maynard's brickfield at Harlington, next to the cottages.[98] The *Dawley Arms* in West Drayton is the best documented of the brickfield public houses. It was probably erected during the long tenancy of this brickfield by Samuel Pocock, upon whose bankruptcy the property was taken over by Broad & Harris (later Broad & Co) in 1884. In the same year they let the house to John Shepherd of the Hayes Brewery at an annual rent of £70 per annum and a barrelage of 2s 6d on all malt liquors, another way in which the owner profited by the spending of his employees. In addition Shepherd was required to pay an entry premium of £100. The original lease of seven years was renewed for a further term on the same conditions, assigned to Isleworth Brewery in 1891, and renewed for fifteen years in 1898.[99] Some beershops were operated

[95] PRO BT31/ 5649/ 39405
[96] PRO IR58/ 39732/ 951-65
[97] PRO IR58/ 39628/ 444-457
[98] LMA Acc 969/69
[99] LMA Acc 1214/1340-1343

by labourers, and presumably these were small-scale affairs. Charles Mole was a brickfield labourer and a beer retailer at the *Anchor*, Botwell in 1851 whilst John Westwood kept the Bulls Bridge beerhouse. [100]

Some attempt was made to control the growth of beershops on brickfields in an area that was not short of public houses, many already catering for the barge trade on the canal. Rutters' lease from de Burgh of a brickfield at West Drayton, adjacent to Pocock's, forbade them from erecting a public house on the site, and despite their long tenancy of the site there is no evidence that one was ever built.[101] Although Messrs Rigby were not prevented from building a public house on the land they leased from de Salis at Dawley, they needed to apply for a new lease and pay an additional rent of £6 per annum if they wished to do so. It was also stipulated that the public house was not to interfere with the principal task of brickmaking.[102]

Whilst such arrangements enabled the men to send out for beer during the day, there was always the likelihood of abuses, both in encouraging drunkenness and providing opportunities for owners or foremen to use truck payments. Where a truck system operated, the employer paid his men partly in kind with groceries and similar things that he provided, or forced them to buy goods from him, especially in isolated areas where the men and their women had little choice in where to buy the necessaries of life. The workers might be paid in tickets that could only be redeemed in the company shop, and in this monopoly situation, the owner profited from charging high prices or supplying inferior goods. This had been an abuse particularly prevalent in the work camps of railway navvies, which were often in isolated places without facilities, but also occurred in other industries.[103] Although legislation existed to prevent the operation of truck, the major act being that of 1831, it was difficult to enforce because action was only triggered by a complaint from an individual worker against his employer, which carried with it the likelihood of dismissal.[104]

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100 Census Enumerator's Book, Hayes 1851, Southall 1851
101 LMA Acc 1386/ 105; Ordnance Survey 2nd edition, 1895
102 LMA Acc 969/64
103 For the truck system amongst railway navvies see T. Coleman, *The railway navvies*. London, 1965 (Penguin edition, Harmondsworth, 1968), p. 88f; Pollard, op.cit., p. 203-4
104 Hilton, G. *The truck system , including a history of the British Truck Acts, 1465-1960*. Cambridge, 1960, p. 109, 121

A number of beershops were operated by owners of brickfields or by their foremen. John Nutman combined the roles of foreman and beerhouse keeper in Northolt in 1851 whilst Francis Newell, the licensee of the *Hambrough Tavern* in Southall, was more impressively labelled as a victualler and brickmaker.[105] A number of beershops were still owned by brickmaking companies in the Edwardian period; the *Dawley Arms* has already been mentioned; the *Cottage*, Dawley was a beershop run by Uxbridge brewers Harman & Company, but owned by Clayton & Co. Not surprisingly its trade depended greatly on the level of work in the brickfield and was three to four barrels a week just before the First World War.[106] The *Courtney Arms* at Heston was another beerhouse operated by Harman's and owned by Paul Mecklenberg. [107] Maynard's Dawley beershop enjoyed a very small trade, at less than one barrel per week, and was not open on Sundays.[108]

The involvement of brickfield masters in the running of public houses inevitably encouraged abuses. The men were often paid there and were likely to start spending their wages before they left. If the owner supplied the men with beer during the working day, he could stop its cost from their wages. This is presumably what is intended by the comment of the Factory Inspectors in 1876

> Nearly all the fields have a beershop in connection, and some are the property of the beerhouse keepers. The men have about five pints a day in wages. It may be worthy of consideration whether the occupier of a brickfield should have a licence.[109]

Mr Smythe, however, argued that intemperate habits among the men could best be restrained by the master owning and managing the beershop and keeping beer off the brickfield.

> I have endeavoured to restrain the habit of drinking by prohibiting beer from being brought on the ground, but allowing men to get it for themselves at a beershop, built by me close to the field, and kept by the foreman, in whom I have every confidence; he is instructed to turn the tap off and not allow a drop more to be supplied, if any symptom of drunkenness appear.[110]

The beershop in question was presumably the *Brickmakers' Arms* at North Hyde.[111]

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[105] Census Enumerators Books, Northolt, 1851; Southall, 1881
[106] PRO IR58/ 39628/ 461
[107] PRO IR58/ 40052/ 9
[108] PRO IR58/ 39628/ 488
[109] Notes of a visit to the brickfields of Hayes in *Report of the Factory and Workshops Commission*, Appendix E. PP 1876, vol. xxix, p. 190
[110] R. M. Smythe, brickmaster, Dawley to Children's Employment Commission. PP 1866, vol xxiv, p. 138
[111] LMA Acc 328/ 105

A more explicit complaint about the use of truck payments was made by a local clergyman, describing a local publican who was also the owner of a brickfield.

> He works on the truck system, selling beer, grocery etc and deducts on Saturday from the wages payable... One was asked how much he spent per week in beer. "One pound, sometimes more, at least the fellow docks it; when he gets me intoxicated he puts down two or three scores for one; he takes good care to have my money on pay night".[112]

The payment of wages in public houses was stopped by the extension to all manual labourers, except domestic servants and the employees of public houses themselves, of a provision of the 1831 Act, which had previously applied only to miners. The framers of the legislation expected this to benefit particularly dock workers and the employees of brickfields.[113] A further amendment to the legislation in the Truck Amendment Act of 1887 placed enforcement in the hands of the Factory Inspectorate. [114]

Brickmakers did provide some other facilities for their workers. The Westbrook Memorial Hall was founded in memory of Edward Westbrook by his widow in 1871, and had a declared object of "promoting the welfare of the inhabitants of Heston, by contributing to the comforts, and aiding in the great work of the improvement of the moral and social condition of the poorer classes of such inhabitants."[115] This was essentially a working men's club. Forty years later Broad & Co owned a Working Men's mission in West Drayton. [116]

Drunkenness was a major problem amongst Victorian working men. "All possible temptations, all allurements continue to bring the workers to drunkenness", complained Engels in the early 1840s. [117] It was endemic amongst brickworkers, a consequence of long hours but relatively high wages, the tendency to drink during the working day, and the proximity of beershops. If the men worked too long and hard during the week by the weekend they were worn out, and

> knowing that themselves, they go off to the beer-shop rather than stay at home doing nothing, and then more time is lost through drinking, so that several days are wasted.[118]

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[112] Rev J. Dennett, Cranford to Children's Employment Commission, op.cit., p. 138
[113] 46 & 47 Victoria c 31; Hilton, op.cit., p. 139
[114] 50 & 51 Victoria c 46; Hilton, op.cit., p.144
[115] Hounslow Local History Library. Cuttings Book SC2, p. 183
[116] PRO IR58/ 39732/ 933
[117] Engels, op.cit., p. 133
[118] Mr Ives, foreman at Tildesley's brickfield to Children's Employment Commission, op.cit., p.136

Their tendency to rowdiness was thus similar to that attached to railway navvies, who operated outside the normal constraints of polite society, and were never, because the way the work moved on and they with it, an integrated part of a community. Like navvies, however, the brickmakers' poor reputation may have been exaggerated.[119] There was often a distinction between the workers who were employed in the winter months, who lived in the area and put down roots, and the itinerant workers who only stayed for the season. A local policeman contrasted the permanent residents and the transients, and though that those

> who reside in the district, and have work in the winter, the moulder and temperer for instance, are steady respectable people; they are very rough in manner and coarse in language, and terribly given to drink, but I have always found them honest and reasonable to deal with: as to criminal offences I have nothing to say against them; there has not been a burglary in the last twelve years.[120]

The drunkenness, bad language and rough manners of the men caused social reformers to be concerned about the influence they had on the morals of the women and children who worked alongside them. This fear of moral corruption was a strand in many of the reform movements of the mid-Victorian period, informing, for example, campaigns against domestic overcrowding and the employment of women alongside men in occupations that encouraged intimacy. The Rev Dennett summed up the prevailing attitude when he wrote

> The language that they constantly hear, the oaths and blasphemy that are frequently poured forth, the utter want of religion and of any religious feeling of any kind... without mentioning the filthy, indecent and shameless habits of many among them, is quite sufficient to satisfy the most sceptical of the baneful effects on an ignorant and juvenile mind.[121]

There were also worries about the physical effects of heavy work and long hours on growing bodies. Whilst brickmaking avoided the dust and fumes of many factory tasks, and the workers were generally healthy, on account of the work being mostly in the open air in the summer months, the weights that were lifted or pushed by the younger employees could be damaging.

> In spite of this [the long hours] the children grow up strong and healthy; they are at times put to work that is too much for them, but not generally ...sometimes after heavy rain has saturated the ground you may see a girl of only 12 years old staggering up the hacks with a

[119] Coleman, op.cit., p.104-8
[120] Serjeant Isley to Children's Employment Commission, op.cit., p.138
[121] Children's Employment Commission, op.cit., p.149

barrow which she can scarcely move along.[122]

Such exertion could produce physical deformities. One girl it was said "has a crooked ankle and her knee is grown out on one side" and a lad working in an unnamed brickfield had "his leg put quite out". Even if such dangers could be avoided the children were often exhausted at the end of the day, and were carried home by the men.[123] A local clergyman commented on a girl who doggedly attended Sunday school, only to fall asleep as soon as she sat down in class; she attempted to cope with the difficulty by remaining standing.[124]

Brickfields, mainly because they were often small-scale and because they operated without extensive buildings, were amongst the last types of working environment to come within the remit of the factory acts. The movement had two related aims; it attempted to reduce the working hours of young people, and by restricting them to provide an opportunity for schooling. The progressive extension of control to all types of industry started with the Factory Act of 1833, which introduced shorter working hours in mills and textile factories for children up to the age of twelve and reduced hours for those aged thirteen to eighteen. Children were required to attend school, but the legislation did not provide for schools to be established for this purpose[125]. A Mines Act of 1842 excluded women and children under ten from working below ground, and a new Factory Act two years later fixed a minimum age for employment in textile works at nine years. Despite further acts that restricted working hours in textiles and included other industries such as bleaching and dyeing, it was a long time before attention was directed at occupations such as brickmaking.

In 1861 a Royal Commission was set up to investigate Children's Employment and amongst several reports it produced was one in 1866 on brickfields in many parts of the country, including London and Middlesex.[126] In 1864 a whole series of industries were placed under control and in 1867 two acts were passed which finally embraced the

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[122] Children's Employment Commission, op.cit., p. 136
[123] Serjeant Isley to Children's Employment Commission, PP 1866, vol.xxiv, p.138
[124] Children's Employment Commission, op.cit., p. 149
[125] 3 & 4 William IV, c.103; Hutchins, B.L. & Harrison, A., *A history of factory legislation.* 3rd edition, London, 1903, p.40-42
[126] 5th report of the Children's Employment Commission, PP 1966, xxix, xxx.

remaining ones; the Factory Acts Extension Act covered manufacturing premises employing more than fifty people, the Workshops Regulation Act applied to units with fewer employees.[127] The acts provided that no child under the age of eight should be employed in any handicraft; that children between the ages of eight and thirteen should be employed only half-time and should attend school the other half; and that young persons between the ages of fourteen and eighteen and women should be employed for no more than twelve hours per day, minus one and a half hours for meal breaks.[128]

The enforcement of these regulations was put in the hands of local sanitary authorities, but this approach proved ineffective and by a further act of 1871 workshops were placed under the control of the Factory Inspectorate. The failure actively to apply the 1867 acts had prompted a press campaign by George Smith, who had already appealed against the conditions under which families lived on canal boats.[129] Smith had first-hand experience of brickfields in the Midlands, as the owner of a yard at Coalville, Leicestershire. He argued that children and teenagers were subjected to unacceptable physical conditions and carried weights, in terms of raw clay and finished bricks, that were detrimental to health, causing muscular and skeletal injuries. The problem was not that each individual load was beyond their strength but there was a cumulative effect from the constant repetition of the task for as much as twelve hours. In this time, he argued, a young worker could have carried a total weight of some 43lbs the equivalent of six and a quarter miles.[130] The investigations of the Inspector appointed by the Children's Employment Commission a few years before had in general supported these claims, but conditions varied across the country, and those in the Black Country, with which Smith had most direct acquaintance, seem to have resulted in heavier weights being carried. He estimated that children under the age of eighteen provided about half of the workers in moulding gangs in West Middlesex, and of these half again were under the age of ten. As many as nine hundred young people may have been employed.[131]

There was an obvious concern with the physical condition of the children, but their

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127 30 & 31 Victoria, c.103; c.146; Hutchins & Harrison, op.cit., p.168-172
128 ibid; Roach, J., *Social reform in England, 1780-1880.* London, 1978, p.191-192
129 Smith, op.cit.
130 ibid, p.11
131 Report on brickfields by H.W. Lord to Children's Employment Commission, op.cit, p.128 - 129

moral and educational development was of similar importance. The regulation of factory employment had always carried with it an educational aim, restricting children's work to enable them to attend schools. In brickmaking it was common for children to work with their parents and older siblings during the summer months and to attend school during the winter months, when they would otherwise be a nuisance around the house. Such a discontinuous style of education was clearly not conducive to children making progress with skills like reading, and moreover the arrival of the brickmaker's children in schools in winter was regarded as detrimental to good discipline. The teachers at Heston National School expressed this problem in forthright terms:

> When the children return to school from the brickfields they are generally rough in manner, dirty in habits, and have contracted the habit of swearing. Almost all that they have learned is forgotten, and usually with the quickest it takes two months to revive and learn again... The regular attendants slacken in their discipline, and get more rough in manners. Their habitual swearing is the cause of the tradesmen's children not attending school.[132]

Once children were expected to attend school half-time there were problems with the operation of the traditional brickmaking gang, which employed adults and children working together; production by the gang system depended on all members of the gang being present during all the working hours. This difficulty had already arisen in textile factories with the passing of the 1833 Act, in attempting to match the hours of children, who were limited to eight hour shifts, with those of adults who could work twelve.[133] In the aftermath of the passing of the 1867 Acts there was discussion about how the half-time system could best be accommodated; the alternatives were the sending of the children to school for half of each day, or by letting them attend on alternate days, an option sanctioned by the legislation. The problem was exacerbated by the distance many of them had to walk to reach school in the isolated villages of West Middlesex. But in either case in order to allow production to continue unchecked, it was necessary to employ two sets of children to work with the adults in each gang. This clearly added to costs, and, it was argued, became additionally difficult because of a scarcity of children. There had been worries in the 1860s that there were insufficient children available to provide two relays to enable a half-time system to operate, and this was reiterated a decade later.

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[132] Children's Employment Commission, PP 1866, vol xxiv, p.150-51

[133] Henriques, U., *Before the Welfare State: social administration in early industrial Britain.* London, 1979, p.96

When questioned by the Factory and Workshops Commission in 1876 the representative of the Master Brickmakers' Association showed a poor grasp of the legislative requirements and appeared not to realise that the act allowed the alternate day arrangement. Ideally, as far as the masters were concerned, the half time system should operate as it had informally beforehand, with the children working half a year during the summer months and attending school in the winter months. Such a compromise flew in the face of the aims of the factory legislation and was one that the Inspectorate were unwilling to accept.[134] However the tendency for children to be absent in summer months, either regularly, or occasionally when they were substituting for an absent brother or sister, continued into the 1890s, as school log books show, as did the similar absence of farm workers' children when the harvest was being got in.[135] Both employers and parents could be fined for employing a child who should have been at school. George Wethered was fined £1 for employing a child under the age of thirteen without a school certificate, and the father Edward Leaver, a Hayes brickmoulder, five shillings for neglecting to send his child to school.[136] The Commissioners also disputed the owners' contention that the statutory age limits, of thirteen before young people could work a twelve hour day, and ten before a child could be employed at all, were set too high; and that the work undertaken in the Middlesex brickfields was much less arduous than that which prevailed elsewhere. The masters wanted compulsory school attendance to end at age 11.[137]

The legislation necessitated a certain amount of bureaucracy as every employed child had to be seen by a certifying surgeon and records maintained at the workplace. Not surprisingly these regulations were sometimes contravened, either accidentally or deliberately. In 1896 the firm of Coles, Shadbolt & Co., cement manufacturers and brickmakers, were convicted at Uxbridge Magistrates court of employing boys without obtaining the proper certificates of fitness from the doctor and failing to keep a register

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134 Factory and Workshops Commission, PP 1876, vol xxx, p.173

135 Betham School, Greenford. Transcript of Log Book for 1879 (Original now lost): October 21st "We have recently received six boys from this quarter [Northolt] who were employed in the brickfields"; August 11th "Some of the older boys are not present, the hay crop not half cut". Northolt School. Log Book. May 15th 1882 "Henry Saunders and Henry Rose still absent from school to work in the brickfields"; April 20th 1894 "Brick making recommenced and some children are absent barrow loading".

136 Report of the Inspector of Factories for the half-year ending 31st October 1873. PP 1874, xiii, p.25

137 Factory and Workshops Commission, op.cit., p.173-6

in the required form.[138]

How prevalent the employment of women and girls was in the brickfields of West Middlesex is difficult to gauge. It is rare to find the wives of brickmakers recorded in the Census returns as having an occupation, but this may be a convention that masks some degree of employment in brickmaking. Even if they had no formal employment they were kept busy caring for those children too young to work and providing meals for their husbands and sons, as well as for the casual labourers who boarded with them in the summer months. Likewise, only occasionally are girls recorded as working in the brickyards, as was noted above, and this may be an accurate reflection of the practice in this part of the country, but one that differed from the practice elsewhere. In the mid-1860s Tildesley's employed about twenty females of all ages and the Southall Brickmaking Company two per stool, a total of between thirty five and forty. The Rev Dennett thought the average for the area was about two per stool. [139] In 1876, after the legislation had imposed restrictions on the use of women and girls R.M.Smythe stated unequivocally that girls were not employed at all, and the following year Sub-Inspector Henderson declared that "the employment of young girls in the fields has been abolished, and the law is generally well-observed". [140] Yet the Inspectorate had prosecuted a number of employers in the previous few years for employing girls under the age of sixteen. In 1873 at Brentford Magistrates Court Francis Newell of Southall was fined £2-0s-0d with 7 shillings costs and Waring Brothers £1-13s-0d with similar costs, both for employing a girl under sixteen years. Individual moulders could also be prosecuted for allowing an under-age girl to be employed, as happened to William Pigot of Dawley at Uxbridge Magistrates Court.[141] Owners might not always know that under age children were working in their brickfield. In 1876 Mr Savage, the manager of the Southall Brick Company, claimed that he was not aware that Mary Hill was barrow loading, but this did prevent the company being fined. In another case a fourteen year old girl was found on the site, but it was alleged that she was not working but merely bringing her father a pot of beer. This explanation was accepted when, upon

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[138] *British Clayworker*, September 1896

[139] Children's Employment Commission, op.cit., p.135-149

[140] Factory and Workshops Commission, op.cit., p.173-6 (Smythe); p.165 (Henderson)

[141] Report of the Inspector of Factories. Half-year ending 31st October 1873, op.cit., p.25; Half year ending 31st October 1876. PP 1877, xxiii, p.34

examination, her hands proved to be soft and white. Her father, however, was cautioned for impeding the factory inspector.[142]

The extension of the factory acts and the introduction of machinery progressively reduced the number of children working in the brickfields, but as we have seen there were a number of prosecutions for breaches of the regulations. It has been argued that child labour in non-textile industries was already declining before it became subject to factory control, although the legislation helped to accelerate the process.[143] Machines, in the shape of steam-powered pug mills and moulding machines, had been introduced in the late 1850s, but the increased labour costs inflicted by the provisions of the Workshop Act may have encouraged their more widespread adoption. It was claimed that the exclusion of the youngest children after 1867 had added 6d per thousand bricks to the cost of moulding and raised the wages of boys from 5s to 7s a week. There was now a clear incentive to design machinery that would substitute for some of child labour: for example, pug mills could be set up to feed the clay onto the moulding bench and remove the need for a pug boy. Sub-Inspector Henderson reported that

> The pug-mill is now generally placed so at to deliver the clay direct on to the moulder's table: and one hand in the gang, the "pug-boy", whose work was most laborious, having to stoop and lift from twenty to twenty-five tons of wet clay, has been dispensed with. .[144]

The spread of machine methods into the Middlesex industry does not seem to have produced the reactions that were seen on other brickfields. There was no violence on the scale and of the severity that affected the Manchester industry in the 1860s and was troubling enough to warrant the label of "outrages" and prompt a Parliamentary enquiry, nor the trade union activity in the Nottingham industry between 1865 and 1885.[145] The absence of conflict in the London area probably resulted from the slow progress of mechanisation both in the Middlesex and Kent yards and much hand-moulding was still carried on at the end of the century.

The extension of machinery threatened the brickmakers in a number of ways. Where a

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[142] *Marvel & Middlesex Register*, 27th July 1876, p.3
[143] Nardinelli, C., "Child labour and the Factory Acts". *Journal of Economic History*, vol.40, 1980, p. 739-755
[144] Factory and Workshops Commission, PP 1876, vol xxix, Appendix E, p.190
[145] Price, R., "The other face of respectability: violence in the Manchester brickmaking trade, 1859-1870. *Past & Present*, vol.66, 1975, p110-132

machine replaced the moulder, it contributed to the de-skilling of the trade. Machines, especially if they were self-loading and had inbuilt conveyors, removed some of the labour requirement. Finally, the breakdown of the gang system, and the different work discipline imposed by a steam driven machine, whose operation was controlled by the owner, led to a change to hourly rates from piece rates. Machinery in the brickyard changed the relationship between the owner and his workers. It altered the balance of costs between labour and capital, and allowed the foreman or manager to regulate the hours worked by shutting down steam engines. It also introduced new types of skilled employees such as engine drivers: James White, William Shaw, Thomas Smith and James Hetherington all are recorded as such at Southall and Alfred New at Northolt in 1881. [146]

If the introduction of factory legislation forced changes on the composition of the workforce and increased costs for business, other regulations imposed new responsibilities on firms. In the late 1890s brickmasters, like other employers, had to take account of the provision of the Employers Liability Act of 1880 and the Workmen's Compensation Act of 1897, which required owners to pay employees for injuries sustained at work.[147] There were two visible effects of these requirements. First the *British Clayworker*, as the main publication of the industry, carried a regular column which reported accidents in the workplace. Many of these described horrific injuries, especially when they involved limbs being caught in machinery such as crushing rollers, but a wide, though not comprehensive reading of these reports suggests that the Cowley district was remarkably free from incidents of this kind.[148] Whilst this may be a reflection of greater safety consciousness and better management in West Middlesex yards, it is more likely a reflection of the low level of mechanisation, and therefore a reduced level of opportunity for such accidents to occur. Employers, whatever the safety record of their own yards, had to be prepared to meet claims against them. This led to the formation of the Brickmasters' Employers' Liability Association Ltd, a company formed in July 1898 with capital of £100,000. The first directors, drawn from the stock brickmakers of the South-East, were G.H. Dean, of Smeed Dean of Sittingbourne, A. Rutter, of D & C Rutter, and

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[146] Census Enumerator's Books, Southall , Northolt , 1881
[147] 43 &44 Victoria, c.41; Walker, D.M., *The Oxford companion to the Law*. Oxford, 1980, p.1307-8
[148] *British Clayworker*, op.cit., passim

G.E. Wragge, the managing director of Eastwood & Co Ltd.[149] There has not been an opportunity to investigate the operation of this company.

Whilst Luddism was not a significant factor in industrial relations in Middlesex, there were some disputes over wages in the later years of the nineteenth century. Wage rates had been driven down during the slack market conditions of the late 1880s, and this had provoked some reaction. There was an unsuccessful strike at Strouds and some other brickfields in 1883 but the major action occurred in the early 1890s when, as conditions improved and brick prices rose, there were attempts to regain the ground that had been lost in the previous decade.

Brick workers also became better organised, becoming part of the so-called "New Unionism", partly by their association with the Gasworkers, since many men, as has been noted above, worked part of the year in each occupation. The "New Unionism" established itself with the semi-skilled workers of the larger towns, and occupations like dockers and gasworkers were obvious candidates. The gas workers were helped by the prosperity of the gas industry in the late 1880s, and only awaited suitable trade conditions and a determined leadership to take action The upturn in the trade cycle in the years 1888-1890 was favourable to labour, with unemployment falling from a 10 per cent level in the mid-1880s to a low of only 2 per cent in 1889.[150]. The introduction of the "iron man", a mechanical stoking device in 1889 gave the impetus for Will Thorne, a stoker at Beckton, to form a National Union of Gas Workers and General Labourers which campaigned successfully for the introduction of the eight-hour shift to replace the twelve hour one.[151] The Union set up branches for workers in other industries including quarrymen and clayworkers. In Birmingham a separate society was founded which also recognised the natural alliance between gasworkers and brickmakers, the Amalgamated Gasworkers, Brickmakers and General Labourers.[152]

There was a determined attempt to impose closed-shops in those industries in which the union had an influence. In July 1890 the men at Eastwoods yard at West Drayton struck

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149 *British Clayworker*, August 1898, p.xxvii
150 Hunt, E.H. *British labour history 1815-1914*. London, 1981. p.304
151 Clegg, Fox and Thompson, op.cit., p.57-58
152 ibid, p.65

over the employment of a man whose union membership had lapsed, and only agreed to return to work if the man was dismissed. The following month three non-union men at Rutters were forced to join in order to prevent a similar incident. With these successes behind them the union held a meeting on West Drayton Green in September, attended by the President and General Secretary of the Union at which the branch banner was paraded and an address given by Eleanor Marx, who was warmly received. A further 78 members, 62 men and 16 women, were recruited.[153]

Encouraged presumably by the successes of the previous year the brickmakers in the Cowley district, numbering some 750 men, struck at the beginning of the brickmaking season of 1891 for an advance in wages of 6d per 1000 for moulding and related increases for setting, loading and skintling. These increases were designed to restore the rates to the level that had prevailed before the reductions imposed during the poor market conditions of the 1880s. The price for moulding had been reduced first in 1884 by 6d and again in 1886 by a further 2d. Although an advance of 4d had been paid in 1888, the men contended that the price of bricks was now higher than it had been for eight or nine years and that a further increase could be justified. They argued that men employed in Tottenham brickyards earned 5s 8d per 1000 as against the 4s 4d that they received.[154] The masters' response was that although prices had risen they were still much lower than they had been, and that the Middlesex men were paid better than the employees of the Kent and Essex yards.

There were two other demands. The first was that the difference between what a pug boy was actually paid and the allowance made for him in the wage structure of the brickmaking gang be made up by the employer. The men argued that they were allowed only 3d per 1000 for the pug boy but were forced to pay an additional penny. It is not entirely clear why the moulders were compelled to pay the extra sum, but may reflect changes to the composition of the moulding gang that had followed the passing of the Workshops Act, perhaps because older boys were now employed who expected more pay. The second one related to the "back-pence" custom of retaining part of the piece rate, typically 4d or 6d per 1000, which was only paid at the end of season. This struck at

153 *West Drayton and District Historian*, No. 94, 1990, p.6; No. 82, 1982, p.7
154 *Brick, Tile and Potteries Journal* 9th June 1891, p. 360

the heart of the traditional arrangement of signing on for the whole season, and the loss of back pence by men who left prematurely.[155] The dispute affected the whole of the Cowley district, and there was a threat of violence behind some of the behaviour. Strikers from Iver arrived in the Hounslow and Heston areas and attempted to intimidate workers at Mecklenberg's, Hiscock's and Doubleday's brickfields. [156]

The masters, through their organisation, the Cowley Brickmakers Association, spoke with a common voice in rejecting the men's demands, at a meeting in Paddington, chaired by Mr Stroud. They argued that although brick prices had indeed risen, they were still lower than they had been, and that the Middlesex men were paid better than the employees of Kent and Essex yards. They also rejected any change to the back pence custom, since it provided a necessary security that the men would remain at work throughout the season. All in all, they felt that to accede to the package of demands would cripple the industry. [157]

The employers imposed a lockout, initially for a fortnight and nearly a thousand men were thrown out of work. The intransigence of both sides produced a prolonged strike, lasting the whole of the season. The union did not provide strike pay and some of the workers, presumably many of those who were only employed during the season, left the district to try and find work in other areas.[158] By July the employees were proposing to seek arbitration, a course of action the masters had already rejected, but the local Member of Parliament, F.D. Dixon-Hartland, offered his services as a mediator in the dispute, only to be welcomed by the men but rejected by the employers. The deadlock was broken, however, when one of the largest employers in the area, Eastwoods, secured a local agreement with their men, who agreed to return to work for an increase of 5½d rather than the 6d they had demanded. [159] Eventually the strike collapsed but it was so close to the end of the brickmaking season that not all the men actually returned to work.

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[155] ibid, p. 360; Evidence of Will Thorne, General Secretary of the Gas Workers Union to the Royal Commission on Labour, Group C. PP 1893-4, xxxiv, p.33
[156] Hounslow Library. Newspaper cuttings collection, Binder 7, Item no.226 (unidentified)
[157] *Brick, Tile and Potteries Journal*, 9th June 1891, p.360; Hounslow newspaper cutting, op.cit
[158] *West Drayton & District Historian*, No.97, 1991, p.7
[159] *Brick, Tile and Potteries Journal*, 14 July 1891, p.7; 11 August 1891, p.43

Although there were no further disputes of this magnitude in the Cowley brickyards, similar industrial action took place in the following years. In 1892 brick workers in the Acton and Shepherd's Bush areas demanded an increase in wages and a strike ensued, but apparently there was no solidarity between the Cowley men and their colleagues, and fellow unionists, nearer London. There was, however, support for the masters from stock brickmakers in Middlesex, Kent and Essex, who entered into an agreement to supply them with all the bricks they needed to meet their contracts.[160] Some brickmakers, such as Strouds and Eastwoods, had interests in more than one district and could move production accordingly.

In 1893 two thousand workers at a dozen firms between Slough and Southall also struck for a rise of 4d in wages. The dispute started in May, but the masters this time, whilst again rejecting the men's demands, kept the brickfields open, guarded by police to prevent violence against blacklegs. The strike was short-lived, the men returning to work after only ten days. [161] The trade press, perhaps not surprisingly, argued that labour disputes in the Cowley area had been damaging for the industry, and made the men's employment prospects less secure.[162]

There is little information about how brickfields were managed on a day to day basis. It seems unlikely that the brickmasters, especially those who owned several brickfields, supervised the work directly, this task falling to foremen or managers. A number of foremen appear in Census returns: William Tilbury was foreman of brickfields and beerhouse keeper at Yeading in 1851; Thomas Thomson a foreman at Southall in 1871; Robert Wiggens at Southall in 1871; William Carter a manager in Hayes the same year; Henry Burridge the manager of Mr Hunt's brickfields at Northolt in 1881. [163] It is not clear how men acquired this position; one assumes they had been moulders who had proved themselves reliable and trustworthy. Not all foremen lived up to the trust put in them. William Reed, who supervised Rutter's works, was convicted of stealing ten shillings from the till at the bar of the Crown Inn, West Drayton.[164]

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160 Harper Smith, T & A., *The brickfields of Acton.* 2nd edition, London, 1991, p.31; *British Clayworker*, June 1892, p.58
161 Report of the Chief Labour Correspondent of the strikes and lockouts of 1893. PP 1894, lxxxi, p.62
162 *British Clayworker*, January 1894, p.203
163 Census Enumerator's Books, Hayes, Southall 1851, 1871; Northolt, 1881
164 *Marvel & Middlesex Register*, 27th July 1876, p.2

In the sub-contracted organisation of the brickfield what did the foreman do? Since the moulding gangs to a large extent regulated themselves, one of his important functions was recording of the number of bricks each team made, in order to determine their wages, and to aggregate these for the purpose of paying the landowner his royalty, and, in the period before 1850, the Excise the tax due on the make. Leases to brickmakers sometimes referred to the need to keep records. Pocock's lease from de Burgh in 1855 required him to keep a weekly account.[165] Mr Trevithan, the manager of the Southall Brick Company, refers to a book in which he recorded the number of bricks made by each gang on a weekly basis. [166] Unfortunately account books do not seem to have survived for any of the Cowley businesses.

In addition the foreman needed to supervise the other parts of the operation, such as the building and firing of clamps, the loading of barges and carts, and the receipt and dispatch of orders. He had to make up the men's wages, and as we have seen, these were often paid in a beershop run by himself. Decisions also had to be made on which parts of the field to dig next and to maintain the site in an orderly state. Some owners obviously took a more direct interest in what went on in their fields, and this could be carried to regrettable lengths. William Burchett, the Heston and Isleworth brickmaker, found himself accused of assaulting one of his workmen, whom he was apparently attempting to persuade to undertake a task in the absence of his moulder. [167]

Ultimately brickfields were not very complex operations to supervise, even after machinery had been introduced. Brick firms in the Cowley district, and in many other parts of the country, generally did not become large enterprises. As Raphael Samuel observed of Headington in Oxfordshire:

> Brickyards failed to grow as capitalistic firms, perhaps because so little was demanded of the employer in the way of management, supervision or capital expenditure.[168]

This chapter has focussed on the labour that brickmaking firms employed; the next chapter considers the cost structure of the industry and the demands it made on capital investment. It also looks at these firms as business enterprises, and seeks to identify the

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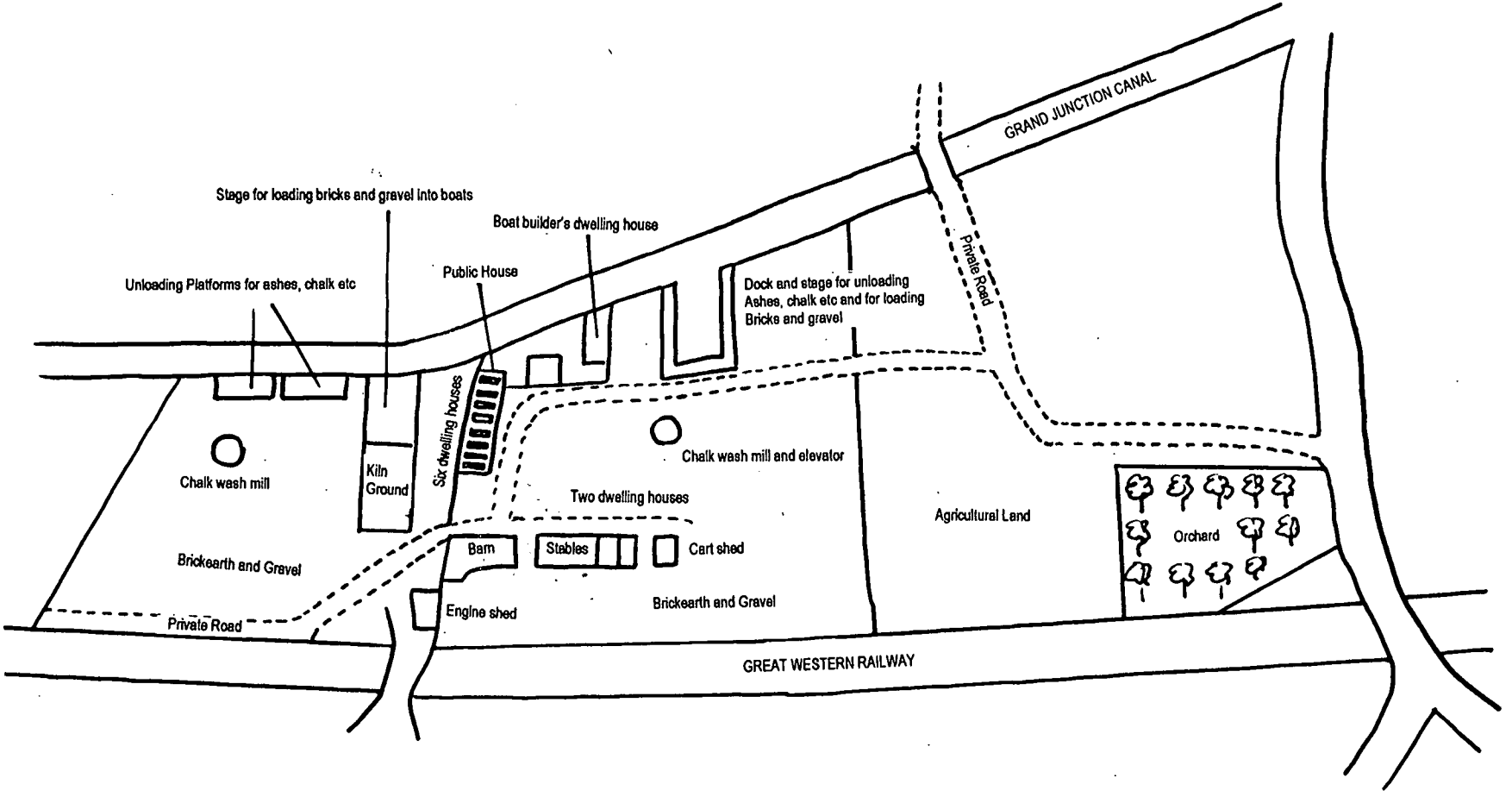
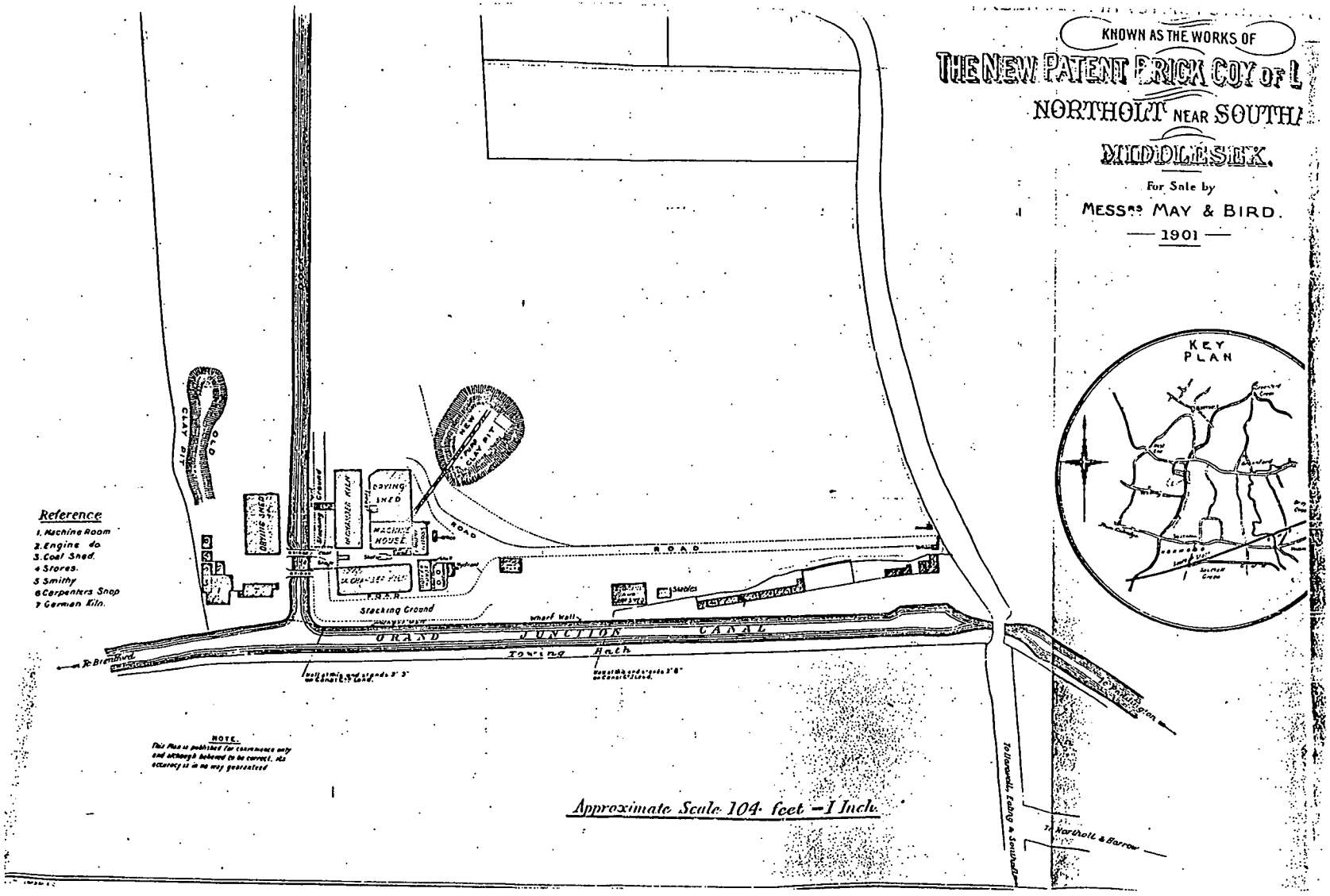
[165] LMA Acc 1386/ 101
[166] Children's Employment Commission, op.cit., p.137
[167] *Middlesex Chronicle*, 27th August 1870
[168] Samuel, R., "Quarry roughs: life and labour in Headington Quarry, 1860-1920; an essay in oral history" in R. Samuel (ed.), *Village life and labour*. London, 1975, p.230

changes that occurred in their size and character during the course of the nineteenth century.



Map 6.1: Maynard's brickfield at Harlington
Source: Undated plan in LMA Acc. 969/69



Map 6.2: New Patent Brick Company's works at Northolt 1901
Source: Ealing Local History Library. *Sale Particulars...*

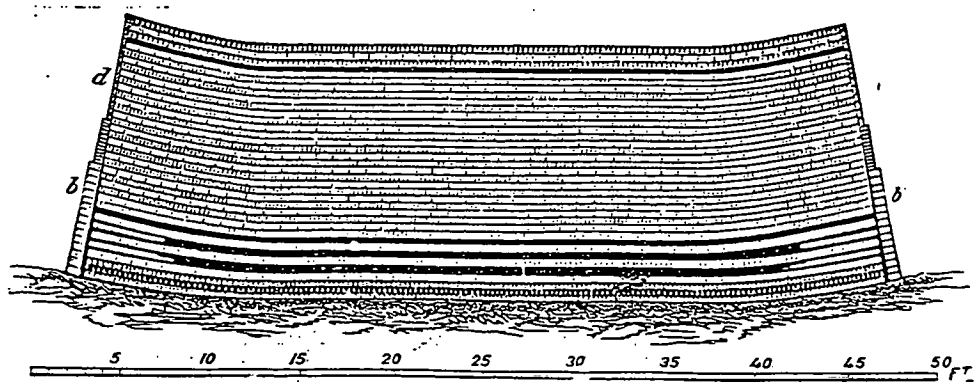


Fig. 17.

Illus 6.1 & 6.2. Building clamps in theory and practice
Source: Dobson, op.cit., p. 145; Perks, op.cit, p. 29

This chapter focuses on the producers in the West Middlesex brickmaking industry, the individuals and firms, and how the size and character of their operations changed during the course of the nineteenth century. Brickmaking, although it had some particular qualities, was subject to many of the same pressures as other businesses, and consideration will be given to common themes, such as the impact of limited liability status from the middle of the century, the growth in size of firms, and the move towards vertical integration at the end of the century. Finally, an attempt will be made to assess what capital was required to set up as a brickmaker, and what the potential sources of capital and credit were.

In the early years of the nineteenth century there were three different modes of brick production: by builders or bricklayers on the building site; by builders at separate brickfields; and by independent brickmakers. At its simplest brickmaking was often an adjunct to the building process, and where developers were laying out housing estates, it was usual to make the bricks on site provided suitable brickearth was to be found. [1] This was a practical approach, avoiding the need for transporting a bulky commodity through busy city streets, and making use of the spoil dug from the excavations needed to create cellars, which would otherwise have had to be hauled from the site as waste. This is the style of brickmaking used by developers on the Bedford estate in London, described by Clarke, but also employed by the builders of major civil engineering works such as docks and railways.[2] A major construction project of this kind in the West Middlesex area was the building of the Grand Junction Canal; the canal company established its own brickworks at Alperton during the building of the Paddington arm. In 1805 the works made over a million bricks, of which only a quarter were used by the company, the rest being sold at the market price to London builders.[3] Despite considerable changes in the building industry, the practice of on-site brickmaking survived into the middle of the nineteenth century. It was employed by George Myers to produce bricks for the County Asylum at Colney Hatch, when the brickmaker from whom he was intending to buy

[1] Powell, C., *The British building industry since 1800: an economic history.* 2nd edn., 1996. p.43
[2] Clarke, L., *Building capitalism: historical change and the labour process in the production of the built environment.* London, 1992, p.135-140
[3] Accounts of brickmaking at Apperton (Alperton) are incorporated in the Grand Junction Canal Company Dividend Book, 1802-1841. PRO RAIL 830/51

failed to provide the necessary quantities.[4] This method also continued to be used by the builders of country houses, especially where the estate could provide the fuel and much of the labour, avoiding the costs of carting bricks some distance from the nearest brickyard. Owners of landed estates endeavoured, where possible, to use the resources of their estates in order to reduce costs, and this self-reliance allowed them to be unconcerned about the availability of building materials, and fluctuations in their market price. [5]

Until the end of the eighteenth century general building firms were unknown and developers hired specialist tradesmen, such as plumbers, carpenters, masons or bricklayers. Where this was the case, bricklayers needed to develop an expertise in making bricks as well. In the early years of the nineteenth century there were already some bricklaying firms who could provide the large number of tradesmen necessary to undertake some of the major public works projects, and to make the bricks they used. Among these was Adams & Robertson, the bricklaying firm engaged at West India Dock.[6] Some builders also became noted brickmakers; Stephen Bird was active during the first half of the century as a builder and estate developer first in Kensington, and later further afield, and was regarded in the 1830s as one of the most eminent brickmakers in the capital.[7] His sixteen acre brickfield was located in the Potteries area and employed over a hundred hands. Thomas Cubitt was another major builder who made bricks on the site of his housing estates but later operated his own brickfield at Burnham in Kent.[8]

In addition there were the independent brickmakers who produced bricks to meet the needs of builders engaged in small jobs - single houses, extensions to existing properties, repairs and alterations. They also provided a source of material for building where the nature of the soil, a cramped or difficult site, or the nuisance of burning bricks in a built-up area, caused brickmaking by the builder himself to be impractical. Some major

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[4] Spencer-Silver, P., *Pugin's builder: the life and work of George Myers*. 1993. p.112
[5] Wilson, R.G. & Mackley, A.L., "How much did the English country house cost to build, 1660-1880?" *Economic History Review*, vol. LII, 3 , 1999, p. 446, 460
[6] Survey of London, vol. XLIII: *Poplar, Blackwall and the Isle of Dogs. The parish of All Saints*. London, 1993 p.254
[7] Survey of London, vol. XXXVII: *North Kensington*. London, 1973, p.71
[8] Hobhouse, H., *Thomas Cubitt, master builder*. London, 1971, p.302f

engineering schemes used a mixture of methods to supply the necessary number of bricks. When Thomas Walker was engaged in building the Severn Tunnel in the 1880s he set up his own brickyard at Sudbrook capable of turning out 600,000 bricks per month. The whole enterprise, however, finally required seventy-six million bricks, of which two-thirds came from Sudbrook, and the remainder from seven different manufacturers in Staffordshire, and a number of firms in the Bristol area. [9]

Besides the practical advantages of making bricks on site two other considerations may have encouraged the practice: first, that this sector of the economy had not reached a level of maturity sufficient to enable it to deliver the quantities of bricks required for major projects such as docks, warehouses, viaducts, hospitals and barracks; and, secondly, that production methods were not very sophisticated or complex, since a brickfield could be set up with a small amount of machinery and no permanent buildings. As a result, most brickmakers operated on a small scale, with little fixed capital; few would seem to have been able to supply many millions of bricks in a year, in the way that Trimmers of Hammersmith were able to do for the West India dock.[10]

There were considerable savings to be made by making bricks on site, since their transport over even short distances considerably raised their cost. There was a danger, however, that choosing a local product could prove a false economy, if the bricks so produced failed to have the necessary durability. This was especially true in some demanding civil engineering projects; experience of some major failures, particularly in tunnel linings, led to the conclusion that engineering bricks, with their higher levels of impermeability were to be preferred. [11]

The brickmakers who set up their works beside the Grand Junction canal in rural Middlesex were producing mainly for the London market, or for the developing suburbs like Ealing on the fringe of the capital. There was no one kind of man, and in a few cases woman, who went into the brick trade: some were local, some from elsewhere in London; some had already made bricks elsewhere, some may have been new to the

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[9] Brooke, op.cit., p.62
[10] Survey of London, vol. XLIII., op.cit., p. 112
[11] Brooke, D., *The railway navvy: that despicable race of men.* London, 1983, p.62

business; some started as builders, others were farmers; some may have previously been brickmoulders, others were gentlemen entrepreneurs. Information is often difficult to come by with respect to the origins of brickfield owners, but some deductions can be made from the little data that is available.

Many of the brickmakers who set up in the Cowley district were already established elsewhere in London, usually in the inner London suburbs. Although the acquisition of an extra-metropolitan site did not necessarily signal the withdrawal from their existing ones, brickmakers had to reduce their operations in built-up areas as the pressure on land increased, as rents rose, and as clamp burning became less tolerated. A number of major brickmaking zones in north London contributed brickmakers to the Cowley district: amongst these were Thomas and William Rhodes, of Balls Pond Road, Islington, who took a lease on land at Dawley in 1853, and James and Alfred Stroud of Stoke Newington who had brickfields in Southall in the 1860s.[12]

The precise motivation of these brickmakers in making the move is not clear, but it is likely that whilst opportunities to expand brickyards within inner London were limited, the industry was expanding in rural Middlesex, the Thames estuary and the Medway, all of which had good transport links to central London. Where brickmakers were equipped with their own wharves in the inner area there was a ready-made supply route for their extra-metropolitan production. This transition is seen clearly in the case of another North London producer, Henry Dodd, a major brickmaker, rubbish collector and contractor, whose main centre of operations was the City Wharf, Hoxton. In the 1850s he was one of the larger rubbish contractors in the capital holding the contracts from the contiguous vestries of St.James, Clerkenwell, St Luke and Shoreditch. He employed some ninety-one people in the rubbish side of the business and deployed over forty carts. His dustyard at his wharf on the Regent's Canal was extensive.[13] By 1860 he was making bricks in Yeading, on a site that had previously been occupied by another

[12] LMA Acc. 969/63; advertisement in *The Builder* 5th July 1873; PP 1866 xxiv, p.135 (Southall), p.163 (Stoke Newington)
[13] Mayhew, H., *London Labour and the London poor. Vol 2.* London 1861-62, p.187, 213 [Dover reprint, 1968]; "Mr Dodd's dustyard" *Illustrated Times*, 23rd March 1861, reprinted in James Greenwood, *Unsentimental journeys*. London, 1867.

London contractor John Jay from 1854.[14] The brickyard was one of the larger ones in the Cowley district, capable of producing about fifteen million bricks in 1865.[15] The through route from the Grand Junction Canal via Paddington to the Regent's Canal allowed manufacturers like Dodd to continue to serve their existing North London markets, as well as providing the means to exploit new opportunities in the western suburbs.

Aside from these arrivals from inner London, what was the background of the other brickmakers of West Middlesex? Four main groups may be identified: builders, professional brickmakers, farmers, and a number who may loosely be termed entrepreneurs. Each of these will be considered in turn. It is not surprising that many builders, in a poorly-developed market for bricks, decided to make their own. If, as we have seen, bricklayers and builders often made bricks on site for the buildings they were constructing, it was not an enormous step to set up as brickmakers on their own account, especially as pressure grew to restrict the burning of bricks in urban districts. Examples of this diversification, at different periods, were the Rigby brothers, Joseph and Charles, described as builders and contractors, and operating from 22 Holywell Street, Westminster; Peter Pearse, a builder from Holborn; and Thomas Watson, a builder and contractor in Southall.[16] Some builders had specialist interests: James Hunt and Joseph Bennett were based at Horseferry Road, Westminster at the time they secured a contract with the Westminster Sewers Commission in 1826 for maintenance work. Its terms required them to "perform brickwork with sound well-burnt stock bricks" that had to conform to a sample provided by the Commissioners. In the 1840s Hunt, still of Horseferry Road, and Bennett, then of Rochester Row, separately took up leases in Hillingdon and Northolt respectively. There was obviously a long elapse between these contracts in the 1820s and brickmaking in the Cowley district in the 1840s, but both may have been making bricks elsewhere in the meantime.[17] Stephen Watkins, of Portland Town, Regent's Park, who, as we have seen, went bankrupt in 1827, was a builder too, with a number of houses in an unfinished state.[18] Henry de

[14] British Waterways Archive, Hemel Hempstead, unlabelled document
[15] Hillingdon Heritage Services. *Hayes Valuation*, 1865
[16] LMA Acc.969/64a; Acc 405/Bundle 1
[17] LMA Acc 328/47; WAM N107; LMA WCS330
[18] PRO B3/5292

Bruno Austin may more properly be described as an estate developer rather than a builder. He was responsible for the layout of a large part of West Ealing in the early 1860s, but also went bankrupt before many of the houses were built. However in 1865 he was in possession of thirty-four acres of brickearth in Hayes and a group of thirteen cottages known as Austin's Row.[19]

There were many men who gave their occupation as brickmaker, a term that blurs the distinction between employer and workman. James Thornton (Hillingdon 1849), the Rutter family (Hillingdon 1862), Frederick Cooper (Hillingdon 1868), Edward Westbrook (Heston 1845), Ann Burchett (Heston 1845), Edward White of Cowley (Hayes 1873) and Frederick Reed (Southall 1910) were all described as such, but it seems likely that as they leased land, and were required to pay royalties on their production, they were masters rather than men, but probably with a practical grounding in the business.[20]

For some farmers here was an opportunity to convert agricultural land to a more lucrative use, but they were dependent, except in the rare cases when they were freeholders, on the willingness of landowners and manorial lords to make land available for this purpose. The decisions of these ultimate owners were also guided, as we have seen (in Chapter Five above), by the superior returns that might be had from brickmaking rather than agriculture. Thomas Shackle of Hayes, was a farmer who combined brickmaking with husbandry on his copyhold land, and fell foul of the lord of the manor for doing so without a licence. William Heron, in Hillingdon, is another such local figure, established as a land agent and surveyor, who became involved in brickmaking both on his own account and in partnership with members of the Rutter family.[21] It was quite possible, and beneficial, to combine brickmaking with agriculture. Any brickmaking operation of the kind that was usual in West Middlesex, and indeed elsewhere, had to make provision for the practical use of the land that was not currently in use for clay-getting. This would seem to have been the approach of Thomas Shackle, owner and occupier of eleven acres in Dawley Field in 1827 and of Edward Shackle also

[19] Hounsell, P., *Ealing and Hanwell past.* London, 1991, p. 64-65; *Hayes Valuation 1865*, op,cit.
[20] LMA Acc.1386/98,105,108; Acc.328/51,52; Acc.538/ 1st dep/42/15; Acc.405/Bundle 1
[21] LMA Acc. 180/182; Acc 538/Ist Dep/45/15; Acc 742/105; Acc 1386/97

in Hayes in the 1860s.[22] William Hinds was described as farmer and brickmaker at Heston in the 1820s, as was William Valder at Cowley in 1845.[23] Later in the century Joseph Gregory was a farmer in Hillingdon and West Drayton who went into partnership with the brickmakers Broad and Harris.[24]

Finally there are those entrepreneurs who became involved in brickmaking, but who, unlike working brickmakers, were regarded as gentlemen rather than tradesmen by the compilers of local directories. The background of Samuel Pocock remains unclear, but he was a gentleman of Russell Square (1855), Ealing (1859), Duke Street, Adelphi (1870), bankrupt in 1871, but operating again at least by 1875, and bankrupt again in 1884.[25] Members of the Rutter family appear variously as gentlemen and brickmakers. John Rutter was a brickmaker at Hillingdon in 1832. Daniel Rutter is shown as resident at Montague House, Uxbridge Common in 1838, but was in partnership with Charles Rutter and William Heron in 1842 as brickmakers.[26]

Other brickmakers came from other commercial backgrounds. Ralph Ratcliff seems to have been a butcher before taking up brickmaking.[27] John Minter, who went into partnership with Samuel Tildesley in Heston and also at Gravehurst in Kent, was a linen draper from Notting Hill in the 1860s, but later managed the brickfield at Southall in his own right in the 1880s. [28] Possibly the most unusual background for a brickmaker was that of Paul Mecklenburg. He had been born in Germany, and trained as a watchmaker, jeweller and optician in Switzerland and Spain before arriving in England and becoming a naturalised British citizen. He opened a jeweller's shop in Hounslow, but in the 1880s gave up this business and went into partnership with his father-in-law, operating brickfields in Scrattage, Lampton and Southall. [29] His father-in-law was presumably the "Brown" of Brown & Mecklenburg[30]

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[22] *Hayes Valuation*, 1827 and 1865, op.cit.
[23] *Pigot's London & Provincial Directory, 1828/9; P.O. Directory of Middlesex 1845*
[24] LMA Acc.1214/1340
[25] LMA Acc 1386/101,102; Acc 538/2nd Dep/1312, 1315; Guildhall Ms.12335
[26] *Pigot's London & Provincial Directory, 1838*; LMA Acc.1386/97
[27] *P.O. Directory of Middlesex 1845*; LMA Acc.538/ 2nd dep/1452
[28] LMA Acc 328/59; *P.O. Directory of the Building Trades 1870; Kelly's Trades Directory Middlesex 1882*
[29] Obituary of Paul Mecklenburg. *Middlesex Chronicle*, 10th July 1920
[30] LMA Acc.506/37; Acc.405/bundle 7

For much of the nineteenth century the most usual form of business organisation was the partnership. Such arrangements left the partners with unlimited liability for any debts incurred by the firm, but this was regarded by many contemporaries as essential if businesses were to act with a proper degree of accountability, arguing that they would be managed better by men who had a personal stake in the enterprise. By contrast, the managers in a joint-stock company, that is one in which the ownership was distributed by the issue of stock, could not be expected, in the words of Adam Smith, "to watch over it with the same anxious vigilance with which partners in a private compartnery [sic] frequently watch over their own".[31] Later commentators argued a similar case in more florid terms.[32]

Limited liability was only available in certain circumstances, since the ability to form such companies had been restricted by the Bubble Act of 1720, passed in the wake of the South Sea Company collapse. Between 1720 and 1855 limited liability was only available as a result of legislation, or a royal charter, which effectively restricted it to large scale enterprises such as banks and trading companies, and eventually to railway and canal companies. Unlike most industrial concerns of the period these last made demands on capital that could not be met by a small group of investors, and required parliamentary sanction to allow them to compulsorily purchase the land through which their route was planned. [33] These companies, however, were exceptional and for most firms activity was not necessarily stifled by the difficulties of obtaining limited liability status, since the partnership proved very adaptable to the changing needs of business. Partnerships could be extended as necessary; and if additional resources were required, new partners could be brought in, to provide extra capital, technical expertise, or managerial control.[34]

Partnerships were found at all levels of commerce, banking and manufacture. Importantly, many partnerships were between members of the same family for it was essential, in the context of unlimited liability, that partners enjoyed a high level of mutual

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31 Quoted in Pollard, S., *The genesis of modern management: a study of the industrial revolution in Great Britain.* London, 1965, p.12

32 Kirby,M.W. & Rose,M.B.(ed), *Business and enterprise in modern Britain from the eighteenth to twentieth century.* London, 1994., p. 64-66

33 Daunton, M.J., *Progress and poverty: an economic and social history of Britain, 1700-1850.* Oxford, 1995, p.286

34 Kirby & Rose, op.cit., p. 65

trust, and this encouraged arrangements within families. In such circumstances of "family capitalism", the success of the business determined the financial well-being of the family. [35] Brickmaking, in as far as the Middlesex brickfield is typical of other brickmaking areas, followed the national pattern with partnerships being the most common form of business organisation, many of them family based. As we have seen Daniel and Charles Rutter were in partnership together, as well as, for a time, with William Heron. At a later date the firm of D & C Rutter was operated by Frederick, Algernon, and Edward, presumably the next generation of the family. [36] Other family partnerships included William & Joseph Studds (Hillingdon 1853), Thomas & William Rhodes (Dawley 1853), Joseph and Charles Rigby (Dawley 1854).[37]

Few examples of partnership agreements survive, but there is one from 1894 involving a Southall brickmaker, albeit relating to a brickfield in Acton. John William Warner of Acton and James Omans of Southall, both describing themselves as brickmakers, entered into an agreement to work Stroud's brickfield in Acton, under the name of John Warner and Company. The details were entered on a pre-printed form, which assumes that most of the terms were standard ones, with a space for particular clauses. The partners had equal shares in the business, whose assets included the tenancy of the brickfield, plant and equipment, and the cash at the bank. The partnership was initially for five years and the agreement stipulated the amount that each partner was entitled to draw in cash each week for personal expenses, respectively 45s and 35s; four years later the sums were increased to £6-10-0d and £3-5s-0d, suggesting that the business was successful. The brickfield, however, closed the following year.[38]

The partnership continued as an important form of business organisation until the end of the nineteenth century, despite changes in company law. After the passing of the Limited Liability Act in 1855, which provided a legislative framework for their registration and monitoring, a number of companies were established in Middlesex

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[35] Daunton, op.cit., p.246
[36] LMA Acc 1386/382
[37] LMA Acc.1386/99; Acc.969/63, 64a
[38] Ealing Local History Collection. Uncatalogued partnership agreements, 1894, 1898. Stroud's brickfield in Acton was owned by the same Stoke Newington business that also operated a brickfield in Southall. Harper Smith, T. & A., *The brickfields of Acton.* 2nd edition, London, 1991, p.54

brickmaking.[39] At least fifteen such companies have been identified as active in the Cowley area before 1900, but to date records for only fourteen of these have been located, the notable omission being D & C Rutter. These companies are listed in Table 7.1. For each of these articles of association and other documents survive; from this information it is evident that nine were conversions, that is, businesses that were already in existence as partnerships. Although the earliest of these companies dates from 1858, most were formed later in the century, reflecting the overall growth in the number of registrations in each decade following the passing of the 1855 Act. It was only in the 1880s that there was a significant decline in the use of the partnership in favour of the limited company, and it was only in some industrial sectors, such as shipping, iron and steel, and cotton, that the newer form of organisation made a sizeable impact.[40]

What prompted the creation of these companies, especially where they were the conversions of existing partnerships? Limited companies could be established for several reasons, some expansionist, some defensive. Whilst the creation of a limited company allowed for a fresh injection of capital which might be used to shore up an ailing business, or to provide the means for a prospering one to expand or to invest in new plant and equipment, it could be used to support a mainly defensive strategy, removing the dangers of unlimited liability especially when market conditions were difficult. Unfortunately from the information available from the returns companies were required to make to the Registrar of Joint Stock Companies it is difficult to judge the performance of individual businesses. However from the little information available it is worth considering the possible motivation of these fourteen companies in the context of changing conditions in the market for bricks and the shape of the industry.

The removal of the brick excise duty in 1850, followed five years later by the more ready availability of limited liability status, especially for smaller enterprises, provided an impetus to the industry. As we have seen brick output seems to have risen significantly during the 1850s. In the next decade competition in the London brick trade intensified with the introduction of firms, mostly to the north of the metropolis, supplying goods by rail, an early example of which was Robert Beart's company at Arlesey in Bedfordshire

[39] Cottrell, op. cit., p. 52

[40] Payne, P.L., *British entrepreneurship in the Nineteenth century*. London, 1974, p.19; Kirby & Rose, op.cit., p. 68

which operated through an office at King's Cross. [41]

The Parry Lewis index of housebuilding points to steeply growing demand for bricks from 1855 to 1878, followed by a period of decline which only bottomed out in 1890. The following steep rise peaked in 1898. Spensley's index, which isolates London building, suggests that the capital lagged behind these national trends by a few years, demand here peaking in 1882, and the resurgence after the subsequent slump only taking effect in 1895-6, such that there was a brick famine in London in 1897, with a corresponding rise in prices. (See Chapter Four, p. 98). In the light of this pattern of demand we might expect the conversion of partnerships into limited companies to have been expansionist in the 1850s and 1860s, protective in the difficult years between 1882 and 1895, and expansionist again in the late 1890s.

Two local companies were formed in that first period of growth, the Southall Brick Company and the Cowley Brick Company. The Southall Brick Company Ltd, registered in 1858, was a conversion in the sense that it was built upon an existing partnership, but it is unusual because the partners did not become significant shareholders in the new company. The formal object of the company was "the granting of periodical loans to Henry Hobbs and George Tilley of Southall, Middlesex, brickmakers", these loans to be secured by a mortgage on the brickfield, its plant and the stock in hand, some three million bricks. Earlier in the year of incorporation advances totalling £16,800 had been made to Hobbs & Tilley, and two of these mortgages were provided by Charles A. Smith, a solicitor from Greenwich, who invested the smallest amount of the company's ten subscribers. The other shareholders were professional men (two architects and a civil engineer) and tradesmen (a cheesemonger and a tallow merchant) with no apparent local connections, the exception being Alfred White, a manufacturing chemist of West Drayton, who had bought an old brickfield site from Pocock in the late 1840s.[42] It may well be that Smith, as solicitors often did in this period, acted as a channel by which clients with spare capital were offered suitable investments, and that the company was formed as a means of safeguarding the investments of the mortgagers.

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[41] Survey of Bedfordshire. Cox, A., *Brickmaking: history and gazetteer.* Bedford, 1979, p.44-45
[42] PRO BT41/638/3491; RAIL 830/93-95

For their part Hobbs & Tilley undertook to produce twenty million bricks per annum for seven years, a sizeable number when produced by manual methods, and capable of providing work for between 160 and 190 people during the peak brickmaking season. Assuming there was sufficient workable brickearth in the seventy-six acres of land that they owned, Hobbs & Tilley could have generated a gross income of some £30,000 per annum, making it easily possible to service the interest payments on the mortgages, which at the formation of the company amounted to only £769 per annum. The attainment of limited liability status was a prudent move for the investors in the business, but the company was short-lived, apparently being dissolved before 1860.[43]

The Cowley Brick Company Limited, formed a decade later in 1869, was a new company, with local investors, designed to acquire land and to start manufacturing bricks. The principal shareholders were Edward and G.T. Hilliard. They subscribed 600 of the 952 shares originally taken up; of the other five shareholders, the minimum number allowed by company rules, the company secretary, Herbert Barlee, held a hundred and the brickfield foreman, Thomas Hall, a nominal two. Although the company was set up to exploit new brickfields, no records of land transactions have been located, and there is little information about the company's progress until it was voluntarily wound up in 1880, having ceased to transact business. Its demise, surprisingly, occurred close to the peak in demand in 1882, and may have been related to the expiry of a lease, or the exhaustion of clay reserves. Following the extinction of the company Barlee continued to operate on his own, appearing in trade directories as a brickmaker until the turn of the century.[44]

Two firms were set up in the flat years of the 1880s. William Mead & Co Ltd, registered in 1887, lasted twenty-seven years, but was not exclusively a brickmaking operation, and perhaps for this reason was not subject to the same market pressures as firms for which it was their sole interest. Mead was a dustman and scavenger with refuse wharves at Paddington, a farmer at Shredding Green, Iver, and a brickmaker, gravel and sand

[43] PRO BT41/638/3491; Its relationship, if any, to the Southall Brickmaking Company, secretary George Augustus Cape, and with a registered address at 8 Old Jewry EC in 1870 and the similarly named company, secretary William Savage in 1876, is not clear. *P.O. Directory of the Building Trades 1870; Kelly's London Suburban Directory 1876.*

[44] PRO BT31/1458/4374; *Kelly's Directory of Middlesex*, 1886, 1890, 1899

merchant at Iver and Acton Vale. He was not therefore strictly a brickmaker in the Cowley district, but his brickfields were only a little further west along the canal from Uxbridge. Mead's operations demonstrate the symbiotic relationships that existed between the roles of dustman and brickmaker, and also the similar one between the street cleaners and farmers, using the manure scraped from the city's roads as an agricultural fertiliser. The company was larger than most of the others so far studied, with a nominal capital of £50,000 in £100 shares and brought together Mead's disparate business interests. Mead sold his businesses to the new company for £9000, made up of £2400 in mortgage debentures, £1600 in preference shares and all of the 5000 ordinary shares. The firm was a private one and comparatively long-lived, surviving until 1915. The shareholders were all family members, with the exception of Alfred Bettger, the company secretary, who was allocated ten ordinary 'A' shares in 1903. The male members of the Mead family all seem to have run businesses of their own, as hay merchants, millers, or farmers, and the intention behind the firm's formation may have been to provide a secure future income for William Mead, who by 1901 was living in retirement in Bournemouth.[45]

Hewett's Brick & Tile Company Ltd, established in 1889, lasted five years and was capitalised at only £5000. It was an offshoot of the Odell company (see below), and George Hewett purchased the lease of Durden brickfield in Southall from Henry Odell, who had rented the fifteen acre field in 1883 for a twenty-one year term. The shareholding in Hewett's is not known but shares in it were among Odell's assets in 1893. The company was wound up voluntarily in 1894 and in the same year Hewett became managing director of a new company, the Southall Brick & Terracotta Co Ltd, formed to work the same Durden field. [46] The new company paid him £50 in cash and allocated him £1000 in fully paid-up shares. As managing director he was to receive a salary of £200 per annum, and one fifth of the remaining profits after a dividend of twenty per cent had been paid. The company had a nominal capital of £3000 in £10 shares and the main investor was Charles Bird, a timber merchant with premises at South Wharf Road, Paddington. He held 98 of the shares issued, Hewett 97, the remaining five shares being held by the nominees of the two principals, in order to

[45] PRO BT31/3958/25112
[46] PRO BT31/ 4424/ 28789

satisfy the minimum legal requirement of seven subscribers. The company was unsuccessful and was voluntarily wound up in November 1896.[47]

Bird's motives, if he was selling building materials generally, rather than just timber, or if he was considering such diversification, may have been to secure a supply of bricks by investing in a brickmaking business. Yet it is difficult to detect any real aspirations towards expansion. The winding up of the company, after a mere two years, at a time when market conditions were improving, may have been determined by the exhaustion of the brickearth in this fifteen acre field, which had by then been in use for thirteen years. If worked at the rate originally envisaged in the 1883 lease, a minimum of five million bricks per annum, a field of this size would only have provided enough clay for between twelve and fourteen seasons.[48]

In the 1890s the industry changed and was increasingly dominated by larger and more highly capitalised businesses. In this respect it conformed to a trend observable in most sectors of British industry, yet the average paid-up capital of all companies in 1914 was less than £40,000.[49] So, as elsewhere, there was still room in brickmaking for the independent entrepreneur, partnership or small private company. A number of brickmaking companies also had wider interests in the supply of building materials. This vertical integration affected a number of businesses serving the London market such as Eastwoods, and the two examples for which there is detailed information, Odell Ltd and Broad & Co Ltd. These two companies were both conversions and shared other characteristics: both were sizeable companies in terms of assets and the scale of their operations, and both looked to achieve vertical integration of their manufacturing and selling interests. However neither was on the same scale as the major Kent stock brickmakers: Smeed, Dean & Co Ltd, founded in 1875 was capitalised at £140,000, Eastwood & Co Ltd, when reconstructed in 1902, at £400,000.[50]

Henry Odell owned a brickmaking business at a number of West Middlesex sites, and,

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[47] PRO BT31/5866/41193

[48] The details of the 1883 are recited in the company's registration papers, ibid.

[49] Musson, A.E., *The growth of British industry*. London, 1978, p.247-248

[50] Perks, R.-H., *George Bargebrick, Esq.: the story of George Smeed, the brick and cement king*. Rainham, Kent, 1981, p.37; PRO BT31/16870/74567

with his son, a building materials supplier trading as Odell & Son at Paddington basin. The new company had nominal capital of £75,000, and purchased the assets of the two component firms for £50,000, of which £12,500 was in cash and the balance in shares. Odell's was probably the largest brickmaking concern in the Cowley district, with at least five sites totalling some two hundred acres of leasehold and freehold land, and a number of workmen's cottages. In addition to the usual plant and machinery the business employed its own canal barges and a steam tug.[51] Despite this apparent dominant position in the industry, the company had a troubled history. In 1894 a dispute arose between the company and its major shareholder, Henry Marks and in the following year the company was put into receivership by the Grand Junction Canal Company from whom Odell rented his wharves at Paddington and Greenford. Later the same year the assets of the company, both its real property and its goodwill, were put up for auction by order of the Court of Chancery. [52] A new company styled Odell & Co. Ltd was formed in 1897, after the Registrar of Joint-Stock companies had given permission for the use of the name, but the Odell family seemingly had no interest in the new enterprise, the main investor being Thomas Clayton of 19 Irongate Wharf Road, Paddington. The company became Thomas Clayton (Paddington) Ltd in 1910.[53] Land in Yeading owned and occupied by Henry Odell in 1893 was owned by Thomas Clayton and occupied by Odell & Co in 1897.[54]

It is possible to provide a more comprehensive history of Broad & Co., which like Odell's brought together a building materials business with a brickmaking operation. The two partners were Clements Burgess Broad and George Harris. Born at Southampton in 1852, Broad worked first on the railways before taking up a position with the Paddington-based builders' merchant Charles Richardson in 1872. Eight years later he started up his own business at 4 South Wharf Road, Paddington, and entered into a partnership with George Harris, the son of a builder, who had spent a number of years at sea, before returning to his father's business.[55] Their brickmaking interests seem to

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[51] PRO BT31/5649/39405
[52] *Southall-Norwood Gazette*, 13th July 1895
[53] *British Clayworker*, April 1898, p.32; Faulkner, A.H., *The Grand Junction Canal*. 2nd edition. Rickmansworth, 1993, p.183
[54] *Hayes Valuation*, 1893, 1897
[55] Westminster Archives. Unidentified newspaper cutting, c. 1974

have started when they acquired Pocock's fields at Hillingdon and West Drayton in 1884.[56] The brickmaking business was known as Broad, Harris and Co. and included in the partnership the farmer Joseph Gregory.[57]

In 1896 the two arms of the business - with a wharf at Paddington basin, and railway depots at Finchley Road and the LNWR goods yard and their brickfield operations in rural Middlesex – were brought together in Broad & Co Ltd. As well as directly owning brickfields the company also had shares in two brickmakers, Gibbs and Canning and the Southchurch Brickfields Co Ltd, neither of which had fields in Middlesex. Broad & Co was a substantial business with nominal capital of £50,000 though strangely the assets of the two partnerships were valued at £62,950. These included leasehold land, machinery, plant, canal barges, stock in hand and contracts. The two principals acquired all but three of the 3500 voting shares; the 505 non-voting shares that were actually issued went to other employees of the business - clerks, bookkeepers and the brickfield foreman - and to Gregory. The direction of the brickfields was the responsibility of George Harris and his son, Arthur. In 1898 there were twenty-two stools working at West Drayton, producing 35,000 bricks each per week by traditional methods with little use of machinery.[58]

The manufacturing side of the business was hit by the downturn in demand at the turn of the century. The company was voluntarily wound up in 1901 so that it could be reconstructed, with the two Harris's as directors; Broad retired the following year.[59] The brickworks at Southall were sold at a loss, but the company retained its fields at West Drayton. Part of the wharf space at Paddington was sold to the gravel merchant S.W. Boyer, but a Thames wharf was acquired. [60](For the later history of the company see Chapter Nine).

Three other companies were formed at this time, operating on a more modest scale: Cullis, Phillips & Co Ltd, James Day Burchett Ltd and the New Patent Brick Company

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[56] Guildhall Ms 12335
[57] LMA Acc.1214/1340
[58] *British Clayworker*, October 1898, p.195-6
[59] LMA BT31/6681/46980
[60] Westminster Archives, Newspaper cutting op.cit.

of London Ltd. There were links between Odell Ltd and the much smaller business of Cullis, Phillips, formed in 1897, in the persons of Henry Marks and Thomas Richards. Both men had been amongst the original subscribers to Odell Ltd, holding 2501 shares each. Marks, whose primary business was as an ice merchant at the Paddington basin, became the largest shareholder in Cullis, Phillips & Co, whilst Richards, a solicitor, held a single share. The company grew out of the partnership of H.W.Cullis and T.Cullis, brickmakers and builders' merchants at Northolt. Alexander Phillips, whose premises first in Kilburn and later in Portman Square were the registered office of the company, was an auctioneer and accountant, who built up his shareholding to equal Marks by 1902.[61]

The company's nominal capital was small at only £1000 and only 455 of the £1 shares had been allocated by April 1897, 199 of these to Marks. By 1902 the shares had been divided into 600 ordinary and 400 preference shares. Marks and Phillips owned two thirds of the ordinary shares, the two Cullis's the remaining third and all the preference shares. The remaining three shares were held by Marks' wife, Richards and Henry Lowthian, another solicitor and probable partner of Richards, thus providing the necessary seven shareholders required by the regulations. The company was thus a tightly controlled private one, which did not solicit additional funds from new investors; further funding of over £2400, in the form of a debenture issued in 1903, was provided by Marks. The company was wound up voluntarily in 1907, to be replaced by a new company, Cullis, Phillips & Co (1907) Ltd.[62]

The firm of James Day Burchett Ltd was registered in 1896 with capital of only £5000. It grew out of long-established brickmaking operations at various locations in West Middlesex, which went back at least to 1842 when Ann Burchett was a tenant at North Hyde, Heston.[63] The company acquired sites at Cowley, Dawley and Isleworth, worked some sites itself and leased part to other brickmakers. The company's office, unusually, was neither in the City nor close to the brickfields, but near Ealing Broadway station, suggesting that Ealing, a rapidly developing suburb, was an important market for its

[61] PRO BT31/7216/51033
[62] Ibid
[63] PRO BT31/ 6615/ 46552; *British Clayworker*, February 1896; LMA Acc.328/18

product. The company was a small private one, with the seven statutory subscribers, and with Burchett holding all but six of the issued shares. By 1903 the company had ceased trading and was dissolved in 1904.[64]

The strong market for building materials that resulted from the house building boom in the last years of the nineteenth century may have provided the incentive for a group of businessmen, mostly City merchants, to establish the New Patent Brick Company of London Ltd in 1896. Without, apparently, any experience in this area of work, the investors purchased the licence to a patent brickmaking machine for the counties of London, Essex, Kent and Surrey, from the Invicta Company, which itself had been founded two years previously. Invicta had acquired the rights to a brickmaking machine, patented in 1891 by two Australians, for £27,200 in cash and shares, and had tested an experimental model at a brickfield in St Albans. This machine may have been designed to replicate some of the advantages enjoyed by Fletton producers, who were already using a dry press process, albeit with a different sort of clay.[65]

The company also purchased thirty-four acres of land at Northolt, beside the canal and immediately north of the boundary with Hayes, on a site that had seen earlier brickmaking activity, for about £5,000, and later sold this to the New Patent Brick Company. The new company had nineteen shareholders at its formation, and this number had increased by 1901 to twenty-seven, several of the new shareholders being Germans resident in England. Despite a capital injection in 1899 to supplement its original £15,000 nominal capital, the company did not prosper and was wound up after liquidation in 1903, in the process providing the most detailed inventory of brickfield equipment that has survived for any Middlesex site. The Invicta company was no more successful being wound up in 1899 as a result of its liabilities. [66]

A number of companies were still-born. A company formed in 1881 to manufacture cement, often an activity related to brickmaking, the West Drayton Cement Company,

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[64] PRO BT31/ 6615/ 46552

[65] Patent No. 2071 (1891) for "an improved dry press brickmaking machine"

[66] PRO BT31/ 6946/ 48889 (New Patent Brick Company of London Ltd); BT31/ 6016/ 42484 (Invicta Patent Brick Manufacturing Co Ltd); Ealing Local History Library. *Sales particulars, New Patent Brick Company,* 1901.

was based on an existing works, operated by Edward Steward, but never issued more than the minimum quantity of shares required for registration and was finally dissolved in 1888.[67] Middlesex Cement & Brickworks Ltd, registered in 1892, was to have traded as a brick, tile, terracotta and cement manufacturer, also at West Drayton, but failed to make the annual return required by the Companies Act in 1894.[68]

A number of brickmaking businesses have been identified in the previous pages, some with sole proprietors, many run by partnerships, and a few limited companies. How did these companies relate to each other, and what was the nature of competition in the brick industry, nationally, in the London area as a whole, and specifically in the Cowley district? It is generally accepted that for a business to acquire a competitive advantage over its rivals in an industry, it can adopt one of two basic strategies. The first approach is to manufacture a product similar to those of other companies, but as a result of greater efficiency, or by accepting a lower profit margin, to sell it at a lower price. The alternative to such price competition is differentiation, that is the ability to make a superior or distinctive product, especially one that would be easily recognised in the market place and be specifically sought by customers. [69]

Both approaches were employed in the nineteenth century business world, but Victorian entrepreneurs often sought to avoid overt price competition because price warfare could be self-destructive and quickly eat into profitability; advantage was, therefore, best sought by reducing costs rather than by lowering prices. In the supply of basic commodities, such as in many common types of clothing, or building materials, firms could not escape the pressure to charge the going market price.[70] In these sectors of manufacturing differentiation was largely irrelevant, whereas elsewhere, in the consumer goods sector, varying degrees of differentiation proved useful, especially where it was supported by the increasing volume of advertising which exploited the first household brands, such as Bass, Beechams and Liptons.[71]

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[67] PRO BT31/ 2841/ 15617
[68] PRO BT31/ 5418/ 37364
[69] Porter, M.E., *The competitive advantage of nations*. London, 1990, p.37
[70] Kirby & Rose, op.cit., p.215-216
[71] ibid, p. 217-219; Fraser W.H., *The coming of the mass market 1850-1914*. London, 1981, p.146

Do these accepted forms of competition relate to the manufacture and sale of bricks and other building materials? In the early part of the nineteenth century it appears that this industrial sector was too immature for such conventional notions of competitive strategy to have much meaning. When bricks were made by builders at the building site market conditions did not prevail; when bricks were purchased from a local brickfield the market in which brickmakers competed was restricted by the cost of transport, since this added considerably to the price of the product, a subject explored in more detail in Chapter Eight. Nor was the product of one brickmaker likely to be sufficiently different from that of another, assuming there was a competitor in the neighbourhood, for the customer to exercise a choice. Even when builders purchased through a brick or builders' merchant, they were usually selecting a generic product, although there were some exceptions to the general rule. Certain bricks, with special characteristics, had been moved some long distance since the eighteenth century and although the distances involved increased during the nineteenth, it is only in the twentieth century that a truly national market for bricks has existed, as a result of, on the one hand, rail and road transport, and, on the other, the domination of the industry by large conglomerates such as the London Brick Company. Because many areas of the country which lacked any local building stone did have suitable clay resources, a series of local brick markets developed in the United Kingdom. London was one such area, whose own brickmakers were able to satisfy its needs up to the first half of the nineteenth century, after which increasing demand and the pressure on urban land stimulated the growth of brickmaking in the capital's hinterland. When brickmakers began to supply the London market by barge from Middlesex, Kent and Essex, and by rail from even further afield, a more competitive environment was created.

These new firms were not in fierce competition with those already established nearer the centre of London, since urban brickfields could no longer supply the quantity of bricks that the expansion of the capital required. The next generation of manufacturers, who from 1850 supplied bricks by rail from sites north of the city, were not a significant threat to the stock brickmaker as long as they only produced relatively small quantities of speciality bricks, which were used for particular decorative effects or chosen for their extra strength or durability. Once, however, the brickmakers of the Peterborough area had perfected the fletton brick, which was intended to be a basic building brick, and

could be produced more cheaply, stock brickmakers faced a considerable challenge. This competition did not become serious until the 1890s, for although the semi-dry process, the basis of fletton manufacture, was developed as early as the 1860s, the commercial breakthrough only occured when a machine made by Whittakers of Accrington was installed at Fletton in 1887, to be followed by a further fifty machines at sixteen sites before 1900.[72] The first appearance of an advertisement for fletton bricks in builders' price books appeared in 1888 when Itters of Peterborough offered bricks at 17s per thousand in trucks at the works, or at 27s or less delivered to Holloway or Finsbury Park in North London.[73] The process the fletton makers used, required less fuel and made possible all-year round working, but depended on a high level of mechanisation, and, consequently, substantial capital investment. When such machinery was introduced in the late 1880s and early 1890s, the low level of demand, that characterised this period, made conditions difficult for manufacturers with heavy financial commitments.[74] The companies who survived these lean years were then able to take advantage of spectacular growth between 1895 and 1900, when a further nine companies were floated in the Peterborough area.[75] As early as 1893, however, the stock brickmakers were well aware of the challenge of the fletton brick to their sector of the industry.[76]

Although there was a local market for the new fletton bricks, the main market was always London. For their producers to compete successfully in the capital it was important first that they should continue to be able to obtain favourable carriage rates from the railway companies, and, secondly, that the stock brickmakers should be unable to lower their production costs. The problem for the latter was that their manufacturing process could not easily be mechanised without actually increasing these costs. [77] In a survey of the state of trade in 1898 an industry commentator noted of the attempts to replace hand brick moulding

> Various machines have at times been tried to accomplish this result, but we are not aware that any great amount of success has up to the present attended their adoption.[78]

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[72] Hillier, R., *Clay that burns: a history of the Fletton brick industry*. London, 1981, p.24
[73] *Laxton's Builders' Price Book*. 71st edition, London, 1888, p.99
[74] ibid, p.21
[75] ibid, p.40
[76] *British Clayworker*, April 1893, p.18-19
[77] ibid, p.17
[78] *Builders Merchant*, vol.1., No.4., March 1898, p.53f

The response was generally to persevere with established working practices, although some degree of mechanisation had taken place and kilns had replaced clamps at some sites. Durden's field was said to have had a kiln and drying sheds in 1894.[79] The introduction of its own version of the semi-dry process by the New Patent Brick Company was an isolated initiative, and not a conspicuous success, although the problems may not have been technical ones (see above). If thoroughgoing mechanisation was risky, the other way stock brickmakers had of lowering the selling price of the product was cutting the cost of labour, a strategy which was adopted when demand was low, but which was difficult to sustain when conditions improved. (see Chapter Six above). Vertical integration, which could generate lower prices by reducing transaction costs, and which provided a guaranteed source of product to the merchant, was another form of defence against the fletton threat, and was, as we have seen, adopted by a number of businesses. As a last resort, some stock brickmakers were encouraged to establish their own fletton sites; T & M Plowman bought twenty-three acres in 1891, Eastwoods two sites from the Fletton Brick Company in 1896.[80]

The Cowley makers did not, however, embark on the kind of horizontal mergers or combinations that were seen in other industries in the period 1890-1905, and were later seen in the fletton sector of brick manufacture. Several large mergers occurred in the textile industries, but a much-cited example from an industry closer to brickmaking was the creation of the Associated Portland Cement Manufacturers, a combination of twenty-seven firms with a capital of £7 million formed in 1900.[81] In 1919 A.P.C was the thirteenth largest company in the United Kingdom. Where full scale mergers did not take place brick manufacturers formed employers' associations to protect their share of the trade. The first Fletton Brickmasters' Association was formed in 1890; a later organisation, the Pressed Brick Makers' Association Limited, was a defensive combine which was started in 1909 as a way of dealing with the difficulties of over capacity which followed the decline in demand that took place in the first decade of the twentieth

[79] PRO BT31/ 5866/ 41193. Multi-chamber kilns are shown on plans of the New Patent Brick Company's works at Northolt. "Kiln grounds" feature on a number of maps, but no structures are visible, suggesting that kiln ground was the place where clamps were built; see LMA Acc.538/ 2nd dep/ 3517 (Hayes); Acc.969/ 69 (Harlington)

[80] Hillier op.cit, p. 93

[81] Jeremy, D.J., *A business history of Britain, 1900-1990s*. Oxford, 1998, p.200-202

Canal" near Uxbridge, but no price was indicated; the same issue of the journal carried a notice of an auction sale of "400,000 good stock and place bricks, sorted and arranged in convenient lots of 5,000 to 10,000". [85] This latter sale was evidently only partially successful, since some weeks later bricks from this site were being offered at prices well below the prevailing rates.[86] Thirty years earlier Robert Dove's financial difficulties, culminating in his bankruptcy, had been caused or compounded by the sale in 1826-7 of over three million bricks at a loss of £1310, and smaller losses in 1829 occasioned by selling bricks at barely half their cost price.[87]

Prices fluctuated with the level of demand and presumably brickmakers and merchants were willing to offer discounts according to the quantities required and the nature of the delivery arrangements. Many advertisements do not carry prices, suggesting that market prices were known to potential customers, and that bargaining around that figure was possible. Since stock brickmakers had broadly similar costs, it was perhaps inevitable that a basic market price would prevail. Ignoring the costs of plant and equipment, the principal elements in the price of bricks were the cost of raw materials and the wages paid to the workforce. (see below) Some raw materials, such as sand, ashes and chalk, were themselves basic commodities and not likely to vary much in price, but the cost of the major component of bricks, the clay, was subject to the rent and royalty payments that brickmakers made to landowners, which were determined in relation to a number of factors. (see Chapter Five above).

Labour costs varied little between firms because wage rates were customarily fixed across the district. It appears that the agreements that brickmasters made with moulders at the start of the season allowed for an increase in wages, if one was proposed elsewhere in the Cowley district, or in the adjacent Slough area, or so the men alleged. The failure to honour such an understanding was at the heart of a dispute between Samuel Pocock and some of his moulders in 1876, which resulted in a strike and a subsequent court case brought by the employer against the instigators alleging breach of contract. The men's demands for an increase had been occasioned by a rise paid by Messrs Nash, Little and

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[85] *The Builder*, 12th May 1860
[86] Stocks were at 28s rather than 34s; place bricks at 18s rather than 27s. *The Builder*, 16th June 1860.
[87] PRO B3/ 1447

Canal" near Uxbridge, but no price was indicated; the same issue of the journal carried a notice of an auction sale of "400,000 good stock and place bricks, sorted and arranged in convenient lots of 5,000 to 10,000". [85] This latter sale was evidently only partially successful, since some weeks later bricks from this site were being offered at prices well below the prevailing rates.[86] Thirty years earlier Robert Dove's financial difficulties, culminating in his bankruptcy, had been caused or compounded by the sale in 1826-7 of over three million bricks at a loss of £1310, and smaller losses in 1829 occasioned by selling bricks at barely half their cost price.[87]

Prices fluctuated with the level of demand and presumably brickmakers and merchants were willing to offer discounts according to the quantities required and the nature of the delivery arrangements. Many advertisements do not carry prices, suggesting that market prices were known to potential customers, and that bargaining around that figure was possible. Since stock brickmakers had broadly similar costs, it was perhaps inevitable that a basic market price would prevail. Ignoring the costs of plant and equipment, the principal elements in the price of bricks were the cost of raw materials and the wages paid to the workforce. (see below) Some raw materials, such as sand, ashes and chalk, were themselves basic commodities and not likely to vary much in price, but the cost of the major component of bricks, the clay, was subject to the rent and royalty payments that brickmakers made to landowners, which were determined in relation to a number of factors. (see Chapter Five above).

Labour costs varied little between firms because wage rates were customarily fixed across the district. It appears that the agreements that brickmasters made with moulders at the start of the season allowed for an increase in wages, if one was proposed elsewhere in the Cowley district, or in the adjacent Slough area, or so the men alleged. The failure to honour such an understanding was at the heart of a dispute between Samuel Pocock and some of his moulders in 1876, which resulted in a strike and a subsequent court case brought by the employer against the instigators alleging breach of contract. The men's demands for an increase had been occasioned by a rise paid by Messrs Nash, Little and

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[85] *The Builder*, 12th May 1860
[86] Stocks were at 28s rather than 34s; place bricks at 18s rather than 27s. *The Builder*, 16th June 1860.
[87] PRO B3/ 1447

Weatherheads in Slough. Whilst the masters in the Cowley district were each paying the same rate to their employees, they resisted a rise to match the higher rates being paid in Slough and denied that such an automatic mechanism existed. The difference in rate was six pence per thousand bricks, the men at Hillingdon having received a four pence increase on the previous year's rate of 4s-1d, whereas the Slough men had achieved an increase of six pence and were now receiving 4s-11d. Other established masters in the district, Mr Studds and Mr Reed, the manager of Rutters' brickfield, denied that the mechanism existed to vary the contract price. The issue was put to the arbitration of a group of four men and four employers, but the outcome is not known.[88]

Aside from the intrinsic interest of this dispute, two general points arise. First, that manufacturers, whatever the strength of the Cowley Brickmakers' Association, agreed the rate which each would pay their moulders, and did not anticipate one of their number giving over the odds. This further implies that there was no need to offer a differential over their rivals' rates in order to recruit workers because there was always an available pool of labour. The fact that one of the moulders in the Pocock case, William Warner, had been an employee of the same firm for twelve years suggests a degree of loyalty between firms.[89] Secondly, labour costs comprised a large proportion of the costs of brickmaking, since stocks were selling that year for 45s and place bricks for 36s a thousand, and moulding alone accounted for ten per cent of the selling price of the one and over twelve per cent of the other.[90] The cost structure of the industry is explored in more detail below.

If there seems to have been little use of price competition in the Cowley district, what of the use of differentiation. The effect of the development of a national market as a result of improved and cheaper transport links, meant that regional styles of bricks, usually caused by variations in the clay from which they were made, started to compete with each other. The first regional brick to establish itself outside its local area was the Suffolk white, in use for prestigious London buildings, from the late eighteenth century. Some bricks, like whites, reds and blacks, were prized for their decorative qualities, whilst

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[88] *Marvel & Middlesex Register*, 18th May 1876
[89] Ibid
[90] *Laxton's Builders' Price Book*, 59th edition, London 1876, p.97

others, like Staffordshire blue bricks, were valued for their strength in engineering applications. These bricks were mostly the product of a regional style and were not restricted to a single maker. However, some firms did manufacture bricks that had particular qualities, either on the basis of appearance or strength. A classic example was the hard red shiny Accrington *Nori* bricks, which were noted for their resistance to atmospheric pollution and grime, Collier's Waterloo Silver Greys, whose particular colour was produced by adding rock salt during the burning.[91] The most effective way to develop such a brand identity was by means of a patent. Two such patented bricks of the 1860s were Ingram's Patent Solid Bricks, claimed to have twice the compressive strength of a standard Staffordshire blue brick, and Beart's patent perforated Gault bricks.[92]

The merchants who sold bricks in London in the 1860s and 1870s advertised bricks from some named manufacturers, as well as the generic Cowley, Kent and Essex stocks. This suggests that the products of these brickmakers had a reputation in the market place for reliability and consistency. Because prices were not usually shown in these advertisements, it is difficult to know whether a premium price was asked for them. Although a number of Kent makers were individually identified, Cowley bricks seem to have been completely anonymous, known simply by their generic label. Thus the now familiar names of Pocock, Rutter and Tildesley, among the more prominent and longer lasting Middlesex firms, did not appear in the advertisements of London brick merchants such as F. Rosher and Charles Richardson, nor did they place any of their own.[93] From the 1880s, however, following the vertical integration that had taken place in the industry, some builders' merchants could promote the products of their own brickfields: Eastwoods' advertisements in 1884 lists brickfields at West Drayton and Sittingbourne. [94]

This may suggest that the Cowley makers' product occupied the bottom end of the market, the standard place or stock brick used for interior work, for lower cost housing, or for the side or rear elevations of better quality buildings. Having said this, there was considerable variety in the quality of the bricks produced by the clamp method, and it

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[91] Muthesius, S., *The English terraced house.* New Haven, 1982, p. 210, 213
[92] Advertisements in *The Builder*, 5th May 1860
[93] ibid
[94] *Laxton's Builders' Price Book*, 67th edition, 1884, p.71

seems likely that the best pale grey malms might have been acceptable alternatives to the Suffolk whites or gault bricks that builders and developers sometimes specified. [95] It is not clear, from the available evidence, whether particular makers were capable of consistently turning out these better quality bricks, or whether they were just the random results of the clamp process. Some bricks at the hottest part of the clamp were overburnt and darker in colour, others on the outside were imperfectly fired and were reused in building the next clamp. In between these extremes the bricks were sorted at the brickfield into a series of categories, somewhat bewildering to the amateur in their subtle distinctions, each of which had a specific name and use. (see above Chapter Six) How were these different categories sold? We know little of the way that brick merchants worked; did they, for instance, keep the batches of bricks from individual makers separate, so as to provide consistency of colour and texture, or mix similar types of product together? Were bricks always sorted by the manufacturer at the yard into their many categories, or shipped unsorted to the merchant and separated on arrival?

The absence of much information about the final destination of most bricks produced in the Cowley district makes it difficult to judge their quality or their subsequent use. In 1876 Northolt's bricks were said to have been of superior quality and employed in the construction of London's sewers. [96] Bricks produced by Edward Westbrook at Heston were selected in 1847 for the interior walls of the new Palace of Westminster, because "they are admitted to be the best manufactured of any that are made for the London market." [97] Such scant information, because of the absence of any surviving account books for these companies, is in contrast to what is known about the premier stock brickmaker, Smeed, Dean of Sittingbourne, which supplied, inter alia, bricks for Kings Cross station, Crystal Palace and a number of docks and underground railways.[98] The relative position of the Cowley stock in the market place is well illustrated in the building of the Albert Hall: the main walls were constructed of picked Cowley stocks, no maker recorded, faced with red bricks supplied by William Cawte of Fareham, and terracotta by Gibbs & Canning.[99]

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[95] Cox, A., "Bricks to build a capital" in H.Hobhouse and A.Saunders (ed.), *Good and proper materials: the fabric of London since the Great Fire.* London, 1989, p.11

[96] Thorne, J., *Handbook to the environs of London.* London, 1876, article on Northolt.

[97] *The Builder*, 17th April 1847

[98] Perks, op.cit., p.9

[99] Survey of London, Vol.xxxviii: *The Museums area of South Kensington & Westminster.* London, 1975, p.189

What did a brickmaker need to do to get started in the industry? Fundamental to any brickmaking enterprise was the purchase, or lease, of ground that contained clay-bearing soil. As we have seen landlords were anxious to exploit the income potential of their land and sought the opinion of experienced surveyors to assess the brickmaking possibilities of their fields. So how did prospective brickmakers meet landlords with land to offer? I think we may assume that word of mouth among the fraternity directed men to new sites, but notices did appear in trade journals offering land for use as brickfields. An 1865 Middlesex example reads:

> To Brickmakers and Builders. Middlesex - to be let, an arable field of about 26 acres of first-rate brickearth, near two stations on the Great Western Railway, and about a quarter of a mile from a wharf on the Grand Junction Canal [suggesting that it was between Hayes and West Drayton]. Apply E & C Newman, auctioneers, Uxbridge.[100]

Some brickmakers, instead of merely reading the "For Sale" columns, made their needs known and contributed to the "Wanted" ones:

> Brickearth. Any person having land containing good brickearth situated within twenty mile of London, and near the River or canal, may hear of a purchaser by addressing a letter to W.S. at the office of The Builder. [101]

A similar advertisement emphasised the importance that brickmakers put on the siting of brickfields near to waterways that allowed for the easy distribution of their product to the London market.

> Wanted to rent or purchase, from five to ten acres of land, containing earth suitable for brickmaking. Must be within five miles of London, or close to waterside in the Cowley or Kent brickmaking districts. Mr J. Johnson, Moore Park brickworks, Fulham SW. [102]

These examples relate to the sale of unworked land, but there was also a market for established brickworks. Many brickfields that were offered for sale in the trade press were not in the Cowley district; however one, possibly the only, brickfield in Greenford, on the eastern edge of the West Middlesex area, was put up for sale in 1865.

> To Brickmakers, contractors and others. The lease of a valuable brickfield for sale at a nominal price, to affect a speedy closing of an account. There are twenty acres, mostly

[100] *The Builder*, 8th July 1865
[101] ibid, 20th December 1845
[102] ibid, 28th July 1860

> containing brick and tile earth, of good quality, situated on the Regent's Canal [actually the Paddington arm of the Grand Junction Canal] at Greenford, near Harrow, about eleven miles from town and known as Skegg's Field. Apply Messrs E & H Lumley, 67 Chancery Lane.[103]

Purchasers of brickfields might be experienced brickmakers, but they might be entrepreneurs, without practical expertise; the latter needed to employ a manager or foreman to run the business for them and organise the workforce. It was possible to advertise for a competent person. A notice for a brickfield in the wanted section also asked for a "thoroughly competent man to take over management of same." [104] As a number of brickworks were bought and sold each year, there were often foreman and managers on the lookout for new positions. In the "Situations wanted"

> A practical brick manufacturer who has had the management of yellow stock brickfields in the Cowley district, for several years past, seeks an appointment as manager; good commercial experience; capable organiser of work and managing of men; good accountant and salesman. F.R. c/o British Clayworker.[105]

For most of the period under consideration it seems likely that brickmaking techniques were based on custom and practice, although some brickmakers experimented with new processes and designed their own machines. In the closing decades of the nineteenth century the chemistry of brick clays and the firing process became better understood and brickmaking was operated on a more scientific and less rule-of-thumb basis. The Institute of Clayworkers, 222 Strand, London WC, publisher of the main specialist journal, *The British Clayworker*, operated a technical department which provided advice to members. Potential brickmakers could seek the assistance of consultants: Messrs Cullis Bros, brickmakers in Acton, were willing to give technical advice on clays, machinery and the laying out of brickyards, whilst W.T. Curry (Assoc M Inst CE, FGS) styled himself a "brick expert" and provided advice not only on the technical aspects of brickmaking, including the testing of clays, but also, by virtue of his many contacts throughout the industry, offered to arrange the purchase of brickfields and the formation of limited liability companies .[106]

Once a brickmaker had acquired a brickfield to provide a source of clay, he, or,

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[103] ibid, 17th June 1865
[104] ibid,1st July 1865
[105] *British Clayworker*, Sept 1896
[106] *British Clayworker*, April 1896; *Builders Merchant*, October 1898

occasionally she, needed to acquire the necessary plant and machinery, since although brick moulding was subcontracted to the moulder and his gang, the owner was responsible for supplying tools and equipment. In the early decades of the nineteenth century this equipment was minimal, comprising a moulding bench for each team, the wood or metal moulds, spades and barrows for carrying the bricks to the hacks. The first widely used piece of plant to be introduced was the pug mill in which the clay, ashes and chalk were mixed. Horses were often used to turn the pug mill, and they were also required to pull the wagons that made local deliveries. Much of the equipment used was simple in construction and could be made by the local smiths and wheelwrights who also provided agricultural implements.

From the middle of the nineteenth century many new machines were available to brickmakers. Although some of the inventions were still-born, as might be expected, many of the techniques later widely employed in brickmaking machines had been discovered by 1860, including wire cutting and continuous extrusion, among a total of over two hundred and thirty patents for machine-moulding alone.[107] The ready availability of machines did not, however, ensure their adoption by brickmakers and mechanisation was often only applied to some tasks. Some brickfields, whilst still employing hand-moulding techniques, had substituted steam engines for horse power to turn the clay and pug mills. Other manufacturers adopted moulding machines in the 1860s, thus removing part of the skilled element in the process, and reducing the size of the brickmaking gang, but these were by no means in universal use even at the end of the century. The inventory of the contents of an Isleworth brickfield, put up for sale in 1896, appears typical of small-scale Middlesex operations of the period:

> Pallet boards, mould stocks, running plates, pug mills, elevators, wash mills, pumps, sand tempering, off bearing and crowding barrows, 4 kilns and boards, 10,000 hack caps, 6 brick carts, harness etc, blacksmith's and wheelwright's shop, office furniture, 8hp portable engine (Clayton & Shuttleworth), 8hp portable engine (Barton and Steam), high-pressure horizontal steam engine (Hallbrook & Co). [108]

Some of this equipment could still be made by the sort of businesses which also supplied agricultural machinery, but the more complex moulding machines, often of patented

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[107] Samuel, R., "Workshop of the world: steam power and hand technology in mid-Victorian Britain". *History Workshop*, vol..3, 1977, p.30

[108] *British Clayworker*, Sept 1896

design, and requiring precise tolerances, were made by larger engineering companies, mainly in the north of England, such as Bradley & Craven or Whittakers.[109] A large amount of machinery became available to British brickmakers, some of it of continental or American manufacture. In the United States a shortage of manpower encouraged the development of labour-saving machinery in many industries, rather earlier than in England, and brickmaking was no exception.[110] Manufacturers and their British distributors offered major items such as heated drying sheds. There was specialist suppliers for some types of equipment; for example Zadig & Co, who had London offices, sold portable railway track and wagons for use in brickfields, and were regular advertisers. [111]

There was sufficient demand in the London area to support some specialist firms supplying brickmaking equipment. John Ainslie, the holder of several patents for brick and tile making machines, who started out in Scotland, operated works in Alperton for some years. His machines could be seen at the works, at his company's offices in Piccadilly, and were also on show at the Polytechnic Institute, as well as at agents' premises in a number of regional centres. One of his customers was Thomas Cubitt. [112] George Stacey & Sons of Uxbridge were a local firm of iron founders, supplying not only agricultural tools, but also "steam engines and boilers, pumps, wash mills, chalk mills and pug mills, elevators and all the machinery of brickmaking" as their advertisements proclaimed.[113] Similar products were offered by E.P. Bastin & Company from their works at West Drayton and their offices in the City, including driving gear, the different types of mill, and the full range of specialist barrows. Bastin's were sufficiently large as a company to exhibit at the Agricultural and Building Trades exhibition of 1886.[114] Another firm, D.C. Cattermole, also of West Drayton, was operating in the 1890s.[115]

How widespread was the use of machinery? With fluctuating demand for bricks and the

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[109] Woodforde, op.cit., p.121-22
[110] Habukkuk, H.J., *American and British technology in the nineteenth century.* 1962. p. 91f
[111] *British Clayworker*, December 1896
[112] *The Builder*, 1st May 1847, p.213; Hobhouse, op. cit., p.313
[113] *Marvel & Middlesex Register*, 1st January 1876, p.1
[114] *The Builder*, 20th March 1880; *Brick & Tile Gazette*, 20th April 1886
[115] *British Clayworker*, August 1898, p.155

resulting movement in prices brickmakers could regulate their costs by varying the size of the labour force, and the wages paid to it, rather than by investing in expensive capital equipment which would be idle when the market was depressed, but on which they would continue to make interest payments. In the 1880s when the building trade was in a cyclical trough and the demand for bricks low, prices fell and the manufacturers cut the wages paid to the moulding gangs. This was a sustainable approach since it coincided with a sizeable fall in the cost of living, of over thirty per cent between 1873 and 1896.[116] In the 1890s, when demand began to grow and price levels rose, as we have seen in Chapter Six, workmen began to press for a return to higher wages. The replacement of labour by machinery may then have seemed more attractive. Mechanisation penetrated the industry in some parts of the country more thoroughly than it did that near London. Because the use of machines was, of course, a potential threat to employment it was sometimes resisted. The "outrages" that characterised the Manchester brick trade in the 1860s were the subject of a government enquiry, but the more gradual progress of mechanisation in Nottingham did not produce a violent outburst of Luddism, although there were a number of strikes. Despite these, by the 1890s all brickmaking in the district was done by machines, with the exception of one small firm.[117]

Some contemporaries complained that brickmaking in London was primitive by comparison with that carried on elsewhere in the country, and that hand made stocks were inferior to machine made bricks. At scientific meetings and in professional journals it was argued that London brickmakers were indifferent to the use of machinery, and as a result were gifting much of their market to more progressive brickmakers outside the capital, but an opposing view was expressed that it was not apathy but practical difficulties that impeded the progress of mechanisation.[118] Information on the take-up of machinery on Cowley sites is difficult to come by, and it is dangerous to generalise from what is available. Brickmaking machines were certainly in use on some sites in the 1860s. R.M.Smythe was using Bawden machines on his field at Dawley; Bawden's works were

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[116] Lewis, W.A., *Growth and fluctuations 1870-1913*. London, 1978, p. 69-70

[117] Price, R.N., "The other face of respectability: violence in the Manchester brickmaking trade 1859-1870" *Past and Present*, vol. 66, 1975, p.110f; Royal Commission on Labour, vol.II. PP 1892, xxxvi, part III.

[118] A paper given by H. Chamberlain to a meeting of the Society of Arts and the following discussion set out the opposing viewpoints. Chamberlain, H., "The manufacture of bricks by machinery". *Journal of the Society of Arts*, No. 185, vol.4, June 1856, p. 491-524

in Notting Hill.[119] Harrison's field at Heston, when sold by the receiver in 1883, had a steam engine by Clayton and Shuttleworth, a brickmaking machine with gearing and pulleys as well as the usual tools of the trade. Rutters' field at West Drayton almost certainly used steam or petrol pumps to convey a clay solution across the large site in the 1890s, but Broad and Company's adjacent works, on the basis of a description and some indifferent photographs, was still using mainly hand methods for moulding in the same decade, although steam was used to power the mills.[120]

Few companies could match the inventory of the New Patent Brick Company's premises at West End, Northolt. Here the bricks were pressed by six of the patent "Invicta" machines (capacity 10,000 bricks per machine daily). These were fed by two clay disintegrators and a perforated pan, which delivered the clay by overhead conveyors. The clay was brought from the clay pit to the shed in wagons, running on rails and pulled by steam-powered winding gear. The bricks were burnt in two continuous kilns, one of sixteen chambers, the other of fourteen.[121] Such thoroughgoing mechanisation, which would be characteristic of the industry working the Lower Oxford clays, was probably unusual in the stock brick industry and reveals the company's intention both to work the notoriously difficult London clay and to challenge the fletton manufacturers. (see Map 6.2).

What were the costs of such machinery to the brickmaker? Unfortunately only a few advertisements carried prices. Among the basic tools of the trade, in 1887, off-bearing barrows were £1-3s-6d, crowding barrows £1-0-0, moulding tables £1-0-0 and individual steel brick moulds, 8s-6d. At the other end of the technological scale, a brickmaking machine could cost £50 in 1870, whilst a Clayton steam power brickmaking machine together with a pair of clay-crushing rollers cost £230 ten years earlier. Bawden's moulding machines cost £55 for the smaller model and £80 for the larger. [122]

What were the costs of setting up a brickfield and operating it, and how could it be

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119 PP 1866, vol.xxiv, p.137; *Post Office Directory of the Building Trades*, 1870.
120 *Uxbridge Gazette & Middlesex & Bucks Observer*, 21st April 1883; LMA Acc.1386/ 382; *British Clayworker*, October 1898, p.195-6
121 Ealing Local history collection. *Sale catalogue, New Patent Brick Company of London*, 1901
122 Foster & Co, Lincoln, *Brick Tile & Builders Gazette*, 12/7/1887; The Builder, 28th July 1870; 28/7/1860; 20th May 1865.

funded? From the information supplied by Dobson it is possible to estimate the costs of setting up a brickfield.[123] The principal fixed capital outlay was the cost of the land on which the brickfield was situated, and which provided the source of the brick clay. Since this land was often leased for a period of twenty years or more, its cost was a twice-yearly recurring charge rather than a one-off payment. Where freehold land was purchased - and while it is evident that some brickmakers owned the land they worked, few sale records of such lands have come to light - the necessary funds may have been provided by a mortgage. Some idea of the value, and cost of the land, can be gauged from the assets of a firm like Odell Ltd; their forty-four acres of freehold land were valued at £8000, or about £180 an acre, whereas their 167 acres of leasehold property and their two canalside wharves were valued at £4000, about £24 an acre.[124] The Invicta company paid £5030 for thirty-four acres of land at Northolt in 1895 (£148 per acre) , but much of the sale was met by a mortgage of £3,300.[125] Newman bought twenty six acres of farmland from the Minet estate in Hayes, with brickmaking in mind, and paid £3120, or £120 per acre. [126] As we have seen the freehold land of the Southall Brickmaking Company was mortgaged for £16,800, which suggests something in the order of £200 per acre had been paid for it, with mortgage repayments of £769 per annum. This contrasts with the likely rent of about £230 which would have been paid for leasehold land. [127] Of course the leasehold option brought with it other costs, in the form of royalty payments, which the owners of freehold land did not have to pay and which, as we have seen, were usually much greater than the ground rent.

Once the land was acquired the amount of additional capital outlay depended on the size of the proposed workings and the degree of mechanisation that was envisaged. At a minimum level a brickfield could be operated with only one chalk, and/or clay mill and one or several pug mills. Writing towards the end of the century Dobson envisaged that a stock brickfield could operate without kilns, steam power or any substantial buildings. However, as we have seen, some brickfields in the Cowley district were operating on a more lavish scale, with tramways, steam engines, pumps, pipework and moulding

[123] Dobson, E. *A rudimentary treatise on the manufacture of bricks and tiles.* 10th edition, London, 1899, passim.
[124] PRO BT31/ 5649/ 39405
[125] PRO BT31/ 6016/ 42484
[126] Hillingdon Heritage Services. Minet estate papers, N477
[127] PRO BT41/ 638/ 3491

machines. Manual methods persisted in Middlesex until the last brickfield closed after the Second World War, ironically having outlived a much more technologically sophisticated neighbour; in the Kent stock brick industry, which continued much longer, hand moulding, air drying and clamp-burning were all still in use in some plants until the late 1920s. [128]

In unmechanised yards the only equipment required, in addition to the clay and pug-mills, and wooden shuttering to cover the hacks, was that used by the brickmaking gangs. For each of these, there needed to be a moulding bench, brick moulds and the barrows used to bring the clay to the moulder and to transport the green bricks to the hacks. In addition a number of shovels, buckets and sieves were employed; together these cost a few pounds. Dobson's estimates of the costs are shown in Table 7.2. The combined cost of setting up a brickfield with one moulding stool was therefore in the region of £90, with six stools about £125. Assuming that each brickmaking gang made 750,000 bricks in a season and that these sold for £2 per thousand (place brick prices, 1898), then the turnover would be £1500 (one stool) or £9000 (six stools).

Dobson, Ward and Middleton each calculated the costs of brickmaking, including labour and raw materials, for a thousand bricks at different times in the century, Middleton in 1805, Ward in 1885, and Dobson in the 1890s[129]. They estimated the total cost at £1-7s-0ds, £1-os-4d, and £1-1s-10d respectively. Each, regrettably, produced their costings in slightly different ways. Dobson's breakdown is shown in Table 7.3. If these are grouped into categories, the costs can be attributed as shown in table 7.4. From these figures it can be seen that in this imaginary and modestly equipped Middlesex brickfield less than ten per cent of the costs related to the use of plant and the largest proportion represented the expenses of labour. Although the comparison between the three sets of estimates is not entirely reliable because of the different ways the three writers presented them, labour costs were between a third and a half of the total, and raw materials consistent at about one third. This suggests that prospective brickmakers needed relatively little fixed capital to set up a brickfield, especially if the field itself was leased

[128] e.g. the Smeed Dean works at Sittingbourne. See Perks, op.cit., p.29

[129] Middleton, J., *View of the agriculture of Middlesex*. London, 1797. 2nd edition, 1807.; Ward, H., "Brickmaking". *Institution of Civil Engineers, Minutes of Proceedings*, Session 1885-6, part iv, p.23; Dobson, op.cit., p.162

rather than purchased, but had to have access to adequate working capital to pay for raw materials and wages in the early part of the season, until there was a cash flow from the sale of the current year's bricks. One of the techniques that worked to the owner's benefit was the custom of holding back 4d or 6d per 1000 bricks from the weekly wage of the moulding gang and paying it at the end of the season. The ostensible purpose of this practice was to help the labourers survive during the winter, but it also assisted the owner with the early season cash shortfall. The holdback is discussed in more detail in chapter six.

The need for working rather than fixed capital was emphasised by the experienced brickmaker, James Trimmer, when giving evidence to the Commissioners enquiring into the Excise Duty in 1836:

> If he [a brickmaker] can get a piece of ground he can go to work, and it is not like some other trades that large buildings must be erected; but a man to go into the brick trade with any advantage must have a considerable capital certainly.

This was necessary because of the delays in getting bricks to market that were inherent in the manufacturing, exacerbated at the time that Trimmer wrote, by the burden of the Excise Duty.[130]

It may be instructive to compare these estimates of the cost of brick manufacture with actual costs of a Botwell brickmaker, albeit an ultimately unsuccessful one. The expenses of Henry Hickman's operation over a six-year period were £8649 of which the largest element was labour (£4020 or 46 per cent), followed by brick duty (£1350 or 16 per cent). At the prevailing rate of 5s 10d £1350 was the tax on 4.5 million bricks, which assumes a total make of 5.1 million bricks, with an allowance of ten per cent for waste. If these figures can be taken at their face value Hickman's manufacturing costs were 33s-7d per thousand when the prevailing sale price was only about 36s-0d for stocks or 26s-0d for place bricks. However it appears that Hickman was only able to sell the bricks at 29s-0d and 18s-0d with a total income of £6493-6s-5d, making a net loss of over £2000.[131]

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[130] 18th Report of the Commissioners of Enquiry into the Excise Department and into the management and collection of the Excise revenue throughout the United Kingdom. Bricks. PP 1836, XXVI, p.177

[131] PRO B3/ 2572; *Taylor's Builders' Price Book*, 1825 and 1830

Another major cost was fuel, even though brickmakers customarily used ashes and breeze bought as rubbish, rather than coal. Hickman purchased his from Stapleton, a well-known London dust contractor, and these payments accounted for seventeen per cent of total costs. In one respect Hickman may have added to his costs by his method of supervising his brickfield, visiting it three times a week from his London home at a cost of 10s-0d a journey. As we have come to expect with extra-metropolitan yards, the costs of land were only a small element in the overall costs, with rent only £20 a year, and royalties at an equivalent of £70 per annum. It is also clear that Hickman invested little in fixed capital, since his equipment at Botwell was valued at only £50. Interestingly Hickman rented his brickfield from Heron & Rutter, who were brickmakers in their own right, and they were his largest creditors.[132]

How did brickmakers finance their operations? Brickmakers were able to generate income from unused parts of the brickfield since they often leased or owned quantities of land for which they did not have an immediate need, but which would provide the future supplies of clay. Whilst such land was waiting to be dug, and again after the brickearth it contained had been extracted and the topsoil replaced, it could be used for agriculture, most likely to provide pasture. In some cases the conditions in the lease required the brickmaker to keep unused parts of the land under cultivation, since they would otherwise revert to scrub.[133] Brickmakers could, therefore, work the land on their own account or let the grazing to a farmer on adjacent land. Few examples, however, are known; the use by F.W. Crees of land at the New Patent Brick Company in Northolt, and Gregory's partnership with Broad and Harris have already been mentioned. [134]

Manufacturers could look for investors to put money into their business. In 1860 a brickmaster advertised for a purchaser for his brickfield, or for a partner to join him in the business, suggesting an investment of £5000, of which half was to be paid within the first three months of their association, in the expectation of making and selling fifteen million gault bricks, which would sell for more than common stocks. Assuming that these would sell for at least £2 per thousand, the brickfield could be expected to turn

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132 PRO B3/ 2572
133 Guildhall Ms. 12335
134 *Sales Particulars*...op.cit; LMA Acc 1214/ 1340

over £30,000 per annum.[135] For many Middlesex brickfields capital investment on this level would not have been required, but brickmakers must often have needed injections of working capital.

What were the sources of finance that were available to businesses like these in Victorian England? It is important to distinguish between short-term loans, needed to provide working capital, or to overcome a period of inadequate cash flow, and long-term ones that provided for a company's growth, or for the purchase of plant and equipment. Short-term loans were available from a number of sources. Banks could give assistance in the form of credit or overdrafts; brickmasters might also obtain credit from the landowner who leased them the land or from a builders' merchant to whom they sold the finished article. [136] Landowners could provide assistance by allowing arrears in the payment of rent and royalties, though they were more likely to defer the royalties, which were dependant on the actual number of bricks being made. This may account, though this is speculation only, for the absence of royalty payments made by Samuel Pocock to the de Burgh estate before 1860 despite the terms of the leases into which he had entered some years previously. To the same estate James Stacey paid no royalties in 1857, but paid both that and the following year's in 1858; John Taft paid only half the amount due for 1859 that year, but the balance with the full amount for 1860.[137]

Where brickmakers needed access to long-term investment, the most likely means was by ploughing back the profits of the business, that is by self-financing. This was particularly important for young businesses, and for many companies that remained small and family owned. Established business, with proven track records, could more easily draw on external sources of capital. [138] The rôle of banks in providing, or not providing, this sort of capital is subject to some debate. It has been argued that banks were generally reluctant to lend money to industry, but also that the apparent failure to support manufacturing results from a lack of demand, which itself stems from the same

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135 *The Builder*, 25th August 1860

136 Such practices occurred in other industries, but there are no specific examples of such credit being applied to the Middlesex brick industry. Kirby & Rose, op.cit., p.95f

137 LMA Acc.1386/ 101, 102, 384

138 Kirby & Rose, op.cit., p.106

twentieth century the brick industry in other parts of the country was marked by a series of large scale mergers such as that which produced the London Brick Company, the Middlesex industry was going into decline, a subject discussed in Chapter Nine.

The products of individual Middlesex brickmakers never seem to have achieved a distinctive presence in the market place, and it is almost impossible to find out where the output of particular makers was used. A few exceptions have been noted above. This is in marked contrast to other brickmakers, and even to a stock brickmaker such as Smeed, Dean. It seems that "Cowley stocks" were simply a generic product, produced by similar methods by a number of small firms. Yet these firms were able to provide many million bricks for the London market, and the growth of the metropolis in the nineteenth century was dependent on their availability and the products of similar yards in Kent and Essex. Crucial to the success of the West Middlesex brickfields was the proximity of the Grand Junction Canal and the link it provided with central London, and it is to this topic that we turn in the next chapter.

Table 7.1: Limited companies in West Middlesex up to 1900

Name	Registered Date	Wound up/ Dissolved	Nominal capital	New or conversion	Comments	Source of information
Broad & Co Ltd	1896	1901	£50,000	Conversion	Reconstructed	BT31/ 6681/ 46980
Cowley Brick Co Ltd	1869	1880	£8,000	New		BT31/ 1458/ 4374
Cullis, Phillips & Co Ltd	1897	1907	£1,000	Conversion		BT31/ 7216/ 51033
D & C Rutter Ltd	n.k.	n.k	n.k.	Conversion		No papers found
Eastwood & Co Ltd	1872	1902	n.k.	Conversion	Reconstructed 1902. New company capitalised at £400,000	BT31/ 16870/ 74567
Grand Junction Brick, Tile & Sanitary Pipe Co Ltd	1875	1876	£50,000	New	Never traded	BT31/ 2143/ 9891
Hewett's Brick & Tile Co Ltd	1889	1894	£5,000	Conversion	Became Southall Brick & Terracotta Co Ltd	BT31/ 4424/ 28789
James Day Burchett Ltd	1896	1904.	£5,000	Conversion		BT31/ 6615/ 46552
Middlesex Cement & Brickworks Ltd	1892	1894	£5,000	New		BT31/ 5418/ 37364
New Patent Brick Company of London Ltd	1896	1903	£15,000	New	New company took over site	BT31/ 6946/ 48889
Odell Ltd	1893	1895	£75,000	Conversion	Reconstructed	BT31/ 5649/ 39405
Southall Brick & Terracotta Co Ltd	1894	1896	£3,000	Conversion		BT31/ 5866/ 41193
Southall Brick Co Ltd	1858	n.k.	£10,000	Conversion*	Later companies with the same name	BT41/ 638/ 3491
West Drayton Cement Co Ltd	1881	1888	£20,000	Conversion		BT31/ 2841/ 15617
William Mead & Co Ltd	1887	1914	£50,000	Conversion		BT31/ 3958/ 25112

* Not a conversion in the usual sense – see text. The relation of it to two later Southall Brick Companies is not clear.

Table 7.2: Cost of setting up a brickfield

For each brickfield

Chalk and clay mills (together)	£60 - £70	
Pug- mill	£12	
Cuckold	5s - 6s	
Total		**£82- 6s - 0d**

For each moulding team

Moulding stool	£1-1s-0d	
Mould	10s-6d	
3 sets of pallets, 26 in each set @ 9s	£1- 7s-0d	
3 off-bearing barrows @ £1- 0 - 0	£3 - 0 - 0	
Total		**£5 - 18s - 6d**

Source: Dobson, op.cit., p.161

Table 7.3: Costs of making 1000 bricks in Middlesex in the 1890s

Costs of labour	per 1000 bricks
Rent of field	6d
Ashes	2s - 0d
Removing top mould	2d
Digging earth	7d
Soiling and turning earth	6d
Chalk and expense of washing	1s - 4d
Moulding	5s - 6d
Horse grinding earth	6d
Sand	6d
Cover boards	2d
Setting	1s - 10d
Bolting, sorting	3d
Loading	6d
Implements	6d
Superintendance	6d
Interest on capital	1s - 0d
Royalty	2s - 6d
Bad debts	1s - 0d
Preparing hacks, obtaining water, making roads, coals and wood for burning, materials for building sand houses, office expenses	2s - 0d
Total	**£1 - 1s -10d**

Source: Dobson, op.cit., p. 162

Table 7.4: Costs of brickmaking grouped into categories

Category	Cost per 1000 bricks			Percentage of total cost		
	Dobson (1)	Ward (2)	Middleton (3)	Dobson	Ward	Middleton
RAW MATERIALS						
comprising ashes, chalk, sand and clay (costs of clay are the royalty of 2s 6d paid on each thousand bricks)	6s 4d	7s 0d	7s 6d	29%	34%	34%
LABOUR						
preparing brickearth, moulding, hacking, setting and loading	9s 4d	9s 6d	8s 0d	43%	47%	36%
EQUIPMENT						
implements, cost of horse, cover boards, interest on capital	2s 2d	2s 0d	}	10%	10%	}
GENERAL BUSINESS EXPENSES			} 6s 6d			} 30%
including preparing hacks, making roads, materials for building, coal and wood, office expenses, rent of field, bad debts, and superintendance	4s 0d	1s 10d	}	18%	9%	}
TOTAL	£1-1s-10d	£1–0s–4d	£1-2s-0d	100%	100%	100%

Sources: (1) Dobson, op.cit., p.162; (2) Ward, op.cit., p.23 (Table 1); (3) Middleton, op.cit., p. 23-26

Chapter Eight: The transport of bricks

The manufacture of bricks could involve transport in three ways: the carriage of the finished goods to the site where they were to be used or to the premises of a builder's merchant; the transfer of the bricks from the brickfield to the railhead or canal wharf; and the movement of clay and green bricks about the site as part of the manufacturing process. This chapter will look at the means by which these different requirements were met.

Bricks are difficult to move. They are a bulky, low-value commodity, but one that requires careful handling to prevent damage. Although they have a high compressive strength they are brittle and this characteristic determines the way that they are loaded and moved. Their rectangular shape also demands systematic loading and stacking in order to maximise the use of space; ideally the container into which the bricks are put itself has to be rectangular, and this has implications for the design of wagons and boats.

These requirements influenced not only the transport of bricks from the yard to the customer, but also movements about the yard itself during the manufacturing process. There was an assumption that a significant rate of loss was inevitable. When the excise duty was introduced in 1785, the tax was levied on the number of bricks made, assessed at the point of manufacture not at the point of sale, but an allowance of ten per cent was made for waste. The waste occurred in two ways: on the one hand bricks were over or under burnt in the kiln or became distorted during firing, on the other they were broken during movement around the yard. Extremes of weather were other sources of damage.[1] Before the advent of production line methods the traditional process of moulding by hand involved the transfer of the freshly-moulded "green" bricks from the stool or bench to the "hacks" were they were laid out until they had dried sufficiently to be transferred to a kiln or clamp. Special long barrows were used, containing two rows of fourteen or fifteen bricks. After the drying process the bricks were far less vulnerable to handling, but still needed to be carefully stacked in the kiln to make the best use of the space, and to ensure that there was an efficient circulation of hot gases. Where clamps were used, as in the majority of Middlesex brickfields, thousands of bricks were built into

[1] Mr Rhodes, a London brickmaker, in his evidence to an enquiry into the operation and collection of the Excise Duty in 1836, suggested that an allowance of 20% should be made. *18th Report of the Commissioners of Enquiry into the Excise establishment.* P.P. 1836, vol xxvi, p.171

a large stack, which had to be structurally sound, but also had to be provided with adequate flues, so that heat was thoroughly distributed.

Once the bricks were burnt the kiln had to be unloaded or the clamp dismantled and the bricks restacked ready for loading into carts, railway wagons, or canal barges. Such loading had to be undertaken carefully and was labour intensive. Other building materials could be loaded more easily. Sand and gravel provided an obvious contrast to brick whereas building stone had similarities, and where the blocks were not uniform in size, even greater disadvantages. Slate was similar in terms of fragility. Sand and gravel could be tipped into barges; unloading it, where gravity was in opposition, was more difficult. With carts or railway wagons the opposite was true: loading required the gravel to be shovelled or carried up an incline in barrows, whereas at the destination the contents could be tipped or shovelled out.

Bricks were often made at the place where they were to be used, since clay was available at many building sites in the London area and this modus operandi removed the cost and difficulty of transport. Whilst this was suitable for large-scale developments such as housing estates and civil engineering projects, it was not a convenient way of meeting smaller-scale demand, where only a few thousand bricks were required to build a house or construct a garden wall. Before the advent of brick and general builders' merchants, manufacturers dealt directly with master builders and bricklayers, and because of the large number of brickfields, bricks were carted relatively short distances across London.

During the nineteenth century the bricks required for the major civil engineering projects continued to be made on site, wherever possible. However, the annoyance caused by brickfields, particularly the smoke from their kilns or clamps, eventually drove most other forms of brickmaking from built-up areas into relatively uninhabited, and therefore rural, areas. This migration considerably increased the distance that bricks had to be transported. Brickmaking as a part of canal, railway and dock projects was more easily tolerated because of the extensive disruption resulting from the scale of the excavations, and presumably the associated dirt and noise. The same aesthetic pressures, therefore, did not usually apply. Indeed the balance worked the other way, since it was less of a nuisance to make bricks on site than to cart many thousands, and sometimes, millions

through city streets.

Outside cities necessity was often the mother of invention, since many civil engineering structures, such as viaducts, were built in rural areas where was no established brickyard, and until the railway or canal was opened there was no easy way of bringing bricks to the site. Docks, of course, were different, since there would also be the possibility of using river or canal transport. Making bricks was also a convenient way of using waste clay, which would otherwise have had to be removed from the site. At the beginning of the canal age in 1761 it was said that "the Duke [of Bridgwater], like a good chemist, has made the refuse of one work construct the materials of another".[2] The Grand Junction Canal Company set up its own brickworks at Blisworth to supply the lining for the tunnel there and made bricks at Alperton on the Paddington arm.[3] One of the most celebrated engineering works in the heroic period of Victorian engineering was the building of the Copenhagen tunnel in 1849/50 by the contractors Pearce and Smith to carry the Great Northern Railway under north London into Kings Cross. Here the earth dug out for the tunnel was converted into bricks which were used for the lining.[4]

Since clay suitable for brickmaking is found quite widely through England and Wales, this model of production was possible in a great many cases, but there were occasions where it could not be adopted, even in the London area. When the West India Dock was being built it was hoped that bricks could be made on site, but the clay proved unsatisfactory and an experienced brickmaker advised against using it. The result was that a very large contract for bricks was given to Trimmers at Brentford and the bricks were transported to the site first by barge as far as Limehouse, and the remainder of the way by a timber tramway.[5]

The adoption of this model leads to the assumption that bricks would only be transported any distance where there was no alternative, but in reality there was always a greater movement of bricks and stone and other building materials than might be

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[2] *Gentleman's Magazine* quoted in Woodforde, J., *Bricks to build a house.* London, 1976, p.131
[3] Faulkner, A.H., *The Grand Junction Canal.* 2nd edition, Rickmansworth, 1993, p. 21; PRO RAIL 830/ 51
[4] Woodforde op.cit., p.131
[5] Survey of London, vol. XLIII. *Poplar, Blackwall and the Isle of Dogs: the parish of All Saints.* London, 1994, p. 254

expected. At times bricks were imported, and also exported, as well as moved across the country. As we have seen, when brick building was reintroduced into England in the thirteenth century the first bricks used were almost certainly imported from the Low Countries, and many thousands of them were used, for example, in the curtain wall of the Tower of London in 1283.[6] Although a brick industry was well established in the Medway area in the seventeenth century, there were times when demand was not met and the balance was provided by imports from Holland. In 1675/6 some 52,000 bricks and tiles were landed at Rochester, 67,750 at Sandwich and 52,500 at Dover. [7]

But the distance that bricks were moved usually depended on the particular quality of the bricks themselves, the higher the quality the greater the distance. The market radii of most brickworks varied according to the type of brick produced and were usually wider for the more costly facing bricks. We can distinguish three types of bricks: first, the cheapest ones used for structural purposes and usually concealed, generally known as place bricks; secondly, better quality bricks used for the principal elevations of buildings, the facing bricks; and lastly, bricks that had special qualities such as Staffordshire blue engineering bricks or the fire bricks used in furnaces. The higher price of such speciality products reflected both higher manufacturing costs but also the relative scarcity of the clays from which they were produced compared with the widespread availability of those from which common bricks were moulded. Particularly in the London area there was no local competition for engineering bricks or firebricks. Facing bricks were often twice as expensive as place bricks, and firebricks three times as expensive. Since freight charges usually related to weight rather than value, premium priced bricks could more easily absorb the carriage costs than place bricks.

However the movement of these higher priced bricks was only possible where suitable transport links were available, and even after the building of the canal network in the second half of the eighteenth century coastal shipping often provided the most practical means. Access by sea from Suffolk via the River Stour and round the coast to the Thames made it possible to provide the desirable white bricks wanted for prestigious projects in London after Henry Holland had started a fashion by using them in Brook's

[6] Schofield, J., *Building of London from the Conquest to the Great Fire.* London, 1984, p.126
[7] Chalkin, C.W. *Seventeenth Century Kent: a social and economic history.* 1965 p.181

Club in 1776-78. [8] Suffolk whites returned to popularity in the nineteenth century when they were specified by some estate developers in London, but the best pale grey Cowley stocks were sometimes regarded as an acceptable alternative.[9] Improved transport arrangements widened the market radius of many brickworks and railways began to have an impact on the distribution of bricks from the 1850s. The Midland Railway carried Gripper's Nottingham bricks which were used for the exterior of St Pancras Station, thus creating a symbolic link with the area that the railway served. A siding to the Great Northern Railway allowed the gault bricks (pale creamy white) produced by Beart's Patent Brick Company at Arlesey to be widely available in London and at other stations, and soon after the opening of the works the decision was taken to open a London office, at the goods yard in York Road, King Cross.[10] Finally in the twentieth century a national market for bricks, as for other commodities, became a possibility and the London Brick Company were able to offer prices throughout the country that did not reflect differential transport costs. [11]

By the middle years of the nineteenth century the movement of bricks by rail or water was well established. This is reflected in advertisements for brickfields in the 1860s which often mentioned the available transport facilities since by then efficient distribution was crucial to commercial success. In 1865 a brickfield, not precisely located but presumably between Hayes and West Drayton, was "near two stations on the Great Western Railway and about ¼ mile from a wharf on the Grand Junction Canal".[12] A twenty acre field was situated "on the Regent's Canal [actually the Paddington arm of the GJC] at Greenford, near Harrow, about eleven miles from town".[13] The same month a brickfield at Shepperton was described as having rail and river access, its "property being bounded on one side by the River Thames, and the station of Thames Valley Railway ...situated upon it, so that every facility is afforded for ready transit to London."[14]

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[8] Cox, A. *Bricks to build a capital* in H.Hobhouse and A.Saunders (ed.), *Good and proper materials: the fabric of London since the Great Fire.* London, 1989, p.11

[9] Dixon, R. & Muthesius, S. *Victorian architecture.* 2nd edition, London, 1985, p. 15

[10] Minutes of Bearts's Patent Brick Company Ltd. Uncatalogued accession, Bedford County Record Office

[11] Blunden, J., *Mineral resources of Britain: a study in exploitation and planning.* London, 1975, p. 149

[12] *The Builder,* 8th July 1865

[13] *The Builder* 17th June 1865

[14] *The Builder* 10th June 1865

The large scale movement of bricks was encouraged by the dictates of fashion.[15] The Victorian predilection for polychrome brickwork necessitated the use of bricks from a number of different sources since brickmakers in the mid-nineteenth century could not artificially provide the range of colours and textures that modern brickmakers can from a single clay source. For instance the architect William Butterfield used London stocks, Staffordshire blues and Suffolk reds in St.Augustine's Church, South Kensington.[16]

By the 1860s the larger builders merchants in London could provide a wide range of colours and styles. The following Eastwoods' advertisement is not untypical

> White and red Suffolk facing bricks and other kiln goods by Messrs Allen and Co., Ballingdon, near Sudbury; Yellow and pale malm cutters and facing bricks by Messrs Caleb Hitch & Co, Ware, Herts; Yellow and pale malm cutters and facing bricks sewer paviours, and bright-coloured stocks from the fields at South Shoebury and Little Wakering, Essex; entire make of bricks by Mr William Ludgate of the Upper & Lower Halstow fields; by Messrs J. Butcher & Son of Otterham Quay and Lower Rainham; nd also by Mesrs J. & G. Parker, of Wickham near Strood. The manufacture of Blue vitrified sewerage bricks by Mr W. Gilbert of Tipton, near Tividale; and Messrs Taylor & Co of Cannock, near Walsall, South Staffs. Ballingdon deep black rubbing and building bricks and the Chalfont and Ballingdon dark and bright red rubbers; Cowley, Kent and Essex bricks in any quantities, by barge alongside.[17]

Bricks were not alone in being transported large distances. A great many building materials were either imported from continental Europe or brought by coastal shipping from distant parts of Britain. Almost all the timber used in house building, particularly in the London area, was imported from the Baltic and had been for most of the eighteenth century. [18] Window glass came generally by sea from the north east of England. Goods on sale at London builders merchants in the 1850s and 1860s included Yorkshire stone (used for paving), Bangor slates, Bath stone and Devon granite and even Aubigny and Caen stone from Normandy, continuing a tradition begun with the building of the Tower of London in the eleventh century. [19]

A major builder and contractor such as Thomas Cubitt required many forms of building materials in considerable quantities. Most of these came by sea and river in flat-bottomed

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[15] Dixon & Muthesius, op.cit. p.15
[16] Cox, op.cit., p.14; Dixon & Muthesius, op.cit, p.205-206
[17] Advertisement in *The Builder*, 6th May 1865
[18] Summerson, J. *Georgian London*. 1978. p.80-81
[19] *The Builder* 23rd February 1850; 25th August 1860

barges or *billy boys* that were widely used in east-coast estuaries and could pass under the Thames bridges. They were unloaded at a Thames wharf where the Cubitt both stored materials and pre-fabricated much of the carpentry and many of the features that went into his building projects. Cubitt brought York stone paving from Bramley, near Leeds, Purbeck stone from Swanage, slates from Penrhyn and glass from Hartley's in Sunderland. He also imported clay for making bricks, one of only a few instances of this practice. Altogether in a nine month period in 1852 2,436 barges bringing in materials were unloaded. There was also a traffic in finished materials from Thames Bank to East Cowes on the Isle of Wight for his contract at Osborne House, and to Shoreham for the development at Kemp Town, Brighton.[20]

Some bricks were also exported. There was a steady trade from Bridgwater in Somerset to towns on the west coast like Liverpool, but also as far as Antwerp, surely a case of taking coals to Newcastle.[21] There was even a transatlantic trade. In the seventeenth century bricks were shipped to the North American colonies as ballast, and even in the nineteenth century bricks were exported to the West Indies in ships fetching sugar cargoes. This trade had fallen to a quarter of its previous levels in 1886 due, a trade journal bitterly complained, to the "miserable huckstering and lamentably ruinous policy of the Gladstonian government in dealing with sugar".[22]

So by the end of the nineteenth century the needs of London builders were being met from a number of sources, both close to home and at some distance. Despite the dislike of brickyards and the increased pressure by local authorities to remove them, brickmaking in urban areas did not cease. But as the century progressed an increasing proportion of the bricks required to sustain the capital's outward expansion came from more distant sites, like those in the Cowley district. Brickmakers here had three forms of transport available to them, road, canal and railway.

The use of road transport would appear to be inappropriate for the carriage of materials like bricks, but there were times when it proved to be the most sensible option,

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[20] Hobhouse, H. *Thomas Cubitt: master builder*. London, 1971, p.290-91
[21] Samuel, R., "Mineral workers" in R.Samuel (ed.), *Miners, quarrymen and saltworkers*. London, 1977, p.10
[22] *Brick & Tile Gazette*, 8th June 1886

especially where the building site was not adjacent to rail or water links, or where the distance involved was short. The distribution of bricks from London yards to building sites within the confines of the built-up area up to the end of the eighteenth century involved journeys of at most a few miles, usually from the outskirts towards the centre.

The incorporation of most main roads into turnpike trusts, whatever its benefits in terms of the upkeep of the surface, hampered the easy movement of goods about the capital. Tolls were charged on all the major roads out of the capital until 1872. In the mid-1850s this added 6d per 1000 to the cost of bricks delivered in many parts of London. The brickmaker Henry Dodd, who was also a rubbish contractor, and some of whose brickfields were in north London, calculated that about half the bricks he supplied were subject to toll charges. However the impact of road tolls was more insidious; where a delivery route required the payment of a toll the requisite cash was given to the carters, but they often took an alternative route that evaded the toll and allowed them to pocket the money. This had two effects; on the one hand it increased the time taken to make deliveries because the toll-free route was usually more circuitous than the main road, and on the other the wear and tear caused to side roads, which had not been built to sustain such heavy traffic, was significant. Henry Dodd observed this, both as a brick manufacturer but also as a supplier of gravel to some Metropolitan parishes, who had to bear the cost of repairing local roads. [23]

The brickyards of West Middlesex were serving largely a distant market, but there would have been some local trade in the Hayes and Hillingdon areas, and here the bricks would have been carried in carts, probably only a mile or two. There is limited information about such local deliveries. Bricks were sent from Henry Kyezor's Hounslow brickfield as far as Kingston; one of his brick carts was stopped in Bridge Road Hounslow in 1876 by a policeman who was worried by the condition of the horse. The horse was probably over-worked since it had been used to move ashes around the brickfield from Monday to Friday, and engaged in making deliveries on the Saturday.[24] Elsewhere Kyezor advertised that his were the nearest brickfields to Richmond, Kew, Mortlake, Petersham,

[23] Evidence of Henry Dodd to the Select Committee on Metropolitan Communications. PP 1854-55, vol.X, p.186

[24] This was during the close season for moulding. *Middlesex Chronicle* 12th February 1876.

habit of self-financing. [139] In 1850 there were 327 private banks and 236 in 1875; most of them had a local focus and played a significant part in the commercial life of their communities. The available evidence suggests that these local institutions were credit banks, rather than investment banks, but that they were able to provide some long and medium term loans.[140]

Since the commercial centre of the West Middlesex district was Uxbridge, the lending policy of the town's banks may have been important to local industrialists. Unfortunately little is known of the part that Hull, Smith & Company played in the financing of local industry in general, and brickmaking in particular. By the 1870s the firm, founded in the previous century, was a partnership of Charles Woodbridge, Arthur Charles Greville and Henry Woodbridge. The one example of their dealings with a brickmaker occurs with Samuel Pocock, to whom the bank had advanced £1500 for discounted bills of exchange. [141] This was a widely used method of providing short term credit, and there is evidence that it was adopted by brickmakers earlier in the century. Henry Hickman, whose unprofitable activities we have considered earlier, owed a number of people for advances made against bills, including John Perring a hatter, and Robert Ellis, described as a gentleman.[142] One of the creditors of Stephen Watkins was the scavenging firm of William Townsend, presumably for ashes, who was owed £185 on bills of exchange. [143]

If bills of exchange were a familiar means of supplying short term credit, mortgages were a widespread form of extended investment, especially where land or property was involved. Hull, Smith converted some of Pocock's debt to them into a mortgage and at the time of his bankruptcy he owed the bank nearly £800.[144] At the end of the period in 1909 the firm of Coles, Shadbolt & Co. Ltd was advanced £4000 by the London & County Bank against their freehold property but two further mortgages the same year came from private individuals. [145] It was quite common for mortgages to be provided by

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[139] The issues are discussed in Collins, M., *Banks and industrial finance in Britain 1800-1939*. 1991, reprinted Cambridge, 1995.
[140] Ibid, p.19, 22
[141] LMA Acc 538/ 2nd dep/ 1312
[142] PRO B3/ 2572
[143] PRO B3/ 5292
[144] LMA Acc.538/ 2nd dep/ 1316
[145] PRO BT31/ 10743/ 81437

individuals rather than institutions, and solicitors played an important part in putting investors in touch with those seeking funds. Thomas Maynard received a loan of £500 from James Fishwick of Westmoreland in 1868, with interest payable at five per cent, secured on his leasehold property at Harlington. Maynard later purchased the lease of the Rutty brickfield from the receivers for the sum of £1500. [146] As we have seen Hobbs & Tilley were recipients of mortgage advances of over £16,000 before the formation of the Southall Brick Company. (see above).

When businesses became joint stock companies they were able to appeal for extra funds by a share issue. From the brief company histories given above, however, it is clear that many brickmaking firms were essentially private in character, and did not want to extend ownership beyond the circle of the original subscribers. This was the problem faced by the large number of private companies in the late nineteenth century, but there were ways of avoiding the difficulty. When some firms went public, only debentures or preference stock were offered for sale, the family retaining the equity; examples of this among major firms were Lever Brothers and Boots the Chemist. [147] This approach can be seen at work with Middlesex brick firms: the New Patent Brick Company increased its capital by the issue of £5000 in preference shares in 1899; Henry Marks, the principal shareholder in Cullis, Phillips provided a debenture of £2420 in 1903; and Silcock's issued eleven debentures of £100 bearing interest of six per cent in 1907.[148]

From this limited evidence it appears that brickmaking in Middlesex had many of the characteristics of British industry in the nineteenth century. Many of the businesses were small, controlled by a single proprietor or by a partnership. The partnership continued to be an important method of organisation in the second half of the nineteenth century, but a number of limited companies worked in the Cowley district. Most of these were not long-lived – the various manifestations of Broad & Company are an exception –and most did not grow significantly. The largest firm to operate in West Middlesex was Eastwoods, but their main operations were always in Kent. Most firms were small, private companies without heavy capitalisation or wide share ownership. Whereas in the

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[146] LMA Acc 969/ 68, 66
[147] Armstrong, J. & Jones, S., *Business records.* London, 1987, p.21-22
[148] PRO BT31/ 6946/ 48889; BT31/ 7216/ 51033; BT31/ 10958/ 83222

Turnham Green, Ealing, Brentford, Isleworth, Twickenham, Hampton, Teddington, and Kingston, but whether his carts delivered to all these areas is not known. His works at Spring Grove were at a greater distance from the canal than most of the brickfields discussed in this study, nearer the Thames in fact, and also to Isleworth station on the London & South Western Railway.[25] There is also evidence that a Southall brickmaker, Mr Rowe, sent bricks as far as Ealing, a journey of about two miles, because his carter was charged with causing an obstruction in Maddocks [Mattock] Lane in 1883, whilst making a delivery. Rowe obviously employed several carts because another carter was summoned for cruelty to his horse in the same month.[26] Local deliveries in the 1880s and 1890s may have been more common, as a result of the volume of building in places like Southall and Ealing; certainly a number of brick carters, or carmen, appear in the 1881 Census for Southall.[27]

Even when the main part of the journey from brickyard to building site was by river, canal or rail, there was usually a need for carting at the beginning and end of it, and quite often at both. Carting to the canal or railhead could be avoided by the building of a dock or a private siding, but carts were almost always needed to convey goods from the point of unloading to the customer. Each transhipment was demanding in labour and time and, in the case of brittle materials like bricks, involved the risk of an increased level of damage. So road delivery might be preferred even if roads or bridges were subject to tolls; in 1786 the Office of Works were willing to pay a premium of 2s 6d per thousand on bricks brought by road from Middlesex which were subject to bridge tolls at Kew. As Chambers, the Surveyor General of Works, noted

> As the bricks arrive by such conveyance in much better condition than when they have been five times moved (which is the case if brought by barges) they are fitter for us and liable to less waste.[28]

Water tended to be the most efficient means of moving bulky cargoes such as coal, bricks and hay. In the era before steam propulsion replaced horses as the main motive power, the use of river or canal barges significantly increased the carrying capacity of the

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[25] *The Builder* 25th June 1870; the distance to Brentford was about two miles, a little further to Richmond.
[26] *Uxbridge Gazette & Middlesex and Bucks Observer*, 17th February 1883
[27] Census Enumerator's Book, Southall 1881
[28] Colvin, H.M. (ed.), *A history of the King's Works. Vol.VI: 1782-1851*. London, 1973, p. 191

horse. Whilst the average load of a single horse was only one eighth of a ton by pack, two tons by wagon on good roads, and eight tons on a tramway with iron rails, it was thirty tons by river boat and as much as fifty tons by canal barge. The cost of the increased productivity that river or canal transport provided was, however, brought at the cost of greater capital investment. [29]

Water transport was crucial to the success of brickworks that were at any distance from the market they served. Whilst London was by far the largest market for building materials, smaller towns were also served by rural brickyards and a good access route was important. At the opposite end of the scale from the London trade, the brickyards in the fen country of Huntingdon were dependent on the river system.

> One reason for there being so many brickyards in Ramsey heights [close to the major Fletton producing area at Whittlesey] was undoubtedly the fact that the brick and tile could be took (sic) by water across the fen, across Ugg Mere, and into the river at Hitson's bridge, now called St Mary's Bridge. Each brickyard had its own gang of barges, or lighters, as they were called, and some men were employed entirely as watermen, to take the brick and tile up to the towns by water, and to bring back coal on the return journey.[30]

The extensive dependence on water transport, especially where the majority of boats and their crews were employed by the brickmakers, left the industry at risk to strike action by boatmen, as was the case at Oldbury in Staffordshire, where in June 1876, in the middle of the brickmaking season, a strike caused the shutdown of fifteen brickyards and the laying off of a thousand hands.[31] A dispute between bargeowners and brickmakers on the Medway in 1890 over freight charges also resulted in a large-scale lockout, putting five thousand men out of work.[32]

Bricks were made at a number of sites along the Thames estuary and along the rivers Medway and Swale, and were carried to wharves along the Thames and, in some cases, to other parts of London through the Regents Canal. The main stock brickworks in Kent were situated at Halstow, Rainham, Milton, Conyer, Faversham and Sittingbourne

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[29] Crompton, G.W. "Canals and the industrial revolution." *Journal of Transport History,* Vol.14, 1993, No.2, p.93

[30] Recollections of William Henry Marshall in Marshall, S., *Fenland chronicle.* Cambridge, 1967, p.39-40

[31] Samuel , op.cit., p.9

[32] Preston, J.M., *Industrial Medway: an historical survey.* 1977, p. 96; Perks, R-H., *George Bargebrick Esq.: the story of George Smeed, the brick and cement king.* Rainham, Kent, 1981, p.40

and closer to London at Crayford. On the Essex side of the Thames estuary there were important centres at Iford, Rainham, Dagenham, Grays, Pitsea, and near Southend at Eastwood, Prittlewell, Southchurch and the Shoeburys.[33] The bricks were carried in spritsail barges, which were a development of barges originally designed to carry agricultural produce. They were usually about 80ft long, with a square section to facilitate loading difficult cargoes like bricks; they could carry 70 to 100 tons, giving them a capacity of up to fifty thousand bricks. The widespread use of these vessels supported a barge-building industry along the creeks and inlets of the Medway.[34] Hundreds of these spritsail barges, known as *brickies,* were employed in the Kent and Essex trades, by companies such as Smeed Dean, Rutters and Eastwoods. In 1869 George Smeed owned sixty barges and other craft.[35] Rutters developed a distinctive type of craft, the *pitch-piners,* built at Crayford on the south bank of the Thames, the headquarters of the firm. The original pitch-piners carried about 35,000 bricks, about 90 tons weight; these were later replaced by larger vessels that could accommodate 40,000 bricks.[36] By the 1880s Eastwoods, which started as a builders merchants in Lambeth, had bought up a number of brickmaking firms, and developed into one of the largest suppliers of stock bricks in the London area, using their own fleet of barges to deliver them almost anywhere in London, Kent and Essex.[37] By 1914 Eastwoods had built up a fleet of forty-four boats, some of which were able to work up the Regents, the Grand Junction and the Surrey Canals.[38] Cargoes could be unloaded at Lambeth, Old Kent Road, Wandsworth, Isleworth, Kensington Vestry Wharf, Teddington, Vauxhall, Mortlake and Weybridge.[39] The barges of these and many other firms were familiar sites in the Thames, and flying their company flags were a source of advertising for their owners. Henry Dodd, the brickmaker and rubbish contractor, was instrumental in establishing races for Thames barges, as the means of improving their design from 1863.[40] The carriage of West Middlesex bricks on the Grand Junction Canal will be considered below.

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[33] Cox op.cit p. 11
[34] Preston, op.cit., p.96
[35] Perks op.cit., p.23
[36] Benham, H., *Down tops'l: the story of the East coast sailing barges.*2nd edition, London, 1971, p.139-140
[37]Wilmott, F.G., *Bricks & brickies.* Rainham, Kent, 1972, p. 2
[38] ibid, p.45-48
[39] ibid, p. 67
[40] March, E.J., *Spritsail barges of the Thames & the Medway.* New edition, London, 1970, p.21-22

The use of railways to transport bricks probably started in the 1840s. Railways did not directly compete with canals, rivers or coastal shipping, but enabled the exploitation of brickfields that could not be served by water transport. Whilst Simmons argues that most of the main brickfields lay away from navigable water, this would seem to be true only for certain brickfields in the Midlands.[41] One of the first major users of railway transport to distribute bricks was Robert Beart, an established brickmaker at Huntingdon, who set up a brickyard beside the Great Northern Railway main line at Arlesey (Bedfordshire) and sold bricks from the works, from other stations of the GNR, and from an office at the York Road goods depot at Kings Cross.[42] Red bricks from the brickyards on the coal measures are to be found along the lines of railways from Ruabon, Accrington and Bristol. [43] Brickmakers had an interest in the construction of new lines, where it enabled them to link their brickfields more effectively. One of the main promoters of the Nottingham suburban railway in 1885 was Edward Gripper, a major brickmaker, and a branch was built into his brickyard.[44] Railway companies themselves had a large requirement for bricks, both during the construction of lines, and also generally for repairs and station buildings. The London & North Western Railway had its own brickworks at Crewe, producing at one time more than six million bricks which were used all over its system.[45]

The Great Western Railway's main route from London to Bristol passed through the same part of Middlesex as the Grand Junction Canal. At West Drayton they were less than a hundred yards apart, the canal flowing just behind the station. The relationship between the canal and the GWR was quite a close one, not only geographically. The first locomotives used on the GWR were brought by sea from Liverpool, and hence by barge to West Drayton where they were transferred the short distance from canal to railway tracks.[46] The railway company also built a dock at Hayes for the regular transhipment of goods from railway to canal and a creosoting depot for sleepers, the wood for which came through the London docks, the creosote itself being carried by narrow boat from

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[41] Simmons, J., *Railways in town and country, 1830-1914*. Newton Abbot, 1986, p.130
[42] Survey of Bedfordshire. *Brickmaking, a history and gazateer*, by Alan Cox. Bedford, 1979, p.44-45
[43] Simmons,op.cit.,p.130
[44] ibid, p.115; Cox, *Bricks*... op.cit., p.14
[45] ibid, p.173
[46] MacDermot, E.T., *History of the Great Western Railway; vol.1: 1833-63*. London, 1927, p.51-52

the Midlands.[47] Because of its proximity to the canal in the Hayes and West Drayton areas the railway inevitably cut through some existing brickfields or land containing workable brickearth. The landowner Hubert de Burgh claimed £15,000 compensation for about three acres of land, part of which was being worked by William Heron, which would be separated from the canal by the railway, thus allegedly rendering it of little or no value. [48] The complications that the resulting narrow strip of land caused are discussed below.

Not only were canal and railway near to each other in West Middlesex, their termini were side by side at Paddington. Somewhat surprisingly, therefore, the GWR did not exploit the brick traffic available in this area and none of the documents indicate positively the use of rail rather than, or in addition to, canal transport. There are some early indications that the GWR was interested in this traffic but no definite explanation why this did not develop. In 1837 it had apparently proposed that it could carry bricks from the West Drayton area at the same rate brickmakers currently paid to the canal company, but there is no evidence that this offer was taken up. It may be that before the 1870s the GWR with only twin tracks from London to Bristol was unable to accommodate both slow moving goods traffic and the inconvenience to express trains that a large number of sidings would produce. This lack of capacity also acted as a constraint on local stopping trains, and it was only after the quadrupling of tracks as far west as Maidenhead in 1878 that the GWR was able to offer an effective suburban service.

So whilst the railway was happy to compete with the canal for the long-distance traffic in coal to London it probably felt that the brick traffic between the Cowley district to Paddington travelled too short a distance to be economic. Some brickfields, however, appear to have used the railway in some way, either to bring in raw materials or to transport the finished goods. At least two brickfields had sidings connected to the GWR main line, one at Botwell, the other at Southall. In the first case the brickfields, probably Shackle's, was located close to where the railway crossed the canal, making connection to either possible, and to complicate matters a dock is also shown; in the Southall case the

[47] Faulkner, op.cit., p.111-112
[48] LMA Acc 742/ 107

railway was closer than the canal to the brickfield.[49] There are few references to the use of the railway to distribute bricks in West Middlesex; one brickfield that did offer a railway alternative is the New Heston brickfield, which offered bricks convenient for water, or in truck to any station on the South Western [i.e. LSWR] or GWR.[50]

The exploitation of the brick clays in Southall, Hayes, West Drayton and Cowley required the presence of the canal, since there was no significant amount of brickmaking before the opening of the Grand Junction Canal. Even if the brickmaking potential of the soil had been appreciated before the construction of the canal transport to the London market would have been a problem. By road it was a journey of fifteen miles, and the brickfields were some distance away from the Thames, which served the brickmakers of Hammersmith and Brentford. The other nearby river was the Colne, which flowed past Uxbridge, but its main economic use was to supply motive power for a number of mills. It was probably navigable for small craft, but flowing south towards the Thames it provided a roundabout route to the city. Canals had an advantage over rivers in this respect, being built where they were required, subject of course to certain limitations of the terrain.

Although there was a long tradition of improvements to natural waterways, the origins of the canal age proper lay with the opening of the Sankey Brook Navigation in 1757, followed four years later by the Bridgewater Canal. These pioneers ushered in a period of considerable canal building activity, with over fifty promotions in the fifteen years following 1760.[51] Many of these early canals were promoted by individual proprietors, who needed reliable water carriage to allow the successful exploitation of their industrial enterprises such as the pottery works of Josiah Wedgwood and the collieries of the Earl of Bridgwater. Consequently in this first period of canal development the investors were mostly local to the schemes which they funded, and often had an economic interest in the canal's objectives.[52]

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[49] Ordnance Survey 6 inch map, 1866; see Map 8.1
[50] *The Builder*, 12th July 1873
[51] Duckham, B.F., "Canals and river navigation" in D.Aldcroft & M.Freeman (ed.), *Transport in the Industrial Revolution*. Manchester, 1983, p.101
[52] Ibid, p.103-104

There has been considerable discussion of the factors that determined the timing of canal building and the dynamics of booms and troughs in activity.[53] The most intensive period of canal promotion took place in the early 1790s during the so-called Canal Mania, when more than eighty Acts for inland navigations were passed in the space of four years, fifty-one of which were for new projects rather than for extensions to earlier schemes. Interest was fuelled by a rapid rise in foreign trade which demonstrated the importance of efficient transport links between the ports and inland manufacturing sites. Potential investors were also aware that earlier schemes had proved profitable. As in other speculative booms schemes were proposed that ranged from the highly practical to those that courted economic disaster.[54]

The ninety-three mile long Grand Junction Canal proved to be one of the most useful of the canals promoted during this period and was England's only north-south trunk route of any consequence. It rationalised the route between Birmingham and London from a circuitous 269 miles in 1789 to only 138 miles in 1805.[55] The earlier route linking the Midlands with their major export port had involved a combination of canals, and depended on the use of the River Thames between Oxford and London. Not only was the route long, but it also involved the negotiation of over a hundred locks and a number of weirs. [56] A number of schemes were proposed that would have produced a shorter and less complex route, one of which was for a new canal from Braunston, on the Oxford Canal, to the Thames in Middlesex. This scheme was published in 1792 with initial support from the Marquess of Buckingham and other interests from that county through which the proposed canal would run. [57]

The detailed history of the canal's inception is not of great significance to this study, but the consideration of the southern end of the route is relevant. The point where the canal joined the Thames was moved slightly downstream from Isleworth to Brentford, and a small section of the River Brent was incorporated in the canal. Another variation from the deposited plan involved the use of a more direct route between Bull's Bridge,

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[53] Ibid, p.105
[54] Ibid, p.106-108
[55] Ibid, p.108
[56] Faulkner, op.cit p. 1
[57] Ibid, p.2

Southall and West Drayton through Botwell and Dawley, rather than one through Cranford and Harlington. [58] If these changes to the route had not occurred the shape of the West Middlesex brickmaking district would have been different.

Early in the history of the canal, as traffic began to build up, the Grand Junction Canal began to realise the benefit of a direct route into London, avoiding the use of the Thames. This plan, incorporated in 1795, with little opposition because of the obvious commercial advantages, envisaged a route from the main line at Bull's Bridge, Southall, north and then east to Paddington, still on the edge of the built-up area of London. Most importantly it was possible to construct the canal on the level thus removing the need for any locks. So although there were a series of locks on the main line between Bulls Bridge and Brentford as the canal dropped down to the Thames, there were no interruptions on the section between Paddington and the Cowley lock at Uxbridge, the so-called Long Level. Despite the interest in the plan it took six years for the completion of the Paddington arm which was not opened until July 1801. With its 14ft profile, allowing the use of wide boats, and the absence of locks, the Paddington branch became by far the most important and successful of all the Grand Junction's extensions.[59] As early as 1810 far more London bound trade travelled along the Paddington arm than used the main arm via the Thames at Brentford (113,220 tons as against 78,476 tons). But less traffic travelled in the return direction, and here the balance was in favour of the main line rather than the Paddington branch (84,136 tons as against 67,728 tons).[60]

Soon after the opening of the Long Level the Paddington basin became a busy inland port and a large trade was passing across its wharves. In 1807 a contemporary reported

> there are already deposits for wood, timber, coal, lime, coke, ashes, bricks, tiles, manure and many other things[61].

Paddington's exports included many waste products from the city, such as ashes, breeze and manure, products which continued as staple traffics into the twentieth century, when the economic significance of canals for higher value goods had waned. In these

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[58] Ibid, p.12
[59] Ibid, p.49
[60] Hadfield, C.,*The canals of the East Midlands*. Newton Abbot, 1966, p.119
[61] Middleton, J., *The agriculture of Middlesex*. 2nd edition, London, 1807, p.533

early years bricks were the most important inwards cargo.[62] Although the canal had been built to facilitate the movement of manufactured goods from the land-locked Midlands to London, the major export port and the largest domestic market, the Grand Junction Canal's biggest contribution, especially after the railways captured many of the more valuable commodities, was in moving bulk cargoes, often of an unsavoury nature. This was not surprising since canals were major carriers of coal, sand, gravel, bricks and other building materials as well as hay, corn and straw, and the wastes of the city, manure, rubbish and ashes. [63] In this respect the Grand Junction was similar to many other canals; the economics of canal usage were best suited to the carriage of high bulk/low dispersion commodities, and that demand was mostly for short-haul operations.[64] Items that fell into this category were foodstuffs, fuel and building materials, the three basic necessities of life, as Duckham has characterised them.[65] In the middle of the century over seventy-five per cent of the traffic on the Grand Junction was local rather than through trade (see table 8.1).

Table 8.1 : Trade on the Grand Junction Canal 1830-52 (tons)

	Through trade	Local trade	% of total	Entire trade
1833-36	190,521	627,015	76	817,561
1837-40	218,903	769,551	77	988,452
1841-44	249,377	777,454	75	1,026,831
1845-48	251,104	855,045	77	1,106,149
1849-52	219,266	843,094	79	1,062,710

Source: S.C. on Railway and Canal Bills 1852-3. Quoted in Hanson, H. *The canal boatmen. 1760-1914.* Manchester, 1975 (1984 reprint). p.87

The commercial centre of West Middlesex was Uxbridge, a long-established market town, situated on one of the main roads out of London and served by long-distance

[62] ibid p.54
[63] Duckham op.cit., p.132
[64] Crompton, op.cit. p.97

stage coaches which passed through and short stage coaches which terminated there. The canal enhanced its economic position, with a number of wharves receiving coal and other cargoes bought by canal. In the early years of the Paddington branch it was the terminus for the short-lived passenger boat service. The Packet Boat dock and the *Paddington Packet Boat Inn* still record this service.[66] The Cowley lock at Uxbridge also marked the end of the Long Level, along which a number of industries were established, in what were otherwise agricultural areas. At Southall there was a gas works, and a vitriol works, in Greenford at a later date the Perkin dyeworks, in addition to the large number of brick and gravel workings. The canal was used by these industries to bring in raw materials such as coal and to distribute the finished goods. There were dozens of docks in West Middlesex, serving a variety of industries. (see Map 8.2)

There were three ways in which bricks could be loaded on to canal barges. At the simplest level, where brickfields were beside the canal, loading could take place across the tow path, without any built-up wharf. This practice occurred sometimes in the early years of the canal and the Canal Company seems to have sanctioned it, subject to the fence beside the canal being replaced and kept in repair. A Mr Pope of Hillingdon applied for such permission in December 1804 and this was agreed.[67] The second method was a wharf on the canal itself, and where the brickfield was a large one, there could be the benefit of a long frontage. Because the canal was a wide one there was not the problem for traffic that such wharves would have caused on a narrow canal. The New Patent Brick Company of London had the use of a wharf wall of 250ft for which it paid a token rent of 5s, with an option of utilising an additional 305ft at a cost of £10 per annum. The company also had a dock on its property, 380ft long, and it was quite usual for brickmakers to have both a wharf and a dock.[68] The clearest example of the use of the canal by a brickmaker comes from Maynard's brickfield at Harlington for which a plan survives. This occupied another narrow site between the canal and the Great Western Railway, east of the Pocock and Rutter sites at West Drayton. There was a small dock on the site (not that which is known as Maynard's dock on the north side on the

[65]Duckham, op.cit., p.97
[66] Faulkner, op.cit. p.54
[67] Grand Junction Canal Company. General Committee Minute Book 1802-1805, p. 442. PRO RAIL 830/41.
[68] Ealing Local History Library. *Sale Particulars, New Patent Brick Company of London, 28th November 1902.*

canal, but the one known as Odell's Dock) described as "dock and stage for the unloading of ashes, clinker and for loading brick and gravel", but in addition there was a "stage for loading bricks and gravel into boats" and separate "unloading platforms for ashes, chalk etc".[69] (see Map 6.1)

One of the earliest recorded docks on the lower reaches on the Grand Junction Canal was that established in 1813 to serve the North Hyde Military depôt at Heston, on the main arm of the canal east of its junction with the Paddington arm at Bulls Bridge. This 1200 yard dock (see Map 8.3) was originally intended to be a loop with a second junction with the canal, but this was never completed. The depôt was used for the packing and storage of munitions and gunpowder brought in by barge from Waltham Abbey and Woolwich.[70] With the end of the hostilities in 1815 the need for the depôt reduced and it was sold off in 1832, the presence of the extensive wharf and dock facilities being one of the selling points.[71] When the depôt was sold again a decade later there was evidence of industrial and commercial use of the site, for Mrs Burchett was using part of the site as a brickfield and a James Skeele, whom contemporary trade directories describe as a lighterman, and who was the owner of at least one canal boat, was using the wharf.[72] The Passingham estate, which owned the estate, leased a number of plots in the 1840s to brickmakers and provided them with access to the long dock.[73] When the Passingham trustees sold it in 1871, after much of the brickearth had been worked out, the sale particulars noted that Lot 8 had "long water frontage which suggests use as a chemical or manufacturing works" and docks for barges were also mentioned.[74] Although the origin of the dock at North Hyde was unusual, similar developments took place along the stretch of canal between Uxbridge and Northolt, so that by the end of the century there were more than twenty docks, serving the brickfields as well as gasworks, chemical works and food manufactories.[75] Some of these were of considerable length, and some had side branches. How did they come to be built, who built them, and what was the

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[69] Undated plan of Maynard's brickfield at Harlington. LMA Acc 969/ 69
[70] Compton, H. & Faulkner, A. "North Hyde military dock". *Railway & Canal Historical Society Journal*, July 1992, p.419
[71] LMA Acc 328/ 9a and 9b
[72] LMA Acc 328/13; British Waterways Archives, Gloucester, Grand Junction Canal Gauging registers.
[73] LMA Acc 328/ 47 Hunt (1845); Acc 328/ 51 Westbrook (1845); Acc 328/ 52 Burchett (1845)
[74] Sale Particulars, North Hyde Farm 1871, LMA Acc 328/105
[75] Faulkner, op.cit, p. 149 (includes a map of the docks)

rôle of the canal company in their construction?

Leases of brickfields by ground landlords usually indicated that there was access to an already existing dock or cut; if none existed the brickmaker was allowed, and, it some cases required, to construct one. The lease on the De Burgh estate in Hillingdon/West Drayton to Daniel Rutter in 1862 provided for use of both a dock and a 350ft frontage on to the canal itself.[76] Thornton's lease of land on the same estate in 1849 also included access to a cut, but he was required to keep the dock itself, and the bridge that took the tow path over the dock entrance, in good repair.[77] In some cases a dock was jointly used by two brickmakers. When Hunt leased land from De Burgh in Hillingdon in 1842, he had access to a dock he shared with the occupiers of the adjacent land, and had to contribute a "reasonable proportion" to the costs of upkeep of the dock, towing path and bridges and to the charges levied by the GJCC.[78] If a dock did not already exist then the brickmaker could be allowed to construct one himself; this might be at his own expense or a shared cost with the landowner. When Samuel Pocock took a forty year lease on about a hundred acres of land at Hillingdon in 1855 he was allowed to make whatever cuts, canals or docks as he required, but at his own cost, and he was required to start the cut during the first year of the lease.[79] In the case of Peter Pearse, a Holborn builder, who took a lease on land belonging to the Osterley estate in Southall, the landlord gave him permission to excavate a dock during the twenty-one year term of the lease, but unusually specified the size, fifty yards by twenty-five yards, and location of it. However although a brickfield certainly operated on this site, which later reverted to agricultural use, there is no evidence that the dock was constructed.[80] In most cases the brickmakers bore the entire cost and examples of shared costs are rare. However when Rudolph and William Fane de Salis let some land at Dawley in 1853 to the Rhodes brothers they encouraged the brickmakers to construct a dock and agreed that

> on completion of a lay up dock intended to be constructed by the lessees to the satisfaction of the lessors they the said lessors will pay to or allow to the said lessees out of the first year's royalty the sum of £50 for and towards the making of such lay up dock.[81]

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[76] LMA Acc 1386/ 105
[77] LMA Acc 1386/ 98
[78] LMA Acc 1386/ 96
[79] LMA Acc 1386/ 101
[80] Lease to Peter Pearse, 1859; lease to Thomas Jacobs, 1879. LMA Acc 405/1
[81] LMA Acc 969/ 63

The construction of a dock required the permission of the canal company, for although the land on which the cut itself was constructed was the property of a landowner, the banks of the canal, which had been cut through to make the connection, and the towpath which it interrupted, were vested in the GJCC. Although few examples survive, the practice seems to have been for the company to give a licence to the brickmaker for a term of years that related to the length of his lease from the landowner and charged him a nominal sum for access. There were further complications when the dock was built on the side of the canal which carried the towpath; on the stretch of the canal between Hayes and West Drayton this was the north bank. To provide continuity of the towpath a bridge had to be built over dock entrances, sufficiently high to permit the passage of barges in laden and unladen states, but not too steep to cause difficulties for the horses. A few such entrances remain, one of the last to be constructed was that over Lyon's dock in Greenford. The Company's surveyor was empowered to check that cuts had been adequately constructed, particularly to ensure that there was no leakage from the cut that could drain water from the canal, since maintaining water levels, particularly in dry summers, was always a major concern of canal companies. In some cases the size of the cut might be stipulated. [82]

There could be problems with the maintenance and upkeep of dock entrances and bridges, and the prevention of leakages from the dock itself, since these would impact on the general operation of the canal. Legally the users of the dock might not be liable for any repairs, in which case responsibility rested with the ground landlord. An example of this occurred in 1900 when the GJCC entered into a protracted correspondence with Odell & Co, and other users of Dutton's Dock, in order to ensure adequate restoration of the bridge over the dock's entrance.[83]

As clay was exhausted and the currently worked part of the brickfield was located farther from the canal and from the original dock, brickmakers had to decide how to procure continued access to the canal both for loading the finished bricks and for unloading breeze, chalk, sand and ashes. To make economic use of the canal manufacturers' sites

[82] Licences to Thomas Shackle, 1825; to Southall Brick Company, 1859; to John Jay, 1854 and subsequently to Henry Dodd, 1860 . British Waterways, Southern Region, Hemel Hempstead. Estates Division Deeds.

[83] British Waterways Authority, Hemel Hempstead. Correspondence file. Dutton's dock, West Drayton.

had to be within what Turnbull has called "a narrow corridor of superior locational space".[84] Whilst bricks could be carted or barrowed across the intervening fields, it was desirable, as indicated above, to avoid unnecessary loading and unloading. Brickmakers could therefore investigate one of three options; extending an existing cut or dock; building a tramroad to connect the dock with the brickworks; or pumping clay from the clay-pit to a working area near the canal. These options were not exclusive and various combinations were tried.

The extension of an existing cut or dock was the most obvious choice, but this was not a cheap or easy process, although some of the costs of labour and machinery could be offset by the sale of the gravel that was dug out. Many brickmakers chose to do this, and by the end of the nineteenth century a number of docks had been extended several times and reached considerable lengths. Pocock's dock was 1,120 yards long in 1893, whilst Otter dock had several branches and was 1,845 yards long.[85]

Pocock's dock provides an instructive study of some of the economic and commercial factors involved in the use of the canal by brickmakers, and, because of a Chancery court case is exceptionally well documented.[86] The site was a complex one since the canal ran parallel to the main line of the Great Western Railway with only a narrow strip, some twenty metres wide, between the two. The brickearth nearest the canal was worked out within a few years of the commencement of the lease and this land was thereafter used only for accommodation needs. It is not entirely clear who built the first stretch of the dock; there is a suggestion that a cut was constructed by the GWR, but no connection was made with the GJC itself until Pocock provided one in about 1850. The later dispute arose over the strip of bank that all docks had to cut through to reach the canal proper, and was complicated by some confusion between this dock and another adjacent one which had been built much earlier by the brickmaker Stephen Watkins. With the large number of docks on a short stretch of canal such confusion was always possible.

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[84] Turnbull, G. "Canals, coal and regional growth during the industrial revolution" *Economic History Review* 2nd series, vol XL, 4, 1987, p. 44

[85] Faulkner, op.cit., p.202

[86] PRO Rail 830 93-95. These contain the transcripts of the hearing of Pocock v. GJCC in Chancery 1877 and two boxes of affidavits and statements, including transcripts of a number of leases and agreements.

Pocock needed to extend the dock in order to work the remainder of his extensive site on the far side of the railway line. This involved not only digging out the dock itself, for which the engineer Joseph Studds provided an estimate of £2 per yard, but also rebuilding the arches that took the railway over the dock for which Pocock paid an additional £34. Within a decade, however, Pocock asked Studds to construct another extension, this time of a massive 550 yards length and a width of 60 foot. The cost of the job was estimated at £2462-10s, a sum equivalent to the selling price of over a million bricks. Such was the scale of this excavation that Pocock was able to secure the annual contract for gravel from the Parish of Paddington and between March 1859 and 1860 dispatched nearly 20,000 tons of gravel, the equivalent of at least five hundred barge loads. The Canal Company received £500 in tonnage dues on these cargoes.

Further extensions to the dock took place in 1863 when Pocock asked the GJCC for the loan of its floating pump and again in 1876, at which point the dispute with the company came to a head. At its fullest extent the dock was 1120 yards long, and in addition to negotiating the railway line also passed under a road, the bridge for which was presumably also constructed at Pocock's expense.[87]

On some brickfields tramroads, using wagons drawn by horses or pulled by steam driven winches, were employed extensively, for two main purposes. They were a means of carrying bricks from the field to the canalside for loading into barges; they were also used to bring raw clay from the farther parts of the site to the place where moulding took place, and this became more important when there was fixed plant, such as kilns or moulding machines. Tramroads had a long history on industrial sites, most often used as feeders to water transport; some canal companies built their own tramroads because it was a cheaper alternative to digging out expensive branches off their main routes. Even if docks or cuts were built, tramroads could provide a further continuation. Tramroads, or railways, originally horse-drawn, had been used since the seventeenth century, originally in the Trent, Severn and Tyne and Wear coalfields, to bring coal to the staithes on the river. They found a ready application where there were heavy minerals that needed to be hauled across country to a canal or river. Brickfields fell into a similar

[87] Ibid

category. Such railways, however crude their technology, were effective in raising the productivity of the horse and its driver by as much as five times. Whilst the earliest railways used wooden rails, by the nineteenth century iron rails had long been in use.[88]

It not possible to tell whether the tramroads used on the Middlesex brickmaking sites used horse drawn wagons, or employed static steam engines and winches; some brickfields are marked with engine houses and these may have used steam-driven winches. Rutter's brickfield at West Drayton had only a short dock but an extensive network of tram routes which had to pass under the railway line; on the other hand the adjacent brickyard of Samuel Pocock had a long dock, but also a tramroad extending away from the canal.[89] (see map 8.4) Some brickmakers and gravel diggers had no separate docks, but their tramroads terminated on the bank of the canal allowing direct transfer from wagons into boats. In some cases the tramroads cut across the towpath.[90] Tramways linked Liddall's Dock at Yiewsley with brickworks and gravel pits.[91]

Tramroads could be easier and cheaper to construct than cuts since they did not involve the excavation and disposal of tons of earth and gravel, even though, as we have seen, this could often be sold. Tramroads were also more flexible than docks; once an area of brickearth had been worked out a tramroad could be lifted and reused elsewhere. An extensive tramroad was laid at Heston by Rutter to serve his site at Heston Farm which was separated from the canal by the intervening North Hyde Farm. The Passingham trustees, as owners of both North Hyde and Heston farms, had considered constructing a canal to link Heston farm with the Grand Junction, because that part of the estate could not be "advantageously let for want of water communication... between the said Heston Farm and the private canal [i.e. the North Hyde military dock]." Because of the legal position regarding the estate at this time such work required the sanction of a private Act of Parliament. The canal was expected to cost up to £3000; the earth dug out was to be manufactured into bricks, and the Hyde Farm account would receive a payment of 2s per thousand bricks, which would offset part of the cost. In the long term

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[88] For the history of tramroads see "Early iron railways" in Simmons, J & Biddle, G (ed)., *The Oxford companion to British railway history*. Oxford, 1997, p.134-5; Baxter, B., *Stone blocks and iron rails*. London, 1966.
[89] O.S. 25in map, 2nd edition 1894
[90] The brickfield was on the east side of the Paddington Arm just north of the junction with the main line at Bulls Bridge. A dock appears to have been built later. O.S. maps 1867 and 1894.

Hyde Farm was also was also to receive a way-leave payment at the rate of 1d per thousand bricks for use of the canal. [92]

Despite these plans the canal was never built, and later maps show the presence of a lengthy tramroad linking the canal and Heston Farm. In coming to this decision the Passingham trustees had sought the expert opinion of M. J. Astley who had strongly recommended the laying of a tramroad rather than the digging of a canal. It is worth quoting his opinion in detail.

> I should think that an equally advantageous, and far less expensive communication might be effected by means of a tramroad to be constructed ... after the proper level should have been attained by digging the brickearth. The bricks would at that level be loaded in waggons, with less liability to breakage, and the communication with the canal might be effected by means of an inclined plane....I should perhaps be allowed to add (having had considerable experience in canal matters) that it would be as well, should Mr Passingham persist in his proposed scheme, that he should be satisfied of his ability to supply his proposed canal with water from his own grounds as it is extremely probable that he would not be justified in using the water of the public canal for that purpose.[93]

Later documents show that a narrow strip of land was let across North Hyde Farm to allow Rutter to construct a tramroad linking his main area of operations with the canal. The firm was in possession of a twenty one year lease which expired in 1885 and was paying a way-leave to North Hyde Farm of 1d per 1000 bricks transported across it, which was averaging £38 per year, in addition to ground rent. These payments would imply that in excess of nine million bricks were being transported along the tramroad.[94]

Little information has been found about the type of railway equipment used on these brickmaking sites. The most detailed inventory comes from the sale documents of the unsuccessful New Patent Brick Company at Northolt in 1901. Here the bricks were made by machines and the plant, engine house, drying rooms and kilns were located close to the canal. The clay-pit itself was no great distance away, but was connected to the manufacturing area by an inclined plane with rails and friction rollers. Three side-tipping wagons, of one-and-a-half yards capacity were drawn by "powerful hauling

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[91] OS map 1912
[92] Passingham Estate Act, 10 & 11 Victoria session 1847. Copy at LMA Acc 328/ 58
[93] Ex parte Passingham Estate Act. Counsel's opinion. LMA Acc 328/ 54
[94] Sale particulars North Hyde Farm and Depot estate 1871. LMA Acc 328/105

gear". These wagons were presumably used for raw clay rather than finished bricks.[95] Some firms specialised in the supply of railway equipment for brickfields; C.A. Zadig's advertisements in the trade press suggested that "their system of portable railways ...[was now] a necessary adjunct to brickfield plant".[96]

A last resort, used again where the brickmaking site was static but the clay pits were at a distance, was the use of pipes, through which a fluid mixture of clay and water was pumped. Ward had advocated their use in the 1880s as the most economic way of transporting clay any distance.[97] The clay was pumped into what were known as washbacks, where it was allowed to sit until it was required. Such methods were used at the Conyer brickfields of the Eastwoods' Company and on the complex site of D & C Rutter at West Drayton in 1895. At this latter the firm was not allowed to make bricks on a portion of land furthest from the canal and had to avoid causing annoyance to the occupants of the adjacent Drayton Hall. To prevent this they could pump clay "in the form of a solution to be made with chalk" north to the site which they already occupied and where their equipment was set up, paying a way leave to the owners in the form of a royalty of 3d per 1000 on the bricks they made from this source. [98]

Brick traffic built up quickly after the opening of the Paddington arm of the canal, but there is only scant information about the boats used in the trade. Although many of the boats registered in these early years are described as being used for coal or salt cargoes or by general carriers, few can positively be identified as operated by brickmakers or used exclusively to carry bricks. A 56-ton narrow boat registered to George Watkins of Brentford, the brother of Stephen Watkins, was "employed in the brick trade", and Ralph Dodd had a 34-ton boat "principally employed in the brick trade to and from Paddington". Messrs Trimmer of Brentford, the contractor for the West India docks (see above) owned at least two boats, one of them a wide boat of 70-tons which probably worked on the Thames.[99] A number of other boats registered at Paddington at this

[95] Sale particulars, New Patent Brick Company, op.cit.
[96] *British Clayworker*, December 1896
[97] Ward, H., "Brickmaking". *Institution of Civil Engineers, Minutes of Proceedings*. Session 1885/6, Part iv, p.2
[98] Willmot, op.cit., p. 23; LMA Acc 1386/382
[99] Details of boats are from the GJCC Gauging Registers, British Waterways archives, Gloucester. Register nos. 1330, 825, 603. Gauging canal boats was a method of ascertaining the weight of cargo carried by

period were used for general carriage and Thomas Homer, who had many interests in the canal, including for a time the packet boat service to Uxbridge, deployed more than twenty boats, one of which was used in the hay and manure trade, and another " at present [1806] in the employ of Mr Samuel White, Brentford, in the brick trade to and from Paddington." [100] Once the registers cease to record the type of cargo carried, few owners can positively be identified as brickmakers, an exception being Messrs Bird of Hammersmith who registered their first 34-ton boat in 1818.[101]

Brickmakers had options about whose boats they used to convey their bricks to Paddington or other canal destinations. They could use general canal carriers, independent canal boatmen, the so-called *number ones*, or operate their own fleet of boats. It seems likely that in the first half of the nineteenth century most brickmaking firms, Trimmer being an obvious exception, were not sufficiently large enterprises to justify owning their own boats, and hired boats when required, or contracted with major canal carriers like Homer to transport their bricks on the regular basis. As firms became larger after 1850 it made more sense to purchase boats of their own, since this reduced transaction costs. Of necessity production levels at the brickfield had to be sufficient to keep the boat or boats, and their crews, busy. Whilst engaged in the Cowley to Paddington trade boats probably spent more time tied up in dock being loaded or unloaded than they did in passage. There were also difficulties in the efficient use of transport which arose from the form of manufacture; clamp burning meant that bricks became available in large quantities with long intervals between each batch, rather than as a steady few thousand each day. Boats, however, were in use throughout the year, not just during the moulding season, fetching raw materials such as sand, chalk and ashes, as well as distributing the finished bricks, and there was probably often a large stock of bricks stored on the field.

There is some evidence of independently owned boats being used to transport bricks, but the incidence was probably low. *Number-ones* were owner crewed, and sometimes

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measuring the craft's freeboard, and a register entry was maintained for each boat active on the canal. Copies of the register were kept at each major junction on the canal. Only the early register entries indicate the kind of cargo carried.

[100] ibid Register Nos 625, 674

[101] ibid, no. 2187

owner-occupied vessels, but by the 1870s they were becoming rare. Factory Inspector Henderson, writing specifically about the stretch of the Grand Junction Canal between Rickmansworth and Paddington, commented that "few of the barges on the canal are owned by the men who navigate them. They are either in the hands of the canal company, brick manufacturers or contractors".[102] One exception to this general trend was the boatman W. H. King, whose family owned a pair of boats, which usually worked together. Diary entries for March and April 1895 show that the boats were working between the brick and cement works of Coles, Shadbolt, a firm of building materials suppliers at Harefield, just north of Uxbridge, and their depôt on the Regent's Canal at Kings Cross.[103] Another owner may have been Richard Sivers, a native of Northolt, whose boat *Prudence* was tied up at Northolt on Census Day 1881, with a 50-ton cargo of bricks.[104]

Many brickmakers in the Hayes and Hillingdon areas, and brick merchants established at Paddington, operated their own boats. Charles Richardson, a builder's merchant at Paddington, registered a 39-ton boat *The Kent*; and Rosher the 91-ton *Harry & Edward*.[105] Brickmakers Heron & Co of Hillingdon registered a number of boats, an unnamed 40-ton vessel, the 38-ton *Emily* and the 39-ton *Frederick*;[106] D & C Rutter of Hillingdon the *Algernon,* Thomas Curnock of North Hyde, Heston, the *Sarah Anne* which later became the *Maggie* and was operated by another brickmaker, W.H.Reed.[107] Francis Newell of Southall owned two 40-tonners, one unnamed, the other the *Susan*;[108] James, John and Isaac Nutman of the Northolt the *Isaac*; James Stacy of Cowley the *Catherine*; and Henry Austin of Hayes the *Confidence.* [109]

As we have seen some brickmakers established in London acquired brickfields in rural Middlesex, and several of them operated their own boats. J. & A. Stroud's base was in Stoke Newington, not apparently giving them immediate access to the Regent's Canal,

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[102] Report of Factory & Workshops Commission. Appendix C. PP 1876, xxix, p.129
[103] Diary of W.H. King. British Waterways archives, Gloucester; Hanson, H., *The canal boatmen 1760-1914.* Manchester, 1975; Gloucester, 1984, p.114-115
[104] Census Enumerator's Book, Northolt 1881
[105] GJC Gauging Registers, op.cit., Nos. 8409, 8697
[106] Ibid, Nos. 8168, 8186, 8423
[107] Ibid Nos, 8480, 8482.
[108] Ibid, Nos. 8167, 9026
[109] Ibid, Nos. 9081, 8182, 8422

and so their confidently name boats *Express* and *Lightning,* both of 38-tons, would have been used to serve their Southall brickfield. [110] Henry Dodd, brickmaker and waste contractor, was based at Eagle wharf, Hoxton and had several boats, including the 37-ton *Sun* and the 78-ton *Brick* on the canal, and spritsail barges on the Thames.[111]

W. & J. Studds, who were brickmakers and gravel merchants, operated not only conventionally sized canals boats of about 40-tons, with names of Victorian seriousness, such as *Industry* and *Providence,* but also some small boats of less than 15-tons. The special purpose of these boats is not described in the registers, but they may have been used to work up cuts or docks, and particularly to carry away spoil when Studds were engaged in excavating docks, as we know they did for Samuel Pocock. (see above).[112]

The last quarter of the nineteenth century saw a significant level of vertical integration in the brick trade. A number of sizeable builders' merchants, operating in London owned brickfields and, in many cases, operated their own boats. Broad & Co, with sites at West Drayton and a wharf at the Paddington basin, counted barges amongst their assets in 1896.[113] Odell & Co, which had a similar operation to Broad's, included in their business interests "barge owning, barge building and wharfinging" and operated a steam tug in 1893.[114] Rutters were still operating barges on the canal at the turn of the century.[115] Other firms had more complex and widespread activities. Eastwood & Co had an extensive fleet of spritsail barges in the Thames and Medway, serving their Kent and Essex brickyards, but also canal boats working on the Regent's and Grand Junction canals, connecting with their brickfield at West Drayton.[116] Mead & Co combined refuse contracting at Paddington with a farm at Iver, served by the Slough branch of the GJC, and brickfields there and at Acton. The nature of their business generated cargoes for their boats both into and out of Paddington.[117] The East Acton Brick Company, which operated the largest brickfield in Acton and another by the canal at Southall in the 1880s

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[110] Ibid, Nos. 9001, 9095
[111] Ibid, No. 8655; Carr, F.G.G., *Sailing barges.* 2nd edition, 1951. p.175
[112] Ibid, Nos.8430, 8497, 9051, 9057
[113] PRO BT31/ 6681/ 46980
[114] PRO BT31/ 5649/ 39405
[115] British Waterways Archive, Gloucester. GJCC Brentford Toll Book 1901
[116] Willmot, op. cit., p. 45-48
[117] PRO BT31/ 3958/ 25112

owned at least one canal boat.[118]

These company boats not only distributed the finished bricks but also carried other raw materials to the brickfields. Neither chalk nor sand was available locally, and chalk probably came from Kent, sand from the Thames Estuary. [119] In October 1897, for example, two of Broad's boats brought a total of 107 tons of sand from an unknown source to Dawley via Brentford.[120] In April 1901 Eastwoods, Odell, Rutter, and the East Acton Brick Company all had boats bringing sand to their sites in West Middlesex, although it is possible that some of this may have been for resale, rather than used in brickmaking. [121]

It was important that brick boats bringing cargoes to Paddington had access to return cargoes, in order to maximise their carrying capacity, and recoup their owners' capital investment. As we have seen there was an imbalance in traffic levels in the early years of the canal, more going into Paddington than coming out, so many barges must have left Paddington empty unless the outgoing cargoes were bulkier and less heavy than the incoming ones. Reliable figures for the volume of material arriving at and leaving the Paddington are difficult to find, but in 1904 boats carrying 104,467 tons of bricks travelled south on the canal from the Cowley area, mainly to Paddington. In the same year outgoing boats left Paddington laden with a total of 635,961 tons of the main categories of waste materials, the equivalent of over 9000 70-ton wide boats. The composition of this total is shown in Table 8.2.

In earlier years some of these volumes may have been greater; by the turn of the century Middlesex brickmaking was in decline, and traffic on the canal fell significantly before the First World War. The amount of manure leaving the city was also reducing as motor vehicles began to replace horse-drawn buses and vans, and this trend caused a corresponding decrease in the need for hay and straw, other staple cargoes on the

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118 British Waterways Archives, Gloucester. GJC Brentford Toll Book, 1901; Harper Smith, op.cit.,p. 50

119 The nearest source of chalk and sand was in Pinner, where a chalk mine was worked commercially in the nineteenth century by a brickmaker from Wealdstone. It is unlikely that chalk from this source was used in the Cowley district because it was not easily accessible by river or canal transport. See Gallois, R.W., *A guide to Pinner Chalk mine.* 3rd edition, Harrow & Hillingdon Geological Society, 1998.

120 British Waterways Archives, Gloucester. GJC Brentford Toll Book, 1897.

121 British Waterways Archives, Gloucester. GJC Brentford Toll Book, 1901

canal.[122]

Table 8. 2: Waste materials leaving Paddington basin 1904

Commodity	Tons
Ashes and rough dust	100,249
Clay and excavations	372,263
Manure	45,669
Slops and sweepings	117,510

[Source: Faulkner, op.cit. p.195]

Ashes provided the ideal return cargo for the brick boats, drawing on a century old relationship between brickmaking and rubbish collecting. In the eighteenth century brickmakers had taken on the role of *scavengers* in the capital, and the ashes and breeze that they collected had a value that allowed them to pay local authorities for the contracts. As the city had grown the waste it produced could not be absorbed within the built-up area and most of it was disposed of by being barged out of the city along the Thames and the canals. A symbiotic relationship developed between the import of bricks and the export of ashes and other rubbish, and this affected the Kent and Essex brickmakers on the Thames and the Medway, and the Cowley and Slough brickmakers on the Grand Junction Canal. The Eastwoods' spritsail barges that brought bricks from Kent and Essex brickyards to the Thames wharves, returned with cargoes of ashes. Willmot described barges loaded with this *rough stuff*, with which some decaying vegetable matter was mixed, sailing downstream followed by clouds of flies. Not only was this an unpleasant cargo because of its smell, but also a dangerous one since the presence of methane could lead to spontaneous combustion. Eastwoods continued to use breeze as fuel until the 1960s when the introduction of smokeless zones in London meant that the ashes no longer had sufficient residual energy value.[123] The Chelsea vestry used the Kensington Canal to barge out its refuse, Westminster the Grosvenor Canal.[124] Because of the unsavoury nature of these return cargoes living conditions on brick boats were

[122] Dyos, H.J. & Aldcroft, D., *British transport: an economic history from the seventeenth to the twentieth century.* Leicester, 1969, p.336

[123] Willmot, op.cit., p.21-22; Smeed Dean, faced with the same problem, continued to use extensive reserves of old ashes and clinker from tips on their site. Perks, op.cit., p.33, 60

[124] Denney, M., *London's waterways.* London, 1977, p. 126, 137.

worst than on most, and a cause of concern to inspectors.[125]

Paddington was the main destination for the brick boats from west Middlesex, and became a major centre for the distribution of building materials. At the same time it developed the complementary rôle as the outlet for the rubbish of London's western parishes, Paddington and St Marylebone. Canal boats also brought agricultural produce into the city, particularly hay and straw; this traffic also had its related waste trade in the form of stable manure and *mack*, the sweepings of the city's macadamised streets.[126] In the 1870s it was said that boats bringing bricks to London usually returned with a cargo or manure or breeze.[127] This process can be observed from entries in King's diary: on 23rd March 1895 his two boats arrived at Paddington basin, having discharged their cargoes of bricks at King's Cross, and spent that and the following day loading ashes and breeze at Mead's wharf, which they took to Shadbolt's works at Harefield.[128] The relationship broke down on occasions when a decline in building activity in the London area reduced the demand for bricks; this in turn reduced the brickmakers' needs for ashes and breeze and lowered the value of these commodities to dust contractors. In the 1860s the fall in the value of these waste materials was so severe that instead of contractors paying local authorities for the contracts to remove rubbish from their areas, the position was reversed and parishes and vestries had to pay their contractors.[129]

The symbiosis between the traffic in bricks and ashes was established early in the life of the canal, for in 1804 the Grand Junction Canal Company agreed to a *drawback*, or discount, on "all ashes carried from Paddington to the brickfields at Norwood and North Hyde for the purposes of brickmaking." [130] It is also likely that most of the bricks being produced in this area were being carried to Paddington, rather than via Brentford to the Thames. Indeed the Canal company were anxious to prevent more than a quarter of the production being routed via Brentford and used a discount on ashes and breeze

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[125] Hanson, op.cit., p. 132; families were still living on refuse boats in the 1920s, see Freer, W., *Women and children of the Cut.* Mold, 1995, p.66-68

[126] For a description of the problems of keeping the city's streets clean, and the nature of mack, see Turvey, R. "Street mud, dust and noise". *London Journal*, vol. 21, 1996, p.131-148

[127] Henderson to Factory and Workshops Commission, op.cit., p.129

[128] Diary of W.H.King, op.cit.

[129] Westminster City Archives. Paddington Vestry Minutes, December 1854 to May 1858

[130] PRO Rail 830/ 41, GJCC General Committee minutes, 8th May 1804

from Paddington as a means of discouraging it. [131] The encouragement of brick traffic to this destination is a recurrent theme in the GJCC's minutes. In 1815 it was proposed "to regulate the tonnage of bricks, breeze and ashes to induce persons conveying such articles to carry them to Paddington in preference to Brentford".[132]

It was assumed that some carriers moved large volumes of such commodities, since the GJCC was willing to offer a discount on tolls to "any one person who shall convey 30,000 tons of street sweepings", which amounted to a thousand boatloads.[133] Some brickmakers in the nineteenth century went a stage further by operating as rubbish contractors, in the same way that builders had, on a more local level, in the previous century. Dodd, the Strouds and Mead have already been mentioned as brickmakers and barge owners. Dodd was one of the largest brickmakers in the capital in the 1850s who described himself as a barge and canal boat owner, brickmaker, merchant and salesman, carman, road and general contractor and wharfinger. Strouds, brickmakers at Stoke Newington and Southall, were dust contractors for Islington in the early 1860s, Mead for Paddington in the early 1880s. [134]

As low value, high bulk commodities most building materials were sensitive to transport costs, which could account for a considerable proportion of the cost price. Even as late as 1948 it was estimated that the cost price of gravel doubled at a distance of twenty-one kilometres from the pit.[135] In the 1850s bricks doubled in cost, it was thought, at a distance of sixty miles from the brickyards.[136] The Bedford estate in the first half of the nineteenth century produced a price list of products from its Crawley kiln from which it is reckoned that the carriage of bricks only one mile added 9d. per thousand to a basic price of 34s., that is two percent of total costs. The greater the distance the steeper the increase in charges became, so that at 5½ miles the transport cost was 14s, adding forty-one per cent to the final bill. [137] However, this calculation is not borne out by other contemporary pricing mechanisms. Builders' Price Books regularly quoted costs for

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131 Ibid, 1st June 1804
132 PRO Rail 830/ 43 GJCC General Committee Minute Book, 15th June 1815
133 PRO Rail 830/ 43 GJCC General Committee Minute Book, 10th May 1864
134 *P.O. Trade Directory of London 1863.*
135 Blunden, op.cit., p.56
136 Brunskill, op. cit., p. 35
137 Survey of Bedfordshire, op.cit., p.31

carting bricks, which showed that the cost of the first mile, in which were included loading and unloading, was much more expensive than the subsequent miles, in a ratio of 4:1 (4s-0d as against 1s-0d in 1856)[138]. By the 1890s these prices had risen to 5s-0d and 1s-6d respectively and remained the same throughout the decade, despite fluctuations in the selling price of stock bricks, which varied between £2-0s-0d and £2-10s-0d. [139] This meant that transporting a thousand bricks a distance of five miles added 8s-0d to their price in the 1850s and 11s-0d in the 1890s. Even though these costs did not rise as steeply as the Crawley example distances of more than a few miles added significantly to the selling price. Presumably, though, beyond a certain point, the costs of carting became totally uneconomic, if the carter could not cover the distance within a working day. It is unlikely, however, especially in the London area, that bricks would be carried more than a few miles, given the generally good access to navigable water.

Carriage costs of bricks were charged on their weight not on their value, but since different grades weighed much the same, but varied widely in selling price, high quality facing bricks and speciality bricks could realistically be transported greater distances. This made it possible to use Suffolk bricks for prestigious buildings in London, but restricted the distribution of stock bricks. Some idea of the range of price differences can be seen in the contemporary builders' price books; throughout the 1890s, for example, stocks sold for £2-0s-0d, place bricks for £1-14s-0d, Beart's perforated gaults at £2-15s-0d, but white Suffolk facings at £4-5s-0d. Other fancy grades, particularly rubbers and cutters, which were used in much smaller qualities, cost even more.[140]

Bricks were heavy to move; 330 stock bricks weighed one ton and a thousand bricks, therefore, weighed over three. [141] Canal narrow boats carried about forty tons of cargo, about 13,000 bricks. The southern stretches of the Grand Junction Canal were built to a broad section and could accommodate larger boats of double the tonnage, and these could load about 26,000 – 30,000 bricks. It is clear from these calculations that a large Cowley brickfield with an output of fifteen million units a year generated the need for considerable barge traffic to get its bricks to London wharves, as many as 550 trips.

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[138] *Laxton's Builders' Price Book* 1856
[139] Ibid, annual editions 1890 to 1899
[140] *Laxton's Builders' Price Book for 1893*, p.50
[141] *Spon's Architects, builders and contractors pocket book... 1880*, p.21

Boats spent a much of their time stationery, tied up in docks or beside wharves, and probably less time in transit. King's diary, which suggests that his boats had a capacity of about 14,000 tons each, also makes it clear that because the distances travelled on the canal was quite short, and there were likely to be few delays negotiating locks, as much time was spent loading and unloading as was taken in journeys.[142]

Transport costs were made up of a number of different elements: principally the cost of boats, barges, carts or wagons; the cost of horses and their upkeep; the wages of carters or boatmen and their assistants; and the tolls payable to turnpike trusts or canal companies. Unfortunately there is scant information about a number of these elements, particularly specifically relating to the carriage of bricks in West Middlesex. No attempt has been made to present a model of transport costs for Cowley bricks, but the following paragraphs present some information about the costs elements involved.

First the cost of boats. Canal boats cost somewhere in the range between £80 to £150.[143] Secondhand boats were often available and cost much less; when the GJCC closed its Carrying Establishment following the disastrous explosion on the Regent's Canal in 1874 which had involved company boats, it disposed of its boats at prices varying from £10 (*Norwood*) to £31 (*Barking*).[144] Presumably this difference reflected their size, age and condition; older boats were often preferred in the brick trade, once they were past being used for better types of work.[145]

Many brickmakers not only reduced transaction costs by owning barges, but by building their own; few Cowley brickmakers, however, operated sufficient to make boat building an economic proposition, unlike some of their competitors on the other side of London, such as Smeed Dean. Rutters and Eastwoods, with interests in more than one district, built Thames barges and may have built canal boats as well. Odell's fleet, which included barges and boats, as well as a steam tug, were valued at £2000, a smallish sum in relation to the overall £50,000 assets of the firm.[146]

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142 King, op.cit.
143 Prices relate to 1808 and 1856 respectively. Hanson, op.cit., p.105, 107
144 PRO Rail 830/ 50. GJCC Traffic Committee 1875-77. 19th July 1876; 9th August 1876
145 Hanson, op.cit., p. 132
146 PRO BT31/ 5649/ 39405

Horses which were widely used to pull carts, boats, and to provide motive power for pug and chalk mills on the brickfield, were a valuable asset. Among the disasters that befell Robert Dove in the 1820s was the loss of eight horses to the glanders, since they worth a total of £350, or more than £40 each. [147] Working horses probably cost a similar amount throughout the century.[148] The upkeep of horses was also expensive. The purchase of feed was always a significant proportion of the cost of any carrying operation, at least 40 per cent. A jobbing horse cost 12s 7½d a week in hay and oats in the 1890s.[149] Henry Hickman reckoned among his expenses the cost of horses at 21s-0d a week, although it is not clear how many horses he owned, and wages of the man who looked after them at 24s-0d. [150]

In 1841 master boatmen might earn between 15s and £1-10s a week, after paying for the horse, but before paying for hired labour, the variation depending on the value of the cargo carried. In the 1870s the master boatmen in the brick trade were amongst the lowest earners. Some were paid a fixed rate of 18s per week; others were paid by freight carried, and they could earn more, but at the risk of a less regular income. In most cases the living conditions on brick boats were worse than on most other boats, especially when carrying return cargoes of manure or rough stuff.[151]

Tolls on the canal were levied per ton mile. Tolls generally tapered down as mileage increased, but were precisely limited to certain maxima by the Act of Parliament that sanctioned the canal's construction. This did not prevent the common practice of allowing *drawbacks*, as the discounts were known. [152] Authorised tonnage rates on the GJC in 1793 were ½d per ton mile on bricks, slate, tiles, sand, manure, pig iron, lead and ironstone, lower than the rates on other commodities such as coal.[153] A second act in 1795 increased the rate by ¼d, other goods by ½d. [154] The distance from Uxbridge to Paddington was about fifteen miles, making the tonnage about 1s 3d per ton, the

147 PRO B3 /1447
148 Tillings, the bus operator, were buying horses at £44 in 1892. Tilling, J., *Kings of the highway*. London, 1957, p. 63
149 Barker, T. & Gerhold, D., *The rise and rise of road transport, 1700-1990*. (Studies in economic and social history) London, 1993, p.17; Tilling, op.cit., p.47
150 PRO B3 / 2572
151 Hanson, op.cit., p..94
152 Dyos & Aldcroft, op.cit., p.101
153 33 George III c.80 quoted by Faulkner, op.cit. p.5

equivalent of 3s 9d per thousand bricks. In 1815 GJCC was offering a flat rate of 1s per ton on bricks, ashes and breeze carried between Cowley and Paddington; for brickfields north of Cowley Lock the Parliamentary toll would apply to the remainder of the journey. [155] Further reductions took place in later years, in the face of railway competition. In 1851 bricks carried from points south of Uxbridge to Paddington were to be charged at the Parliamentary rate up to a maximum of 10d per ton, or 2s 6d per thousand bricks.[156] Bricks from the far end of the canal at Braunceston were charged at 3s per ton for the whole journey.[157] But in 1860 the 1851 reduction in tolls was rescinded by an increase of 2d per ton on ashes, breeze and bricks.[158] The rate was increased in 1866 by a further 1d on ashes and breeze, making the maximum toll 1s 1d, and by 2d on manure and bricks to 1s 2d. No such discount applied on the trade to Brentford, which had to bear the Parliamentary toll. [159]

Tolls affected the movement of bricks on some roads in London and encouraged the use of water transport as an alternative. It was another incentive to move brickmaking outside the city and bring bricks by water to Thameside wharves. This strategy only worked of course when building sites were close to navigable water. In the 1830s a group of London brickmakers complained to a Parliamentary enquiry that they could not compete effectively with extra-metropolitan makers who were supplying the capital by water because of the tolls on turnpike roads which had risen significantly.

> The water conveyance ruins us. The Commissioners of the Metropolitan Roads have put a very great addition of toll on the carriage of bricks. We used to draw 4000 bricks for 4d a day at Ball's Pond Road., and now it is 3s [a load] or 9d per thousand.... Makers of bricks, at a short distance from London, who send in by water carriage, ruin us with the heavy turnpike tolls.[160]

This complaint came despite the removal of tolls from the main turnpike routes including Oxford Street, Edgware Road and the New Road in 1830.[161] The remaining tolls in the metropolitan area were finally removed in 1872. Whilst this advantage that Rhodes complained of applied to the brickmakers who used the Thames from Kent,

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154 36 George III c.25 quoted by Faulkner, op.cit. p.71
155 PRO Rail 830/ 43 GJCC General Committee Minute Book, 22nd June 1815
156 PRO RAIL 830/ 43 GJCC General Committee Minute Book 3rd November 1851
157 ibid, 5th February 1858
158 PRO RAIL 830/ 45 GJCC General Committee Minute Book 6th July 1860
159 ibid, 18th May 1856
160 Evidence of William Rhodes, brickmaker of Balls Pond Road to the Commissioners of the Excise Duty enquiry, 4th March 1835. PP 1836, vol xxvi, p.173
161 Inwood, S., *A history of London*. London, 1998, p.545

Essex and places like Hammersmith and Brentford, Cowley firms would not have benefited since they had to pay canal tolls. Clearly though it was in the GJCC's interest to set affordable rates to stimulate and encourage the traffic in bricks and similar bulk cargoes which made up an important part of their income once the competition from the railways had creamed off many of the more valuable commodities.

There is insufficient information available to compare the costs of using the canal or railway to distribute bricks. Putting aside the tolls it is difficult to know what the costs of transporting a load of bricks by canal was; some indications come from the GJCC itself which paid George Gale 3s-6d per thousand to move a load of 12,000 bricks (one boatload presumably) from Bulls Bridge to Grove Lock, Watford and paid 3s-0d a thousand to H.Roberts for a similar load to the same destination from West Drayton.[162]

It is also difficult to know what the differential between the price charged at the brickfield gate and that on delivery at a London wharf or depôt. In many cases the price a brickmaker charged included the freight cost, especially if the market for his product was usually a distant one. George Smeed held the same price for deliveries to any wharf on the Thames below Battersea Bridge or up the canals, except that the purchaser paid the tolls.[163] More information is available for brickmakers who used railway transport. In June1860 C.H. Tottenham, a Slough brick merchant advertised bricks, all carriage costs paid and sent in GWR trucks to Paddington at competitive prices (best yellow stocks 34s per thousand).[164] In 1850 a red-facing kiln bricks were being offered by a brickmaker at Mertsham, near Reigate for delivery at Croydon on the Dover Railway at 38s 6d per cask (probably 1000 bricks) or at any station beyond that up to the terminus at Bricklayers Arms at an additional charge of 1s 6d.[165]

What would be most useful in identifying transport costs would be a set of account books for one of the Cowley firms, but there is no sign that any have survived. These do survive for one brickmaker who has been mentioned several times in this study, largely as a competitor to the Middlesex manufacturers. The account books of Beart's Patent

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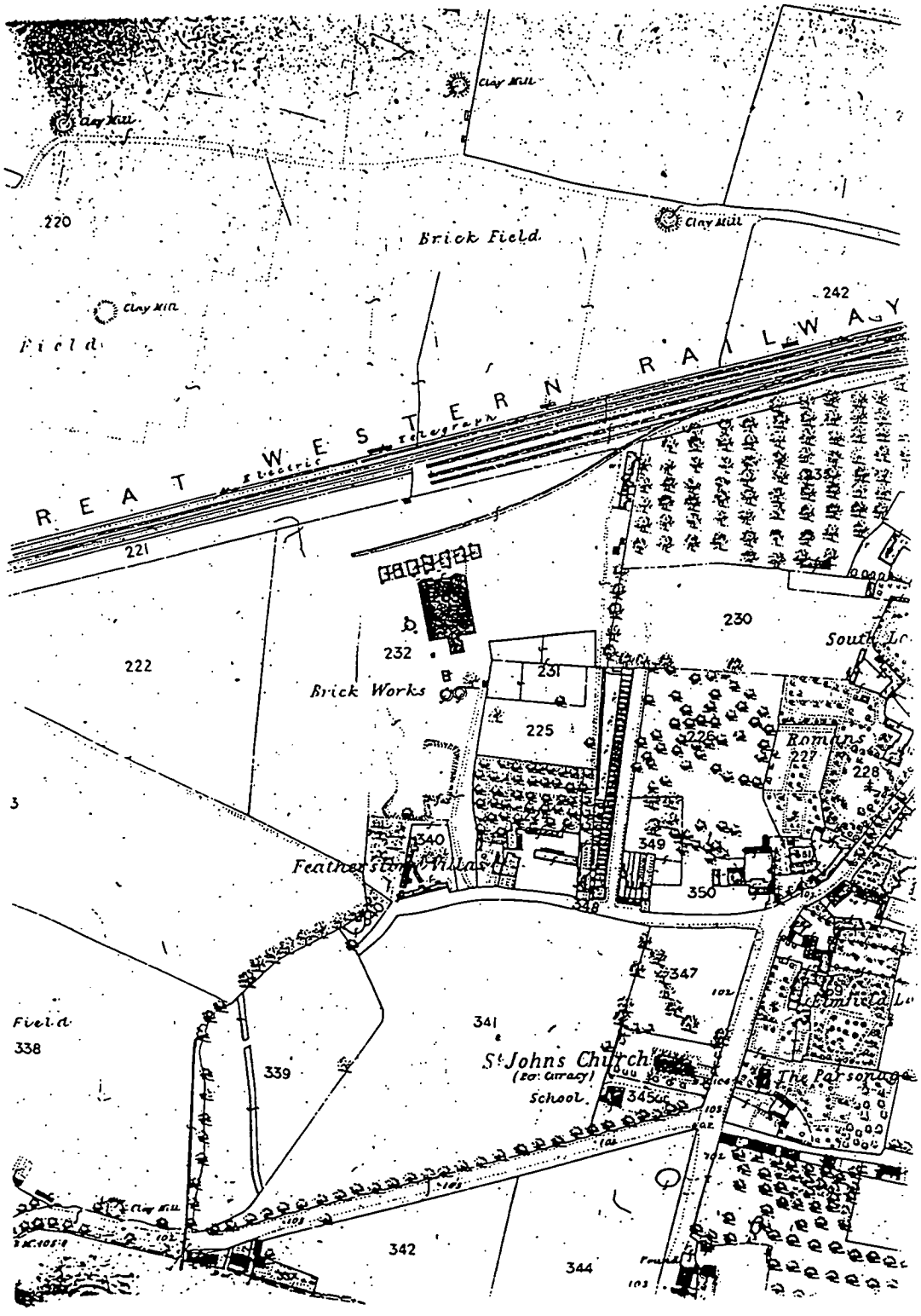
162 PRO RAIL 830/ 78 GJCC Collector's Account Book 16th September 1863; 2nd July 1853
163 *The Builder*, 25th June 1870
164 Ibid, 23rd June 1860
165 Ibid, 28th September 1850

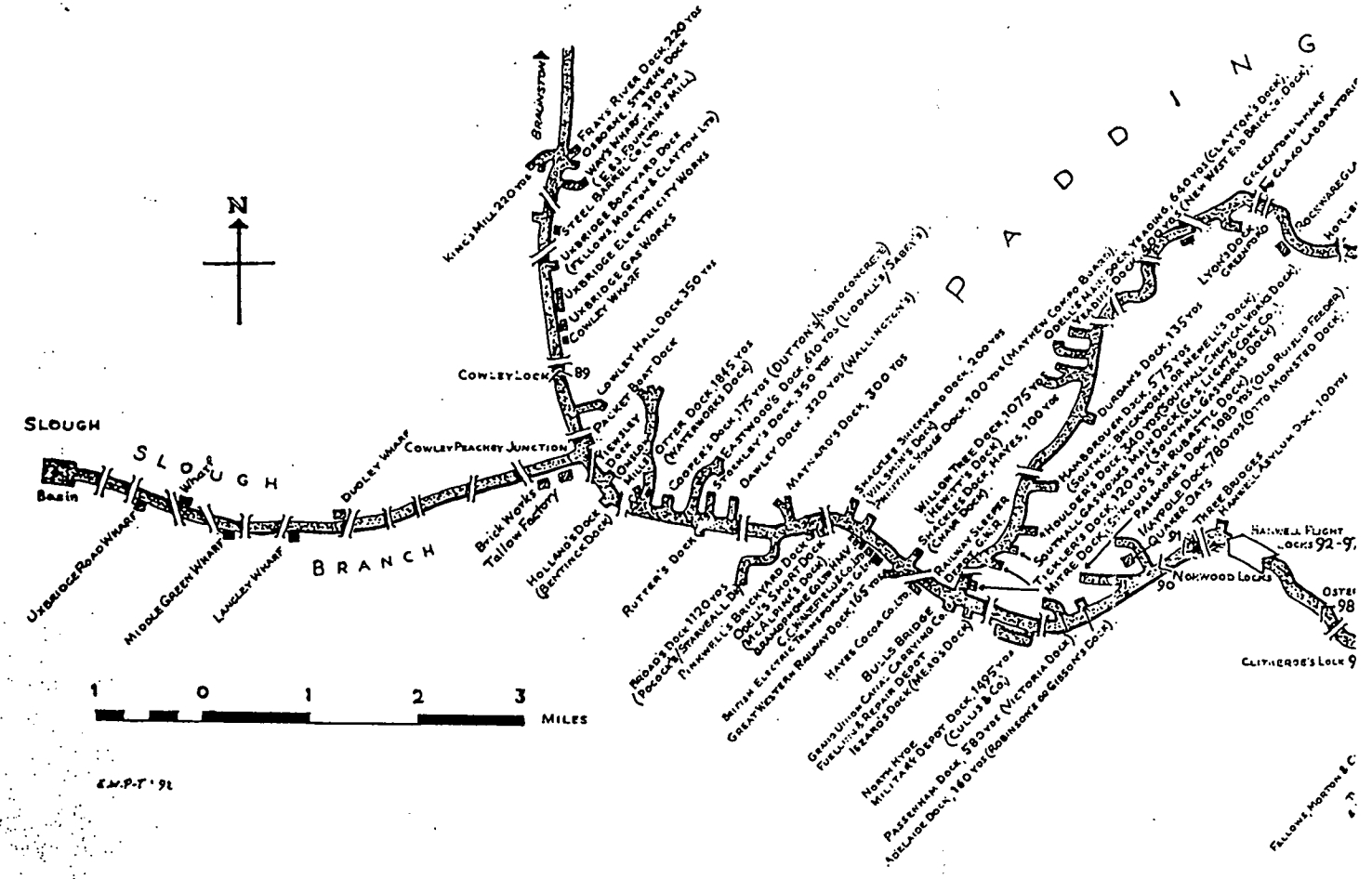
Brick Company at Arlesey contain information of the manufacturing and distribution costs of the company's gault bricks. Arlesey was on the Great Northern Railway and most bricks were carried on the railway to Kings Cross, where the company had an office and a depôt, or to other stations. In 1860 these bricks were selling at 38s per thousand; the cost of manufacturing and distribution was 32s 7d, of which 6s 10d was the transport component (20%). The company was able to hold down the manufacturing cost over the next fifteen years but the cost of carriage fluctuated considerably. In 1865 carriage was 4s 11d out of 31s (15.8%), in 1870 6s-8¼d of 31s-5d (21.22%) and in 1875 5s-7¾d out of 30s- 6½d (18.30%)[166]

Despite the apparent opportunities to use railway transport in the Cowley district, especially at West Drayton, there is no real evidence that the GWR made a significant impact on the brick business in West Middlesex. The Cowley district remained, therefore dependent on the canal, and provided a considerable amount of the traffic on the Paddington arm up to the end of the nineteenth century. Brick boats also performed a useful function in removing large quantities of waste from the metropolis, particularly the ashes and breeze that brickmakers reused, but also street sweepings and manure. A close relationship grew up between brickmaking and rubbish contracting. The decline in that traffic, and of the brickmaking that went with it, is the subject of the next chapter.

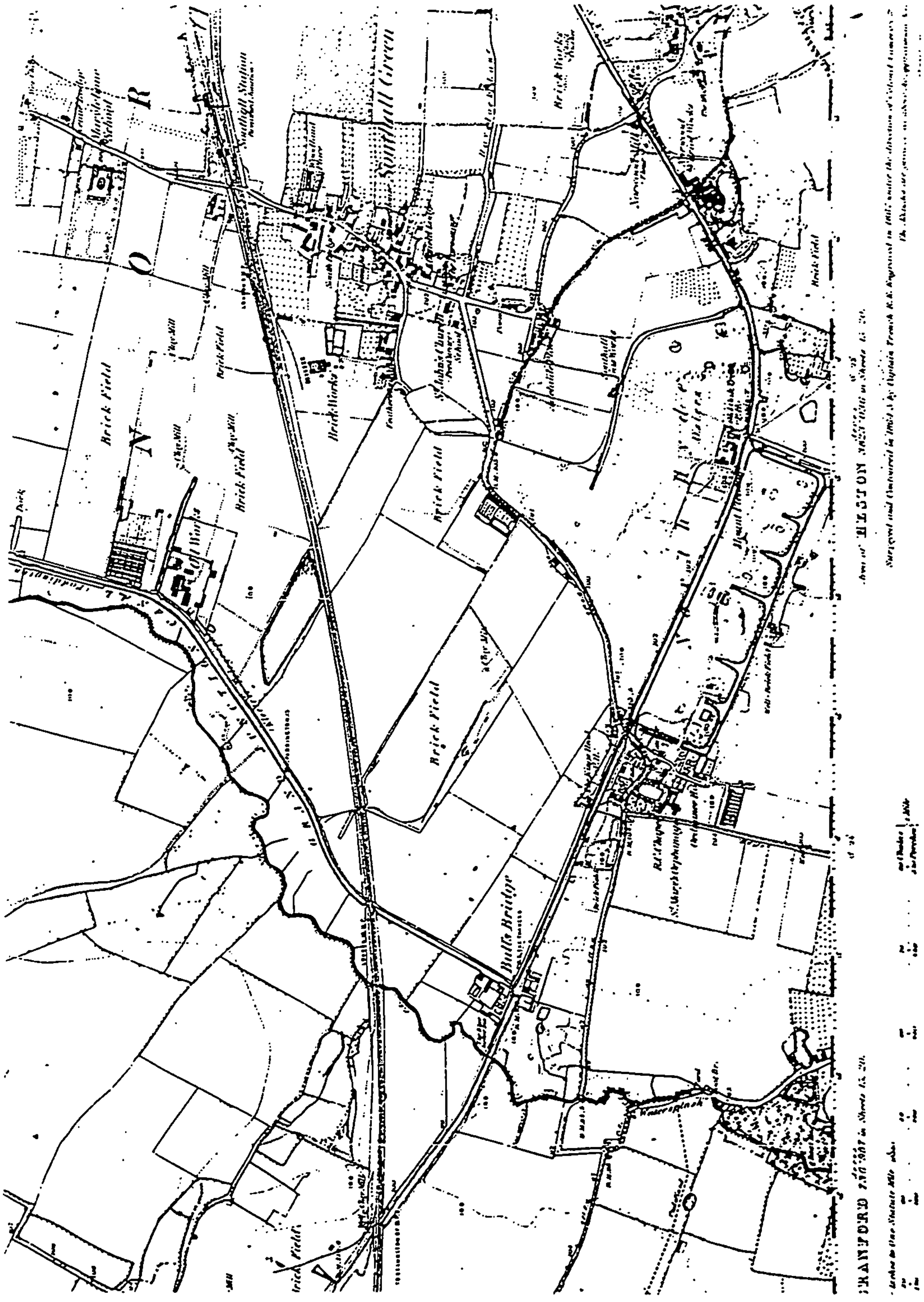
[166] Account Book of Beart's Patent Brick Company. Bedfordshire County Record Office [not yet assigned accession numbers]



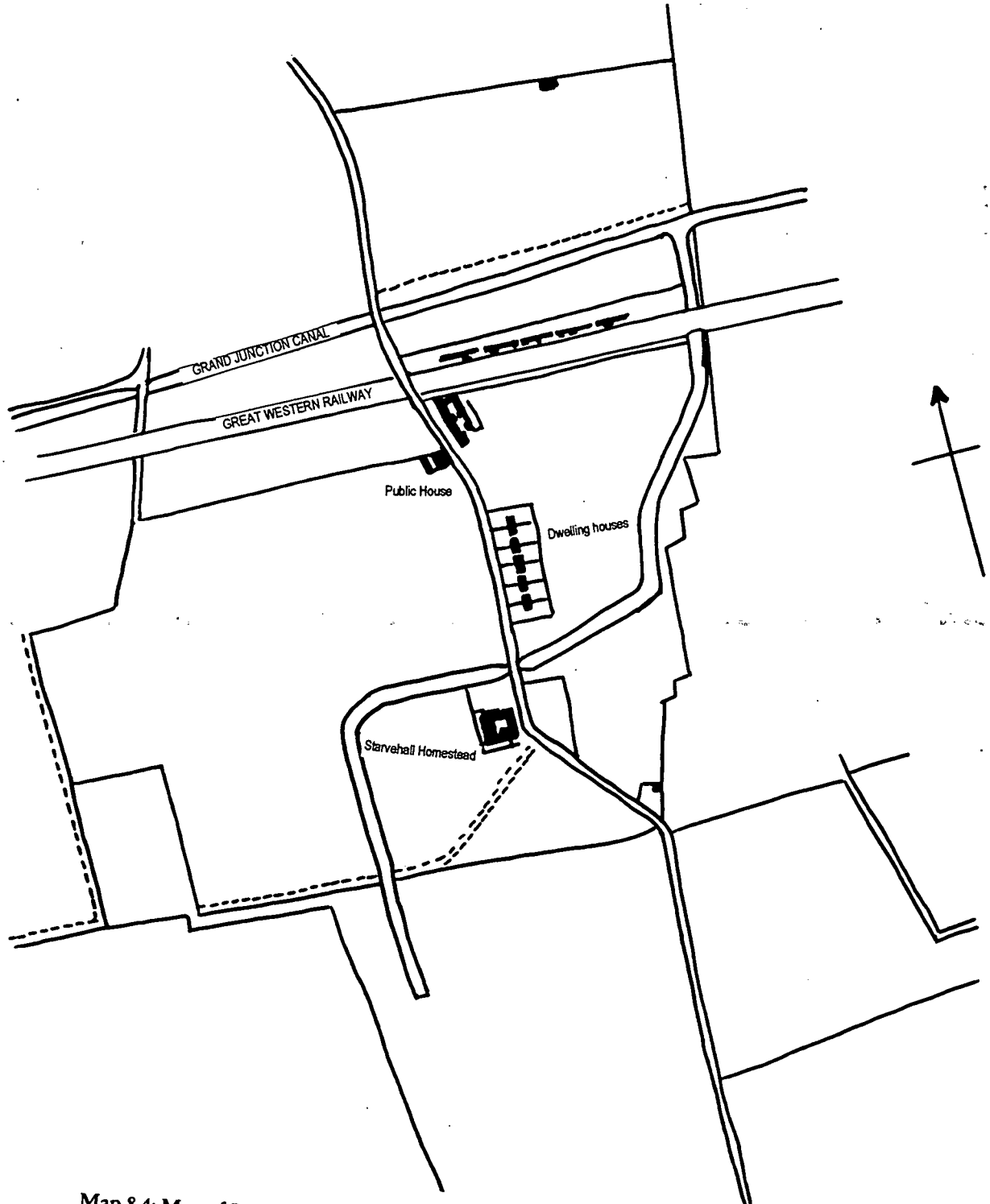
Map 8.1: Brickworks at Southall with siding to GWR main line
(Source: Ordnance Survey 25" 1st edition 1864)



Map 8.2: Docks on the Grand Junction Canal in West Middlesex
(Source: Faulkner, op.cit., p.148-9)



Map 8.3: Map of Heston and Southall showing North Hyde military dock
(Source: Ordnance Survey 6" 1st edition 1864)



Map 8.4: Map of Pocock's brickfield and dock at West Drayton (1880s)
(Source: Guildhall Mss 12335 Lease of 1882)

Once the building boom of the final years of the nineteenth century was over the Middlesex industry contracted, although its final demise was another half-century ahead. This decline can be attributed to a number of factors, some of them short-term, others of a long-term nature. Whilst the immediate cause was a sharp fall in demand in the first decade of the new century, which continued down to the outbreak of war in 1914, there were underlying problems for Cowley brickmakers that prevented the local industry returning to the scale of production and the number of operating units of the 1890s.

In the long term the Middlesex industry was threatened with extinction, like all extractive industries, once the source of its raw materials had been used up, in this case by the exhaustion of the workable clay reserves. However, other economic factors could cause it to become unprofitable even before the inevitable occurred. One such factor was increasing competition in the brick trade supplying London, with supplies coming no longer just from the stock brickmakers of Kent and Essex, but increasingly from the now well-established fletton manufacturers of Bedfordshire and Peterborough, whose production costs were lower. At the same time there were concerns about the reduced availability of the ashes and breeze on which traditional clamp brickmaking methods depended.

These four elements - the decline in demand; increasing competition from fletton producers; the shortage of ashes; and the exhaustion of clay reserves - need to be considered in some detail, to provide the context within which the remaining Middlesex industry operated.

The building boom that had provided the stimulus for brickmakers in the late 1890s peaked in 1902. The mechanisms that controlled the building cycle then triggered a downturn. "Such fluctuations", Spensley argued a few years later, "are quite normal and are due to periods of over-building, which are inevitably followed by periods of restricted activity".[1] In the continued absence of brick production statistics, changes in the level of building activity have been used to indicate the fluctuating demand for

[1] Spensley, J.C. "Urban housing problems". *Journal of the Royal Statistical Society*, Vol .lxxxi, part ii (March 1918) p. 163

bricks.[2] These indices show a drastic fall in building activity in the period after 1902. The Parry Lewis index shows that nationally there was likely to have been a dramatic falling away in production after 1903, which was briefly checked in 1904/5 and again in 1908/9, but then continued unhindered down to the outbreak of war.[3] This national picture is mirrored by the experience of the London area, as Spensley's figures demonstrate; here the number of new houses being built fell from 1902 to 1911, with a similar brief check in 1907/8 and a levelling out in the years following 1911. Wartime conditions after 1914 placed a further restraint. Activity was then no greater than it had been in 1872.[4] As might be expected figures for the percentage of empty houses in London moved in inverse relation to the number of houses being built, with nearly seven per cent empty in 1909, falling to about four per cent in 1913.[5] (see Graph 9.1) The Middlesex Deeds figures, which have been useful for earlier periods, become unreliable for the period after 1900, and have not been used. [6]

If this period was experiencing the regular cyclical trough in building activity, were there particular factors at work? As might be expected from Spensley's analysis, speculative interest in the domestic housing market was low in the first decade of the century, for overproduction in the building boom had led to a glut of properties on the market, as the figures for empties suggest. The cut back in building allowed a better balance to develop by 1911, but a fall in property values discouraged investment in this sector when better returns could be had from Consols or from foreign stocks. Yields on Consols rose by 20 per cent between 1897 and 1907, and this and a number of other factors produced a housing crisis in the Edwardian period.[7]

If house building was one of the main demand factors on building materials, the demand for housing itself was determined by population pressures. The first decade of the twentieth century saw the growth in London's population slow down; Greater London's population grew by only 669,956 compared with a growth of 947,596 in the previous

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[2] The use of the Middlesex Deeds as an index of building activity is discussed in chapter 3.
[3] Parry Lewis's figures are reproduced in Graph 3.2
[4] Graph 3.3
[5] Graph 9.1
[6] The use of the Middlesex Deeds as an index is discussed in Chapter 3.
[7] Rodger, R. *Housing in urban Britain 1780-1914.* Cambridge, 1989, p. 53 ; Burnett, J. A *social history of housing 1815-1970.* London, 1978, p.217

decade. As important as the overall change was the shift in balance between different areas of the capital; in reality the population of the central districts fell slightly (0.3 per cent), whilst suburbs outside the boundaries of the LCC area grew by 33.5 per cent, though even this high figure was less than the increase in previous decades.[8] This inevitably reduced the demand for new buildings.

Since there are no figures for brick output in the Cowley district it is difficult to make comparisons between production in the 1890s and in subsequent decades; changes must, therefore, be inferred from other sources. In the absence of contradictory evidence it has been assumed that most bricks were sent for use in London, and so traffic on the canal can provide a measure of output. Unfortunately detailed traffic figures for the Grand Junction Canal survive only patchily. Nevertheless, the fall in the tonnage of bricks carried along the canal to Paddington in the first decade of this century is an indicator of a sizeable reduction in production in the industry. In 1904 bricks sent southwards from the Cowley district, mostly to Paddington, amounted to over 104,000 tons, or 34 million bricks; six years later that figure was only 28,000 tons, and in 1916 a mere 7,000 tons. Whilst initially there was some small compensation for this reduction from the growth in the brick traffic going northward towards Birmingham, this was short-lived and amounted to only 2000 tons in 1916.[9] However an interpretation that links the scale of brickmaking in West Middlesex with the volume of brick traffic on the canal would need to be modified if there was a significant shift in the geographical pattern of demand and supply, such that a much greater proportion of the make was going to local builders and being used in the neighbouring districts rather than in the centre of London. To a degree this is what may have occurred with the fall in the population of inner London, and the continued growth in the outer suburbs. The urban centres closest to the brickfields enjoyed a significant increase in population in the decade between 1901 and 1911: Ealing's grew by 85 per cent to 61,222; Hanwell's by 83 per cent to 19129; Southall's by 99 per cent to 26323. However the growth of the mainly rural areas where many of the brickyards were situated was much lower, and can only have had a small impact on the local industry.[10]

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[8] Spensley, op.cit., p. 172
[9] Faulkner, op.cit. Appendix 2, p.195
[10] Spensley, op.cit., Table IX, p.172; Census 1911

The demand for bricks and the scale of brick production were both influenced by the vagaries of the English climate; the building sector was, and continues to be, highly weather-sensitive. Wet conditions, especially, also had a noticeable impact on stock brickmaking, with its reliance on outdoor manufacture and atmospheric drying. In 1902 there had been poor weather up to the end of July but the good spell that followed did not allow the shortfall to be made up. Output over all the stock brickmaking areas had fallen by a hundred million units, but this enforced restriction was probably fortuitous since it obviated the need for manufacturers deliberately to cut back production. Contemporary observers could see signs of the downswing in the building cycle; speculative builders were reported "cautious, not finding purchasers". In London the architectural fashion for glazed bricks and terracotta, exemplified by the prodigious use of the latter in buildings such as the Prudential Insurance offices in Holborn, had kept part of the trade buoyant, but did not benefit stock brickmakers. [11]

By contrast, in 1904 the weather had been favourable and the year's "make" was of high quality with a lower proportion than usual of sub-standard bricks. But customers for these bricks were hard to come by:

> The demand, however, had been anything but satisfactory, and prices have, in consequence, ruled downwards, with little prospect at present of being at all remunerative, unless trade becomes brisker, and the cost of manufacture considerably reduced.[12]

Trade conditions worsened so that by June 1905 brick prices had slumped to 8s per thousand, benefiting builders but becoming completely unrewarding for the producer. This, however, did not uniquely disadvantage Middlesex brickmakers, since an uneconomic level of prices ruled throughout the industry.

> Every branch of clayworking is slack, all trades are depressed which depend on internal commerce... A period of the most acute depression known during the past twenty five years, prodigally throwing money into the lap of the big London contractor and his clients.[13]

Viewed from the beginning of 1910 conditions were no better. There had been a depression in London trade in the previous two years; what trade there had been was "at cutting prices, hardly worth taking up". However, the situation for 1910 itself was

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[11] *British Clayworker*, January 1903, p.331, 334
[12] *British Clayworker*, January 1905 p. 315
[13] ibid, June 1905, p.74

thought to be far more hopeful.[14] By this period the Cowley district, which had been separately identified in many of these annual reports in the *British Clayworker*, no longer had an entry of its own, the remnants of the industry being subsumed under the London heading; stock brickmaking, which was now mainly concentrated in Kent, was still treated independently. The fall in demand for bricks had its impact on their sale price, as Graph 9.2 illustrates. After the peak of the cycle in 1902, brick prices in the London market fell by over 20 per cent in the following decade and did not return to that earlier level until wartime conditions significantly increased costs.[15]

As commentators suggested, Middlesex brickmakers did not suffer alone, the fluctuations in demand, and particularly in the London area, affecting all producers. This included the fletton manufacturers in Bedfordshire and around Peterborough who were working the hard and deep seams of the Lower Oxford clay. In the boom conditions of the 1890s they had become established competitors for the stock brickmakers, but in the subsequent slump the price of flettons fell as sharply as did the price of stock bricks, so that by 1905 they were being sold at 10s 6d, which, one prominent producer claimed, was below their cost price.[16] Manufacturers responded to overproduction and low returns by forming trade associations to regulate supply and maintain price levels; the Pressed Brick Makers' Association was formed in 1909 when it was evident that the availability of bricks outstripped demand and that there was little immediate prospect of competition returning to acceptable limits.[17] One major company almost failed; J.C. Hill was the major shareholder in the London Brick Company and was a victim both of the fall in value of the houses he had built speculatively in London and the depression in the brick trade. The company managed to survive Hill's bankruptcy.[18]

The 1914-18 war had a considerable impact on most sectors of the British economy, including construction and the provision of building materials. The already low-level of house building in the immediate pre-war period fell even more; in 1913 about 54,000

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[14] *British Clayworker*, January 1910, p. 255
[15] see Graph 9.1 based on Spensley, op.cit., Appendix A, p.210
[16] Hillier, R., *Clay that burns: a history of the Fletton brick industry*. London, 1981, p. 50
[17] ibid, p.53
[18] ibid, p.47

houses were built in England and Wales, but only 17,000 in 1916.[19] By that stage in the war the government was exerting considerable control over the economy; although some brick production was required for government contracts this did not compensate for the falling away of commercial projects. With conscription in force there were labour shortages, and production costs rose to take account of increased taxation and rising wages.[20] The fletton producers reacted to these conditions by closing down, or mothballing, a number of the smaller yards, and by taking in other kinds of war work, utilising the mechanical skills of their workshops. Those that stayed in operation stockpiled bricks against the anticipated post-war demand.[21]

In the post-war period fletton bricks achieved a dominant position in the London market. The output of flettons rose fourfold between 1912 and 1937 and by the latter date accounted for one third of UK brick production. [22] But their success was restricted to the London area, because only here was their price significantly below that of locally produced bricks. For example in 1931 flettons sold for 51s 3d in London, as against 78s 6d for second-hard stocks, and 83s 6d for best stocks; however, in the same year locally produced bricks in Leeds sold for 47s 6d and in Manchester for 51s 6d.[23] This suggests that it was difficult to reduce costs in the Middlesex industry.

The south-east of England remained an area of numerous but predominantly small brickworks, with relatively high production costs. In 1937 there were still 365 works in the south and south-east supplying an eighth of the total national capacity; this contrasted with the eighty-eight, mostly fletton, works in the Midlands supplying about a third. [24] Initially the fletton brick did not directly challenge the best stock brick. Flettons, both because of their appearance, and because their ability to cope with harsh environmental conditions was suspect, were relegated to interior work, displacing the local place bricks. However towards the end of the 1920s the London Brick Company introduced *Phorpres Rustics*, a textured facing brick, designed to compete with stock

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[19] Mitchell ,B.R. & Deane, P., *Abstract of British historical statistics*. Cambridge, 1962. p.239
[20] Musson, A.E., *The growth of British industry*. London, 1978, p.260-261
[21] Hillier, op.cit., p.60
[22] Richardson, H.W. & Aldcroft, D.H. *Building in the British economy between the wars*. London, 1968. P.141
[23] Bowley, M. *Innovations in building materials: an economic survey*. London, 1960. Tables E (p. 174) and F (p.177)
[24] ibid, p. 174

bricks, and selling for less than second-hard stocks. The presence of this new product forced down the price of stock bricks and briefly restored the competitive advantage to the local producer. This was not sustained, however, and towards the end of the 1930s the gap widened further in the fletton manufacturers' favour.[25]

In the inter-war period there was a doubling of brick output in the United Kingdom from 3,939 million in 1924 to 7,769 million in 1935, accompanied by considerable productivity gains. Between 1907 and 1935 output per man rose by 31 per cent and output per man hour by 47 per cent. Most of this improved manpower efficiency occurred in fletton works, so that by 1935 the number of man hours required to produce a thousand bricks was 9.6 as against 20.8 in all other works.[26] Many of the gains came about as a result of mechanisation or the improved use of machinery. [27] Brickmaking was an industry where there were opportunities for economies of scale, and the average output of fletton works was ten times greater than that of other brickworks.[28] The traditional methods of stock brick production using superficial clays was not conducive to mechanisation or large-scale operation since the yield from each acre of clay-bearing land occupied could not justify the outlay on large-scale plant and equipment. The development of the remaining West Middlesex brickworks in the period between the wars demonstrates different reactions to the problems of competition.

The third threat to the Middlesex industry came from nearer home and arose from changes in the availability and quality of ashes and breeze to fuel the clamps. By the end of the nineteenth century stock brickmaking must have appeared an anachronism, using methods that were primitive compared with the more mechanised yards of the Fletton producers. Yet stock brickmaking was to continue, albeit on a reduced scale, for another half-century. Nonetheless, part of the environment in which stock brickmaking had operated had changed in the last quarter of the nineteenth century; the close relationship between brickmakers and rubbish contractors that had operated for over a hundred years was changing with the move to domestic dust collection by local council's direct

[25] ibid, p. 172
[26] Richardson & Aldcroft, op.cit., p.141-142
[27] Bowley, op.cit., p.162
[28] Richardson & Aldcroft, op.cit., p. 141

labour force, and, in some inner London boroughs, with the use of incinerators to destroy rubbish. The first of these, or "dust destructors" as they were known, became available in 1875, and was used first in the North of England. One was installed in Battersea in 1888 and by 1904 the majority of boroughs within the London County Council area were using them to burn waste, and in some cases to generate electricity as well, the first such combined plant being installed in Shoreditch in 1896. These still produced a certain amount of residue, but methods had also been devised to convert breeze into building blocks (i.e. breeze blocks) or paving slabs. [29]

Reduced availability was one problem for brickmakers; the deterioration in the calorific content of the breeze and ashes was the other. This situation prompted an article in the trade press in 1898 that posed the question "Stock brickmaking: must it become extinct?", and concluded that there would need to be considerable changes if the industry was to survive. The writer argued that the quality of house coal itself had declined causing the resultant breeze to have seven per cent less value than it had twenty years previously; he recommended the use of alternative sources of fuel, either coke breeze, presumably obtainable from gas works, or coal dust. After analysing some detailed statistics, he concluded that the coke breeze provided the cheapest form of fuel at two shillings per thousand bricks, whilst coal dust was 2s 10d and London dust, because of its low calorific value and the costs of screening, was most expensive at 3s-0d.[30]

Despite these warnings ashes and breeze continued to be available for brickmakers for a considerable time, and the long-standing relationship between rubbish contracting and brickmaking was also maintained. In the early years of the twentieth century Odell & Co Ltd, which had interests in both brickmaking and gravel extraction, held a contract from Paddington Borough Council to dispose of all their rubbish (the council undertook the actual door step collections and transported the rubbish to their wharf at Paddington basin). This contract, on a three year renewal, continued for upwards of twenty years, latterly in the name of Thomas Clayton (Paddington) Ltd, which had bought up the

[29] Roebuck, J., *Urban development in Nineteenth Century London: Lambeth, Battersea and Wandsworth, 1838-1888.* London, 1979, p.74-75, 98-99; Gandy, M., *Recycling and the politics of urban waste.* London, 1994, p. 40-41
[30] *British Clayworker*, December 1898, p. 250

assets of the Odell company in 1911. Odell's immediate predecessors had been W & J Studds, brickmakers and gravel merchants, previously of Hillingdon, but by the 1890s operating from Iver, on the Slough arm of the canal. [31]

The neighbouring council of St Marylebone also used Paddington basin and the canal to carry away its refuse, but employed its own transport to do so after 1917. [32] Its sifting plant at the wharf allowed it to separate a number of recyclable commodities from the waste stream, and this was encouraged by the wartime promptings of the National Salvage Council.[33] In the immediate post war period the council was selling ashes and breeze to brickmakers, and in the period 1917-1923 disposed of nearly 5000 tons of fine ashes, 2500 tons of breeze and 600 tons of clinker, earning nearly £2000.[34] Customers included Messrs Reed & Company of Iver Court brickworks in 1922, and the same company, Broad & Co Ltd and W.D. Smith & Co Ltd in 1923, their orders accounting for all the available ashes and breeze likely to be produced that winter.[35] Evidently these brickmakers were still operating in the traditional way, preparing clay over winter for the forthcoming season, since Broad's request was for a boatload of fine ashes to be delivered daily to their field at West Drayton throughout October. As late as 1927 the council received orders from five brickmakers, mostly now working at sites along the Slough arm of the canal, for a total of 7760 tons of ashes and 3655 tons of breeze. The relatively small amount of breeze requested suggests that although brickmakers continued to incorporate fine ashes into the clay mix, alternative forms of fuel were now in use.[36]

Even as late as 1952 the sole surviving brickmaker in West Middlesex, the Hayes Bridge works of the East Acton Brickworks and Estates Co Ltd, was still using breeze and ashes in its manufacturing process. When their landlord complained to the company that their stockpile of some 20,000 tons was a nuisance and asked that it be moved, the managing

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[31] Paddington Vestry Works Committee, 22nd December 1898, 9th January 1896; Paddington Borough Council Minutes, 4th April 1905, 28th January 1908; 17th February 1914, 6th February 1917, 25th April 1922

[32] The contract with contractor Western Cartage was not renewed, and the company went into liquidation. The council subsequently bought many of the company's assets. Marylebone Borough Council. Minutes 8th March 1917.

[33] For one such initiative, in this case waste paper, see Marylebone Borough Council. Minutes 9th May 1918

[34] St Marylebone Borough Council. Minutes 4th October 1923

[35] St Marylebone Borough Council. Minutes 21st December 1922; 1st November 1923

[36] St Marylebone Borough Council. Minutes 27th October 1927

director responded that it was hoped, in the near future, to substantially increase production, and thus dispose of the heaps in a profitable manner. [37]

Table 9.1: Orders received by Marylebone Council for ashes and breeze, 1927

	Ashes (tons)	Breeze (tons)
Slough & Langley Brick Co	2000	1000
Broad & Co	1400	200
E.B. Reed & Co Ltd	2160	855
Burnham & Marlow Brick Co	200	100
W.D. Smith Ltd	2000	1500
Total	**7760**	**3655**

Source : St Marylebone Borough Council. Minutes, 27th October 1927

The fourth threat to brickmaking in West Middlesex was the exhaustion of clay reserves, or at least those brickearth deposits that lay conveniently close to the canal. As we have seen brickmaking had been taking place on some sites for nearly a century and, as the layer of clay in most places was only a few feet thick, it was not surprising that many of the most profitable areas had by now reverted to agriculture or market gardening. The sections of brickfields being worked were increasingly at some distance from the canal, necessitating extensions to the docks and the use of tramways to reach them. Often the removal and use of the superficial layer of brickearth revealed substantial reserves of gravel which were then commercially exploitable, either by the brickmaker himself or by another firm. This had been the pattern for many years, and brickmaking and gravel working continued side by side; however whilst brick production faded away in the first decade of the twentieth century, gravel extraction continued at a significant level. As a constituent of concrete, gravel also benefited from the change in construction methods. Like bricks there was a fall in the volume of traffic on the Grand Junction Canal between 1904 and 1910, but thereafter it grew again and had surpassed the 1904 level by 1922.

[37] Letter from EABWE Co Ltd to Minet Estate Office, 6th August 1952. London Borough of Hillingdon Archives: Minet Papers.

However it is likely that, like bricks, this gravel increasingly came from further north up the canal and from works along the Slough arm.[38]

Table 9.2 Traffic in Sand and Gravel on GJC to Paddington & Brentford

Year	Weight (Tons)
1904	83,918
1910	50,996
1916	68,872
1922	97,682
1928	108,426

Source: Faulkner, op.cit., p.195

In addition to the brickmakers who also dug gravel such as Odells and Studds there were specialist firms such as William Boyer & Sons Ltd and H. Sabey & Co Ltd who opened up pits near the canal. Gravel extractors, like some brickmakers, often combined the supply of gravel with the collection and disposal of rubbish. However, in their case, there was no productive use for the ashes and breeze; rather they were used as landfill in the worked out pits. W & J Studds combined brickmaking with gravel digging; in 1896 the firm secured the contract to dispose of the slop, sweepings, softcore and hardcore from Paddington Vestry, and also to supply gravel and hoggin. Studds had earlier operated from a site in Hillingdon, but by this period were probably using a site on the Slough arm of the Canal, where they were making bricks on a considerable scale. The firm wrote to the vestry in January 1896 from an Iver address indicating that a reduction in the prices they had tendered was possible because of better rates negotiated with the Grand Junction Canal on a large contract for bricks for the new Manchester, Sheffield and Lincolnshire Railway [i.e the Great Central].[39] Later, as we have seen, the Paddington tender was won by Odell & Co Ltd, who held the contract in 1905, and captured it for a

[38] Faulkner, op.cit., p. 195

[39] Paddington Vestry Works Committee. Minutes 9th January, 23rd January 1896

further three-year term.[40] However, when this contract was renewed in 1908 Odell were only required to dispose of the rubbish, the supply of gravel having been separated off.[41]

The situation was not entirely negative. Where owners could resist the combined pressures of more economic brickmaking elsewhere, or other types of commercial or housing development on clay-bearing land, brickmaking continued. However it is unlikely that all the available brickearth was used up before the last brickfield finally closed in 1960, for it did not cease manufacture for this reason, but rather because of difficulties in finding labour locally both skilled in traditional brickmaking methods and willing to work in the rather spartan conditions of a largely unmechanised yard. It certainly felt itself unable to compete with the newer industries that had grown up in the important manufacturing area on the borders of Hayes and Southall.[42]

As brickmaking ceased many of the docks that had provided brickmakers and gravel extractors with the means to load their canal boats became redundant and began to find alternative uses or to be filled in. Where other industries were set up on old brickworks or gravel pits, the dock found a use for the new works. A dock built at Botwell to serve Shackle's brickfield (Shackle's dock) was later used by a chair factory and a pianola factory that were either side of it.[43] Otter dock, the longest and most elaborate of the docks on this stretch of the canal, extending some 1845 yards northward from the canal at Yiewsley, had a long history, having been first opened up about 1820.[44] By the first decade of the twentieth century it was becoming a nuisance, a patch of stagnant water into which all manner of refuse was thrown. The two main owners of the dock were the trustees of Herbert Barlee, a brickmaker from 1880 to the end of the century and Mr William Boyer, the gravel merchant and general contractor. Yiewsley Parish Council were anxious to fill in the dock in order to reduce the health hazard and were able to reach agreement with the owners; loads of spoil from building sites across London were obtained by Mr Boyer, barged to Yiewsley and tipped into the dock, followed by a capping layer of gravel. By 1910 the surface was grassing over and the parish council

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[40] Paddington Borough Council. Minutes 4th April 1905
[41] Paddington Borough Council. Minutes 28th January 1908
[42] See below
[43] Compare Ordnance Survey 6" maps of Hayes for 1868 and 1912
[44] Faulkner, op.cit. p. 67, 202

planted trees in the filled-in dock.[45]

Elsewhere, however, where there were active works, new docks were still being built and lengthened. The same William Boyer and Sons Ltd built Stockley Dock in 1904 and lengthened it in 1914 in connection with their gravel business. The nearby Liddalls Dock was extended by Sabey in 1913 to over 600 yards, probably replacing the tramway that had previously joined the dock to the gravel pit north of Horton Lane. [46]

As we have seen some brick and gravel firms used their workings as rubbish tips. Gravel pits, with their greater depth, were a hazard and ideally suited as landfill sites. Several West Middlesex sites were used by St Marylebone Borough Council. Prior to 1917 it had depended entirely on a private rubbish contractor to collect and dispose of household refuse. It is not clear where Western Cartage Co Ltd tipped their waste but in that year the Council decided that the existing arrangements were unsatisfactory, both because of rapidly rising costs occasioned by the wartime economy and because of unreliable performance. They therefore set up their own collection service, and purchased a tug and a fleet of barges to transport the waste away from the city. The council needed a suitable landfill site, or "shoot", as it was described in contemporary terminology. By a mechanism that is not recorded a site was offered them by A.J. Frazer, at Northolt, "convenient to the Grand Junction Canal". This was an old brick site, previously part of the land owned by the Northolt Tile works, of which Frazer had been the major shareholder and joint liquidator;[47] there was evidently a sizeable excavation capable of receiving a large amount of refuse, over 10,000 tons being tipped there in the six months ending September 1917.[48] Thinking that this tip would be adequate for only a few years, the Council sought other rubbish shoots at convenient canalside locations. It found a suitable site at Cowley Peachey owned by Messrs H. Sabey, twenty-two acres of gravel workings, where the ballast had been dug out to a depth of 25 feet. This large pit would have been able to accept rubbish for a considerable number of years, and the increased cost of transport, as the site was 18 miles from Paddington, was offset by Sabey's lower charges. In the event the site was little used, as the council were offered a site close to

[45] Cox, A.H., "The Otter Dock". *West Drayton & District Historian*, xcii, 1989, p.5-8
[46] Faulkner, op.cit., p. 149; Ordnance Survey 6" maps, 2nd edition 1896and 3rd edition 1912
[47] For the history of the site see below
[48] St Marylebone Borough Council. Minutes, 8th March 1917, 8th December 1917

their first site, at Smith's Farm, Northolt. When this was acquired, the life expectancy of the twenty acre site was put at seven years, but with better management of the waste, including increased levels of recycling, its use as a shoot was extended. Five years later the lease of the Sabey site was not renewed.[49]

When Marylebone Council began to transport rubbish it purchased barges from a number of different sources; much of the equipment came from Western Cartage when it went into liquidation after losing the Marylebone contract; two war-surplus barges from the Ministry of Munitions in 1919; and in 1918 two barges from the brickmaking firm of Cullis, Phillips & Co who since 1897 had been working the old military dock site at North Hyde, Heston, previously occupied by Rutters.[50] The land adjacent to the Northolt shoot on the border with Hayes was also used as a rubbish tip by Thomas Clayton (Paddington) Ltd. The site had been purchased by Thomas Clayton in 1895 and subsequently conveyed to Odell & Co Ltd in 1898, who had used it for brickmaking and gravel working. Part of the site was later leased by Clayton to the Southern Brick & Tile Co Ltd. [51]

These were the main factors that influenced the continuance of brickmaking in West Middlesex in the period after 1902. We have examined the reduced demand in the period up to the advent of war in 1914 and the problems for the industry in general during wartime. It is now time to survey the demand for bricks in the post-war period to provide a background to the history of the surviving firms.

Although demand for bricks was low until the outbreak of war this was not repeated in the post-war period. Despite the war-time deaths there was a considerable national shortage of accommodation, estimated to have been at least 600,000 units, the result of the housing crisis that had already existed in 1914. During the later years of the war there was much anticipation of the building programme that would be required when hostilities ended.[52] Addison's Housing Act of 1919, which offered subsidies to

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[49] St Marylebone Borough Council. Minutes, 16th August 1917; 18th December 1918; 21st December 1922
[50] St Marylebone Borough Council. Minutes, 17th May 1917; 27th March 1919; Compton, H. & Faulkner, A. "North Hyde Military Dock". *Journal of the Railway & Canal Historical Society*, vol.30, no.151, 1992, p. 421
[51] British Waterways, Hemel Hempstead. Deeds (unnumbered); for more information on this site, see below
[52] Burnett, op.cit. p.217-218; *British Clayworker*, 1917 ,passim

housebuilders, was an attempt to remedy the situation, but the level of housebuilding up to 1924 was low, reflecting the slowness of the building industry to adjust to peacetime conditions. [53] Thereafter the scale of building expanded, reaching boom conditions in 1926 and 1927, but then declined as government subsidies, provided under the 1923 and 1924 Housing Acts to private builders and local authorities respectively, were reduced.[54] Demand between 1930 and 1932 was slack, but with the depression affecting industrial and commercial building more than the domestic sector, the percentage of housebuilding in the total grew to over 75 per cent in 1933. By contrast the years between 1934 and 1938 were a period of high investment in commercial building, whilst the volume of housebuilding slowed down. [55] (see Graph 9.3)

The supply of materials remained elastic and output generally followed the fluctuating levels of activity in the building industry. The industry recovered rapidly from wartime restrictions, so that the initial post-war shortages had been made good by the end of 1920 when output returned to pre-war levels. These shortages caused high prices to rule for the first two years, and the price of all materials was about three times the pre-war level. Thereafter prices fell steeply until 1923, the more gradually until 1933 after which they rose until the outbreak of war in 1939.[56] Overall the price of materials fell by 25.2 per cent between 1925 and 1934, and rose by 15.4 per cent in the next four years, a fall over the whole period of 13.7 per cent. There were substantial price reductions for some commodities; the biggest fall was in the price of cement which fell by 30 per cent between 1925 and 1938. Brick prices, however, fell far less dramatically. Significantly the price of flettons was 13.0 per cent lower in 1938 than in 1925, as a result of the efficiency gains that the large works in this sector of the industry were able to introduce, but in the same period the price of stock bricks rose by 13.6 per cent, although the overall rise conceals a number of fluctuations. (see Graph 9.4).[57]

The high price of bricks, and the excess of demand over supply, particularly in the south-

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[53] Burnett, op.cit, p.221-222; Richardson, H.W. & Aldcroft, D.H., *Building in the British economy between the wars*. London, 1968. p. 39

[54] Burnett, op.cit, p.227-228; Richardson & Aldcroft. op.cit., p. 39

[55] Richardson & Aldcroft op.cit., p. 39 – 43 and Tables 4 & 7

[56] Ibid, p. 135-137 and Table 7 (p.75)

[57] Ibid, Table 12 (p.140) ; Bowley, op.cit., Table F (p.177).

east, left the industry vulnerable to supplies from continental Europe, which caused many complaints in the trade press about the inferior quality of many of the imports. Small brickworks near the coast were particularly at risk from supplies from large and efficient works in Belgium. Imported bricks were still thought to be a problem a decade later.[58]

In 1900 the number of brick firms operating in the Cowley district was eleven, but three years later this had reduced to nine. With the brickworks at Northolt, previously owned by the defunct New Patent Brick Co Ltd, between owners, most of the working yards were in the Southall area (seven firms). By 1910 the number of firms had risen slightly to eleven, but spread over a larger geographical area, suggesting that some brickfields had been reopened. These brickmakers are listed in Table 9.3.

Table 9.3 Brickmakers in the Cowley District 1910

Brickmaker	Area
Broad & Co Ltd	Starvehall, West Drayton
Wm Brown & Sons	North Road, Southall
Coles, Shadbolt & Co Ltd	Harefield, Uxbridge
H.W. & T. Cullis	Fern Lane, Heston
East Acton Brickworks & Estates Co Ltd	Brookside, Southall
Herbert Goddard	Heston
A.L. Maynard	Harlington
Northolt Tile Works Ltd	West End, Hayes (i.e. Northolt)
D & C Rutter Ltd	Horton Field, Yiewsley
Silcock & Co Ltd	Norwood, Southall and Heston
Uxbridge Road Brick Co Ltd	Hamborough, Southall

Source: *Kelly's Directory of Essex, Hertfordshire & Middlesex, 1910*

By 1917 these numbers had fallen to seven with the disappearance of William Brown, Coles Shadbolt, the Northolt Tile Works, and finally the long-established business of D & C Rutter.[59] By 1926 only three firms were still in operation; East Acton Brick Works and Estates, and Broad & Co of the older firms; and West End Brickworks Ltd, a new firm working the old site on the Northolt/Hayes border. In 1933 there were still three firms, the only difference being that the Northolt site was being worked by a new

[58] *British Clayworker*, January 1927, p.265; speech by Sir Dennis Herbert, M.P at the opening of the Middlesex Brick Company's new works, *The Times*, 3rd September 1936, p.9

[59] *Kelly's Directory of Middlesex, 1917.*

company, the Southern Brick & Tile Co Ltd. [60]A new company had appeared in 1936, however, Hunziker (GB) Ltd at Cowley Bridge, but this foreign owned concern was producing sand-lime bricks, with the sand obtained from ground flints. It was, therefore, unlike the other brick firms in the area. [61]

Of the Southall businesses little is known of the firm of William Brown beyond its directory entry, but other businesses are better documented. One such was the Uxbridge Road Brick Company Ltd, incorporated in 1906. This firm took over the existing brickfields of W.H.S. Reed, which he held on ten year leases of 1904 and 1906. The company was promoted by Reed and the ground landlord of the sites, A.S. Rushton, and they became its main shareholders. It was a small undertaking, capitalised at only £5000 and with only ten investors, and did not make any share offers to the public.[62]

As might be expected from the general state of the building industry at this period, conditions for the new company were not propitious. Whilst there is little information about the firm's equipment, it is likely that the brickfield was being worked by traditional means since the directors' reports often refer to the effects of the weather on production. They blamed wet weather in 1909 for occasioning a loss of £265 on the year's activity, and, commenting on a smaller loss of £85 in 1912, suggested that "in consequence of last season being an exceptionally wet one, the burn of bricks did not turn out satisfactorily".[63]

Other factors also had a negative effect in the company's fortunes. In 1908 only two stools had been in operation because of the slackness of demand, a feature of the London market that year. The seasons 1910 and 1911 were better ones, with higher prices prevailing, and smaller losses resulting. Ironically, in the light of future events, 1913 was the company's best year, with a profit of £65 made on an output of 2.3 million bricks.[64] Unfortunately the problems arising from the 1914-18 war proved disastrous,

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60 *Kellys Directory of Middlesex, 1933*

61 *Kellys Directory of Middlesex, 1937;* for a description of the works, see *British Clayworker*, November 1936, p.227. Sand-lime bricks started to be made commercially at the end of the nineteenth century; for a history see Bowley, op.cit., p.80f

62 PRO: BT31/17793/89188

63 Directors' Annual Reports. 2nd July 1910; 13th October 1913. Included in PRO: BT31/17793/89188

64 Directors' Annual Reports. 2nd July 1909; 10th July 1911; 4th July 1912; 30th May 1914. Included in PRO BT31/17793/89188

when building activity reduced even more, and output and prices fell. In 1914-15 a loss of nearly £300 was made on a much-reduced make of 1.2 million bricks. The following year the company ceased to trade at the end of the season, when, to the other wartime difficulties, was added a manpower shortage, the company reporting that it was "unable to get enough men to carry on with". The company was dissolved in 1918.[65]

Yet despite the poor level of demand in the previous decade, another brickfield, without immediate access to the canal, but having use of the Jersey estate wharf at Windmill Lane bridge, was let as late as 1910, but only on a year-to-year basis, to Frederick Charles Reed, whose relationship to W.H.S. Reed, if any, is not known. Short-term agreements of this kind are unusual and may be explained both by the uncertainty of the continuing presence of brickearth in this long-worked field, and the landlord's probable desire to sell some of his land for building. By 1919, in the post-war spirit of optimism, the Earl of Jersey's business managers deemed the time for disposal was ripe, especially as house building was advancing into the fields north of the Uxbridge Road on the west side of the town; they, therefore, included Reed's field in a sale of various outlying parts of the Osterley estate. The bed of brickearth, the sale particulars asserted, had been partly worked but still offered the purchaser the opportunity to make bricks on site for new houses. [66] Another lot in this sale was the 62 acre Jackalls Field, which had been used for gravel digging since at least 1896 and was being worked at the time of the sale by William Seward. The land subsequently became the site of AEC motors in 1927. [67] A further part of the sale was Park Farm Hanwell, which had a gravel pit worked in 1919 by a J. Macklin on a yearly tenancy at a rent of £8 and a royalty of 9d per cubic yard. [68]

The firm of Silcock & Co. Ltd was formed in January 1905, as the conversion of an existing partnership, which had been in existence since some point in the 1890s. The company was a private one. Its articles of association declared that it was "a company that does not issue an invitation to the public to subscribe to its shares", and as such was

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[65] Letter from H.E. Reed to Registrar of Joint Stock Companies, 11th June 1917. Official Notice of Dissolution, 17th December 1918. Both included in PRO: BT31/17793/89188

[66]. Lease Earl of Jersey to Frederick Charles Reed. GLRO: Acc 405/1; Sale Particulars, Lot 1. Ealing Local History Library

[67] Gibson, 1896; GLRO Acc 405/3; Sale particulars, op.cit.

[68] The gravel had been worked since as early as 1895. See Half-yearly rental of the Middlesex & Kent estates of the Earl of Jersey, 1895. GLRO: Acc.506/30

typical of the majority of company registrations before the First World War where the aim was to achieve limited liability status rather than to provide the means to raise additional capital for the business. [69] The company's nominal capital was only £3000; in 1907 eleven debentures of £100 were registered but no further capital was raised in the life of the company, which was voluntarily wound up in 1911. The brickfields were in the Norwood Green area of Southall and Heston. [70] Although the company disappeared, brickmaking seems to have continued under the control of Herbert Goddard, previously one of the directors of Silcock & Co, and probably the manager of the brickworks, at least up to the war. [71]

In West Drayton Broad & Company Ltd which had been a major brickmaker in the area since the 1890s had retrenched in the face of difficult market conditions in the first decade of the twentieth century. When in 1911, as we have seen, circumstances began to improve, the firm modernised its operation, erecting new buildings and kilns, and reflected the new feeling of optimism by changing the name of the works from Starvall to Stockley. In 1912 the company also diversified into cement manufacture, but this was at Cliffe, near Gravesend. (see Illus 9.1) It seems likely that Stockley brickworks closed after the First World War, but the firm retained a depot at Hayes station. In 1931 George Harris, one of the original partners, retired after fifty years in the business. The building materials business continued until the 1980s.[72]

A small amount of brickmaking continued in Heston, in the form of the partnership of Henry and Thomas Cullis; their activities are somewhat complicated. They were shareholders of the firm of Cullis, Phillips & Co. Ltd (see Chapter Seven above), which worked a brickfield at Northolt, but also operated brickfields in Acton and Heston, presumably outside the formal arrangements of the company. The Heston brickfields were in Fern Lane, adjacent to the dock at North Hyde, which they leased from the

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[69] PRO BT31/ 10958/ 83222. In 1915 more than two-thirds of firms on the Companies' Register were private. Cottrell,P.L., *Industrial finance 1830-1914: the finance and organisation of English manufacturing industry.* London, 1980, p.162-3.

[70]Silcock & Co are listed in an 1899 directory, *Kellys Directory of Middlesex*, 1899; PRO: BT31/ 10958/ 83222

[71] In 1910 Herbert Goddard and Silcock & Co Ltd are listed, in 1914 only Goddard. *Kelly's Directory of Middlesex*, 1910, 1914, 1917

[72] Westminster City Archives. Unidentified newspaper cutting relating to Broad & Co. c.1974; *Kelly's Directory of Middlesex, 1926*

Grand Junction Canal Company, and were probably taken over from D & C Rutter, who had switched production to Yiewsley by 1910.[73] Cullis continued to produce bricks at Green Lane, Acton until 1923, but the Heston works probably closed during the First World War. [74]

The story of the main Northolt brickmaking site after 1901 is a complex one. After the insolvency of the New Patent Brick Company, the Northolt works were bought by William Belcher in 1902. He had been a promoter of a new company in 1901, the British Carburising Co Ltd, whose aim had been to acquire and exploit a "secret process" for hardening metals developed by Henry Van Vught. In January 1903 the registered address of the company was transferred to West End Works, Northolt and six months later the company's name was changed to West End Brick & Joinery Co Ltd; at the end of the year Belcher sold the Northolt site and works to the company.[75] However in the following year Belcher formed a new company, the New West End Brick & Joinery Company; he cancelled the sale to WEBJ Co Ltd and instead sold to the new company.[76] (Illus 9.2)

There is little evidence of the performance of the works at this period, but the company's affairs were complex. An investor in the company, one Colonel Wardrop took action against Belcher over the allocation of shares in the new company that had been made to him. Belcher lost the case, the judge evidently finding him untrustworthy, although he also thought that Wardrop had been naive. In February 1905 Belcher resigned as a director of the company and shortly after was declared bankrupt with gross liabilities of over £57,000. [77] Later the same year Alfred Frazer became managing director of the company, which was apparently investing in new equipment, and increasing output.[78] However, probably because of flat market conditions, the company did not repay its

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[73] *Kelly's Directory of Middlesex*, 1899; Compton & Faulkner, op.cit., p. 421

[74] Fern Lane brickworks is listed in 1914 and 1917, but has disappeared by 1926. *Kelly's Directory of Middlesex*, 1914, 1917, 1926.

[75] PRO: BT31/ 9608/ 71407

[76] PRO: BT31/10650/80615. Some of the plant and equipment at Northolt, including the Invicta machines were sold by auction in July 1903. *British Clayworker*, July 1903, p.153

[77] Details of the case were reported in *British Clayworker*, February 1905, p.371; Belcher's bankruptcy was noted in the issue for July 1905, p. 138

[78] An advertisement for the Wolff Dryer Co Ltd included an illustration of the Northolt site with two of their dryers installed, one acquired a year previously, the other more recently, as a result of increased output. The text contained an endorsement by Frazer. *British Clayworker*, March 1905, p.x

investments, and a foreclosure was forced by the first debenture holder, the International Finance Society Ltd. The company was wound up in 1906. [79]

How disruptive were these changes of ownership to production at Northolt? There is insufficient evidence to indicate whether business continued or was mothballed during the apparent interregnum before a new company took over. Certainly Frazer was associated with a new company, registered in 1908, Northolt Tile Works Ltd, which was set up to acquire and work a patent of Conrad d'Huc Dressler for improved fixing and manufacture of tiles.[80] Only part of the Northolt site was used by the new company, the remainder of the land and buildings being let to the Native Guano Company Ltd who were using one of the unwanted brick kilns as a guano store. [81] For want of any better information it may be assumed these patent tiles were manufactured at Northolt, although this is less certain once the company changed its name to Dressler Tunnel Ovens in 1912. The company started with capital of £20,000, but this was increased to £31,000 in 1914. The company changed its registered address in 1912 and again in 1913 and finally in 1916 to a site near Stoke-on-Trent suggesting that it might by then have relocated production away from London. The company was wound up voluntarily in 1917, in order that it might be reconstructed.[82]

The redundant Northolt works were taken over by West End Brickworks Ltd, whilst part of the site containing the worked out clay pits was leased by Frazer to Marylebone Council as a rubbish shoot (see above). West End Brickworks Ltd appear to have worked the site for about a decade until it was purchased by a new company, the Southern Brick & Tile Company Ltd, registered in 1927. This was a sizeable company, with a nominal capital of £157,500 which purchased the assets of West End Brickworks for just over £43,000. The sale seems to have been largely a paper transaction since two of the directors of the old company were on the board of the new. The new company

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[79] PRO: BT31/ 10650/ 80615

[80] Dressler was described as a sculptor and resided in Marlow. Patent No. 15879 (1907); PRO: BT31/18375/96526

[81] PRO IR58/ 29130/ Nos. 128, 189, 190. The Native Guano Company Ltd had promoted a process for converting sewage sludge into fertiliser in the 1860s, but it is not clear what operations were carried on at Northolt. See Halliday, S., *The Great stink of London: Sir Joseph Bazalgette and the cleansing of the Victorian capital.* Thrupp, 1999, p.119

[82] BT31/ 138335/ 96526; *British Clayworker*, March 1917, p.414

continued to enjoy use of the wharf, first granted by the Grand Junction Canal Company to the New Patent Brick Company in 1899, and shared the dock with Thomas Clayton (Paddington) Ltd who had entered into an agreement with Frazer in 1912. The company continued in existence until the mid-1930s, with mixed fortunes. A loss in 1929 was attributed to problems with outdated plant and equipment. In the following four years the sales of bricks rose steadily, as Table 9.4 shows:

Table 9. 4 Production of Southern Brick & Tile Works, Northolt

Year ending	Brick Sales		Profit/Loss (-)
	Quantity	Value	
Sept 1930	5,222,690	£13174-2s-6d	£1306-13s-3d
Sept 1931	7,139,600	£16434-6s-4d	- £920-0s-5d
Sept 1932	9,432,474	£20016-5s-0d	£4224-10s-0d
Sept 1933	10,314,920	£23751-19s-4d	£6488-16s-3d

Source: Directors' reports, 30th September 1930, 1931,1932, 1933. Included in BT31/ 138335/ 96526

In 1934 Thomas Clayton who owned the adjacent land south of the parish boundary in Yeading, Hayes, sold part of it to the company. In the same year it was proposed to sell the site to the Northolt Brick Company, by the Southern Brick & Tile Company acquiring a block of shares in the new company. In the event this arrangement was short-lived, for in the following year another new company, the Middlesex Brick Company Ltd, acquired the Northolt works. The Southern Brick & Tile Company was wound up in 1937.[83]

The new company owned the freehold of 200 acres in Northolt and Hayes and set out to increase the output of the works it had taken over by modernising the existing plant and adding new units. By 1936 it had increased production to about 25 million bricks per year and secured a contract for 20 million bricks with the London County Council for their housing estate at Hanwell. In the same year the company issued a share offer to provide the capital to build a large new integrated unit and these new works were opened in September 1936. They were on a scale, and with a degree of mechanisation, previously unknown in the Middlesex brick industry. In contrast to most other local firms MBC

[83] ibid

was using not the superficial brickearth but the underlying layer of London clay, previously thought to be very difficult to work. Although the clay was different the Northolt works were similar to many Fletton sites. Mechanical excavators were able to excavate forty feet below the surface and clay reserves were thought to be sufficient to allow production to continue for 120 years. All the manufacturing processes, after the initial clay getting, took place under cover in a large building containing brick presses, hot air dryers and a 400ft long tunnel kiln.[84] (see Illus 9.3) Production continued until the war, when presumably the fall in demand during the emergency controls curbed output. In 1941 the Royal Bank of Scotland, which had underwriten the company's debentures, foreclosed. The company was wound up by order of the Companies Court in July 1942. The site was subsequently purchased by Taylor Woodrow, who still use it. Thomas Clayton sold the remainder of the Yeading site to Middlesex County Council in 1954. [85]

The style of brickmaking at the remaining brickfield in Hayes was in marked contrast to that of Northolt a mile north up the Paddington arm of the canal. One company, the East Acton Brickworks and Estates Co Ltd continued to produce bricks for sixty years, making it one of the longest lived businesses of those we have encountered. Formed in 1886, and originally, as the name implies, working sites in the Acton area, the company acquired a brickfield in Hayes about 1900 and later concentrated all their activities there.[86] The firm's Hayes field was at Brookside, on the Uxbridge Road, just west of the point where it crossed the canal. In 1898 William Minet, a major landowner in Hayes, leased a forty four acre estate to George Wright, the proprietor of the East Acton Brickworks and Estates Co Ltd, for twenty one years, and from that original agreement brickmaking continued on the site, and the extra land subsequently added to it, until 1960. Minet also leased additional strips of land to enable a tramway to be built from the brickyard to a wharf on the canal.[87]

The company eventually owned about seventy acres of land, farming the parts not

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[84] Share offer 6th February 1936 included in BT31/36488/295931; a description of the new works appear in *British Clayworker*, September 1936, p. 178 and a report of the opening ceremony in *The Times*, 3rd September 1936, p.9

[85] PRO BT31/ 36488/295931; British Waterways, Hemel Hempstead, uncatalogued document.

[86] For the early history of the company see Harper Smith, A & T. *The brickfields of Acton.* 1991. p.21

[87] Lease Minet to George Wright, 14th December 1898. Minet Estate papers., N413; brickfield surrendered to Minet Estate in letter dated 19th December 1959. ibid, MF23

currently needed for clay pits; these latter always formed a small proportion of the total and in 1950 only fifteen acres were in use for brickmaking. [88] Additional land was added within a few years of the original lease; in 1903 John Crowle had acquired the lease of Hayes Bridge Farm, and on his death his executors assigned the lease to East Acton Brickworks. The farming interests were managed by the Rowse brothers, who also became major shareholders of the brick company in 1907. [89] In 1914 a further sixteen acres to the south were added to the brickfield, this time held on a five year lease, so that in 1919 both the leases came up for renewal together. [90]The agreements were renewed, but only for three years, with an expectation of an output of at least ten million bricks over this period. In this new lease the rent, at just over £3-0-0 an acre, had held level for a long period, but royalty payments had increased by 50 per cent since 1914, reflecting the inflationary effects of the war.[91] A further three-year lease was taken in 1922 and later documents indicate that the company acquired new portions of land from the neighbouring Coldharbour farm, amounting to some 14.5 acres over seven years, whilst surrendering to the landlord worked out land, some of which returned to agricultural use, whilst other parts became factory sites.[92]

The brickworks continued until the outbreak of war in 1939, output running at about four-and-a-half million stocks per annum; with wartime government control of the economy the works were compelled to close down, the hack grounds becoming a timber store, and another part of the site a British Restaurant. [93] Production resumed after the war, and a machine to mould yellow stocks was introduced in 1948, and expected to make about one million bricks a year.[94] However post-war output was disappointing, never returning to the levels achieved in the 1930s, as table 9.5 shows.

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[88] *Hayes Gazette*, 29th September 1950

[89] Besides the brickmaking and farming interests, they also owned the eponymous West Ealing department store. ibid

[90] Lease William Minet to EABWE Co Ltd, 17th November 1914. Hillingdon Archives: Minet Estate Papers, N.416

[91] Lease Minet to EABWE Co Ltd, 1920. Hillingdon Archives: Minet Papers, N542.

[92] East Acton Brickworks. Survey showing position at the commencement of road works, 16th May 1938. Minet Papers, N.544

[93] Letter EABWE Co Ltd to Minet Estate office, 1st September 1941. Minet Papers, MF23; *Hayes Gazette*, 29th September 1950

[94] Letter EABWE Co. Ltd to Minet Estate Office, 21st June 1948. Minet Papers, MF23

Table 9.5 : Output of the East Acton Brickworks & Estates Co Ltd, Hayes brickfield, 1939 - 1958

Year	Total output
1939	4,795,219
1946	929,200
1948	1,243,397
1949	1,515,492
1951	1,380,665
1952	1,354,853
1955	938,486
1958	724,236

Source: Royalty statements to Minet Estate. Minet Estate papers, MF23

Stocks were still made by traditional methods, mixing chalk and ashes with the clay; although some moulding was now done using machines the bricks were laid out in hacks to dry and were burnt in clamps of about 300,000 bricks, which took between six and eight weeks. The red bricks were made by hand, two men making about 1300 per day, but these were fired in a permanent kiln which held about 55,000 bricks.[95] Because manufacturing methods were similar to those employed a hundred years before, output could be affected by adverse weather. In a note attached to the 1951 royalty return, Minet's agent recorded a wet season with "only one week of completely fine weather and in that week the machine broke down". The following year the climatic culprits were "a storm in August and snow at the end of March...just as they had commenced to make".[96]

Stock brickmakers had always to cope with the vagaries of weather. However the main problem facing the company in the post-war period was the difficulty in finding suitable workmen. In 1950 the labour force numbered around twenty, compared to the sixty employed pre-war. As men left, particularly as the long-serving ones retired, it was hard to replace them, especially as with the contraction of the Middlesex industry there was no local pool of skilled labour. Five years later the numbers had shrunk to nine men and two boys, and recruitment was undermined by the better job opportunities in the industrial estates that had taken over many of the brickfield sites in the vicinity. The

[95] A photograph of 1950 shows a clamp of about half-a-million bricks. *Hayes Gazette*, 29th September 1950.

[96] Royalty returns. Minet Papers, MF23

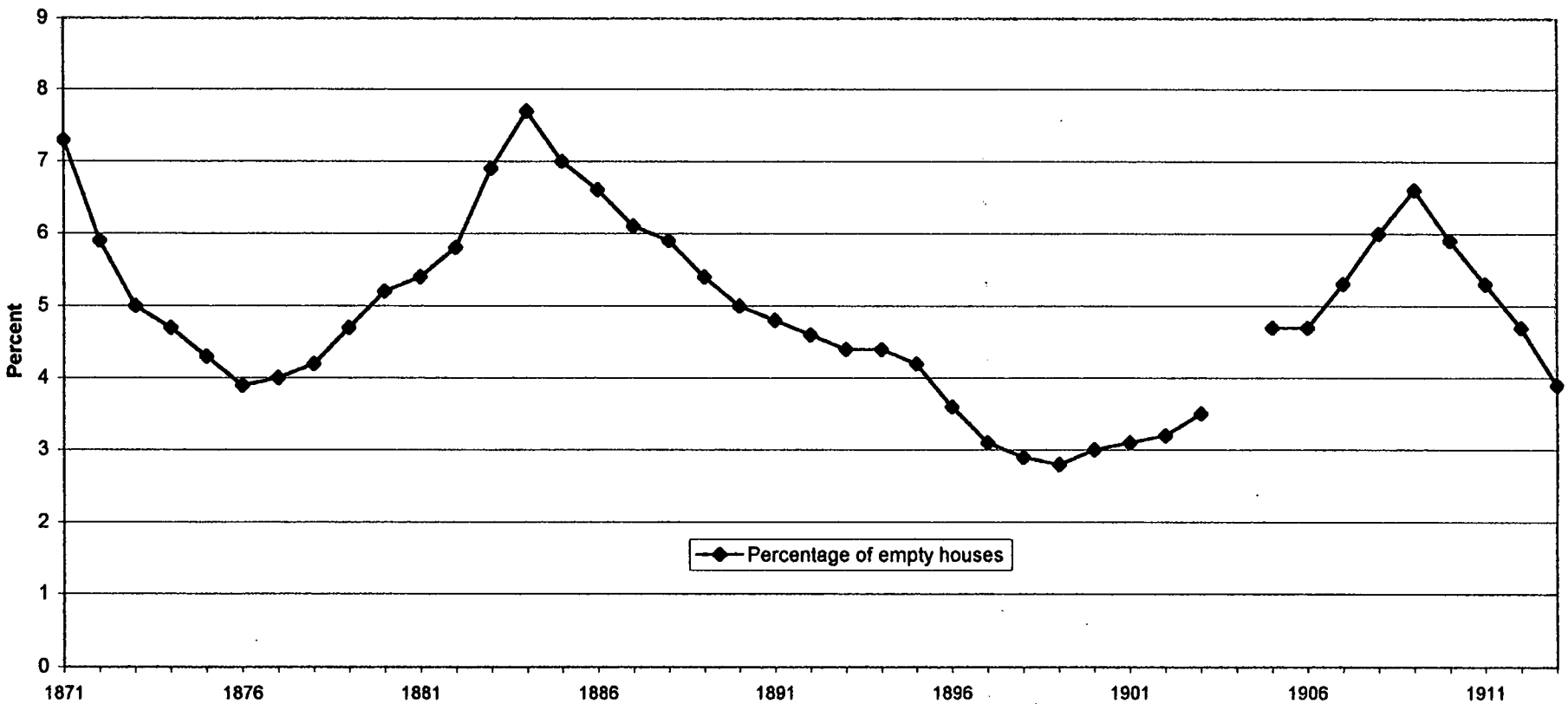
owners recognised that they could not compete "as factories are offering much too good wages and much better conditions of working". When the brickworks finally closed at the end of 1959, it was because it was uneconomical to run the operation at such a low level of output; because of a lack of trained workers, production could not be increased. Amongst the men who were made redundant were two brothers who had both been employed for forty years. [97]

There was much correspondence in the ensuing months between the company and the Minet Estate office about the restoration of the land so that it could be returned to agricultural use, the same concerns that had exercised landowners a hundred years before. The company, no longer having any working brickfields, went into voluntary liquidation. Brickmaking in West Middlesex had come to an end.[98]

[97] Minet Estate papers, MF23; *The News*, 6th February 1960;
[98] Letter John Norman Rowse (liquidator) to Minet Estate Office, 6th December 1960. Minet Papers, MF23

Graph 9.1: Empty houses in London, 1871-1913

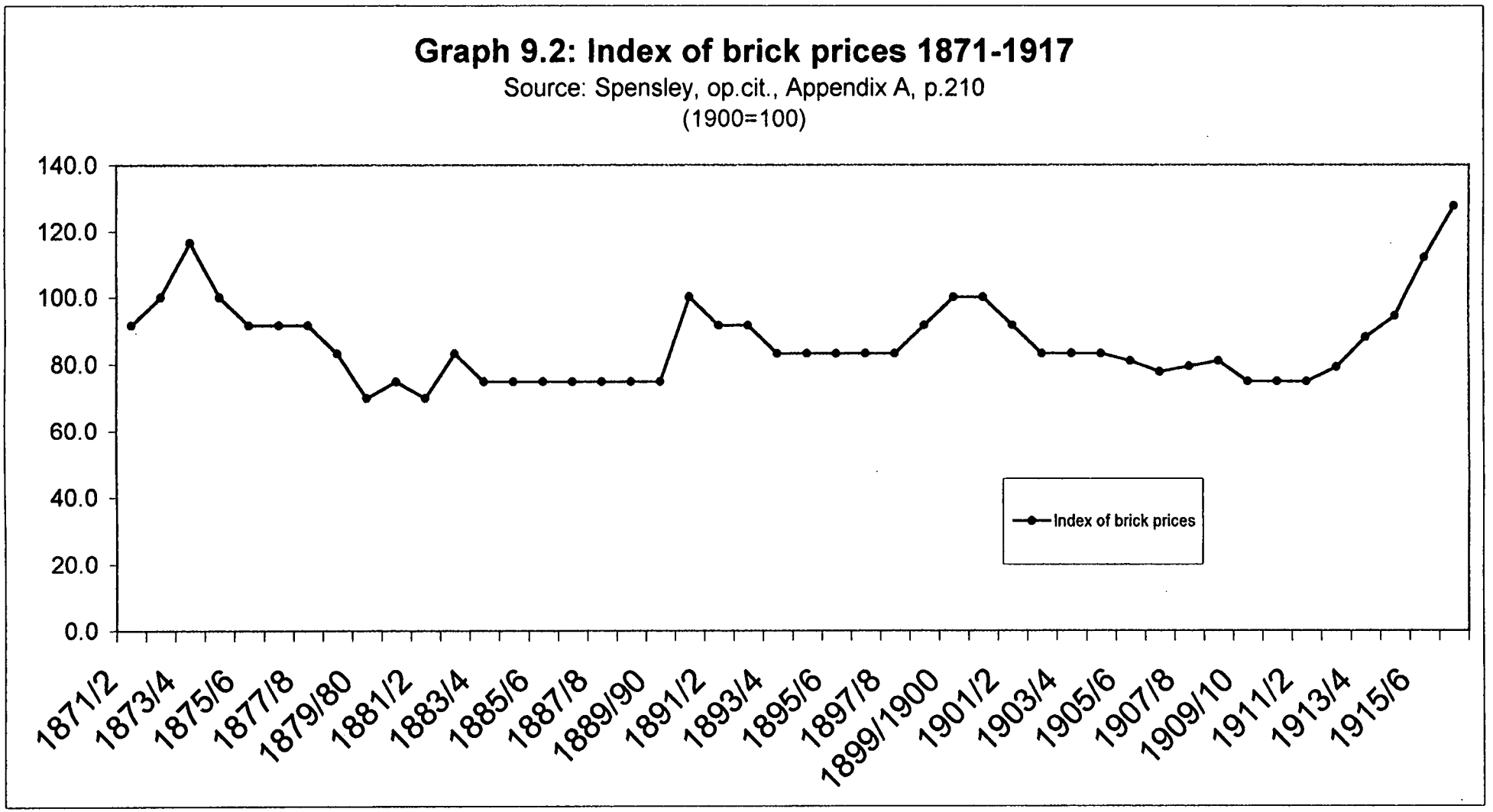
Source: Spensley (1918)



Graph 9.2: Index of brick prices 1871-1917

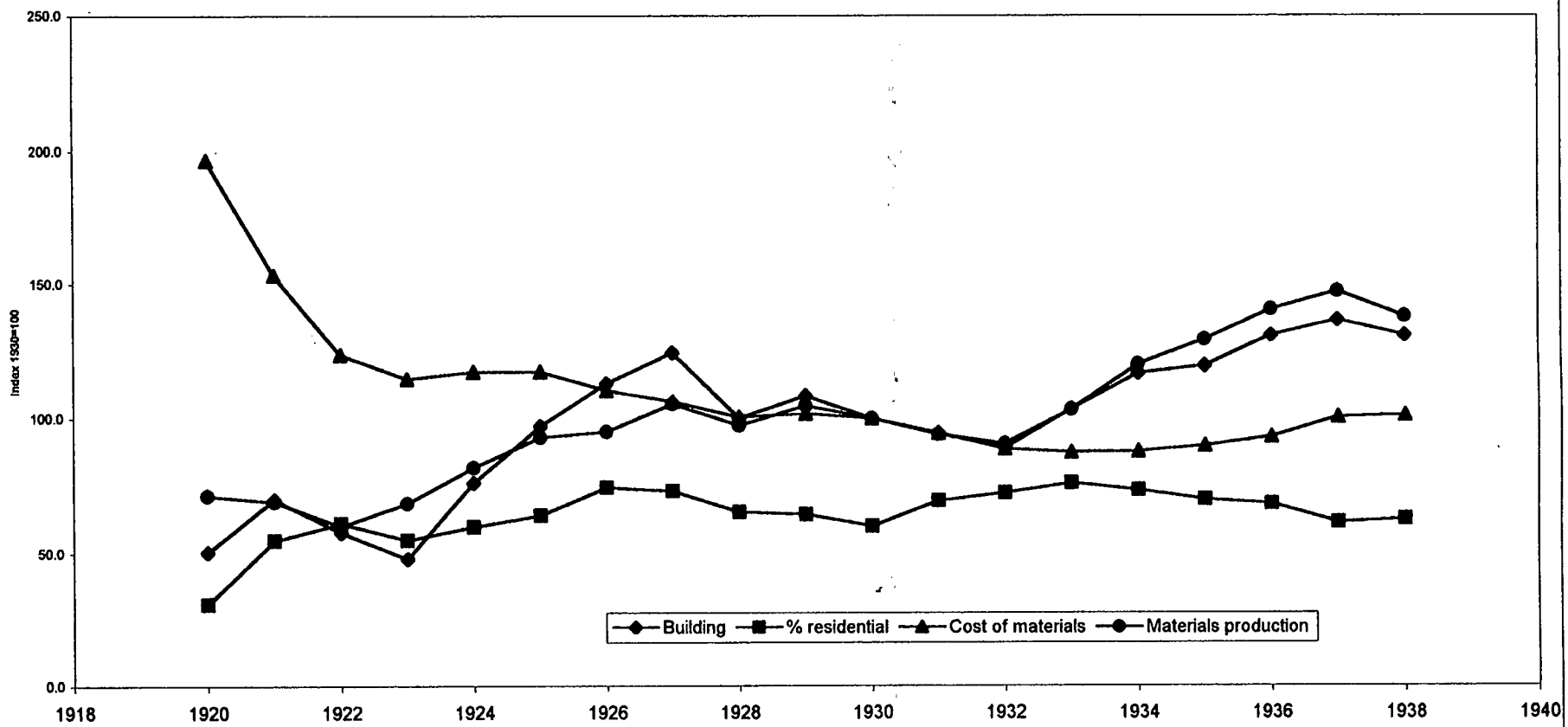
Source: Spensley, op.cit., Appendix A, p.210

(1900=100)



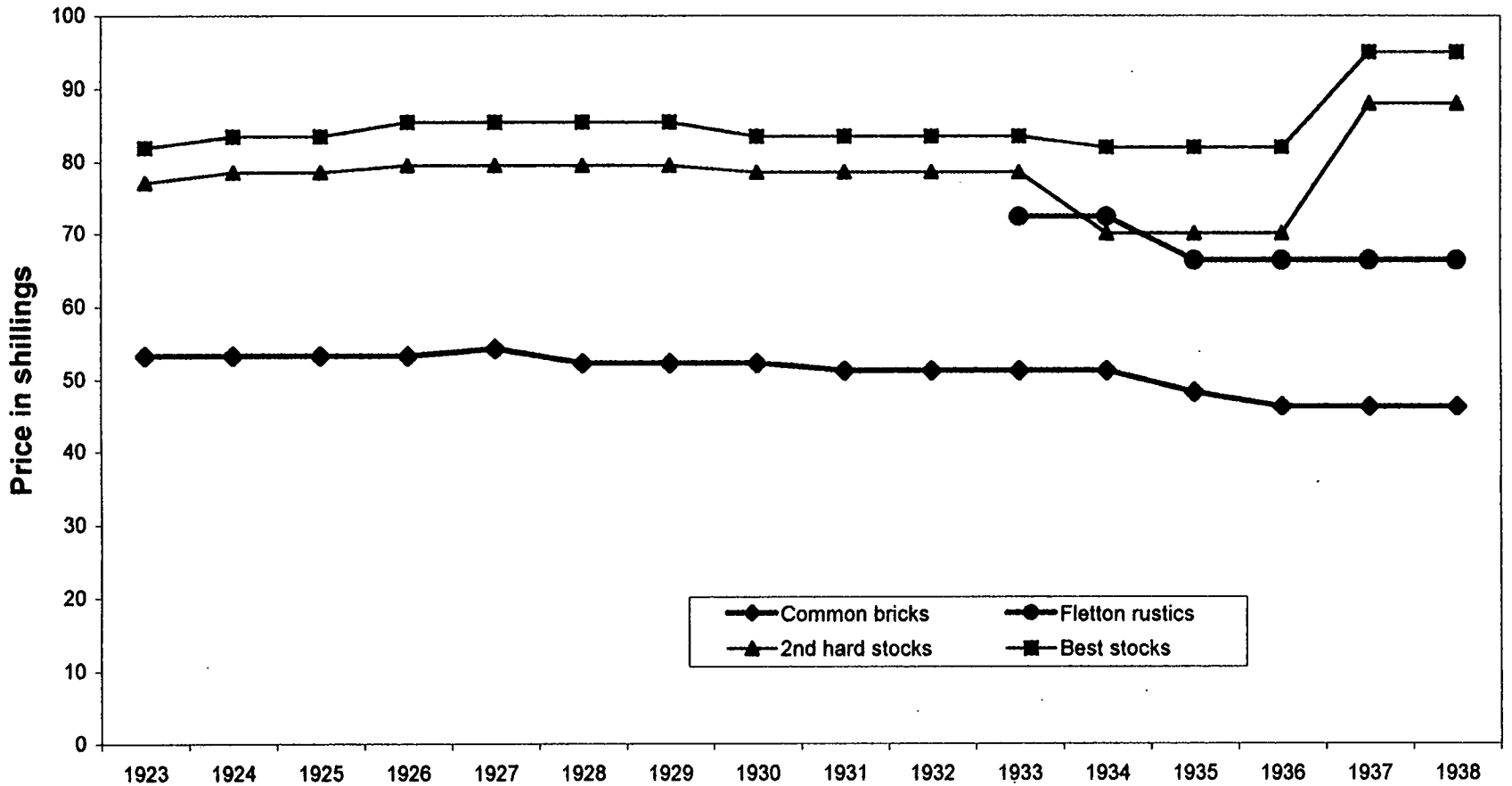
Graph 9.3: Fluctuations in building 1920-38

Source: Richardson & Aldcroft, op.cit., Tables 4 & 7



Graph 9.4: Comparison of the price of flettons and stock bricks 1923-1938

Source: Bowley, op.cit., Table F, p.177



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Illus 9.1: Advertisement for Broad & Co Ltd 1917
(Source: *Post Office Directory of London* 1917)

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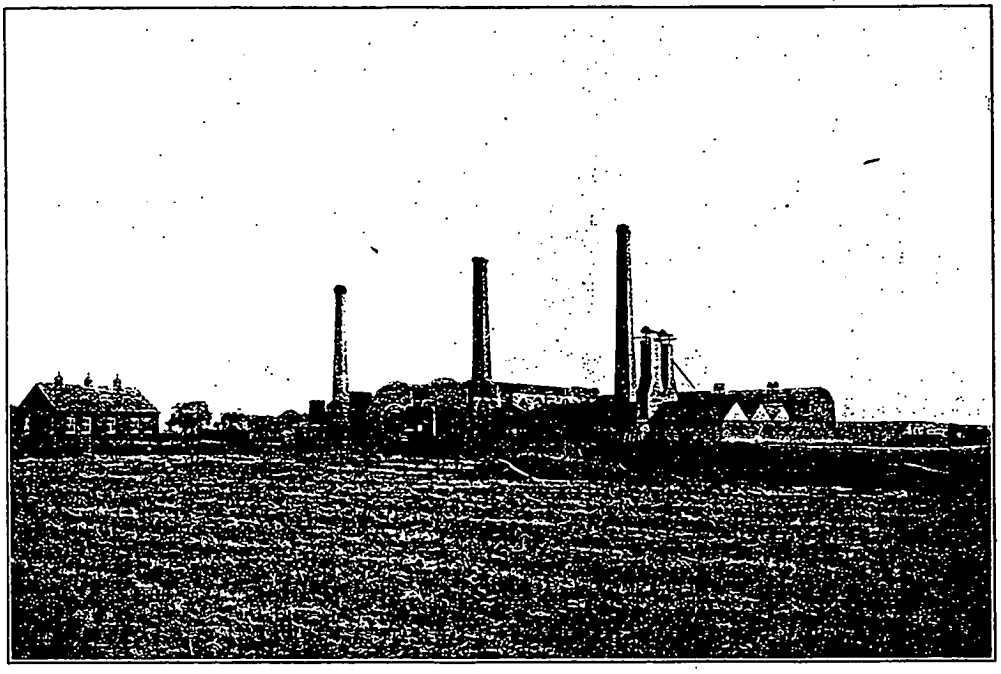

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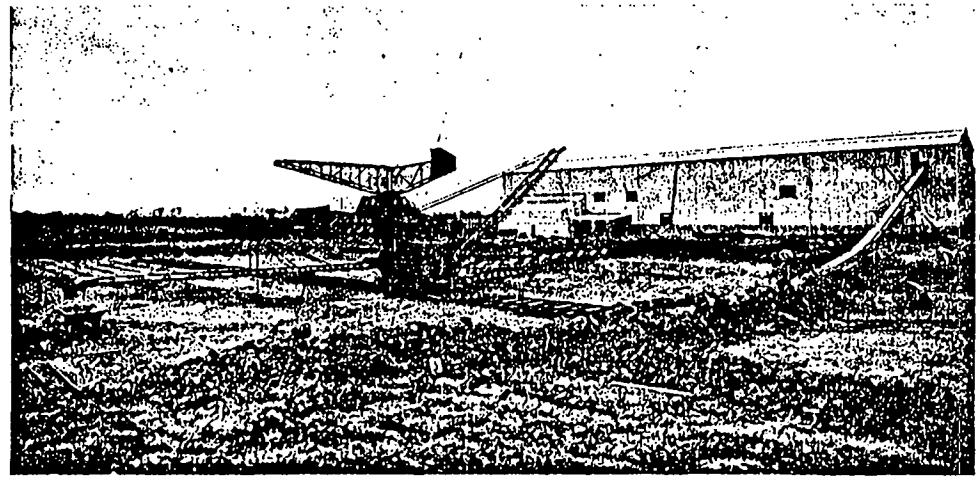
Illus 9.2: New West End Brick & Joinery Company's works at Northolt.
(Source: Advertisement in *British Clayworker*, March 1905)



Illus 9.3: Middlesex Brick Company's works at Northolt 1936
(Source: *British Clayworker*, September 1936)

Brickmaking is an industry that has been neglected by historians, and, whilst regrettable, this is understandable, because, as has been argued, it left fewer records than many others and is, consequently, quite difficult to investigate. The foregoing chapters attempt to remedy this omission, at least for part of the industry in the nineteenth century. Caution is required, however, in using this information; it should remembered that stock brickmaking had particular characteristics – the use of clamps is the most obvious one – and it is unwise to draw general conclusions about the industry nationwide from this local study.

There is a danger in concluding from this neglect that brickmaking was an insignificant industry. Yet this clearly cannot have been the case, since the quantities of bricks required to build Victorian London could only have been produced by a sizeable industry, albeit one that consisted of many small productive units. Having said this, alongside the many firms which produced only a few million bricks each season with only twenty or thirty workers, there were some major concerns, such as those of Pocock, Tildesley, the Rutters and the Strouds. These were businesses with more than a hundred employees, making them large operations by the standards of the time. As I have attempted to show it was quite easy to set up as a brickmaker, because of the modest requirements in terms of capital and equipment. Despite this, or perhaps because entry into the business was relatively easy, many firms were shortlived; even those that lasted and became substantial operations on several sites have left few more records than their smaller cousins.

Conditions of employment in the industry - seasonality, sub-contracting, and sites in remote or isolated places - all tended to soften its impact on contemporary observers and consequently on later historians. The absence of large buildings and major plant and machinery, though not unusual in Victorian industry, as Raphael Samuel and others have shown, reduced brickmaking's visibility in the landscape, and provides little material for the industrial archaeologist. In the stock brickmaking sector of the industry, the use of clamps rather than kilns further reduced the possibility of the survival of physical remains. So for these and other reasons brickmaking has not had the attention that, for example, the textile factories of the north of England have received. Whilst these

factories have been seen as representatives of the leading edge of the industrial revolution and pioneers of a new pattern of work discipline, but were by no means typical of Victorian industry as a whole. Brickmaking, by contrast, retained links with an older style of manufacture, continuing to rely on hand methods, and was able to increase production mainly by employing more labour, rather than by investing in machinery.[1] Yet even here brickmaking does not provide a uniform picture across the country, and stock brickmakers supplying the London market appear to have been less mechanised than firms elsewhere in the country.

Brickmaking was also overlooked by factory regulation, being one of the last industries, partly because of the small size of its productive units, to come under the jurisdiction of the Factory Acts, several decades after the first attempts were made to control working arrangements in textile factories

In West Middlesex brickmaking was integrated with agriculture and horticulture in a rural environment and this made it possible to return sites to cultivation once brickmaking had ceased. Brickmaking in these circumstances was always transitory, since the type of clay in use, found as shallow deposits near the surface, meant that land was used up within a few years. The cheapness and plentifulness of manure from metropolitan sources, and the ease with which it could be transported by canal, allowed some of this land to be put back into productive condition after brickmaking had ceased. A generation after brickmaking had occurred it would have been difficult to see that it had ever happened, except for the lowering of the surface of the land by comparison to adjacent areas.

Although most traces of the brickmaking that once was so common in West Middlesex have now disappeared, there are some pointers to its presence and some attempts have been made to reclaim its heritage. Some local names perpetuate the connection with brickmakers: the *Brickmakers' Arms* in Yiewsley; a number of street names, Rutters Close in West Drayton, Rigby Lane in Dawley, Clayton Road in Botwell, Westbrook Road in

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[1] Samuel, R., "Workshop of the world: steam power and hand technology in mid-Victorian Britain". *History Workshop*, Vol.3, 1977, p.30

Heston and Invicta Grove in Northolt. Interpretation boards on the canal towpath near Stockley Park alert the walker to the once important industry, and the entrances to some of the many canal docks can still be seen on the canal bank.

Although brick firms do not seem to have been of the size and complexity to need the structured management that developed in some large organisations in the second half of the nineteenth century, of which railway companies are the classic example, some rudimentary bookkeeping and the recording of orders and deliveries must have been required. Such records do not seem to have survived and the absence of surviving account books and other kinds of business papers makes it difficult to examine in detail the operation of firms within the industry, and this is one of the areas in which this study is admittedly thin, and the conclusions tentative.

It is because of these shortcomings in the source material that a broad brush approach has been adopted to explore a neglected area of manufacturing. What, then, are the main conclusions that can be drawn? Four areas seem particularly worthy of consideration: the relationship between brickmaking and the Grand Junction Canal; the close connection between brickmaking and refuse collection and disposal; the volatility of demand for bricks and the way that the industry accommodated these fluctuations; and the way brickmaking and the related activity of gravel extraction in West Middlesex operated in a largely rural economy and the continued impact they had on land use.

It is difficult to imagine a major brickmaking industry operating in West Middlesex without the presence of the canal, in the same way that the Kent stock brickmakers were dependent on the Thames and Medway. Although brickmaking had taken place at various places in the district before the end of the eighteenth century, the construction of the canal acted as a catalyst in opening up the area to large-scale brickmaking and gravel digging. A causal mechanism between the canal's building and the start of a major period of brickmaking has been proposed. There is no direct evidence that landowners were responding to the discovery of brickearth in their soil, but excavating the bed of the canal inevitably uncovered the stratigraphy of the soil. Even if amateur geologists did not flock to the view the sites of the new canals as they were later to do with some of the

more spectacular railway cuttings, a natural curiosity may well have attracted the local farmers and landowners to work being carried on adjacent to their land.[2]

The digging of the canal revealed the potential of the soil, if it was not already known. Thereafter the canal was an integral part of the operation of the industry, affording a means of bringing in raw materials as well as distributing gravel and the finished bricks. Despite the presence of a line whose terminus was adjacent to the canal basin at Paddington, the railway never became a significant carrier of bricks for the Cowley district, and the canal retained most of this trade at least up to the end of the nineteenth century. The benefits were not one-sided. If the brickmakers made extensive use of the canal, then their trade provided a significant part of the Grand Junction's traffic. The short distance cargoes in brick, gravel, hay, manure and rubbish on the Paddington arm were of the high bulk, low value type which canals were ideally suited to carry and which were not subject to the railway competition that took long distance high value goods off the canal. It is noteworthy that there does not seem to have been a large scale transfer of brick traffic from the GJC to the GWR, despite the proximity of both canal and railway in some parts of the Cowley district. The retention of the brick traffic was one of contributions to the GJC's continued profitability, and suggests a revision, at least in this particular case, of the general view that railway competition precipitated the economic decline of canals. This is a topic that requires more research.

In many ways the canal was of major importance to the economy of the parishes through which it passed, in terms of the bricks, gravel and agricultural produce that it carried to the city and the supplies of breeze and manure that were made available to brickmakers and farmers respectively. The impact of the canal, easy to assert, is more difficult to quantify, and could form the subject of a separate research project. A comparison between areas through which the canal passed with other Middlesex parishes which did not enjoy this advantage might be instructive.

The intimate connection between brickmaking and rubbish disposal from central London is of major importance. At one level, refuse provided a useful return cargo for

[2] Both canal and railway building had an important impact on the study of geology, and the first geological maps were drawn by William Smith, himself a one time canal surveyor in the late eighteenth century; see

shipments of bricks to the city, but the relationship between the two was much more significant than that. The economics of rubbish disposal depended very much on the price brickmakers were willing to pay for ashes, and a fall in demand for bricks could result in an accumulation of rubbish on refuse wharves. Although I have focused on this from the brickmakers' perspective this is a subject that would reward study from the rubbish disposal point of view, by looking at the contractors and their interaction with the local vestries. The mutual dependence of the refuse trade and brickmaking may appear somewhat overstated, but it is well illustrated by the events of 1879. In that year Paddington Vestry

> purchased freehold land at Alperton for the purpose of storing dust and ashes, which were so plentiful owing to the depression of the brick trade, as to require payment for its removal. The purchase of this land provided an outlet for the material, which, although it has since been sold at low and varying prices, would have entailed an enormous expense if it had been removed from the Paddington wharf regardless of the state of the market; thus it will be seen that the result has justified the action of the vestry, deciding at any time to dispose of the same.[3]

The land was put to use again in 1901 when the demand for ashes and breeze again fell and was eventually sold in 1924 for industrial use. [4]

The relationship between brickmaking and rubbish collection was self-perpetuating only as long as the metropolis continued to expand. The occupants of the new buildings put up with Cowley bricks contributed an increasing volume of rubbish which brickmakers could only absorb if the demand for bricks remained strong. Eventually other factors intervened and changed the relationship; bricks were made at sites farther from London and using methods that did not require the ashes and breeze, and local vestries looked at different ways of rubbish disposal prompted by sanitary as well as economic concerns. Although some brickmakers continued to use ashes and breeze in the 1920s and 1930s, the industry no longer occupied a central place in the economics of refuse, merely providing local councils with a useful source of income to offset their costs.

It can be argued that refuse is not intrinsically useless, but material that is a nuisance in its present location. A pile of manure is a problem on a street corner in a city but a

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M. Freeman, *Railways and the Victorian imagination*. London, 1999, p.15

[3] Westminster Archives. Paddington Vestry Works Committee, 25th June 1896

valuable source of fertiliser in the corner of a farmyard. For much of the nineteenth century cities like London and Paris depended on a rural hinterland to absorb this waste; as areas near the city became suburbanised waste had to be taken farther to less populated and still rural districts. Eventually the process was transformed by changes in the composition of the waste stream as the largely organic material was adulterated by metals, plastics and other packaging, by the introduction of incineration in some London boroughs, and the use of marginal land such as the Essex marshes. Having said this, rubbish still provides landfill for the large clay pits of the Fletton brickmakers.

A similar process had occurred with London's sewage. The much applauded metropolitan sewage scheme carried out by Bazalgette and the Board of Works successfully removed the problems of pollution in the city associated with cess-pits and the health hazards that resulted from it, but left accumulations of sewage sludge at the treatment centres. It was still envisaged that this material had value and could be put to productive use as a fertiliser, and firms like the Native Guano Company produced ingenious plans for converting the sludge into a marketable commodity.[5]

Waste materials such as ashes, breeze and manure had sufficient value to offset the costs of removing them for the city. Indeed for much of the century the value of London's rubbish was sufficient to provide a profit on the activity. One expert asserted that London's sewage if applied to agricultural purposes was equal in value to the local taxation of England, Ireland and Scotland.[6] French writers at the same time spoke of the value of the rubbish in their large cities, such as Paris or Lille, as a potential major export.[7] The way that rubbish could be recycled – predating the more modern interest in the concept- reinforces the notion of circulation that was identified in the first chapter and illustrates the continuous process of interchange between the city and its surrounding region. The development of a model of the metropolitan economy, taking account of these relationships, would repay more investigation.

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[4] Ibid, 28th February 1901; Paddington Borough Council. Minutes, 26th February 1924.
[5] Halliday, S., *The great stink of London: Sir Joseph Bazalgette and the cleansing of the Victorian metropolis.* Far Thrupp, 1999, p. 108-123
[6] Ibid, p.116
[7] Corbin, A., *The foul and the fragrant: odour and the social imagination.* London, 1996, p.116

The gravel extraction that took place side by side with brickmaking, and often took over sites once the brickearth had been removed, had a different relationship with rubbish disposal, one that is more like that of modern brickmakers, with their very deep clay pits, which can accommodate large quantities of rubbish as landfill. Unlike brickmakers, gravel firms did not use ashes and breeze in a constructive way, but as a means of filling in their excavations, and providing a return cargo for their boats. This use of old workings as landfill sites started at the end of the nineteenth century and continued through the 1920s and into the 1930s until there began to be serious objections about the presence of refuse shoots in areas that were rapidly casting off their rural appearance and becoming suburban. Refuse tipping stopped in Middlesex in the late 1930s, following the passing of the Middlesex County Council Act of 1934, and increasingly had to be much farther from the city.

To turn then to the demand for bricks and their supply. The evidence that has been examined in Chapter Three points to sizeable fluctuations in the demand for bricks and other building materials in the nineteenth century and this had implications for the nature of the industries that supplied them. These industries shared the volatility that has always been a feature of the building trades. When demand was strong production was increased, and, when slack, output scaled down. It was relatively easy for a brickmaker to increase production by employing more brick moulders, and they in turn their teams, and by digging out more of the brickearth in the land that he rented. On the labour side hiring staff on an annual agreement and the extensive use of subcontracting gave brickmakers considerable flexibility. In terms of raw materials, the nature of brickmakers agreements with landowners also provided opportunities for varying the pace of exploitation of the brickearth. Land could be worked out within the longish leases that landowners often provided (up to 21 years) and the conditions usually allowed for the surrender of the land before the term had expired. So fluctuations in demand could be accommodated by exploiting a given piece of land quickly when conditions were favourable, and at other times more slowly when the market was sluggish. Conditions in leases usually specified that a minimum quantity of bricks would be made each year, but also made allowances that this figure was an average achieved by higher production in some years and lower production in others.

Whilst these adjustments provided the means by which brickmakers could accommodate changes in demand, and scale production accordingly, the strategy depended on the existence of a reserve pool of labour. The workforce in brickmaking was fairly mobile and was able to work at the many sites along the Grand Junction Canal, and its Slough branch, and in other districts within the London area. Changes in the level of production were, however, not only determined by the demand for bricks, but also by the timing of landowners' leases and their termination. It is difficult to see all these complex interactions from the easily available statistics. Censuses at ten year intervals cannot pick up fluctuations in activity that occur from season to season, nor can they account for differences in the number of workers who arrived only for the summer season. Nevertheless some parishes did experience drops in population between censuses, for example Cowley between 1821 and 1831, Hayes between 1851 and 1861 and Northolt between 1861 and 1871. This last is certainly attributable to a fall in the number of brickmakers in the parish.

It would be of some interest, therefore, to identify the contribution that brickmaking made to the social character and economic life of individual parishes, and to calculate the impact that a reduction in activity made. What was the level of distress among brickmakers and their families when demand was slack and owners reined back production? In this study is has only been possible to provide some clues to this, for example in the comments made about Heston in the 1890s when brickmaking had ceased occasioning high levels of poor relief. This suggests that work on the records of local vestries (district councils after 1895) and Poor Law Unions could be helpful in providing more detail.

In Chapter Five the role landowners played in the development of brickmaking was considered. It was argued that they were able to choose whether to offer their land for brickmaking, and, if they did so, to select the appropriate moment when this would prove most profitable. We can only assume, in the absence of any conclusive evidence, that this choice was made by the owner, but this may not always have been so. Landowners, rather than initiating the process, may have been responding to expressions of interest from brickmakers looking for land; for the former brickmaking represented an important, but not unique, non-agricultural use of land adjoining the canal, others

being gasworks, chemical works, and food processing, all businesses that relied on the canal to bring in raw materials and fuel, and ones that were not likely to be welcomed in more developed areas.

The presence of the canal appears crucial in suggesting land use options to landowners, and not just from an economic point of view. Landowners saw canals and, later, railways driven across their estates, certainly with financial compensation, but ultimately without their consent, and this process changed their relationship with the land, both at a physical, but also at a psychological level. It seems possible that landowners found it easier to envisage uses other than agriculture for their land, once it had been subject to major disruption. For it became difficult to work the land in a traditional way because of the barrier a canal formed, and the isolated areas that were created no longer seemed attractive to agriculture, but could be used for building or industry. For some landowners the problem was compounded by the similar impact of the railway thirty years later. We have seen, for example, that a narrow strip of land was isolated between the canal and the railway on De Burgh's estate in West Drayton, removing its agricultural usefulness but making it highly suited to industrial activity.

The presence of the canal, by making non-agricultural uses of the adjacent land more likely, also reinforced the dependant relationship between the city and its rural hinterland. The reception of London's refuse was one example of this. The adoption of old brickfields and gravel workings as landfill sites for domestic rubbish clearly limited their future use, but even without this activity brickmaking itself had a long term impact on the belt of land beside the canal in West Middlesex. Brickmaking, using the thin seams of brickearth, was essentially a transitory business, exhausting quite large acreages within a few years. Where gravel working followed brickmaking this period was, of course, extended, but ultimately much land became available for other purposes, and was used in a number of different ways. Some land reverted to agricultural or horticultural use, once it had been revived with boatloads of manure, but may have lost much of its original fertility, limiting its value. Some of it still survives as open space, its disturbed and uneven surface being useful only as rough pasture. Some land, particularly that abutting the canal, took on other industrial uses, one of the earliest such cases being the sale by Pocock of land at West Drayton to a manufacturing chemist. Southall became the

site of a number of factories, including the extensive margarine works opened by Otto Monsted in 1913. Other food manufacturers also found canalside locations attractive and in 1922 J.Lyons established a tea blending part in Greenford, and created the last new dock on the Paddington arm. [8] The canalside locations at Botwell became in the early twentieth century the site of a major industrial area, on which EMI Records was one of the best known businesses. That narrow strip of land between the canal and the railway at West Drayton, which Pocock, and subsequently Broad and Harris, had to cope with, has become the site of light engineering and similar companies, as well as a concrete business. Other areas have more recently been reclaimed; at Stockley Park a quantity of derelict land has been transformed into a business park which has incorporated into its landscaping the remains of a disused dock as a water feature, as well as perpetuating a name associated with Cowley brickmaking.[9] Most docks, however, have been filled in, the extensive Otter Dock being a major example, but traces of their presence can still be seen from the towpath.[10] The bridge that carried the towpath over the entrance to Shackle's dock in Hayes has been restored.

Some industries that took over the land vacated by brickmakers may originally have used the transport facilities of the canal, but commercial traffic on the canal finally disappeared in the 1970s and most companies had long since ceased to use it. However canalside locations have retained their industrial uses, and housing development remains unusual on the Grand Junction Canal, though much more common on the Regent's Canal, Little Venice being perhaps the best known example.

In terms of land use, there is an assumed transition from agriculture to brickfield to housing estate, but the timing of these stages varies. Thus there is a marked contrast between areas closer to the centre of London, where brickmaking was usually succeeded by residential development, the fields being just in advance of the building line, and those in distant areas in Middlesex, Kent and Essex which were not affected by the outward spread of the built-up area of the metropolis. Of the different parts of the Cowley district it is only in Southall that suburban development absorbed the brickfields,

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[8] Faulkner, A.H., *The Grand Junction canal.* 2nd edition, Rickmansworth, 1993, p. 150
[9] *Grand Union Canal in Hillingdon.* Leaflet, n.d.
[10] Cox, A.H., "The Otter Dock". *West Drayton & District Historian,* xcii, 1989

but even here it was the growth of the town itself rather than the advance of the metropolitan building line itself. The rest of the district only experienced major suburban development in the 1920s and 1930s, and some parts had not been built over by the time that the green belt intervened. Here there was a long delay between the transition from agriculture to brickmaking and the later use of the land for housing. In the interval the land, especially where it was badly disturbed or marked by water filled claypits, was adopted for unsavoury purposes.

As we have seen a number of old brickfields and gravel workings became rubbish tips. These were blighted areas, difficult to put to productive use unless expensively reclaimed and detoxified. In some cases this has happened and is still continuing; a site that Robbins described in 1950 as "a horrible refuse dump" was eventually used to house the Willow Tree Estate, a major council house scheme by the boroughs of Ealing and Hillingdon, whose name recalls the Willow Tree Dock.[11]

The survival of much open space in this part of Middlesex may in part be the result of the extensive brickfields that once covered the area. Land that had been used for brickfields, and had then reverted to rough pasture, or perhaps been used for landfill, was less attractive to developers than land that had always been farmland. The much deeper gravel pits presented even bigger problems, either having being used as rubbish tips or becoming flooded. It is difficult, however, to distinguish between the effects of brickmaking on land use and the consequences of the presence of the canal, and of the range of industries that grew up on its bank. Brickmaking as a major industry in West Middlesex existed for about a century but its impact on the landscape and the economy of the western part of the Greater London area has been significant. The connections that come from a study of one industry suggest that a larger investigation of this area and its relationship with the city would prove useful in understanding some of the complexities of the metropolitan economy.

[11] Robbins, M., *Middlesex*. London, 1950, p.287; University of Liverpool Environmental Advisory Group. *Transforming our wasteland: the way forward*. London, 1986, p. 65-67

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MAF68	Crop returns

London Metropolitan Archives

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Acc 180	Hayes manorial records
Acc 289	Northolt manorial records
Acc 328	Passingham Estate papers
Acc 397/11	Passingham Estate Act
Acc 405	Jersey estate papers
Acc 506	Jersey estate papers
Acc 538	Papers from Woodbridge & Son, Uxbridge, solicitors
Acc 742	De Burgh estates in Hillingdon and West Drayton
Acc 969	De Salis estates in Harlington
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Acc 1214	Isleworth Brewery Company
Acc 1216	De Burgh estates in Hillingdon and West Drayton
Acc 1261	Shadwell papers relating to Greenford and Northolt
Acc 1386	De Burgh estates in Hillingdon and West Drayton
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Breeze. Cinders or coarse ashes remaining when the finer ash has been seived out of domestic refuse collected by scavengers. As breeze resulted from incomplete combustion in domestic fires it was sufficiently combustible to act as fuel for burning bricks in clamps or kilns. (2)

Brickearth. A general term for any loamy clay that can be used for brickmaking, but used more specifically to describe the wind-blown, fine-textured soils which have been re-sorted and re-deposited by water, frequently in old river terraces. Many of the brickearths of Southern England and Northern Europe were initially blown southwards by glacial winds which picked up many deposits formed by the melting Pleistocene ice sheets. Brickearths give fertile, easily worked soils and are generally classified as of high agricultural value. (1)

Callow. The top soil which has to be removed from a clay ground before the clay can be extracted for brickmaking. Hence **uncallowing** (q.v.) (4)

Clamp. A carefully constructed stack of unburnt bricks with gaps for fuel and to allow hot gases to circulate, which was the traditional method of firing bricks in the London area. The different temperatures achieved at the centre and edges of a clamp produced varying degrees of over-burnt and under-burnt bricks were sorted into a number of different grades. Clamps normally contained 30,000 to 45,000 bricks, but could contain as many as 150,000. Clamps took two to three weeks to burn through, but large clamps took much longer. (2 and 4)

Clay. A natural argillaceous substance of soft rock which develops plastic qualities with the addition of a small amount of water. It then becomes malleable into different shapes which will retain their form when either air or oven-dried. Clays have different physical properties because of their differing chemical and mineralogical compositions, but in general they are based on a hydrous aluminium silicate. (1)

Crowder. Another name for a **setter** (q.v.)

Crowding barrows. Barrows used by crowders (or setters) to wheel dried bricks to clamp or kiln, and for moving fired bricks to loading areas for carts or barges. They differed from hack barrows in being shorter, and more upright. The bricks on crowding barrows were firm enough to be stacked rather than laid out in a single layer as on the hack barrow. (4)

Flattie. A **walk flatter** (q.v.)

Fletton. Common bricks made from the Lower Oxford Clays in Bedfordshire, Buckinghamshire and the Peterborough area. These bricks, notable for their granular consistency when broken open, are produced by the semi-dry process, in the which the clay is ground and dampened, then subject to high pressure moulding. After the 1880s they were widely used in the London area, and are the most common brick produced in the United Kingdom. They take their name from the village of Fletton near Peterborough. (4)

Frog. An indentation in the surface of a brick which reduces its weight, makes it easier to handle and minimises the clay used in its manufacture. When laid "frog-up" the indentation is filled with mortar by the bricklayer. (2)

Gault Bricks. Bricks made from the gault clays which associated with the chalk belt of eastern England. They are normally yellowish in colour but may emerge as pink or red according to their position in the kiln. (2) Robert Beart made his patent perforated bricks from this kind of clay, at Arlesey in Bedfordshire. (4)

Hack(s). An area of ground on which freshly moulded bricks were laid out to dry. Also known as the hack ground. Bricks were often protected from the weather, especially the effects of rain, wooden covers. (4)

Hack barrow. A long flat barrow with a single front wheel, used for carrying bricks from the moulder's bench to the drying hack. Each barrow could hold 28 – 30 bricks, laid out in two rows. (3 & 4)

Hoffman kiln. A type of kiln, circular in plan and designed for the continuous production of bricks. The kiln was divided into many chambers, usually about a dozen, and each chamber in turn was loaded with "green" bricks which were dried, burnt, cooled, and removed chamber by chamber so that a batch of bricks were produced every day. By means of a series of ducts and flues the heat from the continuously burning furnace was directed to pre-heating and firing, while the waste heat from a chamber that was cooling was used to help in drying the green bricks which had just been loaded into another chamber. (2)

Hoggin. A term used to describe a well-graded gravel which contains enough clay to bind it together so that it can be used in its natural state to make a road. (1)

Loess. An unstratified, homogeneous, fine-grained yellow brickearth. Majority opinion favours a wind-blown genesis, whereby widespread dust clouds were carried outwards from the newly deposited glacial and glacio-fluvial deposits of northern Eur-Asia by strong anticyclonic winds blowing from the Pleistocene ice-sheets. (1)

Malms. Bricks made out of a naturally occurring or artificial mixture of fine yellow alluvial clay and about one-sixteenth proportion of chalk. Such a clay is found in the London area. (2)

Mould. A wooden box without top or bottom and with inner sides usually lined with brass or thin sheet iron. In brickmaking the mould is placed over a wooden stock to

form the complete mould into which the clay in thrown. The dimensions of the mould allow for the shrinkage of the bricks in drying and firing. (2)

Moulder. The member of a brickmaking gang who actually forms the brick in the mould. The moulder was the most skilled member of the gang and usually its leader, subcontracting with the owner of the brickfield, and responsible for finding the remainder of his gang. (4)

Off-bearer. Person, often a woman or child in traditional brickmaking, who takes the newly moulded bricks from the moulder's bench to the hack (q.v.) using a off-bearing or hack barrow. Also known as a pusher-out or bearer-off. (3)

Pallet boards. Thin boards which newly-moulded bricks are placed before they are taken to the hacks. (4)

Place bricks. Slightly under-burnt bricks from the clamp, used for inside work. (3)

Pug Mill. A device for mixing and refining clay for brickmaking. The pug-mill consists of a tub of iron placed vertically, and usually tapering downwards, in which there is a shaft from which project a set of knives arranged in a spiral fashion. The shaft was usually turned by a horse treading a circular path around the mill. Clay was inserted at the top , mixed by the knives and forced out through an orifice at the bottom to be taken away to be moulded into bricks. (2)

River terrace. A portion of the former flood plain of a river, now abandoned and left at a higher level as the stream down cuts. (1)

Setters. The men who took the dried bricks from the hacks and loaded them into a kiln or built them into clamps. They did not form part of the moulding gangs are were employed by the owner of the brickfield. Also known as crowders, hence **crowding barrows.** (q.v.)

Shales. Hard laminated rocks which may be crushed or broken down through weathering and mixed with water so as to form a plastic mass from which bricks can be moulded and fired. Suitable shales are found in the coalfields, expecially those of Durham, Yorkshire, Lancashire and Yorkshire. (2)

Skintling (or Scintling). The herringbone placing of bricks for drying, arranged when the bricks are half dry. The spacing allows air to pass freely between the bricks. (3)

Soil. Finely sieved ashes mixed with the clay, so helping to provide an integral fuel for burning the green bricks. Hence **soiling**, the process of adding the ashes to the clay. Also known as **Spanish.** (2)

Stiff plastic process. A brickmaking process in which ground, screened and dampened shale is pressed to make a roughly rectangular clot, and then pressed again to make a smooth sided brick ready for firing. (2)

Stock board, or **stock.** An iron-faced block of wood fixed to the surface of the moulder's bench. The mould fits over the stock. (2)

Stock brick. The term has three main meanings. (1) The name given to any bricks nade with the aid of a **stock board.**(q.v.) (2) The ordinary brick of any particular locality. (3) the yellowish common brick of the London area. (2)

Stool. Also known as a **berth.** The bench on which the moulder shapes the brick. Consequently the unit of measurement of traditional brickfields, indicating the number of moulding teams employed and the likely output. (4)

Temperer. The member of a gang responsible for preparing the clay ready for the moulder. He worked the clay by hand, or using a pug mill, adding [illegible]ies and chalk to the mix. Temperers, like moulders, were usually adult males in the Middlesex industry and were also employed during the winter months, ensuring enough clay was dug and weathered ready for the next season. (4)

Tempering. The action of bringing brick clay into a state ready for use by the brickmaker. Weathered clay is turned over, mixed with the right amount of water, chopped and then wheeled either directly to the moulder's bench, or later, to the pug-mill. (2)

Tunnel kiln. A continuous kiln in which cars loaded with green bricks pass slowly along a tunbnel in which they are pre-heated, fired and then allowed to cool before being unloaded. (2)

Uncallowing. The removal of vegetation and top soil preparatory to digging brickearth or gravel from the ground. (4)

Walk-flatter. The member of the brickmaking gang who broke off a piece of clay, sufficient to make a single brick, and passed it to the moulder. The name was often shortened to **flattie.** The position was sometimes known as a **clot moulder.** (4)

Washback. A slurry of clay and chalk contained in a pond and allowed to settle before being made into London stock bricks. (2)

Wire-cut bricks. Brick clay extruded through an aperture and cut (like cheese) into brick shapes by wires and then burnt in the kiln. Wire-cut bricks are less dense than pressed bricks, they may be perforated, but do not have a **frog** (q.v.), and they often show in the surface the parallel scratch lines resulting from the extrusion process. (2)