

THE UNIVERSITY OF HULL

GOVERNMENT AND THE DEVELOPMENT OF A
SPECIALISED URBAN SYSTEM: THE
CASE OF THE ROYAL NAVAL DOCKYARD
TOWNS IN GREAT BRITAIN

being a Thesis submitted for the Degree of

Doctor of Philosophy

in the University of Hull

by

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ABBREVIATIONS

Add. Mss.	Additional Manuscript
B.L.	British Library
C.S.P.D.	Calendar of State Papers Domestic
H.M.S.O.	Her Majesty's Stationary Office
K.A.O.	Kent Archives Office
N.M.M.	National Maritime Museum Library
P.R.O.	Public Record Office
V.C.H.	Victoria County History

INTRODUCTION

When the workpeople of Mr. Trafford left his factory they were not forgotten. Deeply had he pondered on the influence of the employer on the health and content of his workpeople. He knew well that the domestic virtues are dependent on the existence of a home, and one of his first efforts had been to build a village where every family might be well lodged. Though he was the principal proprietor, and proud of that character, he nevertheless encouraged his workmen to purchase the fee: there were some who had saved sufficient money to effect this; proud of their house and their little garden, and of the horticultural society, where its produce permitted them to be annual competitors. In every street there was a well: behind the factory were the public baths; the schools were under the direction of the perpetual curate of the church, which Mr. Trafford, though a Roman Catholic, had raised and endowed. In the midst of the village, surrounded by beautiful gardens, which gave an impulse to the horticulture of the community was the house of Trafford himself, who comprehended his position too well to withdraw himself with vulgar exclusiveness from his real dependants, but recognized the baronial principle, reviving in a new form, and adapted to the softer manners and more ingenious circumstances of the times.

Sybil: or the two nations, Disraeli, B. (1970), Oxford University Press, 185-6. First published 1845.

Introduction to the Study and Organisation of the Thesis.

Since their inception in the sixteenth century the Royal Naval dockyard towns have, under the control of central Government, combined to form a military-urban system. The dominance of dockyard establishments in the economy of adjacent urban settlements has resulted in the system being comprised entirely of 'specialised' towns and, as the major employer of labour in these towns, the actions of Government have dominated the development and affairs of these townships. The system has been subject to a variety of influences, many of which have impacted on the dockyards and townships via a decision-making hierarchy within Government. In its role as urban manager the policies and decisions of Government have largely been determined by the demands of national defence.

The specific aims of this dissertation are detailed in Chapter 1 and it is not the intention to duplicate them here, but, in general terms this study is concerned with the impact of Government on two levels of this military-urban system. Firstly it is concerned with the various influences and processes which have determined Government policy toward the dockyard system in respect of the origins, maintenance and operational use of the system. Secondly, consideration of the dockyard town is undertaken in regard to the internal social and morphological patterns of the dockyard towns.

The organisation of the thesis reflects these general aims and falls into two parts. The first six chapters examine the macro influences and processes working on the military-urban system, while the following chapters consider the impact of these processes on the urban and social structure of the dockyard towns. The study is concluded by the

presentation of a typology of the development and internal structure of the dockyard town.

Defining the Naval Dockyard

The term 'Royal Naval dockyard town' is used extensively throughout this study. Although superficially specific, 'Naval dockyard' requires definition, not least because perceptions of the differences between dockyards and ports, harbours, docks and ship-building yards have generally been obscure or erroneous.

The term 'dockyard' can be applied to both military and commercial concerns and although it is rarely used in the latter sense (1) normally the prefix 'Royal Naval' is used to specify the naval aspect of the dockyard function. The naval dockyard comprises an enclosed, riparian complex having access to an anchorage or harbour and the sea. Within the enclosure, shipbuilding and ship repairs are undertaken and supplies are distributed to the ships. In order to undertake these duties the dockyard has within its confines the facilities, such as dry docks, slipways and workshops and the materials and equipment necessary to construct, repair, service and fit out naval ships. The dockyard collects, stores and distributes the materials necessary for ship construction and repair and also supplies the equipment, fuel, food, ammunition and all the essentials needed for the efficient functioning of a fleet. The vast majority of tasks are undertaken by civilian labour under the general control of the Admiralty.

To fulfil these numerous demands various processes, such as rope-making and sail-making, are undertaken within the dockyard while other processing functions are attracted to the adjacent area. Food preparation and processing, for example, is undertaken within Victualling Yards situated near a number of dockyard establishments. Various ancillary services, such as naval hospitals and training schools, are also characteristically located nearby. Through necessity, barrack accommodation was usually provided for Royal Marines, seamen and other military personnel.

The dockyard, however, also performs a wider strategic role and this is aptly indicated by the present day use of the term 'Naval Base'. Along with its role as the provider of logistic support for the navy, (2) the dockyard and harbour also constitute a base in which the navy or part of the navy can be stationed when not at sea and a place from which the navy would operate in times of activity. A vital part of the dockyard function has been to provide a safe refuge from the hazards of the sea and to safeguard the naval ships in harbour and in dock from enemy attack, whether land or sea-borne. This aspect is discussed in the following chapters but the point should be made here that the latter role has traditionally involved the construction of a multiplicity of defence works around the dockyard and surrounding area by the Board of Ordnance to protect both land and sea approaches. Defensive measures demand personnel and equipment and emphasise still further the military nature of the dockyard as a fortified naval base.

Ostensibly similarities do exist between naval dockyards and mercantile ports for both act as break-points between land and sea and both are also seen to undertake storage and processing functions. But there is an important distinction for the port relies on trade for its

well-being, attracting from its hinterland goods for export and disseminating imports unloaded at its wharves.(3) This is clearly a very different function from that of the naval dockyards.

Because of the specialised nature of their work and the central control exercised by the Admiralty, the naval dockyards are distinctive and relatively easy to identify. A few have been in existence from the earliest days of the Royal Navy and continue today and their contribution to urban development in adjacent areas has been paramount. Others had a more limited and chequered history. The generally recognised dockyards consist of Chatham, Deptford, Devonport, Harwich, Pembroke Dock, Portsmouth, Sheerness, Rosyth and Woolwich. (Figure 0.1) Harwich was used during the Dutch wars as a naval base but was supplanted by Sheerness in the late seventeenth century and as a result it had the shortest existence of these yards. Its contribution to the urban development of Harwich was thus short-lived compared with the other dockyards. For this reason it does not figure largely in this study. The dockyard at Rosyth is a creation of the twentieth century and its place in the development of the dockyard system was thus late in the day. Whilst reflecting the factors which influenced other dockyard towns in the system its place in this study is also relatively small.

Other sites have been used at one time or another, principally during time of war, as places of refuge and supply, or where small repairs could be undertaken. Understandably, most of the commercial ports around the coast fulfilled this need. These places were especially useful in the era of the wooden sailing ship, when ships had limited motive power and freedom of movement and were particularly susceptible to bad weather. Harbours conveniently scattered around the coast of Britain were utilised

as places of supply and refuge by naval ships. In time some of these locations even acquired small provisioning establishments but they do not warrant the title 'naval dockyard' for the small amount of work undertaken was sporadic, limited and temporary compared with the large permanent dockyard establishments. They are not discussed here. Some places which have been called dockyards, such as Scapa Flow or Portland, are in reality defensive harbours with facilities for provisioning but not for undertaking the wide range of services and tasks normally associated with a naval dockyard. These places too are omitted from this study as are the one time short-lived naval bases at Kinsale and Cork in present day Eire.

This study concentrates therefore on the remaining seven dockyard locations listed above. However, it is important to bear in mind that the naval dockyards were in effect a system of interlinked bases performing a specialist task under Admiralty control rather than a series of separate entities acting independently of each other.

The Company and Specialised Town: Research Themes

Defining the specialised and company town

An aspect of urban development, brought to light almost entirely by empirical studies, has been the creation and development of places based economically on a particular function, be it extractive or manufacturing. These 'specialised towns' are characterised by a vulnerable dependence on a particular industry. Invariably the fortunes of such places closely follow those of the indigenous industry and they are immediately susceptible to changes in the activity of that industry. The dominating industry may be composed of a number of firms or a single company or

entrepreneur, in which case the situation is even more unhealthy. Smailes, writing in 1943, highlighted the potential problems of these 'ill-balanced communities', suggesting that, 'where a proportion of more than one third of the total workers of a community are concentrated in a single industry there is manifest lack of balance'.(4) Necessarily, when tertiary workers and supporting trades are added to those directly involved, the dependence of the community on that industry is far greater than Smailes's notional figure would initially suggest.

Many examples exist of the specialised township, not least because of the legacy of problems which closure or contraction of 'basic' industries have bequeathed to their dependent communities. Smailes points to the extreme case of mining communities as being settlements wholly dependent upon the mine for employment, but iron and steel towns, railway towns, textile towns, shipbuilding centres and chemical-based industrial centres provide further examples.(5) To this list may be appended the Royal Naval dockyard towns.

Arising from studies of specialised towns the phenomenon of the 'company town' has been illuminated. Here, the community is invariably dependent upon a single company which takes an active role in the creation and development of a settlement and in the provision of certain services and facilities. The degree and type of company participation can take many forms. Provision of housing is the most common feature, whereby company-built houses or cottages were let to employees. Provision of water and gas supply, sewage disposal, road construction and cleaning, street lighting, and facilities such as parks, schools, places of worship and libraries were also commonly undertaken by the company. In some instances the involvement of the company with the settlement became so

great that the town was literally a part of the industrial concern itself, managed by the company and becoming the embodiment of the company image.(6)

The distinction between specialised and company towns is not always clear and often seemingly subtle differences can separate them.

Comparative studies undertaken by Turton and Porteous, with which this study can be considered a bedfellow, have examined in depth the role of railway and canal companies in the creation of specialised and company towns.(7) Turton distinguished between railway company towns, such as Swindon, Crewe and Wolverton, and those specialised railway towns, such as Eastleigh, Horwich and Ashford, where 'the economic activity was not quite so dominated by the railway company'.(8) In the case of the railway 'company' town, the railway had located its works in an area in which agriculture was dominant and practically no other industry of any kind existed. With the influx of workers to the railway workshops, the company constructed housing estates which tended to be isolated from existing settlement. Even when the railway company was not a major employer in the district, it usually dominated its own company-administered estate (9) but could do little to stem the accretion of speculative building which sprang up around the company estates.(10)

A feature of company towns, exemplified by railway company towns, was the extent to which the company excluded potential competitors from entering the town to 'poach' its supply of labour. In the case of railway towns this end was achieved by imposing disadvantageous freight rates. However, attempts were made to attract firms which complemented the highly male-dominated railway industry and industries dependent upon female labour were much sought after. Usually such firms which did locate in railway company towns tended also to be contractors to the railway company itself, as in the case of clothing firms at Swindon and Crewe, where

uniforms were made for the railway company, and printing firms which undertook the production of timetables and tickets as at Wolverton.(11)

In the case of specialised railway towns, housing and facilities such as schools and churches (12) were also provided by the company and, as at Doncaster and Derby, the provision of housing took place away from existing settlement: 'The works are almost a town and the employees certainly form a community by themselves'.(13) However, substantial housing was also provided by speculative builders and it was the presence of alternative non-company housing which Turton used to distinguish specialised from company towns. At Darlington, for example, the London and North Eastern Railway Company built an estate of some 200 houses for their employees but, as at Derby and Doncaster, company influence was less than in the company towns of Swindon or Crewe, due in large part to the presence of alternative, railway independent employment. A similar situation existed at Eastleigh and Ashford where gas and water, chapel and institute, school and shop were provided by the company amidst the company constructed housing. These towns, as Turton has emphasised, were not company towns in the true sense, for while the company dominated employment in their isolated estates, yet as at Horwich with its weaving industry, the town as a whole was not completely dependent upon the railway company.(14) Only the company towns of Wolverton, Swindon and Crewe owed their origins, employment and supply of services entirely to the railway company which reigned supreme, and alone.

Porteous makes a similar distinction in his study of canal-created settlements located at break of bulk sites linking canal and river transport systems.(15) He distinguished two types of development, 'adaptive breakpoints,' which grew naturally from decisions made by a

number and variety of persons, and planned 'mushroom towns,' which sprang up 'overnight' from the deliberate actions of a single decision-maker at a single point in time.(16) He summarised well the 'company' aspect of these planned canal settlements:-

it is hardly necessary to justify the canal ports character as a company town. The canal company, if not directly controlling the majority of the population through employment and tied housing, had a great influence both directly and indirectly on most urban utility and amenity projects, including the establishment of schools, hospitals, markets and fairs, gas and water supplies, and places of worship. Public structures were erected only with the goodwill of the company, which through its canal also had some influence on the affairs of most industrial establishments. Despite the rise of manufacturing, the townsfolk followed the traditional economic and physical orientation of the town in looking to the canal company for guidance in many matters.(17)

Goole, at the junction of the Aire and Calder canal and the River Ouse, represents a classic example of such a canal company-created settlement, which, unlike Runcorn and Stourport, remained for many years under the full control of the canal company.(18)

The company town can be distinguished therefore by four criteria:

- (a) The dominance of an employer over employment, almost to the exclusion of all other employment opportunities;
- (b) The active participation of that employer in the provision of services and facilities to the settlement (often the company's estate), whether due to economic necessity, social concern or a combination of both;
- (c) The recognition of that employer as the governing authority within the settlement;
- (d) A seemingly total control or influence over the aspirations and daily life of the settlement and its population.

The 'specialised' town differs from the company town in general by the lack of a total dependance on the economic activity of one company and the reluctance of a company to actively participate in the provision of

services and facilities in the town.

Economic and social factors underlying the genesis of specialised and company towns

Of the many factors which induced the participation of companies and individual entrepreneurs in the provision of accommodation and services for their employees and the local community, two may be isolated in particular. The first is that of hard economic necessity and the second that of humanitarian and philanthropic concern. Many settlements of the first type tend to have been located on 'green sites' and away from existing settlement. In order to attract workers, many of whom may be skilled or semi-skilled, the company was often compelled to provide housing and the basic infra-structure of community life, for little or no such facilities existed. Furthermore, the provision of facilities by speculators or private enterprise outside the company was often not forthcoming and the company was compelled, often reluctantly, to undertake the provision of basic necessities.

Mining represents an extreme case of communities utterly dependent on one mode of work. The occurrence of minerals in sparsely populated localities frequently forced the company to attract workers from outside the area. Where there was a lack of housing and amenities the mining company was compelled to provide accommodation before production could begin and 'not for the sake of doing so'.(19) Only if demand for labour was less than supply or a labour force existed within reasonable daily travel could the company ignore this responsibility. White suggests that between 38% and 48% of the total cost of opening a mine between the two world wars might be tied up in the provision of housing for employees.(20) Nor was this necessarily a profitable operation for the company, for as

the provision of accommodation was an incentive to attract workers this usually entailed keeping rents artificially low.(21) The provision of housing and services thus became part of the capital cost involved in setting up production and was simply a means to an end.

The case of the London (Quaker) Lead Company in the Alston Moor region of Cumberland illustrates this pattern well, for having taken up leases in 1750 at Nent Head the company found themselves, 'employers of a large mining population in an area almost unprovided with houses, villages and all the necessities of a community'.(22) The company was thus forced to provide housing at a number of sites in Cumberland and Westmorland.(23)

A further example of a company promoting the wholesale development of a town in the cause of business is Barrow-in-Furness.(24) Intended to be the terminus for the Furness Railway transporting iron ore from the inland mines to the coast, the railway company initially provided only temporary and limited accommodation for the nomadic navvies and a few of its permanent employees. As the company expanded its activities, however, it was forced to purchase further land and to extend its building commitments in the area. Housing was laid out on a regular rectangular plan drawn up by the railway company and water, schools, hotels and a library were provided:

the need to attract labour and other industries and capital forced the company to provide functions for the development of Barrow as a whole but [they] were never considered as ends in themselves, rather they were the responses to such immediate problems as labour shortage, danger of epidemics and needs of industry for gas and water.(25)

The economic necessity which prompted the London Lead Company's policy of house building and provision of services was tempered by the second broad factor which led to company participation in community

building, that of humanitarian and philanthropic concern. A paternalistic concern by the company or entrepreneur and a social awareness of the needs of the workforce, whether real or imagined, led to the construction of housing and the provision of facilities and services, often with the intention of guiding and directing the morals and conduct of the daily life of the community, under the aegis of the employer.

The dependence of isolated communities, like those of the London Lead Company, on a single employer allowed such employers, whether malevolent or benevolent despots, (26) almost total, unchallenged control over the community. That this hegemony could be bad as well as good is indicated by Pollard.(27) Altruistic attempts to improve the working and living conditions of employees are perhaps best known in the work of Robert Owen at New Lanark where his concern that 'Man's character is made for, and not by him', (28) induced him to improve what he saw as the main influences in forming character, that of home and work-place and the main source of such influences:-

Any general character, from the best to the worst, from the most ignorant to the most enlightened, may be given to any community, even to the world at large, by the application of proper means; which means are to a great extent at the command and under the control of those who have influence in the affairs of man.(29)

It was to the employer that Owen looked to provide the environment for the physical and moral education of the workforce and between 1800 and 1814 he pursued his reforming social experiment at New Lanark, constructing and improving houses, schools, and almshouses, providing low cost food and setting up an educational system for both children and adults.(30)

It was often the case, however, that it was a combination of economics and social concern which resulted in the creation and development of a company town. Such a combination induced the creation

and development of Bromborough Pool on the south bank of the River Mersey by a company manufacturing candles and lamp oil, E. Price and Co., which relocated here in 1853 from its cramped site in Vauxhall, London. In this isolated location the company undertook the creation and development of a settlement, constructing in the process a school, chapel, hospital, recreation ground, flushed sewers, water supply and allotments.(31) Such a combination of economics and philanthropy was also present at Saltaire, founded by a wealthy Bradford spinner and manufacturer, Sir Titus Salt.(32)

However, a paternalistic concern for the well-being of employees, as at Saltaire, did not imply the absence of good business principles. Titus Salt, whilst expending a great deal in constructing his settlement at Saltaire, also gained much from leaving an overcrowded Bradford and carefully choosing a site straddling the River Aire, the Leeds and Liverpool canal, and the Leeds and Bradford railway. Certainly Robert Owen spoke of combining the two, 'In short, have I not been enabled, with one hand, to direct with success the common mercantile concerns of this exhaustive establishment, and with the other hand to direct measures in order to introduce another system'.(33) Similarly, the London Lead Company while acting upon sound business acumen in supplying housing, roads and medical attention, also tempered this economic motive with 'an increased sensitivity to [the] conditions and needs of their work people' induced by the strong Quaker element within the company.(34)

Time and the genesis of specialised and company towns

Generally speaking specialised towns and especially company towns were predominantly creations of the industrial revolution. Indeed, Pollard considered that the company town epitomised the main developments of the industrial revolution; 'here were whole townships under the social

and economic control of the industrialist their whole *raison d'être* his quest for profit, their politics and laws in his pocket, the quality of their life under his whim, the ultimate aims in his image'.(35) The large-scale relocation of industry and population away from traditional centres to new sites was a feature of the industrial revolution. The desire for water power sites and subsequently for coalfield locations is well known but proximity to raw materials, ports, expanding markets, new modes of transport (especially the development of canal and railway systems), were also motivating forces in breaking traditional locational ties. Relocation entailed a movement of population and the creation of settlements in previously largely unsettled areas. Before the advent of elected local government in the late nineteenth century and twentieth century socialism and the Welfare State there was no other body other than the employer and private enterprise to take on the responsibility or have the inclination to provide for the new inhabitants. The restrictions of a long working day and the lack of cheap transport determined that accommodation should be as close to the place of work as possible. Not until the general introduction of cheap transport in the 1870s and 1880s was labour freed from its shackles to the factory site.

The introduction of the factory system and large-scale production techniques and the movement away from traditional cottage-based industry was another factor which stimulated the growth of specialised and company settlements during the industrial revolution. Gathering workers centrally under one roof contributed to the development of settlement around the factory unit; the employer being central to, and dominant over, the workforce and township. The cases of Mellor and Marple, created by Samuel Oldknow, exemplifies this.(36) Similar situations existed with the cotton mills of Samuel Greg in Styall, Cheshire, (37) the Bakewell mill of

Richard Arkwright, (38) and Walter Evans' mill at Darley Abbey.(39)

Furthermore, philanthropic and humanitarian concern for the workforce tended to increase during the period of rapid economic and technological change comprising the industrial revolution. Worsening conditions of urban society during this industrialising period and changing social values spurred attempts to ameliorate and improve the condition and quality of life in which many worked and lived.

Power and control in the specialised and company town

In return for their incursion into community and town building the company or entrepreneur gained, besides the advantage of planning the factory and industrial settlement as they wished, (40) greater control over the workforce. In an isolated location the employer held considerable power over his workforce but that 'power' must have been greater still if, as in the case of the company town, the employer owned 'tied' houses and provided for the daily needs of the community. 'Power' in this case could be exercised by discrimination for or against certain groups or individuals thus aiding control over, and subservience of, the workforce. The exclusion of alternative sources of employment could lead to lower wages and control could be exercised over the social values and morals of the community as a whole. The London Lead Company, for example, provided company houses for their 'most deserving' workmen and used the education system 'to teach the men their 'duty' and keep them respectful and loyal to the Company's interests'.(41) The court minutes of the company record successful attempts to influence and curb the moral weakness's of their workforce; 'we have reduced wages below the excessive figure prevailing last year and in consequence have reformed the morals of the miners - intemperance has ceased and their lavish and extravagant habits are corrected'.(42) References in the same court minutes bear

witness to the rewards accruing to the company from its paternal concern for the workforce, 'Nov 1816. to the good conduct of the men when the neighbouring miners are all dissatisfied'.(43) As a writer in 1834 wrote of the Middleton district,

The beneficial effects of the regulations adopted by the London Lead Company toward their workmen, are strikingly apparent in the general decorum and good behaviour visible in Middleton. Drunkenness and quarrelling are punished by dismissal, and in other respects a strict but salutary discipline is preserved.(44)

The notes of W.C. Taylor's tour of the manufacturing districts of Lancashire provide further illuminating insights regarding the demand by workers for company housing adjacent to the place of work and also of the moral, physical and economic restraints which such occupance entailed.(45) Robert Owen imposed uniformity of religious views on his workforce, (46) while Titus Salt excluded public houses from his estate at Saltaire, nor would allow washing lines to mar the aesthetic qualities of his settlement.(47) Similarly, Oldknow imposed penalties upon those of his community who were caught spitting or blaspheming and this could include the threat of dismissal.(48)

The transfer of company control and administration of these settlements to an elected local government highlights the dominant place of the company and its officials in the life of the community and the control which this position gave the company. Usually this transition included a period of 'quasi-dictatorial' government when the elected body was ostensibly in control but company influence remained. The personnel of the first Council of Barrow, for example, reflects the real source of influence in the town.(49) The town's first Mayor was an official of the Furness Railway Company and the council's meetings were held in the railway company offices.(50)

.... the council retained its character as an adjunct to the

boards of the town's chief industries and, far from diminishing the role of the syndicate added a whole range of new powers to the hitherto purely economic powers of control, [for] the borough council administered a property largely of the syndicate's own creation.(51)

Thereafter, the town hall, the gas and water services and the cattle market were transferred by the 'syndicate' to the new council, (52) but power within the town was retained by the leading personnel of industry. One cannot be surprised by this. Town and community were tightly bound to industry for their very existence and although, as Pollard points out, 'democracy suffered,' the future of both town and workers was largely dependent on the investment of several companies who 'exercised government in the town,' albeit 'tempered with a modicum of social conscience'.(53) A similar situation occurred at Crewe where the railway company retained influence over local affairs by the presence of several railway representatives on the Local Board.(54)

The specialised and company town as a focus for the study of urban development

Certain advantages are to be gained from studying the urban development of specialised and company towns. Firstly, examination of these towns enables common themes to be elicited and points of comparison to be made in the case of places of widely differing function and form. In the search for general laws and the isolation of processes behind urban development, this is a matter of some potential interest. Secondly, the study of company and specialised towns allows town development to be examined by way of the decisions, policies and influences of a single body or group of concerns which fashioned the course and pattern of town development. Urban development may be interpreted as the result of a complex network of decision-makers and the end product is similarly complex. Patterns are continually altered. In specialised, and to an even greater extent in company, towns this complexity is lessened by a

reduction in the number of major decision-makers. This enables the processes and patterns of urban development to be illuminated with greater clarity for the inter-play between cause and effect becomes more direct as the numbers of those involved in making important decisions diminishes.

The towns also allow other important aspects of urbanization to be isolated and studied more clearly. These include the role of entrepreneurs and limited companies in urban development; the changes that occurred in social values in relation to the town or city; the impact of early planning in towns and the rise of responsible and interventionist local government; and not least the morphology and social patterns which arose from these and similar processes. Aspects such as these are apparent in other urban developments but unlike the simplified case of one function towns tend to be hidden by the anarchic and complex nature of their development.

The specialised and company town: the case of the Royal Naval dockyard towns.

All the dockyard towns under consideration were 'specialised' in that the employment structure of the town was dominated by the dockyard, in many cases to the total exclusion of other economic activity. Most dockyard locations also had other forms of Government-sponsored activities in the locality linked to the dockyard, the Royal Navy or military and these further emphasised the economic dependence of the township on the State. Only in rare exceptions, as in the corset-making industry in Portsmouth, did economic activity occur outside the auspices of Government.(55) Government, as the major decision-maker, dominated the development of these towns which came into being somewhat earlier than many other specialised towns. In the case of Sheerness, Pembroke Dock and

Devonport the establishment of a dockyard led to the creation of towns in previously unsettled areas. At Deptford, Woolwich, Chatham and Portsmouth settlement pre-dated the dockyard but was rapidly transformed following the establishment of the dockyard.

The role of Government in the development of these urban communities is interesting, for despite its dominant position the State was reluctant to be drawn into the affairs and provision of facilities for these dependent communities. While the Admiralty and dockyard usually had representatives on local town committees they were there to represent the interests of Government rather than participate extensively in local affairs. An exception was Sheerness where in the early stages of its existence a reluctant Government was forced to provide accommodation and facilities for its workers. Part of the discussion which follows considers these aspects.

Urban Geography and Urban History: Approaches to the Study of Company and Specialised Towns

The urban scene: the interface of geography and history

Popenoe defines the urban scene as a field of study consisting of two primary sections. Firstly it consists of the 'study of the structure and function of communities which are relatively urban in character'.(56) Secondly, it is concerned with the 'causes, conditions and consequences of the urban process as it manifests itself within communities and societies'.(57) No single discipline has these two tenets as basic elements of study, but both urban geography and urban history provide an obvious focus for much of the disparate research carried out in an area

which Thorpe calls 'a true research frontier'.(58)

In the study of specialised and company towns researchers have used the methods, techniques and goals of their respective disciplinary base. As disciplines, both urban geography and urban history are still academically young in Britain. The first conference of British urban historians took place as late as 1966 and its proceedings were subsequently published in 1968, (59) although the newsletter of the urban history group (which stemmed from the Economic History Society), had begun to circulate in 1963.(60) Urban history in America though dates from much earlier and it has tended to produce many of the approaches and to provide the lead for researchers elsewhere, including those in Britain. Urban geography has largely evolved as a discipline since the Second World War and is similarly tied to the town. The urban geographers' concern is not with historical process per se, as in urban history, but with 'those processes which operate to create spatial patterns in the context of the town or city'.(61)

Approaches to the study of urban geography

Within urban geography concern with spatial patterns and explanation of the processes which created them has given geographers a firm basis for their distinctive approach to the city. Study within urban geography has generally been pursued at two levels. One approach has been concerned with examining the spatial organisation of the town itself, while the other has considered the town as part of a much wider system of relationships with other urban systems.(62) In this respect work has tended to be concerned with social and morphological relationships and spatial patterns within towns and with the application of location and central place theory.(63) Urban geography has closely followed the path

of mainstream geography in its approach and technique. Early work stressed the need to observe and record phenomena on the earth's surface, but at a non-causal level. This 'gazeteering' of towns had its counterpart in the antiquarian 'factual' works of early urban-centred history. Distinct changes in the philosophy of the subject have shifted the emphasis away from the eclectic, deterministic and descriptive approach to the search for general laws and processes behind urbanisation. The increasing use of quantitative methods in the social sciences in general has had a profound effect on methodology and techniques within geography. Termed a new scientific revolution by Harvey, (64) (though Chisholm would dispute this), (65) this approach entails the use of theory and hypothesis testing and has largely replaced the earlier descriptive approach and shifted the focus toward 'Explanation in geography'. (66) Model-building has certainly played its part in the testing and refining of relationships in the theoretical and real world. (67) Indeed, Davies claims that the revolution in geography has been foremost in being applied to the urban scene, such that 'Quantification has become synonymous with urban geography amongst the social sciences concerned with the town'. (68) Similarities can be detected between this revolution in geography with the later and more limited transformation which resulted in Thernstrom's 'new' urban history.

Approaches to the study of urban history

In 1966 the late H.J. Dyos called urban history 'ragged and not a little confused', (69) while in 1973 he wrote '...the authentic measure of urban history is the degree to which it is concerned directly and generically with cities themselves and not with the historical events and tendencies that have been purely incidental to them...'. (70) Despite Dyos's seemingly conclusive statement of content, the lack of a universally accepted definition of the aims, methodology and approach of

urban history has dogged its advance as an academic discipline. Although not a crisis of identity, (71) the problem of 'definition' has certainly dominated much of the writing on urban history to date. Hobsbawm's remark that urban history tended to be, '...a large container with ill-defined heterogeneous and sometimes indiscriminate contents' and that, 'It includes anything about cities..'.(72) is perhaps superficially still an apt description. Nonetheless, the urban historian is concerned in general terms with the historical processes affecting the focus of his study, the town.

The lack of a generally accepted framework on which the study of the urban past could be based has led to the use of several approaches, based upon differing criteria. The multitude of published material encompassed under the general term 'urban history' is a conglomeration of diverse work and defining the specific contribution of urban historians to the study of the urban past is difficult. Much of the work, particularly before the 1960s, is American in origin. A.M. Schlesinger in 1924, is generally credited with providing a theory for the study of urban history when he adapted Turner's frontier theory and substituted the town as the originator of social change. Although his theory was severely criticised by William Diamond in 1941, others still continue the theme of the city as the stimulus of social change.(73) That this approach provided no unique framework for urban history was pointed out by Lubove in 1967. 'The main point', he wrote, 'is that all the publications in this category deal with cities, or life in cities, but rarely with urban history as distinguished from social, economic or political history in the context of the city'.(74) As Blumin indicated, the city was used merely as a 'back-drop' for considering certain events or processes which were not necessarily unique to the city.(75)

Robert Park provided a further ecological approach to the study of urbanisation in his early work in urban sociology. This was pursued by Louis Wirth, who isolated physical structure, social organisation and collective behaviour as factors necessary for a theory of urbanisation.(76) Hoover points out that most subsequent work has utilised either part or all of this theory.(77)

Following on from the work of Park were what Reissman refers to as the 'neo-ecologists'.(78) These sociologists, and in particular Hauser, Schnore and Duncan, looked for the relationship between technology, social organisation, population and environment, using quantitative techniques to seek out the general theory behind the process of urbanisation.(79) This approach, whereby urbanisation was studied as a societal process, was pursued further by Lampard in the 1960s. He considered that urbanisation was central to social change and he investigated demographic change in time and space, including migration and social and occupational mobility and stressed the importance of population change as a framework for the study of urban history.(80)

One of the most important influences on urban history in relatively recent years has been the work of Stephan Thernstrom, the pioneer of the so called 'new urban history,' a term of which he himself did not approve since it seemed to assume the existence of an 'old urban history' which in reality, he claimed, did not exist.(81) His framework for study was characterised by three principal traits. Firstly by his application of sociological theory to urban history, 'sociological history' as White calls it.(82) Secondly, he pointed to the extensive use of socially skewed data in research on the urban past, the study of the 'articulate visible elements of a community rather than the masses of ordinary

people'.(83) He, in turn, called for a reversal of such a trend, suggesting a 'grass roots history,' or 'history from the bottom up'.(84) This plea was reinforced by his third and perhaps most important contribution to urban history, a statement of the potential offered by the computer and quantitative methods in historical studies. In this, the use of census data was considered an invaluable source. His call was for less description and greater use of theory in the pursuit of models of the urbanisation process.(85)

This was not however a framework for urban history. Indeed, Thernstrom was adamant in making clear that in his opinion, 'the decisive features of urban life in modern times are not spatially distributed in a way that justifies urban history, or for that matter, urban sociology as a special field'.(86) Nor were the subjects to be studied in the new urban history confined to the city: 'The ultimate aim of the new urban history is to understand how and why these complex changes suggested by the concept urbanization reshaped society'.(87) This put urban history, according to Thernstrom, 'squarely in the domain of social history'.(88) Dyos was one of many to criticise its application as a satisfactory approach to the study of urban history, not least because of its indifference to the human content of the city.(89)

An approach which has gained general acceptance as a basis for the study of urban history is the 'environmental approach'. Here the idea of urban growth is used as an organising theme, 'the process of city building over time', as White calls it.(90) City building in this context is the influence on urban growth of the interaction between decisions made by individuals and groups under social and economic pressures, taking into consideration technological and population change.(91) In this format the

major elements of city development can be ascertained and generalised. Lubove refers to the need for greater emphasis on environmental development, 'the specific decisions by individuals or institutions which influenced urban form and structure'; broad social, economic and technological trends determined the nature of these decisions.(92) In this manner, Lubove declares, urban history would be firmly 'rooted in the behavioural and social sciences'.(93)

Urban historical geography and a framework for study

The application of the temporal variable to the spatial concern of geography is largely the domain of the historical geographer. When applied to the urban scene, the urban historical geographer is firmly on the borders of both urban history and urban geography. His training as a geographer is used with his expertise as an historian to search for the historical processes behind spatial variations and patterns within the urban scene through time. There are obvious overlaps between urban history and urban historical geography, not least in respect to their data and source material. Certainly the urban historical geographer must at some stage be an urban historian for it is the processes influencing urban development and the resultant patterns of urban development that the urban historical geographer is searching for. The difference between the two subjects is largely one of scope and technique only.

A number of weaknesses exist within both subjects, but predominantly within urban history. Study of the city has been undertaken by many disciplines, each applying its own approach, methods, techniques and goals. Within history, however, the study of the town or city did not correspond easily to the traditional sections of historiography.(94) Systematic aspects of history such as economic history, social history and political history were studied in the context of the city, but not from a

commonly accepted viewpoint. Only in local history could the whole gambit of historical studies be applied to the urban scene freely because it was the place which was the focus of study rather than the application of a specialist subject. Until urban history and urban geography became accepted as disciplines and historical events and geographical processes were studied within the overall framework of the town, the progress of the subjects as fields of study was slow.

Perhaps the fundamental weakness within urban history has been the lack of a common conceptual framework for the study of the urban past. This is particularly exemplified when considering the scale of historical study. At the one end is what may be called the microcosm, the detailed study of a particular town or city, 'the local urban history' approach.(95) At the other extreme is the macrocosm, a wider-ranging and embracing study containing the 'general experience' of urban development. Individual studies tend to be prolific and the empirical approach is indeed vital to furthering detailed knowledge of urban development, but three comments should be made in this respect. Firstly, such studies tend to be empirical to the point of ignoring the wider implications of historical trends which may have influenced the development of towns. Secondly, because the studies are ideographic in content and format, no common approach seems to have been adopted. Finally, one has the difficulty of trying to decide just what is unique to the particular urban past of the town studied and what is part of a common experience. When trying to combine empirical studies with wider-ranging studies a seemingly uncrossable chasm appears between the two. The way out of this difficulty might be the acceptance of a basic framework, (96) or a common set of variables, terms, data, aims and techniques, or through the use of comparative studies where general patterns, regularities, similarities and

differences can be illuminated and aid the formation of general theory and model building, as well as indicating the 'uniqueness' of the local situation. This in turn would allow the broader theory to be tested against the individual town or city. What seems to be required is some general framework which will facilitate concentration upon those themes and topics within the local setting and enable not only an exposition of the unique features of urban development, but allow other points, unifying themes and information in support of a wider search for historical processes to be elicited. The editorial of the Urban History Yearbook in 1974, pointed to the late arrival of, and difficulty experienced in, comparative studies because of the dependency upon 'appropriate models of urban development or at least some typological framework into which to fit particular cases'.(97) 'There have been very few attempts indeed to erect any kind of general scaffolding for historical research based on particular cities and even fewer attempts by others to use them'.(98) This thesis has been undertaken within a comparative framework in which the townships associated with the Royal Naval dockyards in England and Wales are the focus of the study.

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CHAPTER 1

AIMS AND SOURCES

Anyone who would study the naval base soon finds that in justice to his subject he cannot strictly confine his attention to the field of his choice.

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Specific Aims of the Study.

A number of writers have suggested that the early naval dockyards were for many years the largest industrial organisations and employers of workmen in the whole country.(1) They were also very large employers of skilled labour and a high degree of specialisation of labour coupled with large-scale operation transformed the dockyards from small craft-based enterprises into the earliest industrial complexes.(2) Yet surprisingly, relatively little attention has been given by geographers to the study of naval dockyard towns. Furthermore, with the exception of a study by Bennett and Cole, what has been written has usually been related specifically to a particular time-period or dockyard location.(3) Greater interest has been expressed in the dockyard locations by economic and naval historians but coverage of the towns has been uneven.(4)

Previous studies of the dockyard towns have tended only infrequently to recognise the existence of similar organisms elsewhere in the country undergoing similar processes. Rarely does the presence of the other dockyard towns break the surface and on even fewer occasions are inferences made that a pattern or event might have reproduced in another dockyard town. It is difficult to discern from such works what is unique about a particular town and what is part of a common experience or process shared by other dockyard towns. The disparate nature of these individualistic studies further detracts from their being readily used in concert to construct a comprehensive picture of the urban development of these towns.

Moreover, because the dockyard towns have largely been studied in isolation from each other this approach has denied examination of a vital element in the urban development of such places: that the dockyards have

been, and continue to be, part of a system of industrial bases managed by a centralised naval administration under the direct authority of Government. Only a few naval historians have dealt at length with this aspect of the dockyards.(5) To study the yards, therefore, as individual elements, unaware of events occurring elsewhere in the system, is to miss a vital part in the jigsaw. Only by knowing how parts of the system were acting and reacting on each other can full understanding of the influences and processes at work on the dockyards and townships be gained.

There exists an obvious lacuna which a comparative study can go some way to filling. Not least, there is a need to knit together these disparate empirical elements; to consider the processes which influenced dockyard-urban development; to examine the way in which individual elements of that system interacted under the central guidance of Government; and to consider the effects of such influences on the urban and social structure of the towns themselves. These form the principal aims of this study.

In pursuit of these objectives two aspects of the dockyard urban system were identified for examination. In their simplest form they can be considered as macro and micro approaches to the system, or using Johnston's terminology, the place as part of a system and the system as a place.(6) Within this division a number of specific aims and objectives were identified. In considering the system-wide influences a first aim was to identify the processes which brought this specialised system into being and which thereafter determined its operational use. In view of the dominant managerial role of the State in the development of this military-urban system a second aim was to examine the nature of the decision-making hierarchy within Government and to assess the role of

Government as urban manager. Government policy towards the dockyards was largely dictated by foreign affairs and the demands of national security and was tempered by financial and political considerations. Such influences acting upon the system often lay outside national and regional economic processes bearing upon other industrial organisations. Identifying the decision-taking role of Government is vital in accounting for, and explaining, the existence and performance of the dockyard system.

A third objective was to examine the operation of the system through time and to consider the geographical implications for dockyard town development of alterations in Government policy towards the system. The interdependence of the dockyards and townships is examined by reference to employment changes in the system. Furthermore, linkages between towns in the system are examined in terms of their migration fields, labour markets and labour mobility.

A further factor identified as having had considerable impact on the dockyard system was that of technological change. The nature of such changes during the nineteenth century are examined and their influence on Government policy toward the dockyard-urban system is identified.

In respect to the system as a place this study examines the urban development, morphology and socio-spatial structure of the towns under consideration. The latter aspect is pursued in detail for three of the dockyard towns using nineteenth century census enumerators schedules. Government was in a unique position to influence directly the development of these specialised and dependent towns and the lives of several thousand people. The detailed case studies best reflect the impact of Government policy and control on urban and social structure of the towns and in particular the manner in which patterns were reproduced throughout the

system because of the central role of Government as urban manager. To synthesise individual studies a model of dockyard urban development is outlined which encompasses the major developmental processes and patterns of such towns and against which individual townships may be compared to discern similarities of pattern and identify local deviations.

Having considered the development of the dockyard town, the contribution of this study and the light which it can shed upon urban growth in general is considered. Just as individual studies can be isolated and unique, so too can comparative studies if they cannot be placed in the general context of urbanization. Comparisons between this military-urban system and other specialised or company towns, where similar processes were at work, is considered, for the stimuli and causes of urban development in this and other studies might be isolated by similarities and differences between these studies. A comparative study of the Royal Naval dockyard towns therefore adds not only a synthesis of a particular type of urban development but a further stepping stone towards explaining the phenomena of urban development.

Sources

Primary sources

The sources used in this study are largely comprised of the traditional documentary and cartographic evidence used in urban historico-geographical studies, in addition to specialised records

relating to naval and dockyard affairs. Ideally, for a study of this kind, sources are required which will allow comparisons to be made of several townships over similar periods of time. Maps, a standard source of reference for geographers, provide such a source and in the historical context are invaluable. They have been used extensively here. They provide an ideal basis for studying the physical development of an urban area and the form which this has taken. The availability of a sequence of maps allows not only comparison between towns, but also the construction of a dynamic picture of town development, the stages of which can be dated relatively accurately. Of particular importance in this connection are Ordnance Survey maps. Harley indicates the exceptionally valuable range of scales available in this series, from 1:63360, the 1:10560 and 1:2534 maps, to the detailed town plans of 1:500.(7) The dockyard locations fall within the national coverage of the Ordnance Survey and the existence of successive editions since its inaugural edition of the 1" in 1801 enables comparisons through time to be made with ease. The militarily sensitive nature of the naval dockyards has, paradoxically, resulted in the dockyard complexes themselves being omitted from Ordnance Survey maps. The adjacent settlements and area beyond the boundary wall of the dockyards are, however, unaffected.

Besides Ordnance Survey maps, the strategic importance of naval dockyards to the nation has resulted in the dockyard locations being relatively well endowed with maps and plans initiated by Government for military and engineering purposes.(8) A number of such plans for each dockyard are contained within the papers of the Admiralty Navy Works Department, ADM 140 series, in the P.R.O. and a series of records in the N.M.M.. Many of these plans are concerned with the various piecemeal improvements which took place in the dockyards throughout the period and are useful in determining the successive stages of dockyard development.

Where the scope of these plans, and particularly those surveys relating to proposals concerning the dockyard fortifications, is enlarged to include the immediate environs of the dockyard and in particular the adjacent settlements, this has proved an added bonus.

Other maps and plans contained within tithe and enclosure awards and in naval records are discussed with their respective sections.

A further comparative source which has been used to study the demographic structure and social geography of dockyard towns in the middle decades of the nineteenth century are the decennial census enumerators schedules currently available for the years 1841 to 1881. For the first four censuses, taken decennially between 1801 and 1831, unlike the five succeeding censuses, no detailed record of census data at the individual level has survived. The 1841 returns contain information regarding the name and address, sex, age to the nearest quinquennium, occupation and whether born within the county or outside its confines, for every individual enumerated. From 1851 the enumerated details are more refined and actual age is recorded, along with relationship to head of the household, and marital status. Of particular importance is the recording for the first time of actual birthplace by both parish and county of every individual enumerated.

The value of the enumerators' schedules as a source in historical research is by now well known and the ground need not be covered again here.(9) The ability to utilise the potential of the computer for data manipulation and processing, as in this study, is one reason why this massive source is beginning to be tapped successfully in large scale studies.(10) Some of the obvious faults which exist with the data and

which have been identified elsewhere are similarly relevant to this study.(11) A significant problem, however, is the loss of a number of schedules of the 1861 returns.(12) In respect to this study in particular the 1861 schedules of the sub-district of Woolwich Arsenal are missing. This is the only dockyard town studied in detail to which this problem applies. The problem is compounded, however, because of the inability to use the schedules of 1871 due to the closure of Woolwich dockyard in 1869 and because no comparable substitute exists to take the place of these schedules.

The parish population totals for the censuses of 1801 to 1831 and the aggregate totals for 1841 onwards have been printed and for the nineteenth century are readily available in a series of facsimile reprints published by the Irish University Press.(13)

The survey and apportionments which stem from the Tithe Commutation Act of 1836 contain useful information concerning tenure and land ownership for areas adjacent to the dockyard towns, in particular recording the occupiers and owners of land and the acreage and state of cultivation.(14) Whilst largely concerned with agricultural land, the tithe awards provide an excellent source of data for discerning land ownership patterns surrounding dockyard settlements. In all over 11,800 tithe awards were undertaken following the Act and nearly all dockyard areas have such an award. The majority of awards were made before 1841 and almost all before 1851 thus providing a comprehensive, comparable and detailed source of information about each place.

The large scale map, usually drawn to a scale of 3 or 6 chains to an inch (26.7" or 13.3" to the mile), which accompany the apportionment provide valuable detailed evidence of the landscape for the second quarter

of the nineteenth century, at a time of rapid urban development and change and they pre-date the Ordnance Survey six inch and twenty five inch maps.

Parliamentary enclosure awards span a much greater time period than do tithe awards but the dockyard towns unfortunately are not well covered by this source. Their utility to this study, as with the tithe awards, is for the information which they provide on land ownership and the cartographic evidence of the accompanying enclosure maps.(15) The latter tend, as Harley points out, to complement tithe maps rather than supplement them, 'both in date and geographical coverage'.(16) But only Portsmouth and Portsea Island are well covered by several enclosure awards, the other dockyard locations being bereft of such documents.

The Department of Manuscripts of the British Library has within its several manuscript collections a mixture of sources relevant to this study, principally comprising charts, plans and surveys of coastal areas and harbours; of proposed and existing fortifications and coastal defences in dockyard areas and naval documents relating to the dockyards. The utility of these manuscripts vary considerably but the most important collection from the standpoint of this study is to be found within the Royal and Kings' Manuscripts which contain detailed surveys and histories of the naval dockyards for the years 1688, 1698 and 1774.(17)

At first sight the quantity and diversity of unpublished naval records would appear to be an embarrassment, and so they are. There exists in the P.R.O. and N.M.M. naval records relating to the daily correspondence, orders and administration of the Royal Navy and its dockyards since the seventeenth century amounting to many thousands of volumes. It is the sheer amount of material and its wide range of content

that precludes a detailed search for data in a project of this size. Such naval historians who have used them extensively have done so for only relatively small periods of time.(18) Nonetheless classes of documents and volumes have been sampled to ascertain the nature and utility of their contents and some classes have, as a result, been utilised more fully than others.

The immense correspondence of both Navy and Admiralty Boards are contained in ADM 106 and 170 and ADM 1-3 respectively in the P.R.O. and ADM A, ADM B, and ADM B.P. in the N.M.M.. Detailed or even cursory examination of all these volumes is beyond the scope of this project even though within them lie the intricate workings of the policy and administrative organisation controlling the Royal Navy and the dockyards. However, a number have been used from which the employment characteristics of each yard have been extracted. The Dockyard and Ropeyard Pay Books contained in the P.R.O. ADM 42 series provide a disaggregate account of the workmen employed in each yard up to 1832 and volumes within Ser/131 in the N.M.M. have similarly been used to obtain the employment characteristics of each dockyard. The Minutes of Visitation of Admiralty Board Commissioners to the dockyards are contained in ADM 7 in the P.R.O. and have been consulted. The letter books of particular dockyards are to be found in the P.R.O. within ADM 106 3318-4372 for Deptford, ADM 179 for Portsmouth and ADM 174 for Plymouth. The N.M.M. holds various records for Chatham dockyard (CHA/), Portsmouth (POR/) and Sheerness (CHA/M). No known location exists for the Woolwich dockyard records. These dockyard records have been sampled for particular years of importance to the yards but the records largely consist of correspondence between the yard officers and the Navy Board regarding the daily operation of the yard in question.

A number of other classes of naval documents in the holdings of the P.R.O. and the N.M.M. have been used and these are referenced as they occur in the study.

Parliamentary or Sessional Papers, especially for the nineteenth century, provide a rich mine of data and information concerning the naval dockyards. The Reports of Select Committees and Royal Commissions contain much information on social and economic policies while within the reports can lie the key to Government thinking.(19) This is equally true for the verbatim reports of Parliamentary debates. Before 1803 general coverage of these debates is recorded in Cobbett's Parliamentary History. Thereafter to 1908, when H.M.S.O. took over, they were recorded successively by Cobbett, Hansard and Reuter. Together they provide an excellent source for discovering the arguments advanced and the lines of thinking behind Government policy and action.

The Reports to the General Board of Health written for the dockyard towns by Robert Rawlinson and William Ranger and produced under the instructions of the Public Health Act 11 and 12 Victoria Chapter 63 permit an insight into the living conditions and urban environment of mid-nineteenth century towns. Published by H.M.S.O. within a year or two of each other, these reports cover the sanitary conditions of selected towns, considering in particular drainage and sewerage, water supplies and general housing quality and cleanliness. Reports exist for the majority of dockyard towns.

Nearly all the dockyard towns under consideration have their published histories. Many of these publications, however, stem from nineteenth century antiquarian works (which frequently form the basis for

later histories) and they contain information of variable quality and utility. They provide a useful 'potted' history of the town, whether factual or romantic, but they tend to be almost devoid of linkages between town development and wider historical processes. The factual content must therefore be placed in perspective. In some instances, particularly where Polytechnics have subsequently been located in a dockyard town as at Portsmouth and Plymouth, monographs of various aspects of the town have increased the number and quality of secondary works available.(20)

There is an abundance of published material on naval history, though much of it falls within the scope of military rather than urban history. Several works are of use in illuminating defence policy and foreign relations with regard to naval policy, a point of some importance in a constantly changing historical context. The utility of these secondary sources will be demonstrated below.

Most dockyard towns have attracted at least one research thesis. They tend collectively to concentrate on specific aspects of town development, whether retailing or morphological development as in Portsmouth, economic aspects as in the Medway towns, or demographic structure and change as in Deptford. Such studies are very useful because of the research and detailed material which they contain but there is rarely a reference to other dockyard towns where similar patterns or processes might be duplicated. Each case is treated in isolation and the degree of uniqueness is left undetermined. It is arguably unfair to make such comments about research degrees and this criticism is pointed more to the weaknesses existing within the subject than towards particular studies.

Minor Sources

The advantages of directories as a source in historical geography has

been indicated in several studies.(21) The gazetteering of selected inhabitants on the criteria of personal means, trade or commercial interests is of use in any attempt to reconstruct the economic character of a town. Inclusion within a directory however, especially early directories, was usually discretionary and the directories are prone to omission and repetition as a result and are generally incomplete. This can be overcome to some extent by combining their use with other available source material and where directories have been used in the study this has been the case.

Local government records and vestry minutes for the nineteenth century tend to be of limited use, dealing predominantly with the minutiae of church affairs though the Poor Law proceedings are more useful. However, Medical Officer of Health reports, where they exist, can be useful, particularly regarding the construction of houses and other buildings and in identifying areas prone to disease and nuisances. Parish and marriage registers can provide much information on population prior to the census of 1801 and schedules of 1841.

There remains a residual group of sources which are nevertheless useful. Local newspapers, especially widespread in the latter half of the nineteenth century, contain a vast amount of information, much of it of little direct use in a study such as this, but occasionally providing such information as eye-witness reports and details of local events which help a great deal in reconstructing the past history of a town. Stages of town development can be gleaned from advertisements of new houses for sale or reports of building schemes and similar information. Debates or controversies in the newspaper columns over certain subjects, particularly if flavoured by readers letters, can indicate local attitudes at the time.

However, the mixture of local and national news, the abundance of somewhat pedantic minutiae and the sheer size of the source makes the task of searching both tedious and time-consuming.

The lack of an index for most newspaper collections is a serious disadvantage, but the extensive run of The Times is an exception and has been used here. Concerned largely with national and international events it nevertheless contains sections of local interest, as for example in its coverage of the closure of Woolwich dockyard in 1869.

Diaries, notes and letters, particularly useful when accessible in published form, provide not only a contemporary source but also fascinating reading. The accounts given by Cobbett, Pepys, Fiennes, Defoe and Cooke Taylor, for example allow illuminating insights into contemporary economy and society and provide a description of places which supplements less personal sources of information.(22)

In a similar vein there can be little that develops a sense of time and place, so important in historical geography, more than photographs or paintings, sketches and drawings. They provide a particularly useful indicator of land and townscape at a certain period. An excellent series of paintings of the naval dockyards and surrounding areas by Nicholas Pocock, undertaken toward the end of the eighteenth century and which hang in the N.M.M., allows a visual image to augment the maps available. Models of the naval dockyards made at about the same time and which also reside in the N.M.M. give a good indication of the extent and form of the naval yards at that date.

There remains fieldwork, 'armed' with the requisite Ordnance Survey map. The built form, morphology and function of the town and the

identification of the remaining vestiges of successive urban landscapes can be discerned most clearly by walking its streets. The ability to distinguish housing types and quality, even many years after construction, is an asset not easily gleaned from documentary evidence, (23) especially as it becomes increasingly important to 'relate the built form of the town or city to its social ecology'. (24)

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CHAPTER 2

THE GENESIS OF THE DOCKYARD-URBAN SYSTEM

A fleet may be defined as a mobile extension of the offensive power of its base, therefore the capacity to carry on offensive naval action depends upon efficient bases - ports in which ships and fleets can be built, repaired, stored, and generally prepared for war - and from which an enemy's base can sometimes be masked or destroyed or his shores and communications attacked.

Oppenheim, M. (1926), V.C.H. Kent, II, 336.

The pre-dockyard navy and logistical support

The naval dockyard came into existence with the explicit function of servicing the Royal Navy and it is therefore to the transition from the medieval naval fleet to the modern Royal Navy that one must look for the factors underlying the genesis of the naval dockyard system. This period of transition is usually assigned to the fifteenth century and the reign of Henry VIII (1509-1547) is acknowledged as marking the passing of the medieval naval era and the beginning of the modern navy and dockyard system.

Before the reign of Henry VIII a number of factors contributed to Government not maintaining a large specialised fighting navy or a high level of logistical support. Prime amongst these factors was the functional interchangeability between merchant ship and warship, which by allowing the monarch to draw heavily upon the mercantile element when times demanded, put off the necessity for the State to build and maintain an expensive naval fleet. The merchantman performed a dual function; trading in time of peace but becoming part of the naval fleet during time of war. The lack of any fundamental specialist warship design before the sixteenth century enabled the merchant ship to be modified and quickly adapted for war service by the addition of fore and aft-castles, and a supplement of military personnel to the crew.(1) Peace and war at sea were very similar anyway, 'the latter implying no more than the temporary legality of invariable habits ...[Piracy was rife and]... war was the normal state of affairs at sea'.(2) Merchant shipping therefore normally went armed.(3)

Generally, the mode of warfare at sea at this time favoured this

duality. The navy was subsidiary to the real means of conquest, the army; the fleet being used largely to transport troops and provisions to the main theatre of war. Naval action was rare, and when it did occur was fought by the principles of land warfare, close quarter, hand to hand combat.

The medieval naval fleet therefore was composed of ships from three sources.(4) The first component comprised the personal ships of the monarch which he controlled and used for his own purposes. These ships were usually few in number and were disposed of at the will of the monarch; the nation having no interest of ownership.(5) The second source were the Cinque Ports which in return for rights and privileges undertook to provide ships and men for the use of the Crown at their own cost for a specified number of days and thereafter at the expence of the Crown. Because of the maritime importance of these ports and their commanding position on the Channel and the passage to France the monarchy had long grown to depend on the Cinque Ports for ships and sailors when naval forces were required for military purposes.(6) The Cinque Ports were at their peak in the twelfth and thirteenth centuries, but the silting up of the ports and raids by the French had contributed to their decline by the fifteenth century.(7)

The third source were the merchant ships of London and other trading and fishing ports. These were 'impressed' into the service of the Crown as required, often with no small hindrance to trade and fishing. Usually an assessment was made upon a port according to its supposed resources and a contribution of ships and men was duly expected in time of need.

It was the availability of merchant ships from the Cinque Ports and

elsewhere which provided the State with a quick, cheap and relatively efficient method of supplementing, if not wholly forming, a fleet. Indeed, Oppenheim suggests that, 'The existence of the Cinque Ports, were..... an indirect hindrance to the growth of a Royal Navy for it was cheaper for the King to order the Ports to act than to man and equip his own vessels.....' (8) With the decline of the Cinque Ports the King's ships were called upon to take a more prominent role and, during the fifteenth century, provide a nucleus around which merchant ships gathered.

A further factor working against the creation of a permanent Royal Navy at this time was the ad-hoc naval policy of the State itself. The number of King's ships varied between time of war, when they were expanded to suit the requirements of the war and the finances of the exchequer, and time of peace when they formed a costly liability and were depleted. 'In the Middle Ages no State was yet rich enough to maintain for long together a great and costly naval force', (9) nor for sometime, sufficiently well organised. Not until the reign of Henry V (1413-1422) did the King's ships begin to amount to any large scale force, though this nucleus of warships was neglected after 1420.(10) In the meantime alternative methods of 'keeping the sea', such as licensing and indenturing private ships, were used when necessary to perform the task without the need for a standing navy.(11)

The shore facilities needed to support such an arrangement were small. Generally the facilities necessary for ship maintenance and construction at this time were not extensive, nor were expensive specialised equipment and facilities required. The usual method of docking a ship was to bring the ship 'to a suitable spot at a spring tide, possibly hauled still further aground by mechanical means, and when she bedded herself, surround her by timber and brushwood, perhaps puddled by

clay'.(12) The merchant ships which normally formed the bulk of the fleet were privately maintained at the owner's cost usually at places concerned with trade or fishing where both skilled workmen and suitable materials could readily be found. Hence the importance of the Cinque Ports, London and the east coast fishing ports in this respect. The King's ships were also built under contract at these same ports paid for either by the King or as a towns' contribution to the defences of the country. Almost any tidal location with a soft muddy shelving shore could be utilised for building or repairing Royal ships and such sites could equally be quickly abandoned for there was little capital invested in the site.

Only during the reign of Henry V when the number of King's ships were greatly increased during the war with France, did a semi-permanent base for these ships, on similar lines to the later dockyards, become established at Southampton Water and at an overflow site on the River Hamble.(13) This area possessed several advantages as a naval centre. Situated on the south coast, Southampton and Portsmouth were ideally located for communication across the Channel and they were often used as the rendezvous for fleets transporting armies and provisions (usually supplied from Southampton) to the Continent.(14) The Isle of Wight gave protection to the Solent and Southampton Water and the double high tide, the second occurring two hours after the first, with a fall of nine inches in between, effectively gave an extended high tide.(15) The River Hamble was deep enough to launch ships of over three metres in draught from a suitable shore and was protected from the prevailing westerly winds. The entrance to the river, 'was safe and deep for the local pilot but dangerous to those who did not know it well,' a useful form of defence from enemy raids.(16) Timber could be readily obtained in the area and there was a sufficiency of the varied shaped timber required for ship

building.(17)

Thus many of the factors which influenced the location of the later dockyards were influential in this early period in the choice of Southampton Water as a naval centre. The naval shore facilities at Southampton, however, were limited. Oppenheim suggests that naval ships were built on land owned by the King and by the King's own workmen under the supervision of William Soper, the 'Keeper of the King's ships'.(18) Only a naval storehouse and smithy existed on the King's land but many of the naval requirements could have been met by the shipping facilities of the commercial port whose ships differed little from those of the King.(19)

Following the death of Henry V the large number of Royal ships were an expensive liability which were costly to maintain and of limited use now that much of France was in English hands.(20) The ships were thus laid up or sold, as were the shore establishment and naval stores at Southampton in 1424.(21) Thereafter, because of unfavourable political conditions there was no attempt to form any centre for naval equipment or stores and the early sites at Southampton and Bursledon which might have developed into permanent naval yards a century later were abandoned.(22) It is clear that the nature of both the King's ships and naval shore facilities at this time was short term but even at this early stage the direct relationship between the number and operational use of the King's ships and the provision of shore facilities is recognisable.

The beginnings of the modern Royal Navy and dockyard system

The construction by Henry VII (1485-1509) of a dry dock at Portsmouth in 1496, the first to be built in England, inaugurated the modern system of dockyards in this country.(23) A number of causal factors were influential in the creation of the dockyard system, many of which

continued to influence the system thereafter. The combined effect of these factors was to exert pressure on the State to actively participate on a large scale in the development and maintenance of a permanent specialised naval force which in turn demanded a number of supporting dockyard bases.

Foremost amongst these contributory factors were the changes brought about in naval architecture as a result of advances made in armament technology towards the end of the fifteenth century. These radical architectural alterations produced the first of a line of specialised warships and increasingly the dual role of the merchant ship which had permitted the varied composition of medieval fleets could no longer be maintained.(24)

Cannon had been used on board ships since the fourteenth century, principally as slow-firing anti-personnel weapons.(25) The weapon took a subsidiary place to the dominant tactic in naval warfare of close quarter fighting. However, improved technology in cannon founding led to naval ordnance assuming a new prominence at sea. Heavy ordnance capable of projecting shot relatively long distances with much greater destructive power than hitherto was an important naval innovation which called forth alterations in the design of warships.(26) The weight and effect of discharge on the old castellated 'round' ships created instability, top heaviness and poor performance under-weigh. The use of heavy and powerful cannon at sea thus led to the innovation of port holes, cut in the ship's side, allowing ordnance to be nearer the centre line of the ship and thereby reducing top-heaviness.(27) Such changes brought about improvements in warship design represented by the advance from the 'carrack' type ship with high fore and aft castles to the speedier, more

readily manouvered 'galleon', one of the first sailing ships to be regarded primarily as a warship.(28) Cannon was now carried on gun decks placed in the belly of the ship and this severely interfered with the cargo space of merchant ships.(29) Because of these architectural changes and the need for stronger ships capable of withstanding both the weight and the recoil of the guns, fighting ships became increasingly specialised. No longer could the mercantile element be called upon at short notice to perform the function of a warship. Henceforth the task of constructing and maintaining this specialist fighting force fell to the only institution capable and in a position to perform such an undertaking, the State.

A further factor instrumental in the transition to a large navy was the growing awareness by the State of the importance of sea power as part of its diplomatic armoury in foreign and defence affairs. The importance of sea power to a maritime nation like England, especially in an era of continual national conflict, was long established. However, from the sixteenth century the attention focussed on sea power and the scale of naval operations, spurred on by the revolution in warship design, surpassed all that had gone before. Under Henry VIII the Royal Navy was enlarged to a size and permanency it had never before attained. When he came to the throne in 1509 Henry possessed five Royal vessels. By 1547 in the pursuit of supremacy on the seas and financed by the monies obtained from the dissolution of the monasteries Henry had built forty six ships, captured and retained thirteen others and bought twenty six. Much of this increase may be attributed to the continental policies pursued by Henry.(30) The modern Royal Navy and its administration date from the reign of Henry VIII and it was largely the requirements of sixteenth century warfare, especially the technical improvements in warship design, and the political and military aims of Government which brought it into

being.(31)

The dramatic increase in the number of Royal warships, the specialised nature of their design and the increased awareness of naval power as an instrument of Government policy entailed new and increasing demands on shore facilities. During Henry VIII's reign such demands called into being dockyard establishments at Deptford and Woolwich on the Thames, at Portsmouth and, at the end of Henry VIII's reign, at Chatham on the Medway. As the Royal Navy grew in size and complexity so did the shore establishments necessary to construct, maintain and provide for such a fleet. Further dockyards were established as circumstances dictated, as at Harwich, Sheerness in 1667, Devonport in 1689, Pembroke in 1814 and Rosyth in the early twentieth century. The large investment in immovable capital at these locations, such as storehouses, docks and slipways, and the specialised workforce required, tended to favour the continual use of these sites and reduce the need for temporary sites. Such capital requirements and technical expertise were beyond the scope and capabilities of ordinary private builders and the creation of naval dockyards represented a necessary shift away from the previous dependence on commercial builders who had dominated the construction of Royal ships before the radical technological changes of the late fifteenth and early sixteenth centuries. Henceforth the specialist requirements of the Royal Navy were catered for by the naval dockyards and both were under the direct administration and control of Government.

The Location of Naval Dockyards

Strategic considerations of situation

Two basic considerations seem to have influenced the location and, to a certain extent, the operation of dockyards both of which could, and did, change over time. The first consideration concerns broad aspects of naval strategy which influenced Government decisions regarding the siting of dockyard bases. This aspect is fundamental to any understanding of the dockyard town simply because the naval base cannot be separated from its strategic context.(32) The second factor concerns the physical requirements of a site which affected the specific placement of a dockyard within a region.

Command of the sea confers upon a country both offensive and defensive advantages.(33) To Britain command of the sea was essential. To dominate a maritime area it was necessary to position naval bases as near as was defensively possible to the likely scene of naval operations, especially potential theatres of war.(34) The choice of such sites lay with Government and its interpretation of the strategic value to be gained from developing certain places as naval bases. Necessarily such considerations changed through time. Up until the twentieth century the English Channel was the most important maritime region to England and emphasis shifted continuously within this area. Thus, following the Norman conquest the Cinque Ports, Portsmouth and Southampton were admirably located for cross-channel links. With the loss of France and her subsequent position as the traditional enemy of England, Portsmouth provided a favourable location from which to command the principal scene of maritime operations. During the Dutch wars of the seventeenth century, however, emphasis shifted to the south-east and the Kent dockyards. Later still, the new threat posed by French naval expansion along the Breton coastline shifted attention to the south-west, the Channel approaches and the south Irish sea. Such realignments were not confined to the age of

sail for in the twentieth century the threat posed in the North Sea by the German Navy brought about the development of a naval base at Rosyth on the Firth of Forth. This aspect is discussed in greater depth in Chapter 4 but the essential of a naval base was the ability to get ships to sea quickly and to be able to mask, respond to, and counter any movement of the enemy rapidly.(35) In this respect the location of a dockyard close to an enemy base was an important consideration.

Only in the early years of the dockyard system was this overall consideration tempered by another factor and this was in respect to the early siting of dockyards at Deptford and Woolwich and to a lesser extent at Chatham. Whilst these dockyards were strategically well located (especially during the Dutch wars) in the south-east of the country in secure up-river locations the choice of situation was also influenced by a desire to place them adjacent to the commercial and administrative centre of the Kingdom. In the early stages of such a large-scale innovative enterprise, personally promoted and supervised by an active monarch, it is not surprising that the earliest sites should be close to London. In fact it is noticeable that in general each successive dockyard was established further away from the capital. This was largely the result of strategic considerations but the problem of distance from the administrative and governing centre of the dockyard system did have a bearing on the timing and development of the system.(36)

Physical considerations of site

A second consideration which was influential in the choice of site for a dockyard were the physical attributes of a particular site. Whilst strategic considerations delimited the general area in which a naval base was required, the local geography determined where, within that area, a

dockyard should be established. A number of qualities were sought and prime amongst them were deep water access, good anchorages and invariably some form of natural defensive position.

All the dockyard sites possessed deep water approaches. (Figures 2.1-2.6) Usually this extended as far as the dockyard itself though this was not a vital requirement for wharves could be extended into deeper water and the tides utilised for docking. Changing physical conditions, however, as in the up-river yards of the Thames and Medway which experienced difficulties due to shoaling, could alter the situation. Defence from external attack and protection from storm and bad weather were also important requirements. In the early years, up-river sites were favoured for this reason. The long, narrow river courses could be defended by cross-fire from the banks, by the use of cables across the entrance and by the use of guardships to block enemy access. Land-locked harbours such as at Portsmouth and Devonport were particularly favoured. The Irish yards at Haulbowline in Cork harbour and at Kinsale possessed similar defensive qualities while the later yard at Rosyth was sited some way up the Firth of Forth. Locations around the coastline which satisfied strategic demands and possessed both deep water and potential defensive qualities were not common but, with one exception, the sites of all dockyards are characterised by a combination of these two.

The exception was the yard at Sheerness which, despite possessing excellent deep water facilities, was nonetheless in an exposed and vulnerable position at the junction of the Medway and Thames estuary. Its vulnerability to attack, as illustrated by the Dutch raid in 1667, was known previous to the yard being extensively developed. The choice of this site was to provide quick and ready access to the dockyard for small ships requiring speedy repairs and supply and thus to overcome some of the

deficiencies of the up-river yards.

A sheltered anchorage was also considered an important requirement. The rivers at Chatham, Deptford and Woolwich were considered suitable in the early years of the dockyard system though silting and shoaling was a considerable problem at a later date. Portsmouth harbour and the Hamoaze were ideal anchorages though they were restricted somewhat by the difficulty involved in entering the harbours. For this reason sheltered anchorages outside the harbours were also favoured. The Solent, protected on three sides from the weather, provided an excellent anchorage and rendezvous for the fleet. Plymouth Sound, however, though potentially a useful haven was exposed and dangerous to shipping in certain weather conditions and it was not until Government invested heavily in a breakwater in the early nineteenth century that this deficiency was corrected and the Sound became a suitable anchorage. In all cases a soft muddy floor, free of rocks and hazardous obstacles on which ships might ground at low tide or in heavy weather was a necessary requirement.

The site of the dockyard itself needed to be dry and firm. The availability of drinking water for the use of the dockyard and to supply ships was important but not vital for, as in the case of Sheerness and Devonport, nearby supplies could be tapped. Proximity to settlement was not a requirement. Though useful for accommodating workmen in the early years of a yard many dockyards were located in areas initially devoid of settlement. However supply of materials, especially timber, was a factor. Heavy use of local supplies soon entailed the yards being supplied from areas further afield or from the distribution and supply yard at Deptford.

Usually a number of potential sites would be considered within an area before a decision to locate a dockyard was made. Thus when towards the end of the seventeenth century a dockyard was required further west than Portsmouth to guard the western approaches and mask the ports of Brittany, a number of sites at Falmouth, Torbay, Dartmouth and Plymouth were considered, surveyed and costed as potential yards. The final choice in this case was the Hamoaze at Plymouth because although all the sites examined could have fulfilled the strategic requirements, the Hamoaze was considered the best site for the dockyard itself.

No one site could be said to have fulfilled every requirement sought by Government officials and deficiencies in a site could be outweighed by advantageous factors. However the qualities which initially favoured a site could and did alter throughout time and affect the operation of the dockyard.

Such changes could be brought about by physical means such as the silting up or shoaling of a river or harbour entrance though dredging could improve the situation. Alternatively technological changes could effectively alter the suitability of a site. Thus the dramatic increase in the size of ships during the nineteenth century brought about a major reappraisal of a number of dockyard sites and ultimately led to the closure of Deptford and Woolwich dockyards which no longer possessed sufficient depth of water for the new warships. Importantly, therefore, local geography influenced the locations of the dockyards and changing physical conditions of site could, and did, influence the operation of the system. Throughout, however, it was decisions taken by Government officials based on strategic and local considerations of site which determined the location of the dockyard bases.

The Dockyard Towns

Having considered the general factors underlying the genesis of the dockyard system the remainder of this chapter is devoted to examining the particular geographical and historical circumstances surrounding the origin of each dockyard. In this, the section provides a brief introduction to the dockyard locations under consideration in this study and enables the themes outlined above to be considered in relation to the particular circumstances of each yard. Where possible, the decision-taking role of Government officials in the setting up of a dockyard is considered, for an understanding of the official mind at the time reveals much about the underlying influences bearing upon the development of the dockyard-urban system.

Chatham

Chatham dockyard is located some distance up the River Medway just below where the river breaches the North Downs escarpment. (Figure 2.1, Plates I and II) The river to this point is relatively wide and sinuous but further passage up-river is hampered by a narrowing of the river and Rochester Bridge over which the Norman Castle stands guard. Just below the town of Chatham the chalk outcrops along the side of the river and this was the chosen site for the dockyard. To the east of the yard the land rises to a height of over thirty metres before dipping north-eastward as part of the continuation of the dip slope. A steep sided dry valley containing Luton and Chatham at its mouth intersects the Medway to the south of the dockyard and it was at this junction that the early dockyard

was established.

The earliest record of dockyard facilities in this area is in 1547 when payment was made for the hire of a storehouse at 'Jillyngeham Water'.(37) In its early years Chatham was used predominantly as an anchorage for the fleet and especially so during the winter months when ships were laid up. On 8 June 1550 'Ordre was given to the Lord Admyrall that the Kinges shippes shulde be harbarowed in Jillingham Water, saving those that be at Portsmouth, to remaigne there till the yere be further spent'.(38) On the 14 August 1550 the Privy Council further ordered, 'A letter to the lord Admirall to remove the Kings Majesties shippes from Portsmouth to Gillingham Water whare he shall take order that they may be calked and grounded'.(39)

The problem of where to anchor the fleet appears to have troubled the authorities for some time before Chatham was eventually chosen;

The authorities never seem to have been able to settle on any convenient spot for permanent moorings for the ships, which oscillated between Woolwich, Deptford, Erith, Limehouse, Northfleet, Greenwich, Greenhithe, Radcliff, Barking, and elsewhere, as though every place was tried in turn and found wanting. The Medway may have been a satisfactory alternative....(40)

The yard was provided with facilities for ship repair and maintenance though a dry dock was not constructed until 1625 and ship building was not a part of the dockyard function here before this date.

A number of physical qualities favoured the use of the Medway and Chatham as a naval base. The river afforded ample room for ships to anchor, was protected from the wind and weather and its tidal range allowed the largest ships of the day to be graved. 'Chatham is so safe and secure a port for the ships to ride in that his Majesty's navy may better ride with a hawser at Chatham than with a cable at Portsmouth'.(41)

The river's soft muddy bottom was free of rocks and its safe position up-river was an important factor in its favour.(42) Furthermore, Monson emphasizes the importance of the propinquity of the site to London; 'No part of England can victual a navy so conveniently, speedily, and at so small a charge as London; all the corn for bread, beer, butter, and cheese, etc., is brought by water from the adjacent countries thereabouts. And for beef, pork, and bacon, London is placed in the centre'.(43) As such, Chatham could 'be supplied with all things they shall stand in need of, for London is the storehouse of all England'.(44) London and the dockyards at Deptford and Woolwich and the various private building and repair yards on the Thames could also provide sailors for the fleet and logistic support when required.(45) This was not an inconsiderable advantage for the delay in sending artisans, mariners and stores to Portsmouth was considerable:(122)

Not a cable, anchor, mast yard, barrel of powder, or any other thing that belongs to the furnishing of our fleet, but must be brought from London or Chatham to Portsmouth, with an exceeding great charge, and no less delay and danger, considering the uncertainty of winds, the peril to be intercepted by enemies, and the hazard of shipwreck.(46)

The advantages to be gained from a good site in close proximity to the Capital were obvious.

There were nonetheless disadvantages with the river and site. Monson refers to 'the hazard of the shoals and sands in going thither' and, 'The distance from Chatham thither, if the French should attempt anything upon us.'(47) The ability to get to sea quickly in the event of an emergency was an important consideration and the site at Chatham concerned the authorities in this respect;

have heard some wish, that for the better expedition in time of service, some part of the Navie might ride in some other haven [than Chatham], the rather bicause it is many times very long before a ship can be gotten out of this Riever into the sea.'(48)

However, the defensive advantages to be gained from such an up-river site mitigated to some extent the inconvenience of reaching and leaving the yard. Furthermore, the yard was strategically well placed to counter any naval threat from Holland;

If Holland or the East land become our enemies then doth Chatham lie most with our advantage to annoy them, if they attempt any part of our north coast, of Norfolk, Suffolk, Essex, and Kent, which are places of most peril considering their nearness to the city of London.(49)

A further factor forwarded in Chatham's favour was that even when the fleet was anchored in the Downs (off Dover) there would be 'little advantage gotten betwixt Chatham and Portsmouth' in any war with France.(50)

Separated from the dockyard by over three kilometres of undulating countryside and dependent upon fishing and agriculture the nearby settlement of Gillingham remained an isolated rural community until the nineteenth century. Chatham had a more natural association with the dockyard because of its proximity to the yard, first established where the present Gun Wharf now stands below St Mary's Church. That, and the ancient town of Rochester, strung out along the old Roman Watling Street, provided the early base for seamen and dockyard workers.

Deptford

Deptford lies on the south-western bend of a meander of the River Thames, to the west of where the River Ravensbourne enters the river opposite the meander core of the Isle of Dogs.(Figure 2.2; Plate III) Situated on the flood-plain of the Thames, the area is generally low-lying and early settlement was attracted to the relatively higher gravel terraces which border the Thames to the west of the Ravensbourne.(51)

Deptford acquired early importance because of its position as a crossing on the Ravensbourne. The name of Deptford stems from 'deep-ford', implying that it was only traversible at low tide possibly because of the tidal swell into the Ravensbourne.(52) The Ravensbourne was certainly heavily used for water powered mills which existed at regular intervals along its course.(53) The lobe of higher flood-plain gravel reaching almost to the river may also have offered a favourable site to early settlers. Hickman suggests that there were probably three centres of early settlement at Deptford:(54) along the side of the Thames on low-lying marsh-land where a fishing settlement existed in Saxon times called Mereton, meaning town in the marsh; (55) at the site of the crossing over the Ravensbourne and a farming community to the north-west of Deptford around the Sayes Court area.

It was at the first site that early shipbuilding took place possibly because the outflow of the Ravensbourne formed an inlet which allowed 'small craft to be grounded out of the way of the tidal stream rush in the Thames, while the deep bend of the Thames at this point and the scouring from the Ravensbourne formed a channel of fairly deep water, close to the western shore which protected shipping moored in the stream from the violence of prevalent south-westerly winds and gales'.(56)

In the early fifteenth century warships of Henry V (1413-1422) were placed on 'stokkes' at Deptford for repairs to be made and when toward the end of the century ships of Henry VII (1485-1509) were laid up in the Thames a storehouse was hired in the locality of Deptford in which to store their gear.(57) Although the area had links with early naval activity they were not extensive unlike Portsmouth, Southampton or the Cinque Ports and this was largely because the Thames was distant from the then strategically vital English Channel and the direct line of

communication with the French coast.(58) However, with the establishment of a permanent naval organisation proximity to London had a number of advantages and a dockyard was set-up at Deptford in 1512-13. 'From the administrative point of view there must have been an economy in every branch of expense in building near London where all naval stores were plentiful, where the cost of transit was largely saved and where workmen were numerous'.(59) Because of the proximity of Deptford, and indeed Woolwich, to London and the navy office no resident Commissioners were appointed to these yards for the first two centuries of their existence for they came under the immediate authority of the Comptroller and Surveyor of the Navy.(60) As a further result of this propinquity the Navy Board frequently drew upon the experience of the Deptford officers 'for Information upon matters respecting the several branches of business in the Dock Yards, [such that] the Principal Officers in this Yard have been usually considered as the most experienced and ablest Officers in their several Branches'.(61) Deptford also had the advantage of easy access for Henry VIII who as the principal instigator of the Royal Navy and the dockyard system took a keen personal interest in events.

Furthermore, 'This yard being so near London (which may be considered as the Grand Magazine for all sorts of naval stores for almost all the Kingdom) it is the great Magazine for receiving [all] kinds of stores more than for its own use to be distributed to the other yards as demanded also for the supply of all the foreign yards. ... It is conveniently situated for receiving Timber from the interior parts of the Kingdom by the River Thames therefore it is useful for building both large and small ships there being a sufficient flow of water for launching them'.(62)

Thus from the point of view of proximity to London for supplies and

administration and the personal interest of the monarch, the favourable site on the Thames at Deptford was chosen as a suitable location for early dockyard work. During the sixteenth century Deptford became the foremost yard in the country though insufficient depth of water in the Thames meant that ships could not be moored there for long but were taken down river to be laid-up at other ports.(63) The silting-up of the Thames subsequently led to Deptford utilising its position adjacent to London and specialising in the role of distributing centre during the eighteenth century.(64).

Devonport (65)

Until the formal establishment of a dockyard complex in the Hamoaze during the 1690s a small establishment at Sutton Pool had performed minor repair work, revictualled naval ships which called into the port, and maintained naval cruisers during periods of war. The facilities were small, of a temporary nature, and provided by private rather than Government enterprise, much the same as other small-scale facilities set up by the naval authorities around the country.(66)

Government interest in Plymouth as a site for a dock had been expressed in 1625 when the River Tamar was surveyed and an estimate for a dock made.(67) As one of the western-most ports Plymouth was useful as a last and first port of call for ships leaving the Channel and arriving from the west. No naval dockyard was warranted before 1690 because naval activity was centred in the east. Portsmouth serviced the Channel and when necessary the western approaches. Plymouth had shown its utility as a naval base in the west at the time of the Spanish Armada but subsequent to the war with Spain danger from this area diminished and strategically a naval base was unnecessary. Further, the difficulties of establishing a dockyard at such a distance from the administrative and supply centre of London, was great.

With the accession of William of Orange in 1688 and the elimination of Holland as an enemy, the south-east coast was made secure and attention switched to the threat posed by the growing French military ports to the south of Ushant. The English fleet, when in this region, had anchored in Torbay but no facilities existed in the west for repairing and maintaining a fleet.(68) Because of the increasing strategic importance of the western approaches in naval operations, later emphasised during the war of Spanish Succession (1702-13), the decision was taken by Government to establish a new dockyard to the west of Portsmouth. Torbay was unsafe as an anchorage when winds blew from the east and was therefore discounted as a possible site.(69) Amongst other sites considered was Plymouth.

The advantages of Plymouth as a base in a war to the west were well known even before the Armada. Sir Walter Raleigh had written that the fleet 'should not be pent up in Rochester Water.... for service in the south or west, ships take so long to reach there'.(70) In suggesting Saltash on the River Tamar as a possible site he particularly emphasised the importance of having a safe anchorage several miles up-river from the entrance which should, he stressed, be heavily defended. Monson reiterated the advantages of Plymouth as a base in the west, again because of the delays involved in ships going to the Thames and Medway for repairs or to be laid-up during the winter months.(71)

But upon a present employment during a time of war betwixt Spain and us I do hold Plymouth a more convenient harbour than either of the other two so long as the war shall last, for in the winter, which is the time that ships must keep harbour, they shall have space sufficient to make provision against the spring and lease a great charge in carrying the ships from Plymouth to Chatham, and after from Chatham to Plymouth. Secondly, the ships will be clean, which is a great advantage in sailing, for we may allow from the time of the graving at Chatham, until their coming to Plymouth very near two months. Thirdly, at Plymouth they shall be sooner and better manned, sooner victualled and sooner at sea than if they were

furnished at Portsmouth or Chatham.(72)

By the late seventeenth century demands on the limited facilities at Plymouth had already outgrown the small premises and workforce there. In May 1689 the Navy Agent at Plymouth, John Addis, was asked by the Admiralty to suggest suitable sites in Plymouth where a dock might be constructed.(73) Addis suggested Turnchapel in Cattewater, within the Barbican and at Temple Couche. Sir John Berry, Commissioner of the Navy, was sent to examine other possible locations at Bideford, Dartmouth and Plymouth.(74) Turnchapel was favoured but an inability to find a contractor to undertake the work delayed the building of a dock.(75) The demands of war in the meantime were making the need for action imperative. Other yards were being placed under increased demands and already a Master Caulker and Master Attendant had been appointed for the proposed dock.(76) Edmund Dummer, Surveyor to the Navy, undertook a further survey of sites at Plymouth and Dartmouth in September and October 1689 accompanied by Robert Walters, a mason and subsequent contractor for building the new dock. In a letter dated 1 October 1689 Dummer explained the criteria upon which he judged the potential of various sites.(77) He noted the tidal range, inquired of the ease of entry and degree of shelter afforded in times of storm, and ascertained whether all the materials required for building a dock were available locally.(78) On the 5 October 1689 Dummer wrote of Dartmouth, it 'is the place to be wish't for on this occasion.'(79) However, according to an earlier survey of 1689 it had been rejected '...by reason of the conceived hazards of entering under the High lands and Rocky shores....'(80) Falmouth, also surveyed in 1698, had likewise been rejected because it was 'clogged with many inconvenient shoales and suddain soundings and therefore not very much frequented by shipping, it was surveyed in 1693 and judged not to abound in those Qualifications which are Proper for ye Improvement of the Navy.'(81)

Ultimately in early 1690 the Hamoaze was chosen as the site for a new dockyard by the Navy Board and subsequently agreed to by the Admiralty. The drowned river valley of the Tamar was deep, in places being over thirty seven metres in depth, and its lower reaches were land-locked, extensive, possessed deep water close to the shore and had a good tidal range of four to five metres. (Figure 2.3, Plate IV) Entrance into the Hamoaze was via a deep but narrow channel and this channel passed between the northern shore and the igneous outcrop of Drake's Island. From here the channel opens out into a natural bay, the Sound, which could provide an extensive but exposed anchorage. Access to the Hamoaze by the route to the west of Drake's Island was prevented by 'The Bridge' a shallow ledge of land connecting Mount Edgecumbe to Drake's Island. Although criticism was voiced at the time of the decision about the narrow channel to the north of Drake's Island being dangerous, (82) the potential defensive nature of the site was recognised and later capitalised on during subsequent centuries.

The new agent appointed for the port of Plymouth, Captain Henry Greenhill, arrived in October 1690 and reported favourably on the Hamoaze:

I cannot give it too large a Character, it being soe very safe, whereit for all ships, the depth of water up to Saltash and above it being considerable ... the tyde floweth att ye severall places I have survey'd sufficient for any of their Majesties Ships, being from sixteen to eighteen foot at Spring tydes, according on ye winds are a southeast making the greatest tydes.... Morestone [Granite] from Higston Down is used everywhere locally for Keys and Wharfs.... there is much Marble stone which makes ye best of lime for building, also Dunstone [grit or sandstone] Shindle [slate] and Clay. Timber is to be obtained at 40/- a load.... the River abounds in fish,Cattle at Saltash market ... There is all sorts of Corn in the neighbourhood and much cyder. (83)

Greenhill considered the site proposed by Dummer for the new dockyard at Point Froward on the eastern shore at the entrance to the Hamoaze, 'very commodious' but the large expanse of water in front of the site concerned

him because of the effect this would have on the dockyard gates during a storm.(84) Greenhill surveyed another site further up the Tamar at Saltash which, while possessing deep water, was more sheltered against the weather. Greenhill stated one of his reasons for favouring the site at Saltash was because it would also be close to the town where the workmen would be able to lodge.(85) At face value this statement suggests that whilst physical considerations were dominant in the choice of site for a dockyard they were supplemented by occasional thoughts regarding the workforce required by the dockyard. Whether this was really an important factor here is not clear; certainly the lack of workmen or accommodation did not prevent the eventual choice of other dockyard sites. In the event Dummer, in reply, pointed to Stoke and Stonehouse as potential dwelling places for the workers once the dockyard was established at Point Froward.(86) The extent and proximity of these settlements, however, might be questioned for Worth suggests that the area about Point Froward was marshy, desolate and possessed only a few hamlets. In 1670, besides a church and the manor house on Mount Wise, there were no more than twenty dwellings in the parish.(87) Dummer also listed other features of the Point Froward site which he considered favourable. It was not, he considered, too exposed and would be a good site for the construction of docks and slips. It had potential for enlargement and yet was secluded and could be kept so, to prevent possible theft. Further, he pointed to Plymouth which would, he claimed, be close enough to be a market for supplies.(88)

Eventually the Navy Board acted upon Dummer's recommendation and decided to build a dock at Point Froward, under contract to Robert Walters.

Pembroke Dock

The ria of Milford Haven contains a deep water channel, with an average depth of eighteen metres, which extends as far as Pembroke Dock.(Figure 2.4) This deep water channel extends several kilometres up the Haven though there are some sections of the Haven's shore which contain substantial areas of mud flats. The entrance to the Haven is approximately two andahalf kilometres wide and the channel narrows to less than one kilometre above Pembroke Dock.

The convenience and suitability of Milford Haven as a shelter for shipping in the west had long been recognised before the establishment of a naval yard there in the early nineteenth century. Defoe referred to Milford Haven as 'one of the greatest and best inlets of water in Britain... some say a thousand sail of ships may ride in it'.(89) Lewis Morris in 1748 described the Haven as 'one of the most extensive and best ports in His Majesty's Dominions, consisting of as many Roads, Harbours and Creeks as would perhaps contain all the vessels in the world'.(90)

Such a favourable stretch of water soon earned the Haven an important reputation as a place of refuge, for it offered 'the only perfect and accessible shelter from all winds at all times and for all classes of vessels between Falmouth and Holyhead'.(91) Strategically Milford Haven commanded the Irish Sea and the coast of Ireland and in the wake of an invasion scare during the Seven Years War a petition was submitted to Parliament by several merchants of London who suggested that Milford was a 'safe and commodious harbour... conveniently situated for the resort and security of Merchant ships, when they cannot easily enter the English Channel, and for the sending out and relieving of Cruizers, from time to time, upon proper stations in the Ocean; and for the immediate repairing and refitting such Cruizers....'.(92) Any wind was favourable for entering or leaving the Haven, they claimed, by using the strong currents

and access to the sea was 'in a great deal less time than is usually employed in sailing with the most favourable wind from Portsmouth to the Land's End ...'.(93) The Haven could, they submitted, be easily defended against any attack and they suggested 'That a Dock Yard may be established there, and any number of Ships, and of any Rate, could be rebuilt, careened, repaired and fitted for sea, with the greatest convenience and expedition; and that plenty of proper materials for the construction of ships abound in the adjacent Counties'.(94) A Select Committee appointed in 1757 concurred with these suggestions and urged the immediate construction of defensive batteries along the shore of the Haven and at the entrance.(95) Land for such works was purchased by the Board of Ordnance in 1759.(96) A rejoinder on the vote granting this money in 1758 noted that, 'Docks and a shipyard may be considered later'.(97) In the event the Treaty of Paris in 1763 put an end to any immediate consideration of building a dockyard here as well as bringing the construction of defences in the Haven to a halt.(98) The comparatively recent development of Devonport probably precluded the establishment of a dockyard at Milford Haven at this time.

Not until the early years of the nineteenth century was a naval dockyard established on the shore of Milford Haven and in the first instance this was largely brought about by the personal town building ambitions of a local land owner, William Hamilton and his agent and cousin, Charles Fulke Grenville. In 1790 an Act of Parliament was obtained allowing the construction of quays, docks and piers and the establishment of a market at Milford. The silting up of the Pennar River which served the port of Pembroke on the opposite bank brought about the transfer of the Irish Packet service and the custom's house to Milford from Pembroke and boosted the development of the town. In 1796 in further

pursuit of his plans to develop the town Grenville persuaded the Navy Board to enter into a contract with a Mr Jacob of London to build ships on a site which Grenville would lease to the Government at Milford.(99) Such an agreement, signed in April 1797, was not unusual at this time for war with France demanded that the Navy Board construct ships by contract on a number of sites.

In 1807 Hamilton died, followed two years later by Grenville, and the estate passed to his brother, Robert Fulke Grenville. In the meantime Jacob had gone bankrupt and Government had taken over the yard at Milford to complete the vessels on the stocks.(100) Just before Charles Grenville died Government had expressed a desire to purchase the yard rather than lease it on a yearly basis. It would seem that the Napoleonic war had stimulated Government interest in establishing a dockyard within the Haven and, because of Government involvement in the yard, Milford was considered a suitable site. Charles Grenville had agreed to sell but to the annoyance of the naval authorities Robert Grenville sought to exploit the situation and held out for a far greater sum than the £4455 the Admiralty and Charles Grenville had valued the site at.(101) The Navy Board in response suspended any further improvement in the site and instructed William Stone, the Master Shipwright at Milford, to make an extensive examination of the shores of the Haven for possible alternative sites for a dockyard. In October 1810 he reported favourably to the Admiralty on a location opposite Milford at Paterchurch Point.

The site chosen by Stone, was owned by the Board of Ordnance, being part of the lands purchased in 1759 on which forts were to be built. In 1812 the site of 20 acres 1 rood and 32 perches was purchased by the Navy Board from the Board of Ordnance and in December 1814 the Navy Board transferred the dockyard facilities to the new site at Paterchurch, later

to be known as Pembroke Dock, and relinquished the site at Milford despite pleas from Robert Grenville and personal representations from Lady Hamilton to reconsider. Robert Grenville had overplayed his hand in negotiations with the naval authorities and despite Grenville's reduced demands the authorities were reluctant to invest heavily at Milford with the possibility of later exorbitant demands being made. Following the Napoleonic war the town of Milford entered a period of depression which lasted for much of the nineteenth century.

The site at Pembroke Dock comprised an area of relatively flat land underlain by limestone which abutted on to the deep water channel of the Haven. The lower reaches of the Haven could be defended by forts and batteries and possessed a favourable tidal range.(102) With the exception of four or five buildings, no settlement existed in the area. The old market town of Pembroke was just a few miles away but the future development of this site and the resultant creation of the town of Pembroke Dock was due solely to the establishment of the dockyard here in 1814.

Portsmouth

Portsea Island, on which Portsmouth and the dockyard are located, is in a synclinal structure between the chalk anticline of Portsdown to the north and the northern limb of the monocline in the Isle of Wight. The island is low lying and almost uniformly flat and abuts on the west onto the land-locked Portsmouth harbour.(Figure 2.5) The old town of Portsmouth is on the eastern flank of the entrance to this harbour and is opposed by Gosport on the west. Just beyond the entrance to the north of Old Portsmouth is the dockyard.

The entrance into the harbour is narrow and funnel-like and because the harbour is land-locked it is sheltered from the wind and the sea. (Plates V and VI) The harbour, unlike the nearby harbours of Chichester and Langstone, is deep at low tide, averaging ten metres, and the entrance is kept clear of shoals by the flow and ebb of the tide through the constricted entrance. This scouring is greatest on the ebb tide and material is deposited to the south-west of the entrance on Spit Bank. The existence of this spit effectively confined access to the harbour to a deep-water channel which runs close inland to the south-east of the harbour and historically permitted land defences to command both the approaches and entrance to the harbour and dockyard. To the south of the harbour lies the sheltered anchorage of Spithead which provided an extensive and valuable roadstead for the fleet.

The strategic position of Portsmouth at the mid-point of the Channel coastline and opposite France made it a convenient and accessible site for cross-Channel traffic and communication. Before the reign of King John (1199-1216) Portsmouth and Southampton were used as points of departure and arrival linking the two component parts of the royal domain. (103) After the loss of Normandy in 1204 Portsmouth became the rendezvous for fleets transporting armies and supplies to France. Victualling of the army and ships was performed by the commercial port of Southampton while the fleet anchored in Portsmouth harbour or the Solent.

At the time of the Domesday Survey only the three agriculturally based manors of Buckland, Copnor and Froddinton (now Fratton) were sufficiently important to warrant mention though scattered buildings may have existed near the present site of Old Portsmouth at the harbour entrance. The town of Old Portsmouth would appear to date back only as far as the twelfth century when Richard I (1189-1199) created a planned

settlement here primarily as a supply base for his troops operating abroad.(104) Storehouses were built during the reign of King John and 'graving' places established.(105) Raids by the French in 1338, 1339 and 1370 prompted the construction of ramparts to protect the town and in 1418 the Round Tower, the first of a number of such defences, was constructed to command the entrance into the harbour and the Camber, a natural inlet off the harbour which afforded a sheltered anchorage and the site of the earliest port facilities.(106)

It is perhaps not surprising given the early military and strategic role of Portsmouth that the first known dry dock in Britain was constructed just to the north of Old Portsmouth facing on to the harbour in 1495-6. No transition phase appears to have existed between the old method of graving a vessel on a beach and building a puddled clay wall around it to keep out the tide and the innovation of constructing a timber-walled dry dock with gates to prohibit the entry of water.(107) The importance of this event at Portsmouth, from the standpoint of the naval dockyards, is that it occurred at a time when the modern Royal Navy was in the very earliest stage of development and was the precursor of large-scale Government provision of shore facilities to service naval ships. The construction of a dry dock entailed a large investment of capital in a site which was over and above that which small shipbuilders and ship repairers could afford. Importantly such investment favoured the use of a permanent site. Around the dock, storehouses and workshops were constructed and timber was brought from the New Forest and Bere Forest. Stores were supplied from Southampton and, despite the cost and length of time, from London. The existing fortified town of Portsmouth provided the earliest residential area for workers in the dockyard.

Sheerness

Sheerness is situated on the extreme north-western point of the Isle of Sheppey at the confluence of the Thames and Medway rivers. (Figures 2.6) Here the Medway curves north-eastwards to flow into the Thames estuary between the Isle of Grain in the west and Sheerness in the east. The incorporation of the old English 'ness' in its name aptly indicates the major physical feature of Sheerness: that of a promontory. (108) One principal attribute which first attracted the attention of the Admiralty to this inhospitable site was the deep water channel on which the west shore of Sheerness abuts. The harbour at Sheerness is approached on the seaward side by a five mile long deep water channel having a least depth of eight metres at lowest ebb. (109) Deep water at the Little and Great Nore in the Thames estuary, only a few kilometres from Sheerness, provided further extensive anchorages for the fleet.

Whilst Sheerness possessed physical qualities favourable for the establishment of a naval dockyard, the impetus for setting up the yard was generated by strategic considerations. The Dutch Wars of the seventeenth century focussed naval activity firmly in the east and the Royal Navy was supported in this area by the dockyards of the Thames and Medway. The creation of a dockyard at Sheerness was in response to deficiencies in these riparian yards. The rivers were difficult to navigate, particularly as the size and draught of men-of-war increased and shoaling took place, and this made access hazardous and was the source of many accidents. The need to work the tides and await favourable winds often meant long delays in reaching and leaving the up-river yards. (110) Whilst the defensive qualities of these sites countered the disadvantages of an up-river location the deep water site at Sheerness at the head of the rivers was easy of access and would reduce the need to send all ships to the up-river yards. (111) Thus Sheerness yard was intended primarily to undertake minor

ship repairs. Small frigates were constructed there only in order to fully employ the work force. Moreover, at the time Sheerness yard was founded, plague was raging at Chatham, Woolwich and London and the new yard may have been an attempt to keep the disease away from the fleet.(112)

The construction of an advance base during time of war was not a new idea. During the First Dutch war (1651-4) Harwich had been developed in a similar mode. However, the shallowness of water at that port, the long circuitous route to the Thames supply yards, the difficulty encountered in leaving Harwich against an easterly wind and the lack of room on shore to store provisions all contributed to the abandonment of Harwich and the establishment of a new outport at Sheerness.(113) In March 1673 the Duke of York ordered that Harwich was to be run down and all vessels were thereafter to go to Sheerness.(114) Continued use of Sheerness following the Third Dutch War (1672-4) effectively ended Harwich as a working dockyard, although it did continue as a cruiser station for some time after.

The site and area around Sheerness consisted of low-lying alluvial marshland which was liable to flooding and inundation by the sea. The promontory was exposed and uninhabited and according to all accounts very inhospitable. The nearest settlements were at Queenborough, three kilometres to the south and Minster, five kilometres to the east both situated on higher ground of London Clay.(115) Minster, like Queenborough, dates from the Saxon period and was the most central of the parishes on Sheppey and formed the administrative and judicial focus for the island.(116) Queenborough grew because of its castle built between 1361 and 1367, (117) though at the time of its demolition in 1650 the castle had long been obsolete. Although the prime purpose of the castle

was to guard the entrance to the West Swale its loss may have encouraged the construction of defences on drained land to the north of Queenborough at Sheerness.(118)

The defensive potential of Sheerness to command the Medway and Thames estuary had been recognised for some time for bulwarks had existed in that area since 1551, contemporaneous with the establishment of Chatham dockyard.(119) During the Second Dutch War (1665-7) Sheerness was chosen by the Government as the site for a fort and it was during the construction of this fort that plans were considered to build naval facilities adjacent to the fort.(120) Construction of the fort under the auspices of Charles II had begun in 1665 and the importance attached to the site is indicated by the number of visits made by the King and his foremost ministers to Sheerness.(121) On 1 September 1664 Peter Pett, the Navy Commissioner of Chatham dockyard, had written to the Navy Board indicating that 'the ground staked out for a yard near the graving place at Sheerness will be most fit for a single or double dry dock, to contain nearly an acre and a half of ground'.(122) Thus the site had previously been in use as a graving place for cleaning ships' hulls though this probably involved no more than beaching ships on the shore, a common practice requiring no substantial provision of facilities. However, Sheerness was not the only site considered for the dockyard for Sir William Winter also surveyed both Grain and Queenborough as alternative sites before settling on Sheerness.(123)

In March 1665 Pett wrote to the Navy Board requesting timber to build a small house at Sheerness to keep provisions in.(124) In June 1665 he sent an estimate for approval to the Board for building a mast house for 'making that place more useful for cleaning ships'.(125) In April, a hulk, 'to be placed upon the beach', was sent to Sheerness and men

followed soon after.(126) Plans of the 'proposed dockyard at Sheerness' were sent by Commissioner Pett to Pepys in July 1665 and orders to proceed were received in August of the same year.(127) Pepys, in his diary under 18 August 1665, noted 'To Sheerness, where we walked up and down, laying out the ground to to be taken in for a yard to lay provisions for cleaning and repairing ships, and a most proper place it is for the purpose'.(128) On the 13 November 1666 the Navy Board directed that all large ships were to be cleaned at Sheerness though the yard was already operational by this time.(129)

The Dutch raid on Sheerness in 1667 by De Ruyter underlined the concern of Government about the security of the Medway and Chatham dockyard and had far-reaching long term effects on Government policy regarding dockyard defences. The immediate result of the raid, however, was the destruction of the fort, naval yard and the hulk at Sheerness.(130) In August 1667 work began on rebuilding the fort and the naval yard and far from reducing the investment here the raid emphasised the strategic and defensive importance of the site and both fort and yard were rebuilt on a much larger scale.(131) (Plate VII)

In February 1673 Jonas Shish was appointed the first Master Shipwright of Sheerness dockyard (132) and in May the recently appointed Clerk of the Cheque at Sheerness noted 'The beginning of something like a yard here'.(133)

Woolwich

To Woolwich falls the reputation of being, 'the first Royal Dock Yard in the Kingdom, being the first place where Royal Ships was (sic) Built.' For this reason Woolwich is referred to as the 'Mother Dock'.(134) Whilst

a dry dock was constructed at Portsmouth in 1496, on the criteria of ship construction defined in the King's Manuscript, Woolwich has the honour of being 'the first Royal Dock Yard.'(135)

Such a reputation stems from the construction of the 'Henry Grace de Dieu', reputedly of 1500 tons, built by order of Henry VIII (1509-1547) in 1512. The ship appears to have been an experimental precursor to the naval ships specially designed to carry heavy ordnance. Several payments were made in 1512 for the construction of the ship at Woolwich: to 'Maryan Danyell, widdowe for the hire of her grounde and houses, occupied with the Kinges tymber and the Henry Grace de Dieu a hole yere ..'.(136) Further payments were made for fish and victuals, 'beddes bought for lodggying,' beer, fodder for beef and mutton to feed and accommodate the 'shipwrightes, maryners, and other artificers... working upon the Kinge's great shippe and galleys at Woolwiche'.(137) Interestingly, payments of 'conduct money' were also made 'to shippwrightes and other artificers comying from their countreys to work upon the Henry Grace de Dieu'.(138) Storehouses and other appurtenances were erected during the building of the great ship, including a smithy.(139) Though probably of a temporary nature these facilities were the beginnings of Woolwich Dockyard.

Early settlement on the Thames favoured sites where the chalk of the North Downs outcropped at the edge of the river forming higher drier land amidst low-lying alluvial marshland.(Figure 2.2, Plate VIII) Agriculture and fishing formed the chief livelihood of the population of Woolwich before the advent of the dockyard.(140) The occurrence of exposed chalk and sand deposits close to the surface gave rise to an important river-borne trade in both materials. The sand was excavated in large quantities and sent to London for sanding floors and for the glass industry and was also used as ship ballast especially on naval ships.

Chalk was similarly quarried for the production of lime. These industries overlap with the period of the dockyard.(141) Such excavations were extensive and the resultant pits greatly influenced the subsequent morphology of settlement in Woolwich.(142)

Quite why Woolwich was chosen as the site for the construction of the Henry Grace de Dieu is not fully known. Alternative sites on the River Thames at Deptford and at Erith were also contemplated during this period for storehouses were erected at both places in 1513.(143) A liability to flood, even at ordinary tides, led to the abandonment of the site at Erith toward the end of Henry VIII's reign, while Deptford developed into a dockyard complex. Generally, the same factors which favoured the establishment of a dockyard at Deptford were similarly applicable at Woolwich.(144) Oppenheim suggests that the choice of Woolwich was due to physical qualities and certainly the presence of deep water favoured its selection. But perhaps more important at this time of experimentation was the desire to choose a site to which the originator of such a shipbuilding programme, the King, could gain easy access. The need for a site readily accessible to Henry VIII to facilitate his deep involvement in naval construction favoured a Thames location. The King resided not far away from both Deptford and Woolwich at his Palace at Greenwich and this was an important factor in the early establishment of dockyards at these sites. Furthermore, London with its extensive trading links, was the source of most naval stores which were imported from around the country and abroad and this was a further factor influencing the choice of a Thames location. Strategically, although the yards were in the east of the country near the centre of naval activity, it is reasonable to suggest that at the time of the founding of these London dockyards the full implications of the potential role which a naval base would perform was probably unforeseen,

and the yards were considered first and foremost as shipbuilding centres. Their position some distance up-river was also important from a defence point of view. The main reasons it would seem for locating a dockyard at Woolwich was the availability of a safe favourable site in close propinquity to London where control could be more easily exercised over what was a unique large-scale undertaking for the time.

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36. As can be seen in the establishment of Plymouth Dock in 1689-91.
37. Oppenheim, M. (1926), op.cit., 341; Early records of the dockyard refer to it as being on Gillingham Water until 1567 when the records revert to the name Chatham. Rogers contends that the first 'beginnings of dockyard activity in the Medway were at Gillingham not at Chatham'. (Rogers, P. (1947), A history of Gillingham, Chatham, 51.). The wholesale removal of the dockyard establishment from Gillingham to Chatham in or before 1567 seems unlikely, although a wharf, mast pond and storehouse just below Saint Mary's Church were not erected until 1567. (Cull, F. Chatham dockyard: early leases and conveyances for building during the sixteenth and seventeenth century, Archaeologia Cantiana, LXXIII, 80. It would seem more likely that merely the name Gillingham Water was changed on that stretch of the Medway to Chatham Reach, the dockyard establishment remaining where it had been. The dockyard's Management Training Centre would seem to endorse (Chatham Dockyard Management Training Centre (1964), The history and development of Chatham Dockyard, 1.)

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CHAPTER 3

THE GOVERNMENTAL DECISION-MAKING PROCESS AND MANAGEMENT STRUCTURE

Public expenditure is a major component of governmental activity As the global sum rises and falls, major repercussions are felt throughout the system. Within the global sum, various government departments compete for budget allocations in debates which are often only heard and resolved within Cabinet How these budgets are balanced depends upon the conflict of social and economic forces at any particular time and upon the strengths and weaknesses of individual Ministers in the bargaining process. Once determined, the expenditure begins to produce spatial effects...

Herbert, D.T. (1979), Introduction: geographical perspectives and urban problems, in Herbert, D.T. and Smith, D.M. (eds) Social problems and the city, 5.

The terms 'gatekeeper' or 'urban manager' can best be reserved for those individuals who hold power at an intermediary position in the allocation system and whose decisions directly affect the urban environment. Whatever the form of the political or economic system within which they operate, these are the specific agents who ultimately control and allocate resources made available at the local level.

Ibid., 6.

Introduction

The management of the dockyards and the formulation of policy affecting the dockyard system were heavily centralised within Government in London and local responsibility and initiative were reduced to a minimum. Furthermore, the criteria upon which decisions affecting the Royal Navy and the dockyards were based were predominantly related to national events and policies which were often far removed from local regional economic considerations. The structure of the decision-making process and dockyard management and the influences which acted upon it had a vital bearing on events in the dockyard-urban system not least because resource allocation to the dockyards was determined centrally by Government and its agencies. This centralised structure lends credence to consideration of the several dockyards as a system under the pivotal control of Government. The importance of organisations and institutions in urban development has been stressed by a number of researchers.(1) In respect to the dockyard-urban system an understanding of the role of Government and its agencies is central in accounting for the processes influencing the system and the relationship of these processes to the impact of external forces.

Controlling the network of dockyard establishments was a management structure comprised essentially of three parts, each of which conforms closely to the trichotomy of decision-making levels hypothesised by Herbert.(2) (Figure 3.1) At the highest level was the policy-making executive comprising initially the monarch and his advisers and subsequently Parliament, the Cabinet and the Prime Minister of the day. From this authority came the policy and executive orders upon which the immediate agencies controlling the dockyards and Royal Navy, the Admiralty Board and Navy Board, were to act. Through these two bodies instructions

were disseminated to the various branches of the navy and dockyard system. At the local level of the dockyards were the 'resident Commissioners' and their principal officers who were responsible for the actual implementation of the commands which had filtered through the system. (Figure 3.1) The decision-making and management structure was thus strictly hierarchical. Friction and 'grey' areas of responsibility which developed and 'clouded' the system largely stemmed from ill-defined areas of responsibility and the nature of the historical development of the administrative structure itself. These difficulties, however, were largely eradicated by the naval reforms of 1832.

Government as Urban Manager

Government was at the core of policy formulation and resource allocation in respect to the dockyard system and the Royal Navy. It is beyond the scope of the present work to explore the extensive development and workings of Government and political institutions but a few points of relevance to this account can be indicated. The first concerns the nature of that part of Government which actually formulated policy and determined the overall demands on the Royal Navy and dockyards. In the early days of the Royal Navy the system of naval administration was flexible, as was that of Government. Policy was determined by the King and his close advisers but was influenced as much by personalities as by specific officers of state. (3) From the earliest beginnings of party politics and Cabinet Government, important decisions regarding naval matters were similarly made by an informal meeting of a small group of highly influential Ministers at the very centre of Government rather than by the

full complement of Cabinet or Parliament.(4) Whilst the Lord High Admiral, or if this office were in commission, the First Lord of the Admiralty, had a seat on the Council or Cabinet as a Minister of State and was therefore ostensibly part of the policy and decision-making body he was often excluded from the actual policy discussions leading to a decision affecting the navy. While his advice on naval matters would be sought by the executive it was not necessarily accepted and decisions affecting the navy and dockyards were made by those statesmen at the very centre of Government and often without Admiralty involvement. In accounting for the origins of policy decisions toward the dockyard system this process is important not least in terms of the criteria upon which they were based. The tendency to debar Ministers from such decision-making meetings declined as the notion of collective responsibility became accepted.

Secondly, whilst international relations was a major factor determining Government policy toward the Royal Navy and dockyard system it was not the sole influence. Other factors could affect the activity of the Royal Navy and supporting yards and in this respect party politics and the management of naval funding could be particularly relevant. Certainly during the nineteenth century political and financial constraints were imposed upon the Admiralty by successive Governments and it is worthwhile to consider the extent and effects of such influences as they affected the dockyard system.

Sir John Henry Briggs spent forty four years of his life in the Admiralty spanning the middle part of the nineteenth century as first deputy reader and subsequently chief clerk and during his period of office he served no less than fifteen First Lords and fifty Admirals.(5) His comments on the relations between the Admiralty and executive are

therefore enlightening. 'Many First Lords', he claimed, 'have used their best endeavours with the Cabinet and more particularly with the Chancellor of the Exchequer, to obtain increased grants for the Navy, with a view to augment it and to increase its general efficiency, but they, alas! failed in their laudable attempts. Political considerations and financial difficulties were invariably advanced on the ground of refusal....'(6)

The navy and dockyards obtained their funds from central Government and restrictions placed on their finances, for whatever reason, necessarily affected their performance. Briggs gives a number of examples when political considerations influenced the provision of naval finances. The administration of Mr Ward Hunt for example, First Lord between 1874 and 1877, experienced great difficulty in obtaining funds for naval expenditure because of the pledge of economy and retrenchment of Disraeli's Conservative Government.(7) The administration of Lord George Hamilton (1886-92), in contrast, had the support in Cabinet of W.H. Smith and G.J. Goschen (both at the Treasury but formerly First Lords of the Admiralty) and funds tended to be more forthcoming than previously. Decisions therefore regarding the Royal Navy were not based solely upon strategic questions and foreign affairs but also upon the politics of Government and financial control exercised by the Treasury. In the case of the former much could depend upon the party in power and the First Lord: Briggs refers amongst others to the administration of the Earl of Auckland (1846-1849) who during his term of office called for economy and dockyard reform in contradiction to previous First Lords who had advocated expansion of the Navy and shore establishments.(8) Briggs concluded '... the sole object was to keep down the navy estimates for the current year to meet the convenience of the party in power, and to gain a little ephemeral popularity for economy, each political party vying with the other.'(9)

This constant call for economy was doubtless not directed solely at the Admiralty but at most departments of State, though the armed services are forever in the predicament of preparing to counter potential threats whose real danger were open to debate. Only during times of war or hostilities did this threat become reality and provide a very powerful key to unlock the parsimonious Treasury coffers. In such circumstances funds were more readily forthcoming than during peace-time. The tendency was for Government, ever conscious of the need for economy, to act with complacency towards the navy and dockyards during peace-time, only to throw economy to the wind once a crisis escalated or hostilities occurred. In such circumstances expansion took place immediately. As Briggs observes of the Crimean War:-

One day the Foreign Office desired every possible exertion to be made, and orders to that effect were sent out and were promptly put in hand; then came a notification that negotiations were proceeding more satisfactorily, and a delicate hint from the Treasury that no unnecessary expense was to be incurred. A few days later a despatch arrived intimating that a change for the worse had taken place, and that naval preparations were to be pressed forward with all speed. This was immediately followed by an order to suspend proceedings lest they might have an injurious influence upon the pending negotiations and so precipitate a crisis. These orders were scarcely issued when counter-instructions were received to press on with vigour the preparations for war.(10)

Once hostilities were concluded severe retrenchment inevitably followed in the Government's haste to reduce expenditure to a peace-time level and the effect on the dockyards was immense.(11)

Treasury influence over naval funding and therefore naval policy grew substantially during the nineteenth century. During the formative years of the navy the Privy Council annually considered the navy's estimates for the forthcoming year and policy was accordingly linked with finance.(12) Naval estimates were composed of three sections. That section for the 'ordinary' was for maintaining ships laid up, for the officers in the

civil and sea service and for repairs to dockyard facilities, in all the 'fixed' cost of the Royal Navy. The second section was for ships 'in commission' or at sea. This covered wages, victuals, ordnance, wear and tear and was calculated at so much per man per month.(13) Thirdly, was the 'extra-ordinary', which comprised all that expenditure which lay outside the former two sections, including new construction and repairs not covered in the 'ordinary' and 'in commission' sections.(14) No estimates were required to be drawn up by the Navy and Admiralty Boards in respect of the 'in commission' or 'sea service' section for the number of men to be employed in the coming year was decided by the King in Council with Admiralty advice. The Commons were then informed and voted the supply.(15) Estimates for the 'ordinary' were drawn up by the Navy Board, revised and amended by the Admiralty and, without Treasury interference, were presented to the Commons by the members of Parliament sitting on the Admiralty Board.(16) In many respects the sheer complexity of the estimates was usually sufficient for the vote to be a mere formality.(17) Estimates for the extra-ordinary involving new construction and modernisation, however, required firm support in Parliament from the Admiralty. The level of financing decided in Parliament necessarily determined dockyard activity during the following year though unexpected events, such as war, could lead to a supplementary vote being made.

During the early nineteenth century as part of the trend toward closer Parliamentary control over the large sums of public money being expended by departments of State, the Treasury was given the task of exercising stricter control over naval finances.(18) Briggs for one objected vehemently to naval policy being subordinate to the Treasury,

..... it is not this party or that party which is to blame, but successive governments, which, for so many years, have vied with each other in reducing the navy estimates to the lowest possible ebb, with a view to meet the popular clamour

for economy and retrenchment; and, as each successive government passed out of office, there was a visible sign of depletion in one branch or another of the naval establishments: sometimes in the materials, sometimes in the number of artificers and workmen, sometimes by postponing the repairs of storehouses and other buildings, and putting off indefinitely new works of pressing importance. Ships which were intended to be launched in one year were delayed until another, and the shipbuilding programme of the year was rarely completed. Sometimes the depletion appeared in naval ordnance, gun-carriages, or in ammunition, and not infrequently, reductions were apparent in the number of seamen, marines and boys. All these and other depletions, which might be adduced 'ad infinitum' were made to meet the demands of the Treasury, which, as far as the resources of the country were concerned, had no sense or reason.(19)

While one might consider these remarks as being exaggerated nonetheless events in the dockyard are to be considered against a broad backcloth of political and financial influences as well as the more obvious impact of foreign relations.

Within Government the executive thus determined both overall policy and the level of funding toward the dockyards and in the process of allocating resources to the dockyard system Government had early assumed an urban managerial role.(20) Resources allocated to the dockyards consisted principally of funds for the repair, construction, supply and maintenance of the navy and were commensurate with the level of activity anticipated by the executive. The most important basic resource in this respect were the wages and salaries of dockyard personnel.

Government was also responsible for other forms of resource allocation to the dockyard locations as in the construction of fortifications by the Board of Ordnance, the stationing of military and naval personnel in the vicinity and extensions and improvements to the dockyard complexes themselves. The specific allocation of resources within the system was largely undertaken by the administrative tiers below the executive and in

particular the Admiralty and Navy Boards.

The Management Structure

The Admiralty Board and Navy Board acted as the linch-pin between the dockyards, Royal Navy and the policy-making executive. (Figure 3.1) The development of these boards was largely determined by precedent, altered according to circumstance. In general the Navy Board controlled and organised the civilian side of the Royal Navy and their principal concern was the dockyards. The active service or sea-arm of the Royal Navy came under the direct control of the Admiralty Board to whom the Navy Board was officially subservient. In matters relating to the civilian management of the navy the Admiralty Board worked through the Navy Board but retained for itself direct control over fleet and ship manoeuvres.

The Admiralty Board

The Admiralty Board was based in London though at some distance from the offices of the Navy Board. The Board stemmed from the office of Lord High Admiral, the King's personal representative in naval affairs and his military commander at sea. (21) Up until 1628 the office of Lord High Admiral had always been held by an individual, and occasionally the monarch himself. After this date the position alternated between individual and commissioners appointed to execute the office. Since 1709, with one exception, the position of Lord High Admiral has been held in commission. Initially the commissioners were members of the policy-making Privy Council and were the great officers of the realm but after 1709 only the leader or First Lord was entitled to a seat at the Council or in the Cabinet. (22)

The Lords Commissioners of the Admiralty were subordinate to the executive and their duties were clearly laid down from an early date. Acting under 'such instructions and directions as we or our Privy Council shall from time to time give', the Admiralty Board had the power and authority,

to make such orders and issue such warrants for the repairing and preserving of our ships and vessels already built or to be built in harbour with all things belonging to them and every of them according to your good discretions and for the new building preparing fitting furnishing arming victualling manning and setting forth such ships and fleet as you shall receive directions for either from us or from our Privy Council and also to establish and direct such entertainments wages and victuals for and unto all and every such person and persons as are or shall be employed in those our services or anything appertaining thereunto and further to give such discharges from those services or any of them to you or any three of you in your wisdoms and good discretions shall be thought fit....(23)

It was through the office of Lord High Admiral that policy decisions formulated by the executive were forwarded to the next level in the hierarchy to be implemented. The Office, besides conducting the military operation of the fleet, was also the source of professional advice on naval matters to the policy-making body, drawing upon the expert advice of subordinate boards and especially the Navy Board in the process.

Between 1709 and 1832 there were generally seven commissioners appointed to execute the office of Lord High Admiral, though the number varied quite considerably during time of war.(24) Although some of the members of the Admiralty Board were, or had been, serving sea officers, this was not an obligatory qualification for election to the Board for the Board was a political animal and appointments were made and personnel changed according to the political party in power. This was unlike the Navy Board which was composed of professional and permanent officers.

The foremost Commissioner, the First Lord of the Admiralty, was personally answerable to the monarch and, from the early years of the eighteenth century, to the Cabinet and Prime Minister for the actions and affairs of the Navy. Until the Reform Act of 1832 it was common for professional naval careers to be combined with a political career and in such circumstances the First Lord was usually an Admiral.(25) From the early nineteenth century, however, the post was almost always held by a civilian, appointed by the Prime Minister. He was a member of either House of Parliament and was the Minister of State responsible to Parliament for all naval matters. He had a seat in the Cabinet and with his colleagues assumed collective responsibility for the affairs of State and policy-making.(26) The First Lord appointed his fellow Commissioners to the Board but he was under no obligation to accept their advice.(27)

The Navy Board

Prior to the mid-sixteenth century the small number of King's ships were administered by a number of ad-hoc expedients which drew heavily on existing local administration. Changes in naval technology and warship design demanded new administrative structures and by 1546 naval administration and organisation had advanced sufficiently for several offices to have become established.(28) These offices were ultimately to become known as the 'Principal Officers of the Navy', or the Navy Board.

Up until 1832 several changes were to occur in the composition and tasks of the members of the Board but essentially the officers were five in number. Initially, the Treasurer was the most important member of the Board but he became increasingly estranged from his colleagues as his links with the Exchequer developed.(29) The Clerk of the Ships dealt with timber contracts and naval stores but by the eighteenth century these

duties had been taken into the Surveyors's department. In its place a new post was created, the Clerk of the Acts, whose function was that of chief secretary to the Navy Board.(30) The Surveyor was largely responsible for the design, construction, repair and maintenance of the Royal ships and for the storehouses, wharves and dockyard facilities which were required to perform these duties. It was the Surveyor therefore who was especially concerned and involved with the naval dockyards. Finally, the Comptroller checked and audited the accounts and performance of the other members of the Board.(31)

The Navy Board exercised direct control over the dockyards and as a result its members were necessarily specialists in their chosen office. The members were variously former dockyard officers, master craftsmen or experienced sea officers, depending upon the requirements of the post. They were the professionals of the naval administration. The Navy Board was responsible for the civil management of all aspects concerning the material condition of the Royal Navy. This included the construction, repair and fitting out of ships and the supply of stores and provisions. The Board was directly responsible for the dockyards, issuing commands to the resident Commissioners and principal officers and was closely involved in the employment or laying-off of dockyard personnel. The Navy Board was not, however, responsible for the deployment of the fleet once in commission nor for fleet personnel.(32) However, they did undertake the task of victualling the fleet and attending to the care of the sick and wounded, though both these functions were later placed under separate Board status under the nominal supervision of the Navy Board.

By the eighteenth century the number of commissioners had increased in line with the increasing size and complexity of the Royal Navy and naval affairs.(33) From the 1740s resident Commissioners were appointed

to the major dockyard establishments to supervise work in the yards and provide the link between dockyard and Navy Board. Whilst officially a colleague and an equal of his compatriots on the Navy Board in London, in reality the distance of resident Commissioners from the capital effectively down-graded their status as members of the Board. The decision-making bodies were heavily centralised in London and little executive authority was delegated to the resident Commissioners and officers of the dockyards. This not only severely restricted the scope for local decision-making but also produced a weighty bureaucracy whereby all decisions, from the important to the trivial, passed through a system of proposal, estimate and warrant, between dockyard and Navy Board and Navy Board and Admiralty before action could be taken.

Post 1832 reorganisation and the Board of Admiralty

The division of authority between the Navy and Admiralty Boards created a great deal of friction between the professionals of the Navy Board and their 'amateur' political masters in the Admiralty. At times this relationship approached that of competition rather than one of cooperation, each jealous to defend their own Board's independence. The lack of communication and coordination between the two Boards, separated as much by their history and function as by their buildings, was a particular problem. Whilst the Admiralty Board, dealt with ships' officers and Admirals on flagships at the Nore and Spithead the Navy Board controlled the dockyard officers, and neither sea officer nor dockyard official would act without orders from their respective Board. This division of responsibility and control exacerbated an already complex administrative structure. Such problems eventually led to a large scale reorganisation of naval administration on 1 June 1832.(34) Under the terms of the reorganisation the Navy Board, Transport Board, Sick and

Wounded Board and Victualling Board, were abolished and their functions concentrated and incorporated under the one authority of a new Board of Admiralty. Five departments were created within the new Board and each of the permanent principal officers of the old Navy Board were placed under the direct, though nominal, supervision of a member of the old Board of Admiralty.(35) These five departments comprised the Surveyor of the Navy, the Accountant General, the Storekeeper General, the Controller of Victualling and the Physician of the Navy.(36) The members of the Board comprised the First Lord, the Civil Lord, four serving naval officers and two secretaries.(37)

Broadly, responsibility within the Board was divided into three sections. Movement of the fleet and its personnel were the direct concern of the three naval Lords; the Controller was responsible for the material condition and well-being of the Royal Navy and the Civil Lord for the works department; and the Parliamentary Secretary was concerned with navy finances. Importantly for the dockyards the old department of the Surveyor of the Navy now came under the title of Controller of the Navy. Within this office were several assistants each responsible to the Controller for an area in the organisation concerned with the construction and maintenance of the navy. The Director of Naval Construction was the chief assistant to the Controller and was responsible for the design of all ships, whether built in the naval dockyards or by contract. The programme of ships to be built and the type of such ships was, however, determined by the Board as a whole.(38) The Director of Naval Construction worked closely in liaison with the Director of Naval Ordnance, the Engineer-in-Chief (responsible for the design and construction of steam machinery in ships and for gun mountings) and the Director of Naval Stores, in the planning and implementation of construction work.(39)

The Director of Dockyards was the person responsible, as the name suggests, for superintending the work of the dockyards. He was concerned with the building of ships, for ship repairs and maintenance, the machinery in the dockyards and with the number, pay and appropriation of dockyard personnel. In short, all matters directly concerned with the working and function of dockyards and victualling yards. The Director of Dockyards dealt with the dockyards via the Admiral Superintendents and was responsible up to 1886 to the Director of Naval Construction and thereafter directly to the Controller of the Board. He provided the link between dockyard and the Board of Admiralty and the rapidly increasing organisation in the face of massive technological change.

The Boards as 'gatekeepers'

The actual allocation of resources to specific yards was generally undertaken by the Admiralty and Navy Boards and after 1832 the Board of Admiralty. These agencies and especially the Navy Board undertook the role of 'gatekeeper' in which they channelled resources within the system based on their technical expertise and knowledge of the capabilities of the dockyards to undertake certain tasks and functions. Importantly the two Boards acted upon policy instructions from the executive and determined employment levels at each yard based upon postulated work schedules which they set. On 4 May 1748, for example, following the Peace of Aix-la-Chapelle the Navy Board was commanded by the Admiralty Board to substantially reduce the dockyard workforce.(40) On 20 May the Navy Board recommended in reply that '1304 may be forthwith discharged if their Lordships approve thereof'.(41) Numerous references to similar procedures occur throughout the eighteenth and nineteenth centuries.(42) Occasionally the advice of resident Commissioners was sought in

determining the number and composition of workmen required in the yards but the Navy Board tended to be autocratic in this respect.

The level of employment in the dockyards was a vital element in the prosperity of dockyard towns and, along with the presence of military and naval personnel, had a great impact on the supporting tertiary sector. In determining the allocation of this important resource to the various yards the Admiralty Board and especially the Navy Board exerted a major influence on the fortunes and development of specific dockyard locations.

The dockyard officers

The day to day management of the dockyard establishments up to 1832 was in the hands of 'resident Commissioners' and thereafter, Admiral Superintendents. They were directly responsible to their colleagues on the Navy Board for the efficient functioning of the dockyards. Distance was a limiting factor in communications between the Board and Commissioner for until the late nineteenth century the yards at Portsmouth and Devonport were between two and four days travelling time from London and even Chatham was a good day's journey from the capital. It is perhaps suprising then that with the difficulties and delays in communication the local representatives of the Navy Board were delegated so little freedom or accorded inferior status on the Board. Power over the dockyards was securely based in the Navy and Admiralty Boards, situated, like their political masters, in London.

The resident Commissioner was usually a former sea officer and via his principal officers in the dockyard, he implemented instructions received from the Navy Board. (Figure 3.1) He sent weekly reports to the Board involving details and specifications of a technical nature relating to the progress made and work in hand in the yard. The Admiralty Board

had very little direct contact with the dockyards, apart from an annual visitation and, until 1832, dealt through the Navy Board in all matters relating to the dockyards. Thereafter the permanent experts were directly under the supervision of the Lord Commissioners of the Admiralty.

The dockyards at Chatham, Portsmouth and later, Devonport, were sufficiently important for a resident Commissioner to preside over the establishment. The Commissioner for Chatham also supervised the dockyard at Sheerness until the 1820s, while the Thames yards of Deptford and Woolwich were considered sufficiently close for the Navy Board itself to administer the yards for many years, though occasionally resident Commissioners were appointed. Other resident Commissioners were sent to the more distant dockyards and naval bases overseas as and when required. With the appointment of Admiral Superintendents from 1832 the posts at Portsmouth and Plymouth were granted the rank of Rear Admiral, whilst at Woolwich the officer was a Captain with the rank of Commodore Superintendent. For the remaining dockyards and victualling yards Captain Superintendents were appointed.(43)

The five principal officers of each yard came under the direct supervision of the resident Commissioner. The Master Shipwright and Master Attendant effectively controlled the dockyard labour force and between them supervised almost all the work undertaken in the establishment. The Master Shipwright had invariably risen 'through the ranks' of the dockyard to reach the pinnacle of his trade. The Master Attendant usually rose to his post through the sea service and was responsible for the movement of vessels and yard craft in the harbour, the 'ordinary', and supervised the riggers and sailmakers.(44) Between them they provided the technical expertise necessary in such a large

construction industry and were supported by other specialists in the workforce.

The three remaining principal officers held what were largely clerical posts within the establishment. The Clerk of the Cheque handled the finances, wages and mustering of the workmen. The Clerk of the Survey was responsible for the reception and handling of stores while the storekeeper undertook the task of storing and issuing materials. Unlike the Master Shipwright and Master Attendant, these posts could, before the introduction of qualifying examinations during the nineteenth century, be obtained by political and social connections.(45) Although the principal officers were equals the Master Shipwright, because of his central position in the dockyard, was recognised as the senior officer.(46)

From about the middle of the seventeenth century these officers were assisted in the daily control and management of the work force by Foremen. Under these, Quartermen or Leading Men operated with their chosen 'gangs' or 'companies' of 'shoaled' shipwrights (47) varying in number between ten and thirty.(48) Subsequently the titles of these posts were changed and additional posts were made during the latter part of the nineteenth century but the structure remained basically the same.(49)

Of the artisans in the dockyard, the shipwright was the aristocrat and was involved in almost every aspect of dockyard work, indeed, on average they formed between one third to one half of the workforce in the dockyards.(50) The shipwright was largely considered a 'heavy' worker in wood but diversified during the iron and steel revolution in shipbuilding to work in both wood and metal. Lighter tasks involving wood were the province of the joiner and carpenter and not until the introduction of metal in ship construction on any large scale from the 1840s did fitters or

millwrights appear in the dockyard.(51)

Notes

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CHAPTER 4

GOVERNMENT, EMPLOYMENT AND THE PROVISION OF HOUSING IN THE DOCKYARD SYSTEM

The fluctuations occasioned by the alternate operation of peace and war, have hitherto prevented the society of the [dockyard town] from acquiring any permanent feature. Under the influence of these opposite causes it exhibits a surprising contrast. Peace is almost annihilation to it. Trade then stagnates; speculation expires; numerous houses and shops are shut up; the streets are silent, and inactivity and despondency pervade every one. War instantly changes the scene. A new spirit is suddenly diffused, and the greatest ardour and industry prevail. The frequent equipment and return of fleets occasions the expenditure of vast sums of money; and multitudes of speculators resort thither from all parts of the Kingdom to participate in the spoil. Shops of every description open in endless succession; not a house is vacant; clamour and bustle pervade the streets; and at length the whole place exhibits the appearance of a fair. Britton, J. and Bradley, E.W. (1807), The beauties of England and Wales 6, 124.

There is also this note to be put upon the two great arsenals of England, Portsmouth and Chatham; Namely, That they thrive by a war, as the war respects their situation. (viz) That when a war with France happens, or with Spain, then Portsmouth grows rich, and when a war with Holland, or any of the powers of the north, then Chatham, and Woolwich, and Deptford are in request.

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Employment Trends and the Development of the Dockyard-Urban System

Employment is fundamental to urban growth and decline. In this chapter dockyard employment is used as an index of change in the dockyard-urban system. The availability of annual and occasionally quarterly and monthly employment data is invaluable in examining the major trends in dockyard development and the influences bearing on the system. The employment trends are a valid indicator of events in the system and variations in the trends reflect altered conditions. The data portray in some detail the development of individual yards and the standing of each yard relative to other yards in the system. In this respect employment is a useful indicator of the interdependence of yards within the system and especially illuminates the effect of Government policy on the component parts of the system. Furthermore, because of the economic dependence of these specialised towns on the dockyards the trends and variations in dockyard employment can be closely linked to the various stages of urban development in the dockyard town. The lack of accurate population data for the towns during much of this period emphasises the utility of employment data as a surrogate in this respect and even in the nineteenth century annual employment data would appear a more realistic indicator of change in the urban system than decennial population figures.

Annual employment data have been collected from a variety of sources for each of the dockyards for the period between 1686 and 1890 with an omission between 1833 and 1865 because of the incompatibility of data in the available sources.(1) Discussion of the employment data and method of data collection is contained in Appendix A. The earliest records of dockyard employment date from about the mid-seventeenth century and coincide with the beginnings of a permanent dockyard labour force. Up

until approximately 1650 the dockyard workforce did not have continuous employment.(2) Employment in the yards was of a temporary nature and workers were laid-off during peacetime in similar fashion to the ships and seamen. Demands for skilled workmen at short notice were met by impressing shipwrights from private yards around the country.(3) Generally it was not until the Dutch wars in the seventeenth century that the Royal Navy and dockyard system were sufficiently organised to become permanent features and not temporary facilities called into being in times of need. This pattern largely reflects the sporadic nature of the Royal Navy up until this date. From the mid-seventeenth century there was a growing awareness of the importance of continuous control over maritime communications and 'command of the seas' either by a fleet 'in being' or by blockade of a rival navy in port. In this respect a rapidly expanding overseas trade, so vital to a maritime England, slowly refined the nebulous concepts of sea power. Furthermore, it was not until the end of the seventeenth century that the separation of the specialised warship from the merchant ship became fully complete.(4)

The first conclusion to be drawn from the employment data is the sharply fluctuating nature of dockyard employment. (Figure 4.1) Such fluctuations point to the major determinant of growth and decline in the dockyard system, that of war and peace. To examine the employment peaks of the naval dockyards through time is to identify almost every war or conflict in which this country has been involved with foreign powers during the past two and a half centuries.(5) It is clear that the alternating cycle between war and peace was a fundamental trend upon which the dockyards had grown from the earliest years. In most instances there was a distinct increase in employment in the period immediately preceeding the onset of declared hostilities. The decision to make war is rarely a

sudden one and is not made in a vacuum and usually preliminary preparations were made in readiness for the possibility of military action. Just as declaration of war was marked by a rapid increase in dockyard personnel to meet wartime demands, so the declaration of peace was marked by extensive reductions in the dockyard workforce. This cycle is the dominant trend in dockyard employment from the late seventeenth century to the mid-nineteenth century. Noticeably, the level of employment in each yard at the onset of peace was at a higher level than that of the previous peace. Thus within the cycle of war and peace the general trend was marked by an increase in the number of workmen employed in the various yards. The fortunes of the dockyards and townships, as their military function would suggest, were clearly tied to the business of war.

This pattern continued to form the basis of the employment trends after 1850 but, as is evident from the trends, other factors were becoming increasingly influential with respect to dockyard employment after this date. Large upswings in dockyard employment toward the end of the nineteenth century cannot solely be attributed to the effects of war. An important factor contributing to variations in employment levels at particular dockyards and the system generally after 1850 was that of technological change. This is discussed more fully in Chapter 6 but one result stemming from the extensive advances in ship and naval technology during this period was a substantial increase in the number of dockyard personnel. Changes in technology, as with the decision to go to war, necessitated decisions by Government which affected the dockyard system. In the former case this would involve where and when to implement new shipbuilding programmes and dockyard extension schemes which arose as a result of the new technology. In all cases it was Government which determined employment levels at each dockyard.

It is noticeable that the employment trends of each yard are not identical. Whilst practically all yards follow the general trend of an alternating cycle between war and peace the rate of increase and decrease in employment at each yard was not always uniform. Changes in the relative standing of various yards during this period can be discerned whilst a number of yards portray close similarities in their employment trends through time suggesting that groupings of dockyards within the system may be identified at certain periods. The trends of Deptford and Woolwich, for example, are identical between 1685 and 1830 except for a brief period during the war of Austrian Succession when a combination of roles of shipbuilding and distribution centre carried employment at Deptford higher than at Woolwich.(6) The rise of Plymouth from its inauguration in 1691 was rapid such that by 1763 the yard exceeded employment levels at Deptford, Woolwich and Chatham during a phase of expansion which practically doubled its workforce in less than ten years. From this time Plymouth closely followed the employment trend of Portsmouth and the two formed the major naval bases of the dockyard system.

Employment at Portsmouth had risen during the late decades of the seventeenth century to exceed the workforce of Chatham by the time of the War of Spanish Succession (1702-18). Thereafter the employment trend of Portsmouth closely followed that of Chatham until after 1763 when Plymouth took the place of Chatham. For the next forty years employment at Chatham rose at a lesser rate than that of Portsmouth and Plymouth though the yard remained the third largest in terms of numbers employed. During the Napoleonic war, however, the number of Chatham workers was equalled for a while by those of Deptford and Woolwich which then fell away dramatically following the Treaty of Vienna. The employment trend of Sheerness shows a

steady growth during the century and a half before 1832 and throughout this period the yard remained the smallest of the permanent establishments. Pembroke Dock was established in 1814 and began with an equivalent number of workers to that of Sheerness. During the latter part of the nineteenth century technological changes in naval shipbuilding favoured the use of Pembroke Dock as a major building yard and in terms of employment it overtook Sheerness toward the end of the nineteenth century during a period of extensive ship building programmes.

With respect to these changes in the dockyard system four broad factors can be indentified which influenced Government policy toward particular yards and shifted emphasis and activity to, and between, certain parts of the system.

The influence of naval strategy

The importance of naval strategy to the dockyard system lay in the effect which shifts in naval activity from one maritime area to another had on dockyard activity. A nearby naval base during a time of hostilities was vital both as a place of refuge and because its repair and supply facilities would allow ships to return to sea quickly.(7) Thus naval bases adjacent to a theatre of naval operations were more active than those at a greater distance from the scene. The movement of naval operations from one theatre to another, depending upon foe and strategy brought about a shift of emphasis and activity within the dockyard system and this is reflected in the employment trends of the various dockyards. Not all dockyards were affected to the same extent by the onset of war, for particular dockyards in proximity to naval activity were affected to a relatively greater extent than those further removed from the scene. In this respect reference has already been made to the importance of the eastern dockyards during the Dutch Wars of the seventeenth century and

their relative decline following the shift of naval operations to the Channel in the wars against France during the eighteenth and nineteenth century. Such a shift was reflected in the creation of Plymouth Dock and its rapid growth to a place of dominance with Portsmouth in the dockyard system.

The importance of particular dockyards during time of hostilities was further emphasised by the dependence of British world power to a very large extent on command of the sea in European waters. Command of the sea in this case did not imply a universal coverage of all seas and until about 1900 the basis of Britain's world power rested on her policy of containing rival continental navies in Europe either by bringing them to battle or blockading their fleets in port. Only a minimum naval presence was then required elsewhere around the globe supported by strategically located naval bases at the important foci of sea routes or 'gateways'. (8) The naval bases of Portsmouth and Plymouth Dock on the important Channel route through which most of Europe's trade was funnelled were geographically well placed in this respect. Domination of the Mediterranean was affected from the dockyard at Gibraltar, held since 1704, which effectively bottled up the European navies in home waters. By separating the fleets of her enemies, maintaining a fleet capable of dealing with any naval strength which might be brought against her and aggressively bringing an enemy fleet to battle or blockading it in port, Britain could maintain domination in two hemispheres. Only with the emergence of naval powers during the early twentieth century in other parts of the world, such as Japan and U.S.A., was Britain's policy of basing world-wide power on the containment of European navies negated. A great deal of importance was thus attached throughout the eighteenth and nineteenth centuries to the Channel dockyards which maintained and

permitted the British fleet to pursue a world role.

Changing conditions of site

A factor which also contributed to shifts of emphasis within the dockyard system was that of changing conditions of site. This might involve the shoaling of anchorages or the approaches to the dockyards. Dredging in such circumstances was possible and could alleviate the problem, but if the shoaling and shallowing of water became severe then nothing could prevent a reduction in the use made of the dockyard for particular functions. The problem was aggravated by a general trend toward larger ships.

The site initially selected for a dockyard occasionally led to difficulties at a later date when changing circumstances demanded new requirements. The site of the Medway and London dockyards admirably fulfilled security requirements during the early years but problems caused by the difficult and time-consuming process of reaching the yards, especially in emergencies, weighed against them at a later date. The great investment which had been made in these yards, however, favoured inertia under such circumstances for the cost of removing an established yard to a new site was judged prohibitive. In many respects the shift of naval activity to the Channel during the eighteenth century accelerated the trend of up-river dockyard decline for because of the changing and deteriorating condition of the rivers the dockyards were no longer able to fulfil all the requirements of the Royal Navy. The physical problem had, by 1689, 'turned the bases near London into minor yards, used mainly for the construction of the medium and smaller rates'(9) Shoaling of the Thames was claimed to have been partly the result of rapid commercial expansion along the banks of the Thames in London.(10) Indeed, in view of a threat by the naval authorities to move the dockyards elsewhere because

of this shoaling, further riparian development was halted for a while by the City of London authorities.(11)

The premier position of the Thames yards in the system was taken by Chatham during the latter half of the seventeenth century, only to succumb itself to similar problems during the eighteenth century. In response to the deteriorating condition of the Thames and Medway, Sheerness dockyard was created at the mouth of the rivers to alleviate time-consuming journeys up-river for ships requiring only minor repairs.

Altered site conditions therefore contributed to realignments within the dockyard system and were influential in affecting the development of particular dockyards. Indeed, when rapid technological change outstripped the physical resources of the dockyards then closure, as in the case of Deptford and Woolwich in the late 1860s, was often the only alternative. However, in an attempt to save the up-river dockyards and the capital invested in them there was a trend toward specialisation of function in the dockyard system.

Specialisation in the dockyard system

During the eighteenth century there was a trend away from a policy of self-sufficiency in the dockyards.(12) Such a policy had been necessary because of the difficulties which distance had created within the dockyard system. In the eighteenth century two circumstances combined to accelerate this trend.(13) The first was the growing acceptance of France as a perennial maritime enemy and the long-term shift of naval activity to the Channel. The second was the increasing demands made on home dockyards to provide stores and supplies for increasingly active overseas squadrons. The shift in naval activity from the North Sea to the Channel and eastern

Atlantic left the up-river yards of Chatham, Deptford and Woolwich strategically ill-placed to participate extensively in the new theatre of naval operations. While Portsmouth and Plymouth Dock, because of their strategic situation, became the major naval bases for the fleet the up-river yards were experiencing difficulties not only because of their distance from naval activity but also because of deteriorating physical conditions of site. By the early eighteenth century the necessity for every dockyard to be self-sufficient was no longer indispensable and there was a movement toward specialisation within the dockyard system.

By the 1740s, as a result of these processes, a broad division of the dockyards can be made into two parts.⁽¹⁴⁾ The first group consisted of Plymouth Dock, Portsmouth and, perhaps Sheerness, all of which can be classified as 'naval bases'. These dockyards were concerned with cleaning refitting and minor repairs but their real importance lay, in their strategic position in relation to the fleet on active service.

The second group comprised Deptford, Woolwich and Chatham which, being remote from the theatre of war and difficult of access in an emergency, specialised more in the general requirements of the navy such as major repairs, shipbuilding and the preparation and distribution of naval stores to domestic and overseas yards. In this respect Deptford, because of its proximity to London, became the major distributive centre for the dockyard system.⁽¹⁵⁾ The primary function of Woolwich from the mid-eighteenth century, and later that of Pembroke Dock, was that of shipbuilding.⁽¹⁶⁾ Chatham had lost its place as the premier dockyard to Portsmouth and Plymouth Dock by the mid-eighteenth century and henceforth became the centre for major repair work for which its four dry docks were invaluable.⁽¹⁷⁾ Shipbuilding was undertaken here but it was secondary to the main function of repair work.

Whilst the trend toward specialisation in the dockyard system was made in response to changing circumstances the effect of such specialisation on the dockyard system was to direct emphasis and activity toward particular sectors of the system at certain times. Thus, as Government directed work to some parts of the system rather than to others, so dockyards grew at different rates.

Seasonal fluctuations

A fourth but minor factor influencing shifts within the system and demands on particular dockyards during the early phase of the dockyards, was that of seasonal variation. Examination of the monthly employment figures between 1686 and 1718 shows substantial seasonal fluctuations largely in respect to one dockyard, Chatham. (Figure 4.2)

Before about 1750 demands on the dockyard system were not evenly spread throughout the year. As well as the dominant trend of war and peace there was a seasonal cycle which also varied between time of peace and war and between dockyards. During times of peace the dockyards tended to be busiest during the summer months when good weather and long days facilitated work on the ships. (18) Such a peace-time seasonal trend can be seen in the intervening years between 1698 and 1701 and again in the period following the Peace of Utrecht (1712). However, the onset of war shifted peak employment to the winter months. The fleet was unable to keep the seas during the winter months even during a campaign and it had to return to harbour for refitting and repairs in readiness for the forthcoming summer campaign. (19) Such winter peaks took place at Chatham during the wars of the Austrian and Spanish Succession (1689-97; 1702-13) for it was in the River Medway that the main fleet was laid up at this

time.(20) Occasionally similar seasonal fluctuations can be discerned at other dockyards but during the period for which data exists such seasonal variations are a feature predominantly of Chatham where the variation often amounted to over one third of the total workforce though this decreased as time went on.

Such seasonal variation was greatly disrupted and reduced in the period following the Seven Years War (1756-63) when a portion of the fleet was required to remain on station blockading the French ports throughout the year. An examination of the quarterly returns between 1774 and 1800 suggests, despite some missing data, that such seasonal variations had largely ceased by this date.

GOVERNMENT AND HOUSING IN THE DOCKYARD TOWN

In general it is clear that urban development was closely linked to the cycle of war and peace which was the major determinant of urban growth and decline in the dockyard system. However in spite of the dominant position of Government as the major, if not the sole, employer in the dockyard towns only in the case of one dockyard, Sheerness, was Government involved in the provision of large-scale accommodation for the workforce. This is perhaps more surprising given the specialist nature of the dockyard function, the imposition of extensive fortifications by Government and the restricted commercial access to the water frontage all of which effectively sealed-off most dockyard towns as State dominated military-naval organisms. Part explanation for this lies in the historical role and attitude of Government in such situations, the availability of alternative sources of capital for house building and the

effect of the sharp fluctuations in dockyard activity and employment on the housing market.

In the first place the reluctance of Government to be drawn into such forms of intervention was an important factor. For many years as democratic Government developed there was a preference for limited government best summed up by the later term, 'laissez-faire', in which provision of housing and facilities was not a recognised concern of the central authority. But such a philosophy could only be pursued in respect to the dockyard towns and the dockyards continue to function efficiently if the provision of housing and facilities were undertaken by others. As with those company and specialised towns where provision of facilities was undertaken for 'hard economic reasons' the company was often reluctantly drawn into the provision of accommodation for the workforce because no other body would or could undertake the task. Indeed, often it represented a heavy and unwanted burden on the investment capital needed to set up an operation. In the case of the dockyard towns only at Sheerness, where the yard was established on a barren, inhospitable site some distance from existing settlement, was Government forced to provide accommodation on a scale which was all but unknown at other dockyard locations. This provision of accommodation took the form of hulks moored in the Medway and barrack-like accommodation within the adjoining fort.

The provision of some form of accommodation by the dockyard and naval authorities was not uncommon in the early years of the dockyards but it was invariably of a temporary nature and involved very small numbers of workmen. The use of hulks for accommodating dockyard workmen was particularly common at the onset of the yards because it was an easy and cheap method of housing the advance workforce when existing nearby

accommodation was inadequate and before new private accommodation could be provided. Occasionally, in the early years of the dockyard system, some small and temporary accommodation was also provided for single workers in dockyard storehouses but this was the exception rather than the rule.(21) The naval authorities always undertook the provision of houses within the dockyard walls for the officers of the various yards for it was considered in the interests of the service that senior officials be on hand at all times. The authorities also provided extensive accommodation in the form of barracks for seamen and military personnel. None of the above, however, can be construed as amounting to large-scale Government intervention in the housing market.

At Sheerness, however, the provision of accommodation on board hulks and within the Garrison took place on a large-scale for a century and a half and indeed housed workmen and their families rather than just workmen as was the usual practice. This was a reflection of the unpopularity of the site felt by workmen and officers alike and the need by the dockyard authorities to attract workers to the yard. It may also be a reflection of the lack of local capital invested in the provision of housing for there is good reason to believe that a substantial proportion of the early investment in house building in proximity to the yards came from the private funds of dockyard officials, from naval and military officers and from local persons. These were the people with the funds and knowledge of the area and they were also best placed to assess the likely demand for accommodation. John Addis, for example, the Clerk of the Cheque at Plymouth, is recorded as owning forty two houses in 1706 when the dockyard was in its infancy (22) and local speculators are also recorded as attempting to lease land for the building of houses there.(23) By initially providing short term temporary accommodation on board hulks and tapping the resources of existing local settlements the authorities were

thereafter able to rely on private investment to provide housing and accommodation and were not required to enter the housing market in a large way.

The sharp fluctuations in dockyard activity and employment further postponed the forced entry of Government into the housing market. Each wartime peak in demand for accommodation was followed by a dramatic fall in dockyard employment upon a return to a peacetime establishment. Thus the onset of peace considerably dampened the previous wartime boom:

'Trade then stagnates; speculation expires; numerous houses and shops are shut up; the streets are silent and despondency pervades everyone.'(24)

The town is then over-provided with accommodation and facilities from the previous war-time boom. This slack in the housing market was, however, extremely helpful during the next up-turn in naval and dockyard activity. The rapid increase in dockyard personnel could utilise the spare housing capacity in the early stages of the boom and thus the intervention of Government in the housing market to attract and provide for their workmen was not necessary. Once the boom was under-way in the town, fuelled by increased employment in the yard and a greater military and naval presence, demand was sufficient to attract speculators to invest in the town:-

A new spirit is suddenly diffused, and the greatest ardour and industry prevail vast sums of money [are expended]; and multitudes of speculators resort thither from all parts of the Kingdom to participate in the spoil. Shops of every description open in endless succession; not a house is vacant; clamour and bustle pervade the streets'(25)

A sequence of cycles, each one greater than the one before, maintained a constant over-capacity during peace-time which could be utilised during the next up-turn before speculators were once again attracted to the town. Between 1680 and 1830 some twelve cycles of varying degrees of

magnitude can be discerned from the employment data.

At Sheerness a number of circumstances, which are discussed more fully in Chapter 9, forced Government to provide accommodation for the dockyard workers. Noticeably though, employment at Sheerness tended to increase steadily and the sharp fluctuations which were such a feature of the other dockyards did not occur at Sheerness until late in the eighteenth century. Not until the time of the Napoleonic war could Sheerness be said to have achieved the pattern of the other yards. In the meantime Government was forced, despite its unwillingness, to take measures to provide some form of accommodation for the workforce.

Notes

1. Employment data for the period 1686 to 1718 have been obtained from a tabulated collection prepared by the naval authorities and contained in N.M.M. Ser/131. A duplicate copy of this manuscript is in B.L. Additional Manuscript 9324 ff.27-51. Figures for the period 1719 to 1748 have been published in diagrammatic form in Baugh, D. (1965), The navy in the age of Walpole, Princeton, and in view of the diverse nature of the sources for this period the employment data have been interpolated for this period from Baugh's diagram. Data for the period 1750-1832 are to be found in quarterly returns sent from the Navy Board to the Admiralty Board and contained in N.M.M. ADM/B and ADM/B.P. For the period following 1832 employment figures have been taken from the Naval Estimates in P.R.O. ADM/181.
2. Macleod, N. (1925), The shipwright officers of the royal dockyards, Mariner's Mirror, 11, 355-6.
3. Macleod, N. (1925), The shipwrights of the royal dockyards, Mariner's Mirror, 11, 281; Oppenheim, M. (1896), A history of the administration of the Royal Navy and of merchant shipping in relation to the navy 1509-1660, Bodley Head, London, 72.
4. Graham, G.S. (1965), The politics of naval supremacy: studies in British maritime ascendancy, Cambridge University Press, 13-14.
5. For an analysis of British naval history during this period see, Kennedy, P.M. (1976), The rise and fall of British naval mastery, Allen Lane, London; Marcus, G.J. (1961), A naval history of England, Longmans, London; Graham, G.S. op.cit.
6. Baugh, D.A. op.cit., 265.
7. Mahan, A.T. (1892), The influence of sea power upon history 1660-1783, Sampson Low and Marston, London.
8. Graham, G.S. op.cit., 10.
9. Ehrman, J. (1953), The navy in the war of William III 1689-1697, Cambridge University Press, 83.
10. Ibid.
11. Ibid.
12. Baugh, D.A. op.cit., 263.
13. Ibid.
14. Ibid.
15. B.L. Kings Mss 44, 27.
16. Baugh, D.A. op.cit., 267.
17. Ehrman, J. op.cit., 90; Baugh, D.A. op.cit., 269.

18. Ehrman, J. op.cit., 89.
19. Ibid.
20. Ibid., 267.
21. C.S.P.D., James I 1608, XLV.
22. Oppenheim, M. (1968), Maritime history of Devon, Printed by University of Exeter, Torquay, 84.
23. Stephens, A.E. (1940), Plymouth Dock: a survey of the development of the royal dockyard in Hamoaze during the sailing ship era, unpublished Ph.D. thesis University of London, 81.
24. Britton, J. and Bradley, E.W. (1807), The beauties of England and Wales, 6, 124.
25. Ibid., 125.

CHAPTER 5

STRUCTURED MOBILITY AND LABOUR MARKETS WITHIN THE MILITARY-URBAN SYSTEM

... In the study of urban and regional systems ... there is a need to link more explicitly the study of city and regional development to growth and change in organizational systems - that is to build bridges between macro studies of the spatial structure and behaviour of industrial and commercial organizations and more aggregate studies of urban regional population and employment trends ... in terms of systems thinking ... the various establishments of multi-site organizations are basic economic entities of the spatial system, while intra-corporate linkages provide obvious channels along which change is transmitted.

Goddard, J.B. (1978), Urban and regional systems, Progress in Human Geography, 2, 309-31.

Thus far in this study the dockyards have been considered as comprising a system of industrial complexes based on a number of criteria including those of function and employment, all of which may be subsumed under the primary factor of centralised Government control. This chapter explores in greater depth the premise of this claim. A basic component of any system is that of linkages between the elements making up the network in the form of flows of goods, information and people within it. This section examines the structure of population and labour mobility within the military-urban system by the use of disaggregated data and the resultant patterns are considered in the light of Government control.

Disaggregate Data and Population Movement

Previous studies which have examined population and labour mobility in an historical context have largely concentrated on delineating net and gross migration streams between counties and constructing migration fields for particular locations using aggregate data. The latter have been constructed for a number of dockyard towns (Figures 8.19, 8.21, 8.23, 9.11,) yet while these may bear some resemblance to the migration fields of the various dockyard towns a number of weaknesses exist in their interpretation. The use of aggregate birthplace information contained in the nineteenth-century censuses do not deal with inter-censal mobility but with 'life-time' migration. The data give no indication of movement between place of birth and place of enumeration nor whether the move was direct or in stages. This largely reflects the constraints involved in unravelling not only the behavioural influences behind the decision to migrate but the actual delineation of such movements. These constraints are particularly relevant to historical

studies in which the availability and quality of suitable source material is frequently an issue. For this reason it was considered necessary to utilise disaggregate data in order to reconstruct patterns of adult migrant mobility within the dockyard system. This has been achieved by examining the birthplaces of children born to migrating adults. Such migrant path-ways have been termed 'sibling time-paths'.(1)

There are very few sources in Britain with which to pursue historical migration studies at a disaggregate level though sources for reconstructing population movement in the nineteenth century are better than those for previous periods.(see Appendix B) As in most historical research one is forced to make do with imperfect data. By utilising sibling birthplace details contained in the census enumerator's schedules for the middle decades of the nineteenth century it is possible to trace part, if not all, of the path by which a migrant travelled to a certain location.(2) This has been done for a sample of the Sheerness population, extracted from the census schedules of 1871. Sheerness was selected because it possessed several features which made it suitable for investigation but there is no reason why any of the dockyards could not have been selected. The town is isolated and thus problems regarding the definition of the urban area were thereby avoided. Being one of the smallest yards the population sample was manageable under the circumstances. The town was also devoid of alternative sources of employment beyond that generated by the dockyard and military presence and analysis of the influence of Government on migration patterns was thereby simplified.

Sibling Time-Paths to Sheerness

From the sample, information relating to the birthplace of siblings born to migrating adults resident in Sheerness in 1871 were extracted and the intervening 'links' or intermediate 'stations' as Hägerstrand calls them (3) between such birthplaces provide a useful indication of an individual's migration path. The methodology employed here is detailed in Appendix C. The maximum number of moves recorded by the birth of a child was five, though by far the greater number of migrants made two moves.(4) (Table 1) Migrants who made only one move, direct from place of birth to Sheerness, were only recorded as such if their last child was born in the same location as its parents before the move to Sheerness occurred. This group comprised 16% of the sample. Approximately 84% of these migrants therefore arrived in Sheerness via at least one intermediate location. The mean distances travelled by migrants on each link of their migration path to Sheerness reveals that with one exception the first link in the path is longer than that of the second, suggesting a shorter 'resettling' move within an area once a major initial move had been made.(Table 2) This would certainly follow expectation and theory regarding information fields.(5) Having undertaken an initial move a migrant's awareness space or familiarity with the new location will increase, and with this new information a further 'second stage' move within the area could occur. Alternatively, the initial residence could have been temporary accommodation deliberately chosen with the intention of moving again soon after.

An initial examination of the birth-places of Sheerness migrants indicates the presence of the distance-decay effect whereby the number of migrants is a function of distance from Sheerness. (Figure 5.1) The relationship, however, is irregular and the occurrence of various peaks corresponds to a small number of locations which were prominent in the

migration path network whose outfall was Sheerness. What becomes clear, from an examination of the structure of individual space-time paths making up the network, is the importance of other dockyard towns and local settlements not just as sources of migration but also as intermediate centres through which large numbers of migrants were channelled en route to Sheerness.

To illustrate this point, a frequency distribution of the distances for each link and a spatial plot of these links were constructed for each group of migrants, differentiated according to the number of links in their paths. (Figures 5.2-5.22) For those paths consisting of only one link the importance of local migration from neighbouring locations, and particularly the Medway Towns, can be seen. (Figures 5.3-5.4) Also prominent are a number of other locations, notably Plymouth, Portsmouth, and London. Over 56% of these migrants came from only eight locations.

The distribution of distances for the first link of those migrant paths involving two links shows a distinct, but irregular, distance-decay effect. (Figures 5.5-5.7) Not all movement was toward Sheerness; indeed, at least 10% of these moves were directionally away from the town, and many more were patently not even toward Kent. Finally, it is interesting to note that the vast majority of links were travelled by only one person. Structurally, at least, these migrant paths have little in common at this stage. These findings are in marked contrast to the second, and final move into Sheerness. Here the frequency distribution is dominated by a few locations, somewhat similar to those encountered in the paths involving one move. The initial link was thus towards one of these key centres, the importance of which recurs throughout each migrant group. The centres are of two types. The first are local settlements close to

Sheerness, Minster and Queenborough, which act as reception centres for migrants who subsequently move into Sheerness. The second are the naval dockyard towns of Chatham, Woolwich, Devonport, Portsmouth and Pembroke Dock, together with London, which receive migrants from elsewhere and then send many of them on to Sheerness.

The previous pattern is again discernible in the case of paths involving three links. (Figures 5.8-5.11) The first link represents a move into the network of key centres. The length of the link tends to be either short or long, and they are rarely duplicated by others. Approximately 20% of the migrants on this link moved away from the direction of Sheerness. Most of the moves on the second link take place between these nodes, with a great number of them being duplicated. The third, and final, move into Sheerness is totally dominated by six locations, with only a small handful moving to Sheerness from locations other than these. Again the local settlements, dockyard towns and London, with particularly heavy migration from Woolwich, predominated. (6) The situation for those paths involving four and five links is more complex, although the role of the dockyards and local centres is again evident. (Figures 5.12 -5.22)

Migration to Sheerness during the middle years of the nineteenth century was thus dominated by a relatively small number of urban centres. These consisted of other dockyard towns, two settlements close to Sheerness, and London. On the evidence of their migration paths, a considerable majority of migrants moved to Sheerness by first being drawn into this network of centres and thereafter circulating within it before reaching Sheerness. The role of the local settlements appears to have been to act as reception centres for migrants before moving a short distance into Sheerness. Most of the network, however, consisted of

dockyard towns, and it seems that these operated as a system of labour markets which 'captured' labour from outside and then retained it within the system. It would seem more appropriate to rename the migration field of Sheerness its migration network. Evidence from other centres in this network suggests that they too received migrants in much the same way. The process by which this happens is discussed later in this chapter.

The sequence of moves undertaken by migrants illustrates the variety of distances involved in these paths, and in particular the absence of an overall trend. In the case of migrants with paths containing four links for example there was not a tendency for migrants to make shorter moves over time, but for them to engage in alternating short and long moves after the initial move had been made.(Figure 5.23) This implies that once in the network, a migrant's path was largely conditioned by the shape of the network, his entry point and the opportunities available in the dockyard system of which he or she was aware. In many cases, the character of a migrant's path reflects a certain amount of return migration between dockyard centres.(7)

Social and Occupational Characteristics of the Migrants

The importance of naval dockyard towns in the migration network of Sheerness is not surprising given the specialist nature of dockyard work. Examination of the occupation data of these sampled migrants (Figure 5.24 and Table 3) shows that approximately 45% of male migrants were employed in the dockyard, the largest group being shipwrights.(8) A further 10% were recorded as being in the Royal Navy and 4% in the Army and Royal

Marines. Most of the pensioners (10% of migrants) had been connected with the armed forces and dockyard. Thus 65% of male migrants were directly concerned with Government controlled employment. Of the remainder, 16% were involved in tertiary employment, and 7% were labourers. Some of these occupations, particularly the labourers, are likely to have been employed in the dockyard. Overall therefore, more than 65% of the males were employed by Government in the dockyard or armed forces. A dearth of alternative sources of employment in Sheerness effectively made the tertiary sector and local trades dependent upon the dockyard and Government as the mainstay of the local economy.(9)

Comparison of these figures with the employment structure of all economically active males in Sheerness indicates that dockyard workers were over-represented among the migrants.(Figure 5.24 and Table 3) Military personnel are approximately the same proportion for both groups. Predictably local trades, the tertiary sector and labourers are under-represented among these migrants. The fact that dockyard workers are over-represented reinforces the previous findings about the character of the migration network and its dependence on dockyard centres. Further, it has been found that many ex-servicemen found employment in the dockyard, and this again would tend to increase the importance of dockyard locations in the migration network.(10)

If a comparison is made between the social class of migrants and the total sample one can see that social classes one, two and four are comparable.(Table 4) However, social class three is substantially over-represented among migrants and social class five substantially under-represented. Thus this group of family migrants appears to consist of more skilled and semi-skilled artisans and naval and military personnel and fewer unskilled persons than those resident in Sheerness, a finding

that is confirmed by many studies of the occupation-selective nature of migration.

Labour Procurement and Composition

Very little is known historically about the nature of dockyard employment. Shipwrights made up a substantial proportion of permanent dockyard workers for their skills were used in almost every aspect of dockyard work. At the other extreme the large number of labourers needed in the dockyards almost certainly fell into the category of temporary workers. The yards were naturally concerned to retain specialist workers as far as possible. There was generally no difficulty in hiring unskilled labour who could be employed and dismissed to suit the dockyard service. Indeed there were occasions when during a period of substantial reduction in the dockyard workforce shipwrights were transferred to labouring positions on the understanding that at a later date they would be reinstated to their original position. A further method of retaining skilled labour in the dockyard service would be to transfer workers to other dockyards where skilled workmen were in demand. This could well account for the excess of skilled migrant dockyard workers recorded as entering Sheerness.

Because dockyard employment was highly volatile there was a combination of two types of workers in the dockyard, those who were 'established' or permanent employees and those who were 'hired' on a temporary basis. In periods of sharp seasonal fluctuation, seasonal workers were comprised largely of riggers and labourers.(11) Demand for

these workmen would be greatest during the period when the fleet was in harbour undergoing refits or being laid up. At such a time, however, a substantial number of seamen specialised in such work would be available and could fill such temporary demand.

The lure of permanent employment was tacitly used by the dockyard authorities as part of the process to attract skilled workmen and to retain it. Government pay was lower than that of private yards and for a number of years very irregular such that the workers lived for long periods of time on credit from local 'ticket' dealers and from local commercial dealers who drew the workers' tickets for pay from the Navy Office. In the early years therefore dockyard towns had an extensive credit system which tended to tie workers to the dockyard service. The privilege of taking an apprentice whose wages the shipwright could claim, and the chance of receiving a discretionary pension when eventually dismissed from the service through old age or infirmity, were also held out as rewards for long serving 'deserving workmen' in the dockyards.

The naval authorities played on these ties of the workmen to the yards. In 1668 Sir William Coventry wrote to Samuel Pepys,

There will be £10,000, if not £12,000, this week for paying men off in the yards. It will have two desirable effects to pay off all the foreigners at Chatham and Portsmouth; one that it will stop the greatest and justest clamours of those who are remote from their dwellings, and have the least credit; the other that those who are inhabitants will be afraid of being discharged whilst hoping for the money, because then they must go from home to seek work, and perhaps not find it. In Deptford and Woolwich this method will not have the same force, because the River Thames will be their home to furnish them work...(12)

The employment markets were thus not uniform throughout the system. Some yards, such as on the Thames, found it easier to obtain workmen than others who had to compete with private and commercial concerns. Others like Sheerness were in unpopular locations and disliked by workmen and

naval officers alike. Some, because of their remoteness, had difficulty procuring suitable workmen. Plymouth was in this position and the officers there often tried to prevent workmen from being laid off because of the difficulty in obtaining skilled men.(13) This was to little effect however for their workmen were reduced by Government in line with other yards.

The extent of the volatility of employment in the dockyards, whereby thousands of workers could be dismissed in a matter of months, must have had an extensive impact not only on the local economy but also on patterns of migrant mobility. The most vulnerable workers were the unskilled whilst attempts were made to retain skilled workmen.

Labour Mobility, Government and the Dockyard System

One reason for the pattern of migration paths examined above was the role of organised migration undertaken by Government and the dockyard authorities. In the case of military and naval personnel and their families (the latter have been termed 'derivative' migrants (14)), the compulsory movement or 'posting' to other bases as part of the normal deployment of forces doubtless accounts for some of the channelling of migrants between a limited number of locations. It is all but impossible to identify paths before entry into the armed forces or after leaving, though many ex-servicemen, on becoming civilians, remained in these locations.

A key to explaining the channelling of non-military migrants between a few major locations may lie in the degree to which the movement of employees between the dockyards was a matter of policy authorised by the dockyard authorities or their immediate controlling body, the Admiralty. Unfortunately this is not easy to determine, though circumstantial evidence suggests that such movement took place. It is an area of historical migration which has received scant attention to date. Johnson and Salt have recently drawn attention to the geography of the internal labour markets of many contemporary organisations.(15) In referring to the movement of personnel belonging to particular organisations between spatially dispersed plants and offices they state,

This aspect of migration has become increasingly important in recent years, as advanced industrial economies have become dominated by large multi-functional and multi-locational organisations, which need to relocate some of their staff as part of the process of promotion, and also to make available scarce technical and managerial skills in those locations where they bring most benefit to the organisation.'(16)

Johnson and Salt suggest that three broad categories cover migration policies operated by employers. These consist of policies designed to cope with plant run-down or closure; the wholesale transfer of operations from one location to another and, most importantly in terms of numbers involved, the movement of staff between the plants or branches of multi-locational organisations as a routine element in their operation.(17) All three seem to have been present in the dockyard system in the nineteenth century, and indeed earlier, but what is not clear is the importance of staff in inter-dockyard flows in the nineteenth century.

The degree of routine movement between the yards has not been studied and is difficult to assess. The dockyards were one of the first craft based organisations to become an industry involving a high degree of specialisation of labour resources. In the earliest days of the naval

dockyards excess demand for workmen experienced in one yard during periods of great activity were made good by impressment of workers, from commercial yards, and by 'loaning' workers from various dockyards for periods of from a few days to several months.(18) Standard rates of payment were laid down per mile for artisans travelling from one yard to another, and for the transportation of tools. Dockyard personnel were also enlisted by the Admiralty for work in overseas bases.(19) During the closure of certain dockyards many workers were retained and transferred to the remaining yards. Such a situation occurred following the closure of Deptford and Woolwich dockyards in 1869, of Pembroke and Rosyth dockyards in 1925 and is projected to occur following the closure and run-down of Chatham and Portsmouth dockyards by 1984.(20) It was workers taken mainly from Devonport dockyard who established Pembroke Dock in 1814.

Nonetheless it is difficult to determine the degree of routine and permanent movement of personnel between the dockyards. Examination of the lists of workers from the eighteenth and nineteenth centuries for the various yards shows, from the information on place of apprenticeship, that movement within the system of dockyards was taking place but the extent to which this was stimulated by the authorities requires further research.(21) Such movement would account for the disproportionate number of skilled workers migrating between these dockyard nodes and for the dearth of unskilled workmen. Further research might determine possible differences in route taken by skilled and unskilled workmen, perhaps reflecting organised movement for the former but not for the latter. This migration would also be taking place within an environment of less uncertainty than would be the case for workers changing employers, which might account for differing patterns of migration.(22)

Hägerstrand's research on the genesis of migration fields in Sweden

suggests a further reason for the pattern of migration paths described here. He suggested that migration fields result from a 'feed-back' process, (23) involving what is termed 'chain' migration.(24) This process hinges on the communication or feed-back from friends and relatives who have previously moved to those who have not yet done so. These people could also act as 'introducers' into a new social environment. The actions of 'active' migrants, over a period of time, therefore, will create 'a network of social contacts which tend to conserve a 'bias' in migration frequencies'.(25) Migration at any time is therefore to some extent dependent on preceding migration. Bearing in mind that the major part of the dockyard system had been in existence since the early years of the seventeenth century the suggestion that migration patterns and the channelling of migrants between major nodes during the middle part of the nineteenth century was in some way influenced by patterns of historical continuity is of considerable interest. Contributing to this would be the routine communication which took place between dockyard establishments, and the geometry of transport networks available to migrants especially, in this case, movement by sea. Regrettably, lack of data concerning the sources of information upon which individuals made their decision to migrate makes it difficult to confirm this.

Migration links among dockyard towns continued to exist into the twentieth century, though with necessary variations.(26) A recent analysis of labour migration between urban locations has emphasised the importance of movement between locations containing naval bases.(27) Indeed, of 50 residuals which could not be ascribed to the effects of size and distance in the gravity model, the five largest involved movement between the naval bases of Plymouth, Portsmouth and Dunfermline (Rosyth

dockyard). Movement between the dockyard at Chatham and two dockyard related townships of Barrow and Yeovil was also highlighted.(28) These linkages emphasise the continuing network which exists between dockyard towns.

A number of weaknesses exist in the methodology employed here not least because the method relies on the birth of a child to record a change of location.(29) Any move which was made but was not accompanied by the birth of a child in the new location is 'lost' to the analysis.(30) Further, it is assumed that the birth of a child in a different location from that previously recorded for the adult represents a move. This is an assumption which need not necessarily be true, for the 'new' location could, for example, represent a temporary visit for the birth of the child at the home of parents or relatives.(31) Furthermore the migrants considered in this study were all married adults and had families, and this in itself has limited the analysis to a particular sector of society who were of a certain stage in the life-cycle. This factor, is generally recognised as having a great influence on the decision to migrate.(32) The space-time paths of single adults, childless couples and those whose children were all born in Sheerness must go unrecorded. It is unknown, therefore, to what extent migrating families reflect the paths of all migrants to Sheerness. Nonetheless the dominance of certain paths is so striking amongst these migrants that it would be very surprising if other migrants did not in some way correspond in their patterns.

Such an examination based on disaggregate data does suggest, however, that the structure of population and labour mobility was largely determined by the nature and shape of the dockyard system itself and that this represented a distinct migratory subsystem. Such patterns of labour mobility point to extensive linkages and interaction between the

dockyard-urban locations and in this respect Government exercised a major role because it determined the levels of employment at the several yards within the system. There would appear to be good reason to consider the dockyard towns as forming a military-urban system operating under the auspices of Government.

Notes

1. Harris, T.M. (1982), Sibling time-paths: an examination of nineteenth century migration to a dockyard town, Occasional Paper No. 6, Department of Geography, Portsmouth Polytechnic.
2. This approach has been used in a minor way by: Gwynne, T. and Sill, M. (1976), Census enumerators books: a study of mid-nineteenth century immigration, Local Historian, 12, 74-79; Anderson, M. (1971), Urban migration in nineteenth century Lancashire: some insights into two competing hypotheses, Annales de Demographie Historique, 2, 13-26, Bryant, D. (1971), Demographic trends in south Devon in the mid-nineteenth century, in Gregory, K.J. and Ravenhill, W.D.L. (eds) (1971), Exeter Essays in Geography, Exeter, 125-142.
3. Hägerstrand, T. (1975), On the definition of migration, in Jones, E. (ed.) Readings in Social Geography, Oxford University Press, 204.
4. Although the mean number of moves undertaken was 2.2 in reality the actual number of moves would have been greater simply because moves other than those recorded by the birth of a child would have gone unrecorded. The extent of the latter can only be gleaned from an examination of how the final move of each migrant into Sheerness was recorded. In the case of 52% of the migrants, this final move was registered not by birth of a child but by the census. More than half the migrants had therefore made a move which, but for the census, would have gone unrecorded if reliance were placed solely on child-birth as evidence of a move. Doubtless many of these migrants may have had a child born in Sheerness before moving elsewhere, thereby reducing this figure. However, using this sum one can suggest an average upper limit of 2.8 moves per adult and a lower limit of 2.2 moves.
5. Hägerstrand, T. (1957), Migration and area: a survey of Swedish migration fields, Lund Studies in Geography, Series B, 13.
6. The closure of Woolwich and Deptford dockyards in 1869 resulted in the redistribution of some workers to other naval dockyards including Sheerness.
7. This was not an uncommon occurrence, see Wendel, B. (1953), A migration schema: theories and observations, Lund Studies in Geography, Series B, 9, 11-20.
8. The total number of male migrants was 252 of which 111 were dockyard workers including 39 shipwrights.
9. Harris, T.M. (1980), The social geography of a nineteenth century dockyard town: towards an investigation of the influence of national policy on urban social structure, unpublished paper presented at a conference held at the University of Oxford.
10. Field, J. (1978), The diary of a Portsmouth dockyard worker, Portsmouth Archives Review, 3, 40-66; Waters, M. (1977), Craft consciousness in a Government enterprise: Medway dockyardmen

- 1860-1905, Oral History, 5, 51-62.
11. Ehrman, J. (1953), The navy in the war of William III 1689-1697, Cambridge University Press, 90-91.
 12. C.S.P.D. June 28 1668, 463.
 13. ADM 7/593.
 14. Hägerstrand, T. (1957), op.cit., 132.
 15. Johnson, J.H. and Salt, J. (1980), Labour migration within organisations: an introductory study, Tijdschrift voor Economische en Sociale Geografie, 71, 5, 277-284.
 16. Ibid., 277.
 17. Ibid., 277-78.
 18. See P.R.O. ADM 42.
 19. See for example, P.R.O. ADM 106/3553.
 20. See Navy Estimates P.R.O. ADM 181/79 and 80; P.R.O. CAB 24/175/422, 452.
 21. See for example, P.R.O. ADM 106/2982.
 22. Johnson, J.H. and Salt, J. op.cit., 278.
 23. Hägerstrand, T. (1957), op.cit., 131.
 24. See White, P. and Woods, R. (eds) (1980), The geographical impact of migration, Longman, London, 37.
 25. Hägerstrand, T. (1957), op.cit., 130-2.
 26. Sheerness dockyard, for example, was closed as part of Government cuts in 1959, as had a number of other yards by that date.
 27. Flowerdew, R. and Salt, J. (1979), Migration between labour market areas in Great Britain 1970-1971, Regional Studies, 13, 211-31.
 28. Ibid., 229.
 29. See Harris, T.M. (1982), op.cit., 34-5 for a fuller discussion of these weaknesses.
 30. An obvious exception is the final move into Sheerness which is recorded by the census itself.
 31. A good case could be argued, however, that it was more likely for relatives to travel to the home of the prospective mother rather than vice versa.
 32. Wolpert, J. (1965), Behavioural aspects of the decision to migrate, Papers and Proceedings of the Regional Science Association, 15, 159-169; Doling, J. (1976), The family life

cycle and housing choice, Urban Studies, 58, 55-8; Simmons, J.W. (1968), Changing residence in the city, Geographical Review, 58, 622-51; Johnston, R.J. (1971), Urban residential patterns, Bell, London.

CHAPTER 6

TECHNOLOGICAL CHANGE, GOVERNMENT POLICY AND THE DOCKYARD SYSTEM

As an artefact of culture the ship is inevitably subjected to general cultural influences and by cultural influences one means standards of scientific and technological achievement and the effects of social organisation, tradition and contacts. The importance of such cultural influences is manifest in the fact that every craft, except the very simplest, combines ideas drawn from many different sources at many different times ... The ship is the result ... not only of local conditions but also of a long tradition in which scientific, technological, social, economic and political factors have played an important part.

Robinson, H. (1954), The influence of geographical factors upon the characteristics and development of the ship: a study in human geography, unpublished Ph.D. thesis, University of Sheffield, 2.

Early Ship Technology and the Dockyard System.

Because of the relationship between the Royal Navy and the naval dockyards any change in the size, structure or composition of the former was necessarily reflected in changes within the dockyard system. This was especially the case in respect to variations in the number and operational use of naval ships. At certain times, however, the system was also greatly influenced by rapid change in warship design and construction. It was such a technological revolution in naval ordnance and naval architecture which initially brought the Royal Navy and dockyard system into being but a further revolution in ship design was not to occur again until the mid-nineteenth century

During the period from the seventeenth century to the mid-nineteenth century, little fundamental change in warship design and technology took place. 'A thorough investigation of all letters patent relating to improvements in ships between the years 1618 and 1810 disclosed no improvement worth recording'.(1) The main construction material was timber and the ship carried her main armament of large cannon on gun decks and fired through port holes broadside on. The amount of machinery on board ship was minimal. Whilst improvements were made by the provision of more rigging and a greater divided sail plan the sole agent of propulsion throughout the period was wind.(2) Ships did increase gradually in size, from approximately 1000 tons at the beginning of the seventeenth century to a maximum of 2500 tons by the early nineteenth century (3) but with the exception of slightly greater size, efficiency and degree of ornamentation, in terms of construction there were no radical changes.(4)

In the field of naval ordnance, the muzzle-loading smooth bore gun introduced into the navy by Henry VIII became, with few alterations, the

accepted gun for the next 250 years.(5) Sir A. Noble was of the opinion that by the mid-nineteenth century, 'no appreciable advance had been made in artillery during 500 years, either in gun powder or its mode of manufacture, and but little, except in size, and that not very great, in the guns themselves'.(6) The thirty-two pounder cannon, remained the standard gun on board warships until the mid-nineteenth century, though at times a multiplicity of cannon sizes did exist.(7)

The method of ship construction employed during this period can best be summed up by the phrase, 'rule of thumb'. Shipbuilding skills and dockyard trades were passed on via the apprenticeship system, very often from father to son.(8) Ship designers, in this age of limited science and mathematics, tended to adhere to tried and tested designs; their prime concern being to avoid an expensive failure rather than further the development of the ship.(9) Graham considers that this obstinate opposition to innovation, combined with a contempt for scientific learning and a blind faith in 'practical experience,' had resulted in the wooden sailing ship being developed as far as was empirically possible by 1700.(10)

The design of the warship had thus been determined by long and arduous experience gained over many years, but ship evolution was also constrained by the structural limitations and building qualities of the construction material itself, wood.(11) It was not until the mid-nineteenth century that new materials, technical advances and the application of theory to the practice of shipbuilding radically altered the nature of naval shipbuilding and warship design and had a number of repercussions on the dockyards and dockyard system.

The importance of this for the dockyard system during the intervening period was that changes in the dockyard system which arose from technological advances in warship design during this period were slight. Such change as did occur in the dockyards was rather due to variation in the size and operation of the Royal Navy, the strategic demands made on the system, and the effect of physical changes in site. During the nineteenth century, however, a revolution in warship construction, which largely stemmed from innovations of the industrial revolution being applied to maritime conditions, forced fundamental and wholesale change on the dockyard complexes and the dockyard system. Henceforth the influence of technological change supplemented war and peace as a determinant influencing the dockyard-urban system. The point should be made here though that it was the way in which technological advances influenced Government policy toward the system which was vital. It was Government which decided when to take up the innovations and when and how to implement them, admittedly influenced by the tide of events. Government decided what alterations were to be made to the system, when and where to extend the complexes and what yards should be closed or expanded as a result. This chapter, therefore, examines the impact of technological change on Government policy and the dockyard-urban system.

The components of this 'Industrial revolution in sea power' which covered the transition from the wooden sailing navy to the metal steam fleet can be categorised under four main headings; iron, steam, ordnance and armour.(12) In view of the impact of these elements on the Royal Navy and the dockyard system it is worthwhile to briefly examine the components underlying the new technology before moving on to examine the impact of change on the dockyard system.

Technological Changes in the Nineteenth Century

Iron

Iron had been used in shipbuilding in a limited way before the nineteenth century, being closely associated with the development of the marine steam engine towards the end of the eighteenth century.(13) As with many of the technological advances in naval warship design during the nineteenth century it was private industry and the mercantile marine which invariably provided the lead. A number of weaknesses in the use of iron plating on naval ships, largely a reflection of the quality of iron then available, resulted in the Admiralty not actively developing the naval iron ship until the mid-nineteenth century.(14)

A major stimulus was given to this process by events in the Crimean War. The destructive power of the shell gun on timber ships during the war effectively made the wooden naval ship obsolete. The necessity to use armour plating to counter the destructive power of the new ordnance forced the introduction of iron ships. Armour plating was used on wooden ships and indeed on 'composite' ships, which had a wooden exterior on an iron frame, but in order to support the ever increasing weight of armour plate the use of iron in ship construction was vital. In 1860 the 'Warrior' was launched, an iron hulled ship carrying four and a half inches of armour plating.(15) The Warrior marked the beginning of the modern steam and iron navy and by 1865 the construction of warships in iron had displaced the use of wood as the major material in naval shipbuilding.(16)

The many advantages of iron over wood in shipbuilding relate to the greater strength and rigidity given to the ship as a whole.(17) All ships

suffer from the weakness known as 'arching' or 'hogging' whereby during movement at sea the twin factors of buoyancy and weight sometimes resulted in the end of the craft being unsupported in relation to the centre.(18) Such weaknesses in timber built ships had placed the upper limit of a ship's length at about 300 feet. Beyond this limit the stresses imposed by the above conditions had threatening effects.(19) Furthermore, with the introduction of steam engines the vibration set up was great and a more stable and stronger ship was required to withstand these stresses.(20) The use of an iron framework and iron rivetted plates overcame these defects.(21) The ability to construct bulkheads and provide an inner skin, the 'double bottom' common place in warships after 1880, (22) lent shape to the ship and improved safety. Shapes could also be more easily moulded to facilitate construction and iron was an alternative material to the ever dwindling supply of suitable oak.(23) The scarcity of such material, even in the royal forests, favoured the development of a substitute material which alleviated a problem which had concerned the naval authorities for centuries.(24) Also, the more durable nature of iron and especially steel gave longer life to a ship and reduced the need for almost continuous maintenance which was such a feature of the wooden warship.(25) Narrower ships could be built because of the greater strength of iron, thereby allowing lighter ships for no loss in strength.(26) Thus heavier guns with their greater recoil could be accommodated and, as the metal ship developed, the way was open for an ever increasing weight of armament and armour to be carried.(27)

The enormous advantages to be gained from the use of metal in shipbuilding accounts for its rapid adoption from the mid-nineteenth century. It was necessary, however, for a number of improvements in the field of metallurgy and iron production to take place during and following the industrial revolution before the large-scale use of iron in

shipbuilding could take place. Here, developments and innovations in naval design were closely related to changes and improvements taking place in other fields during this period and in particular the large-scale production of cheap iron and steel. From 1876 the Admiralty increasingly used steel in the construction of warships and iron was rapidly replaced during the next 20 years as the major building material.(28)

Steam propulsion

The adoption of steam propulsion in the Royal Navy closely followed the path of that of iron. Early pioneer work on steam driven paddle wheel ships was undertaken by private individuals concerned with small commercial craft and largely stemmed from the development of steam engines on land.(29) An attempt was made in 1815 to construct a naval steam sloop at Chatham but on the conclusion of peace the scheme was abandoned in the same year.(30) During the retrenchment which followed the Peace of Vienna a cautious British Admiralty showed very little interest in the new steam vessels (31) but prompted by the work of private concerns and the great progress of steam in the merchant marine the Admiralty did undertake some experiments and built some steam vessels during the 1820s.(32) Early naval steam ships, however, were limited to harbour defence and use as tugs because of heavy fuel consumption, inefficient engines and limited range.(33)

In the early stages steam engines were merely considered as ancillary to sail, and ships were to have both. Furthermore, for military purposes the bulky machinery, encumbered gun decks and extreme vulnerability of the paddle wheels to enemy gunfire, made such a vessel ill-suited and a liability as a ship of war.(34) It was not until the widespread introduction and improvement of the screw propeller during the

1830s and early 1840s that the major weaknesses of the steam ship were overcome.(35)

The abandonment of vulnerable paddle wheels and the advantages gained from lowering recently improved direct action engines below the water line as a result of the screw propellor began the trend from sail to steam as the major motive force for warships. The screw propellor provided a less vulnerable target than paddle wheels and gave greater manoeuvrability and speed. Paddle wheels no longer interfered with the fighting qualities of the ship and the broadside was returned to steam ships.(36)

The greater manoeuvrability of ships and their lessened dependence on the vagaries of the wind induced a more favourable response to the use of steam and from 1845 the Admiralty adopted the screw propellor for all steam warships. Although sail power remained the rule and steam the exception the transition from a sailing navy to a steam powered navy took place at an increasing rate.(37)

Following the Crimean war sailing vessels were considered by Sir Charles Wood, First Lord of the Admiralty, to be obsolete and from this time on steam power was dominant.(38) Not till 1873, however, was the first naval sea-going steam ship launched which disposed with sails altogether.(39) With this reduction in sails the adoption of the turret system, the basis for capital ships until the end of the Second World War, was possible.(40)

Naval ordnance

There were good reasons why little change had occurred in British naval ordnance from the mid-sixteenth century to the early nineteenth century.(41) Gun founders were working at the limits of the metals and

technology available and until improved metals became available during the nineteenth century and allowed the development of new techniques and advances in the science of gun making, the thirty-two pounder gun remained the standard broadside armament of the Royal Navy.(42)

Improvements in both French and American ordnance following the Napoleonic war gave the stimulus in Britain to introduce heavier and more powerful armament.(43) In particular the invention by the Frenchman Colonel Henri-Joseph Paixhans of the shell-gun during the 1820s revolutionised naval ordnance and ship design. Shells had been used in mortars for centuries but their velocity was low and this was reflected in their poor penetrative power and accuracy.(44) The shell itself also proved to be unsafe. The Paixhans gun in contrast fired in a flat trajectory to much greater effect. In response to this gun British smooth-bore guns were converted for use with the shell and in 1839 a shell gun itself was adopted.(45)

A further advance in naval ordnance, that of rifling, began in the 1830s though did not become a permanent feature until the mid-nineteenth century. The effect of giving a spiralling action through the barrel to the shell reduced the need for 'windage', (46) and the power of ordnance was thereby increased and greater accuracy and range obtained. Tests between 1842 and 1846 resulted in the development of eight inch and ten inch shell guns and a pivot gun for use on board steamers.(47) At the same time gun carriages were improved and in due course the old wooden carriages were replaced by advanced hydraulic systems.(48)

Again it was during the Crimean war and the Battle of Sinope in 1853 in particular that the shell gun displayed its great advantages over

previous ordnance designs and inaugurated a period of extensive development and improvement in naval ordnance.(49) Warships which had previously carried up to or over 100 guns henceforth boasted only a handful of guns, but which were immensely more powerful.(50) Armour-piercing shells replaced solid shot and naval ordnance gained a marked advantage over the defensive power of the warship from the 1860s onwards.(51)

Advances in naval ordnance called forth the use of armour plate on naval warships to counter this threat. This in turn stimulated the use of iron and steam as part of the trend toward stronger ships able to carry the weight of armour and cope with ever more powerful ordnance. Furthermore, the reduction of rigging enabled ordnance to be brought amidships to service both sides of the ship and resulted in the adoption in 1873 of the revolving armoured turret. The 'broadside' was now obsolete and the way was prepared for the development of the Dreadnought type of battle ship in the early twentieth century.

Armour

The dramatic advances in naval ordnance as demonstrated during the Crimean war called forth the adoption of armour plating to protect vital parts of ships.(52) The great thickness of timber in wooden men-of-war was, of course, in itself a form of armour against cannon fire but the rapid development and superiority of the shell gun threatened the capacity of battleships to withstand future action involving such ordnance.(53) The way forward was indicated by the performance of armoured floating batteries at Kinburn in 1855.(54) In 1859 the French launched the iron-clad 'Gloire' an iron plated wooden framed ship. This was followed a year later by the British equivalent, the 'Warrior'. Henceforth one of the dominating themes in naval design was the struggle for ascendancy

between the penetrative power of naval ordnance and the resistance of armour plating. Advances in one called forth equal or greater advance in the other. Ellis records the various stages in the competition between gun and armour plate.(55) In 1860 armour plate of four and a half inches thickness was used on the Warrior. By 1881, a series of increases had resulted in coverage of ships with up to 24 inches of armour plate to prevent shell penetration.(56) Because of the enormous increase in weight as a result of this trend iron plate was limited on many ships to the central and vital parts thereby giving rise to the 'citadel' type ship.(57) Advances during the 1870s in the use of steel and compound armour plates gave increased protection for less weight (58) and armour plate was improved still further by later processes.(59)

The Impact of Technological Change on the Dockyard System

The major components of technological change outlined in the previous sections were not independent of each other but rather they were tightly interwoven. In respect to their impact on the dockyard system therefore they are considered as a whole. The impact of technological change on the dockyard system can be discerned in five respects. Firstly, the response of the dockyards was to increase the provision of dockyard facilities and to extend and enlarge the docks and dockyard complex to accommodate the new breed of warship and associated technology. Secondly, rapid technological advances toward the end of the nineteenth century brought about a continuous warship replacement programme which was greatly stimulated by the naval rivalry with France which these advances engendered. Thirdly, the number of dockyard workmen and range of skills

required to build and maintain the new warships were substantially increased and altered. Fourthly, private industry became increasingly involved in the supply of specialised components and the trend was to contract warship construction out to private firms on a scale never before contemplated. Finally, the technological advances in ordnance and warship design brought about fundamental change in the nature and provision of dockyard defences. All but the last of these categories are examined in detail in the remainder of this chapter. The impact of technology on the provision of fortifications surrounding the dockyards and townships is indicated in this chapter but is discussed more fully in the following chapter.

Dockyard provision

One immediate problem facing the dockyards following the introduction of iron ships was the inadequate docking facilities and graving places which the yards possessed. For the previous 250 years the size of the wooden sailing ship had changed relatively little and a maximum length had effectively been fixed by the limits of the building material. Docks and dockyard facilities designed to accommodate naval ships had, as a result, changed little in dimension over the centuries. After the mid-nineteenth century, however, the rapidly increasing size of warships made new demands on dockyard facilities over and above those of the preceding centuries. 'The most important dominant single result of the technological developments during the nineteenth century was the progress toward ever larger and heavier capital ships'.(60) This trend can be placed in perspective and its impact on dockyard provision considered by an examination of the extent of this increase in size during the nineteenth century. In 1842 when the 80 gun ship H.M.S. Goliath was launched she measured 190 feet in length and displaced 3600 tons.(61) In 1860 the launch of the first iron ship, H.M.S. Warrior, marked the beginning of an

era of rapid increase in the size of warships. H.M.S. Warrior, at 380 feet long and 8850 tons displacement was larger than any ship of the line ever built before.(62) The Achilles, launched in 1863, displaced 9700 tons and was 400 feet in length. The Royal Sovereign, constructed under the Defence Act of 1889, was 380 feet long and 14,150 tons.(63) In 1893 the Majestic class of battleship displaced 14,900 tons and was 390 feet long.(64) By the turn of the century the revolutionary H.M.S. Dreadnought, launched in 1906, was 490 feet long and displaced 17,900 tons.(65) Nor did Dreadnought represent a peak for by 1910 the Orion class of warship were constructed to a length of 545 feet and a displacement of 22,500 tons.(66) The subsequent size of warships continued to increase until after the Second World War when the era of large battleships came to an end.

Such dramatic and rapid increases in the size of ships forced change on the dockyards, not least because in the 1860s only Chatham dockyard possessed a capital dock capable of receiving the current large battleships and then only if their rudders were removed.(67) In the dockyards docks and slips had to be lengthened and enlarged continuously to keep pace with the size of battleships being constructed.

The impact of these processes in concert on dockyard provision led to Portsmouth, Devonport and Chatham undergoing extensive enlargements which created almost entirely new yards. At Devonport, Keyham 'steam yard' was constructed to the north of the existing yard.(Figure 6.1) At Portsmouth a similar development took place, (Figure 6.2) while at Chatham the whole of St Mary's Island to the north of the dockyard was brought into the complex and three large basins constructed which utilised the former course of St Mary's Creek.(Figure 8.5) Such extensions greatly increased

the size of the dockyards and enabled the establishment of many of the facilities and specialist sections required in the construction and repair of the new breed of warship.

Whilst certain yards were expanded to cope with the new demands of modern warships two dockyards were eventually closed as a result of these innovations. The Thames yards of Deptford and Woolwich were generally regarded as having exceeded their useful lives as functioning dockyards before the Crimean war. Deptford had previously been closed during the 1820s only to be reopened during the 1840s. The Crimean war had given new life to Woolwich dockyard but the yards were incapable of complying with the demands of the new naval technology and were finally closed in 1869. The depth of water in the River Thames and the width of the river made the sites unsuitable for the ever increasing size of warship. Instead the new technology gave added impetus to dockyards possessing deep water facilities and room for these large ships to enter and leave. The new programmes of capital investment which these changes demanded were substantial and the closure of Deptford and Woolwich took place as part of the rationalisation of the system which these changes imposed. At the same time the capacity of the two closed yards were accommodated by the extensions which were taking place elsewhere in the dockyard system.

The ship building programme

The rate of development in warship design was so great that such advances brought about a continuous replacement programme during the latter decades of the nineteenth century.

The best ship existing in 1867 would have been more than a match for the entire British Fleet existing in 1857 and, again, the best ship existing in 1877 would have been almost if not quite equal to fighting and beating the entire Fleet of only ten years earlier. By 1890, the ships of 1877 had become well nigh obsolete and by 1900 the best ships, even of 1890, were hardly worthy of a place in the crack Fleets of the

country.... By the end of 1900 the best cruisers of 1890 had been told off to the less important stations; and in the mean time fleets everywhere had been reinforced with craft, such as destroyers, of types which in 1890 had been entirely unknown. (68)

Such rapid obsolescence required an extensive building and replacement programme by the dockyards to keep pace with advances in warship design. In 1905, for example, the Dreadnought effectively rendered all previous warships obsolete and ushered in a new era in which all navies were effectively forced to start rebuilding from scratch. In Britain this inaugurated a further warship building programme.

Furthermore, these replacement programmes were stimulated by renewed naval rivalry and an arms race between Britain and France and later Germany. Spurred on by rapid changes in warship design such rivalry substantially contributed to the pace of the building programme during this period. Naval rivalry was not new but continuous change in the military balance which occurred as a result of these technological advances increased international political and military tension. During these periods of tension public funds for naval programmes were more readily forthcoming.

Impact on the workforce

Coupled with new demands on the provision of dockyard facilities there were also changes in the demands made upon the workforce. The number of workmen employed in the dockyards increased dramatically toward the end of the nineteenth century with an accompanying expansion of the urban areas surrounding the dockyards. The average annual employment in all the yards between 1870-73 was 12,300 men. By 1899-1903 this had more than doubled to 27,200. (69) This increase reflects the greater size of the dockyards, the larger scale of operation which technical change had forced upon them and the increased complexity of the new naval ships. Of

note is that this increase in the workforce was made up almost entirely of 'hired' men, which rose from 5,700 to 21,200 during this period, whilst the number of 'established' men remained constant if not slightly lower. (70)

At the same time as dockyard employment was rising the crafts and skills required by the authorities changed as the ships progressed from wood to metal and sail to steam. No longer was timber the major working material but iron and steel, and workers in metal, engineers and men educated in engineering were in demand in the dockyards. Later still, new trades such as electricians were added to the list of craftsmen required by the yards. For much of the nineteenth century a great deal of the heavy labour in the dockyards had been performed with little or no mechanical assistance. From the time that steam machinery was introduced into the dockyards by Bentham in the early part of the century this situation was to change and transform the nature of dockyard work. Shipwrights in the dockyards, unlike their counterparts in private yards, took over much of the new work in iron and steel as well as that of wood. In private yards it was the boilermakers who undertook this broader aspect of ship building and repair work, but in the dockyards boilermakers were forced to confine their work to boilers. Also, unlike private yards, a number of skilled 'labourers' in the dockyards undertook a large proportion of work which in private yards was dealt with by semi-skilled workmen.

Besides the influence of these changes on the number of workmen employed in the dockyards and the type of skills required, it is not known to what extent this change was reflected in the migration fields of the dockyard towns. Certainly the demand for labour brought about substantial

migration to the dockyard towns during this period, but the basis of dockyard skills had changed and it would be interesting to compare the migration fields of the dockyard towns in 1861 and again before the First World War to see if the demand for workers in heavy metal and engineering trades changed the traditional migration fields of the dockyards.

Warship construction by contract

A further change introduced by the revolution in warship design and construction was the increasing interplay, or 'partnership', between naval dockyards and private industry.(71) Because of the growing complexity and advanced technology involved in ship construction, the naval dockyards came to rely heavily, and in some cases completely, on the provision of materials, the manufacture and design of components and eventually the complete construction of warships, by private companies. Indeed after 1918 a substantial proportion of all naval warship construction was undertaken by private yards.

The construction of warships by contract in private yards was not a new development. Ships had always been built by the dockyards but a number had, during the previous two centuries, been contracted out to private shipbuilders. This was especially the case during periods of war or of emergency when the resources of the dockyards were fully occupied with repairing and supplying naval ships.(72) Indeed, the major function of the dockyards was to undertake repairs which, except for a small percentage, were rarely put out to private contract because of concern about the quality of workmanship and materials and because of the difficulty in examining and assessing whether the repair work had been carried out correctly. Furthermore, until a ship was opened up and examined it was often not possible to determine the nature of the repairs required. The dockyards had skilled workers and materials available at

all times and could accommodate repair work at short notice, especially during time of war. The scrutiny of dockyard officials on the spot also ensured that high standards of workmanship were maintained.(73) Contracts for building ships in the early years generally went to well known and established merchant shipyards and usually to those which had previous experience of naval construction work.(74) In this respect private yards on the Thames were particularly favoured because of the greater personal control which naval officials in London could exercise over the shipbuilding process.(75) This bore marked similarities to some of the earliest reasons for establishing the first naval dockyards on the Thames. In periods of great demand, however, other establishments and even new contractors were encouraged to undertake work if their site, materials and workmen were suitable.(76)

With the introduction of new building techniques and materials during the late nineteenth century not only were the dockyards poorly equipped and lacking in expertise to build in iron but they were also geographically poorly located to actively participate in the new naval technology. The Warrior, for example, was built on the River Thames by the Thames Iron Works because the dockyards had neither the experience nor the facilities to build in iron.(77) The raw materials of coal, iron ore and limestone were in the north of the country where the heavy industrial metal industries, vital to the new shipbuilding techniques, were similarly located. Even the major shipbuilders, previously located on the Thames, were forced to move northwards to reduce costs in labour and especially materials and to obtain a site capable of accommodating the increasing size of ships.(78) The naval dockyards, however, were located in the south of the country for strategic reasons. An examination of the location of the major shipbuilders at the beginning of the twentieth

century shows that all except the naval dockyards were located north of a line drawn from the Humber to the Mersey where they were close to the emergent iron and engineering industries.(79) (Figure 0.1)

Besides being geographically poorly located with respect to materials and engineering processes the new technology also entailed manufactures such as armour plate, marine engines and armaments which were beyond the scope and expertise of the naval dockyards to undertake. Special rolling mills and manufacturing techniques were required in the production of materials and equipment and especially armour plate. These components were therefore left to private specialist manufacturers to provide.(80) These specialist firms also undertook much of the costly research and development, often in pursuit of Admiralty specifications. The Admiralty gave advice but no financial help in the development of these items though the companies were rewarded with contracts if successful.(81) Eventually the construction of complete ships was contracted out to large specialist firms who possessed their own subsidiary plants to supply necessary parts and materials.

For a number of reasons therefore the dockyards were forced to cooperate on a large scale with private shipbuilders, armament manufacturers and engine makers. In nearly all cases the contracts were put out to a limited number of private armament firms. Armour plate was manufactured by a cartel of private contractors including Vickers, Cammell, John Brown, Whitworth and Beardmore.(82) Naval gun manufacture was undertaken by only a few firms including Armstrong, Vickers and Coventry Ordnance Works.(83)

By utilising private industry in the development, design and construction of the components of the new warships the Admiralty were not

compelled to enter immediately into the development and production of innumerable items required in their construction. Nor did the authorities have to immediately enlarge the dockyards and workforce to participate in the new naval technology.(84) A true partnership between the Admiralty and private manufacturers developed during the years 1860 and 1914 (85) in which the Admiralty was the senior partner dependent upon the assistance and greater productive capacity of private companies.(86)

One immediate result of the transfer of warship construction to private yards was to precipitate the closure during the 1920s of Pembroke Dock. This yard had specialised in shipbuilding and especially so during the late nineteenth century when of all the dockyards it was the nearest to an industrial iron and steel area. It became an important centre especially for the construction of steel ships but the trend toward ship construction by private tender and the reduction in the Royal Navy during the economic recession of the inter-war years brought about the closure of Pembroke Dock in 1925.(87)

Two other important trends can be discerned from the development of this partnership with private industry during the late nineteenth and twentieth century. The first was that because of the size of defence expenditure, Government and the naval authorities extended a significant influence over a growing number of firms, employees and townships in various parts of the country creating a sub-system which became, like the system of dockyard towns, dependent upon the Admiralty and the defence budget for their livelihood.

Throughout the nineteenth century defence was one of the two largest items in Government expenditure and from 1885 the largest.(88) The Royal

Navy took an increasing share of the burgeoning budget. By 1896 it accounted for half the total defence budget.(89) In previous years a substantial proportion of this had gone into the dockyard system though some was expended outside the yards for materials. The naval revolution however not only greatly increased total naval expenditure but a greater proportion of it was put out to towns in other parts of the country where naval work was being undertaken by private firms. The extent of Government patronage increased as total defence spending grew and more contracts were put out to a number of large specialist armament firms.(90)

Between 1860 and 1914 the amount of naval work contracted out to private shipbuilders became increasingly important to private firms.(91) Between 1870-1874 the private shipbuilders share of naval construction amounted to 19%. After 1900 the private yards had increased their share to 50%.(92) No longer was naval shipbuilding merely a sideline to private shipbuilders but a very important component of their work.(93) This trend continued between the two World Wars (94) and after the Second World War the naval dockyards undertook no shipbuilding at all and concentrated on ship repair and maintenance.(95)

This concentration on repair and maintenance in the dockyards contributed to a more stable employment situation for such work cannot easily be cancelled or postponed as could new construction.(96) However, during the period when the dockyards undertook both construction and repair work the work load was distributed between naval dockyards and private yards on the basis of maintaining stable employment in the dockyards. As work on repairs was lessened in 1931-2, for example, so new construction was undertaken in the dockyards. As the amount of repair work increased in the following years so the dockyards undertook less new construction which was put out to private shipyards.(97) Whilst the

fluctuations between boom and slump were thus lessened in the dockyards, and some stability in employment maintained by controlling orders to private manufacturers, the Admiralty tended to accentuate or even contribute to the cycle of depression and boom in the dependent private shipbuilding yards.(98)

During the inter-war years orders for materials and equipment in connection with the construction of warships by private contract revealed that some 23 Scottish and 58 English towns received orders and that the number of firms involved ran into hundreds.(99) Naval work and indeed defence work overall began to play an increasingly important part in the work of a number of firms scattered throughout the country. In 1934, for example, naval work comprised 20% of all work in hand in private shipbuilding yards and this increased rapidly in the next few years.(100) The growing amount of work being placed by naval authorities with private industry through the defence budget, gave them an increasingly influential role in the level of economic activity of the country as a whole and some regions in particular. Outside the naval dockyards Government began, through the issue of contracts, to influence not only regional economies but also to direct and discriminate economic measures to or away from certain regions. These injections into the economy were, however, still largely tied to the same considerations under which the economies of the dockyard towns had been subjected for a number of centuries.

Vague attempts were made to keep contractors supplied with a steady flow of orders, but no allowance could be made by the Admiralty for cyclical fluctuations.... The building completed year by year, and the proportion completed in the Dockyards and privately, depended upon the naval vote and on the amount of Dockyard labour needed for repair. This was a naval, not an economic decision.(101)

Thus the prosperity of a large number of firms and the employment of thousands of people became increasingly dependent upon the Naval

Estimates. They also became increasingly caught up in the same cycle as that experienced by the dockyards as Government exercised financial and monetary controls through the defence budget based on policy considerations. So great had the defence budget become that Government spending on armaments tended to substantially influence the economic cycle, as for example in the immediate years before the Second World War (102) and defence budget expenditure became a mechanism through which Government controlled the economy. Economic considerations have therefore come to play an increasingly important role in the extent, timing and spatial selectiveness of armament spending throughout the country and during the twentieth century in the dockyard system.

A second outcome of placing naval work with private contractors was that the importance of Government orders to these firms and to the regions in which they were located led to the creation of an important pressure group which attempted to influence the level of naval activity. A series of 'determined naval panics', which Pollard claimed were instigated by the armament combines, played an important part in influencing the timing and amount of naval work put in hand.(103) Pollard correlated the 'panic' years of 1896-7, 1904-5 and 1908-9 with slumps in commercial and naval shipbuilding activity and noted that the agitation for naval expansion during 1908-9 occurred following a period in which for two years running Government had reduced the naval budget.(104)

The vested interests concerned in warship construction are nowadays very large ... The immediate effect of any proposal to limit naval armaments will be to deal a heavy blow at these interests, with the result that the latter would in all probability array themselves against the movement, and the consequent opposition thus created would be a formidable obstacle.(105)

The growth of a powerful lobby of armament manufacturers and their dependent workforces and the manipulation of public opinion introduced a further important factor influencing, and in some instances dictating,

naval building programmes. As Pollard comments, 'This marked the culmination of the development of what appeared to be an independent, self-generating, demand for naval armaments which increasingly moved beyond the control of the Cabinet.'(106)

Fortifications

The impact of technological change on the nature and provision of fortifications surrounding certain dockyards is dealt with in detail in Chapter 7. Suffice it to say here that advances in naval ordnance provoked a further extensive programme of defence schemes for the dockyards. Existing bastion defences encircling both dockyard and settlements became obsolete and were replaced by a network of forts encircling the naval base at a range of several thousand metres.

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7. Ibid., 279-80; Garbett, H. (1897), Naval gunnery, G.Bell, London, 22-3, 26-7.
8. John Evelyn, for example, on witnessing the launch of the 'Charles' at Deptford in 1668 remarked, 'built by old Shish, a plain honest carpenter, master builder of this dock, but one who can give very little account of his art by discourse, and is hardly capable of reading, yet [is] of great ability in his calling. The family have been ship carpenters in this yard above 300 years', Evelyn, J. (1959), The diary of John Evelyn, edited by De Beer, E.S., Oxford University Press, London. 117.
9. Graham, G.S. (1958), The transition from paddle-wheel to screw propellor, Mariner's Mirror, 44, 35; Naish, G.P.B. op.cit., 488.
10. Graham, G.S. Ibid., 35; Furthermore, the system whereby ships were constructed according to a classification by 'rate', calculated on the basis of the number of guns carried by the ship and thereby linking size of ship to its armament, in many ways contributed to stifling experimentation by standardising ship proportions and design. Robinson, C.N. op.cit., 235-43.
11. Naish, G.P.B. op.cit., 495.
12. Brodie, B. op.cit., 10.
13. Robb, A.M. (1958), Shipbuilding, in Singer, C. (ed.), A history of technology 1850-1900, Clarendon Press, Oxford, V, 350.
14. Parliamentary Papers, 1863, XXXVI, 301, 1; Brodie, B. op.cit., 136; Watts, P. (1911), Warship building 1860-1910, Transactions of the Institute of Naval Architects, 53, 293; Graham, G.S. op.cit., 47; Robinson, C.N. op.cit., 283-4.

15. Brodie, B. op.cit., 137-41; Graham, G.S. op.cit., 48.
16. Brodie, B. op.cit., 147; Graham, G.S. op.cit., 48.
17. Parliamentary Papers, (1863), op.cit., 1.
18. Indeed alternate strains are present for when the centre is unsupported relative to the two ends then 'sagging' in the middle results.
19. Derry, T.K. and Williams, T.I. (eds) (1960), A short history of technology, Clarendon Press, Oxford, 371.
20. Graham, G.S. op.cit., 46.
21. Robb A.M. op.cit., 355-8; Naish, G.P.B. op.cit., 588.
22. Robb A.M. op.cit., 372.
23. 'Great' and 'Compass' timbers used in timber built ships were of such an unusual shape and size that they could only be obtained from Oak trees generally over 120 years old; Robinson, C.N. op.cit., 72.
24. Albion, R.G. (1926), Forests and sea power: the timber problem of the Royal Navy 1652-1862, Harvard University Press.
25. Parliamentary Papers, 1863, op.cit., 1.
26. Brodie, B. op.cit., 149-154.
27. Ibid., 157-8.
28. Yates, R.W. (1962), From wooden walls to Dreadnoughts in a life-time, Mariner's Mirror, 48, 295-6; Brodie, B. op.cit., 163-4; Robb, A.M. op.cit., 373; Graham, G.S. (1956), The ascendancy of the sailing ship 1850-1885, Economic History Review, second series, 9, 86-7; Derry, T.K. and Williams, T.I. op.cit., 374.
29. Spratt, H.P. (1958), The marine steam engine, in Singer, C. (ed.), A history of technology 1850-1900, Clarendon Press, Oxford, V, 141-3; Moyse-Bartlett, H. op.cit., 11.
30. Brodie, B. op.cit., 20.
31. Graham, G.S. (1958), op.cit., 38. Navy Estimates during this period were reduced from a peak of £20,096,706 in 1813 to a low of £4,434,783 in 1835, Brodie, B. op.cit., 24.
32. Moyse-Bartlett, H. op.cit., 10; Graham, G.S. (1958), op.cit., 38-9.
33. Brodie, B. op.cit., 23; Graham, G.S. (1958), op.cit., 37; Naish, G.P.B. (1958), Shipbuilding, in Singer, C. (ed.), A history of technology 1750-1850, Clarendon Press, Oxford, IV, 587.
34. Graham, G.S. (1958), op.cit., 40; Robinson, C.N. op.cit., 295.

35. Petty, W.M. (1969), The introduction of the screw propellor into the navy 1830-1860, unpublished M.Phil. thesis, Birkbeck College, London, 111, 120; Spratt, H.P. op.cit., 147.
36. Petty, W.M. op.cit., 7.
37. Ibid., 111, 120, 133; Graham, G.S. (1958), op.cit., 41-44; Spratt, H.P. op.cit., 147.
38. Hansard, series 3, CXLV, col. 426; Hansard, series 3, CXLIX, col. 915.
39. Brodie, B. op.cit., 76-7; Robinson, C.N. op.cit., 298-310; Sandler, S. (1967), The emergence of the modern British capital ship 1863-70, Bulletin of the Institute of Historical Research, XL, 119.
40. Sandler, S. op.cit.
41. MacMillan, D.F. (1967), The development of British naval gunnery 1815-1853, unpublished Ph.D. thesis, King's College, London.
42. Ibid.; Hall, A.R. (1958), Military technology, in Singer, C. (ed.) A history of technology, 1500-1750, Clarendon Press, Oxford, III, 347-50; Robinson, C.N. op.cit., 253-4.
43. MacMillan, D.F. op.cit., 146.
44. Ibid., 170-2; Brodie, B. op.cit., 181; Garbett, H. op.cit., 16-17.
45. Brodie, B. op.cit., 181.
46. 'Windage' was the gap between barrel and shot designed so as to allow for irregularities in the cannon and projectile.
47. MacMillan, D.F. op.cit., 293-6.
48. Robinson, C.N. op.cit., 277.
49. Ibid., 265-71; Derry, T.K. and Williams, T.I., op.cit., 504; Noble, A. op.cit., 281; Garbett, H. op.cit., 89-90.
50. By 1884 the British 16.25" calibre breech-loading gun weighed 111 tons and was capable of hurling a projectile of 1800 pounds and penetrating 34.1" of wrought iron plate at a range of 1000 yards. Brodie, B. op.cit., 222.
51. Brodie, B. op.cit., 194-8; Garbett, H. op.cit., 31-57.
52. Brodie, B. op.cit., 175-7.
53. Robinson, C.N. op.cit., 284-286.
54. Ibid., 284-6.
55. Ellis, C.E. (1911), Armour for ships 1860-1910, Transactions of

- the Institute of Naval Architects, 53, 338.
56. Ibid., 340.
 57. Yates, R.W. op.cit., 295; Robinson, C.N. op.cit., 288; Brodie, B. op.cit., 207-10.
 58. Ellis, C.E. op.cit., 338-341.
 59. Ibid., 341-4.
 60. Brodie, B. op.cit., 235.
 61. Jones, L. (1957), Shipbuilding in Britain: mainly between the two world wars, University of Wales Press, Cardiff, 26.
 62. Jones, Op.cit., 22; Brodie, B. op.cit., 235.
 63. Watts, P. op.cit., 301.
 64. Ibid., 307.
 65. Ibid.
 66. Ibid., 309.
 67. Petty, W.M. op.cit., 158-9.
 68. Clowes, W.L. (1903), The Royal Navy: a history from the earliest times to the present, Sampson Low and Marston, 7, 68.
 69. Pollard, S. and Robertson, P. (1979), The British shipbuilding industry 1870-1914, Harvard University Press, 169.
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 71. Lyon, H. (1977), The relations between the Admiralty and private industry in the development of warships, in Ranft, B. (ed.), Technical change and British naval policy 1860-1939, Hodder and Stoughton, London, 37.
 72. Pool, B. (1962), Some notes on the building of warships by contract in the late seventeenth century, Mariner's Mirror, 48, 90.
 73. P.R.O. ADM 7/593.
 74. Pool, B. op.cit., 91-2.
 75. Ibid., 95.
 76. The inauguration of naval shipbuilding at Milford during the Napoleonic war prior to the establishment of Pembroke Dock is an example of this.
 77. Watts, P. op.cit., 294.
 78. The Thames Ironworks was the last of such Thames shipbuilders to relocate in 1912.

79. See Pollard, S. and Robertson, P. op.cit., 51.
80. Lyon, H. op.cit., 47-9, 51.
81. Ibid., 51.
82. Pollard, S. (1952), Laissez-faire and shipbuilding, Economic History Review, V, 107.
83. Lyon, H. op.cit., 50.
84. Ibid., 61.
85. Ibid.,
86. Ibid.; Ashworth, W. (1969), Economic aspects of late Victorian naval administration, Economic History Review, 22, 504.
87. P.R.O. CAB 24/175 cp 422, 452; CAB 21/287.
88. Ashworth, W. op.cit., 491.
89. Ibid.
90. Ashworth refutes the suggestion of Lord Charles Beresford that men in the Royal Navy and in warship building in 1897 totalled over 1,000,000 persons and considers that about 250,000 persons or 2.25% of British male labour force is a more realistic figure. Ashworth, W. op.cit., 492.
91. Pollard, S. op.cit., 108.
92. Ibid., 108-9.
93. Ibid., 108.
94. Jones, L. op.cit., 59.
95. Jones estimates that for the period between the wars approximately 80-90% of naval repairs were undertaken in the naval dockyards, Jones, L. op.cit., 59.
96. Ibid.
97. Ibid., 59-60.
98. Ibid., 60.
99. Ibid., 111.
100. Ibid.
101. Pollard, S. and Robertson, P. op.cit., 213.
102. Jones, L. op.cit., 223.
103. Pollard, S. op.cit., 110.

104. Ibid.
105. Memorandum from the Admiralty to Government on the forthcoming Hague Conference of 1907, cited by Marder, A.J. (1961), From the Dreadnought to Scapa Flow, Oxford University Press, 1, 37.
106. Pollard, S. op.cit., 110.

CHAPTER 7

GOVERNMENT POLICY AND THE INTERNAL STRUCTURE OF NAVAL DOCKYARD TOWNS: THE IMPACT OF FORTIFICATIONS.

Throughout most of the history of civilization, the size, shape, and interior arrangements of cities have been strongly affected by man's desire to protect himself and his possessions by means of fortifications. Each advance in the technology of weapons has led to more elaborate methods of defense against them.... Interesting perspectives are cast on the conflict between military and civilian priorities in urban affairs, conflicts that are still with us although forts and armories only persist as fossils on the city scene.

De la Croix, H. (1972), Military considerations in city planning: fortifications, preface by George R. Collins, G. Braziller, New York, I.

A dominant theme in the urban development of dockyard towns has been the influence of fortification. For those towns which were sufficiently exposed to warrant extensive defences the urban plan, and indeed residential patterns, are largely explained by reference to this process.

The patterns of urban development of the several fortified dockyard towns are strikingly similar and form a unique distinguishing feature. The presence of dockyard defences emphasises three points which are particularly relevant here. Firstly, they emphasise the specialist military function which the dockyards performed and the importance which the State attached to the defences of these yards as part of the country's defence network. No commercial port attracted anything approaching the degree of investment which Government poured into fortifying the dockyards. Secondly, the fortifications readily provide an indication of the interventionist role which the State could take in the affairs of the dockyard localities when circumstances dictated. Thirdly, the parallel schemes of fortification carried on simultaneously at several yards within the system emphasises the common processes which influenced the dockyard towns and the replicated patterns and features which resulted from the decisions of Government at the centre of this system.

Morphologically the dockyard towns may be classified into two groups based upon the extent of fortification as a component of the urban plan. All dockyard locations were protected by fortifications in one form or another for both 'fortified' and 'unfortified' dockyards possessed several defences at a distance from the arsenals, usually protecting sea or river approaches. With respect to Chatham, Sheerness, Portsmouth and Devonport, however, the dockyard and immediate settlement were surrounded on the landward side, from the mid-eighteenth century, by an array of fixed defences within a few hundred metres of the dockyard. The remainder of the

dockyards, Deptford, Woolwich and Pembroke Dock, were adequately defended by fortified positions some distance away from the dockyard itself. Three major phases of dockyard fortification may be identified, each of which had an impact on the urban development and environs of the dockyard towns.

The Early Phase of Dockyard Defence

The earliest phase of fortification dates from the time when the State accepted responsibility for national defence. The strategic importance attached to the naval dockyards ensured that such locations would receive some form of defence. In this early phase defensive works were situated at some distance from the yards and were primarily intended to prevent assault from the sea. The impact of these defences on the dockyards and immediate settlement was thus small.

Of the earliest dockyards set up by Henry VIII only Portsmouth possessed fortifications which predated the construction of the dockyard. The strategic importance of Portsmouth as a place of embarkation for armies campaigning on the Continent had resulted in the unwelcome attention of raiding French privateers. A survey of the town's defences undertaken by Richard II (1377-1399) resulted in the fortification of the harbour entrance and enclosure of the town by a simple rampart and moat.(1) Successive monarchs during the fifteenth century improved and extended these ramparts and exploited the natural defensive qualities of the narrow harbour entrance by erecting a series of defences, such as Southsea Castle, along the shore adjacent to the deep water channel leading to the harbour entrance.(2) The Solent was similarly protected by

castles at Sandown, Yarmouth and East and West Cowes, (3) and the western entrance to the Solent via the Needles passage was defended by Hurst Castle, whilst Calshot and Netley Castles controlled Southampton Water.(4)

On the Thames similar defences were ordered to be erected by Henry VIII in 1539.(5) Five bulwarks were to protect the entrance to the river and thereby the dockyards at Deptford and Woolwich. The defences built at West Tilbury and Gravesend safeguarded an important ferry passage whilst the remaining three works were situated down-river at East Tilbury, Milton and Higham where the Thames first narrows.(6) Possible amphibious landings in the Thames estuary were prevented by extensive shallows and mud flats and thus the defences were so placed as to enable crossfire from the forts to enfilade the river as it narrowed and thereby block further access up-river. The importance of the lower Thames in the overall defence of London is emphasised by the stationing of the army at Tilbury during the invasion scare of 1588.

The creation of Chatham dockyard in 1547 some distance below the old Norman castle at Rochester necessitated the construction of a fort to command the river approaches to the dockyard. In 1560 Elizabeth I (1558-1603) ordered the construction of Upnor castle on a bend in the River Medway just below the dockyard and also the erection of a bulwark at the entrance to the river at Sheerness. As a further means of defence, an iron chain was placed across the river to prevent enemy access.

From the death of Elizabeth I until the reign of Charles II (1660-1685) coastal defences were largely neglected and allowed to decay. The degree of attention attached to dockyard defence varied according to the policies of the monarch and Privy Council and those bodies controlling the purse strings - Parliament and the Treasury.(7) Government policy,

international relations, war, the threat of invasion and the availability of funds were invariably factors instrumental in concentrating attention on the country's defences. These factors were not dissimilar to those bearing upon Government policy towards the Royal Navy and the dockyard system and they further emphasise the common criteria upon which decisions affecting the dockyard towns were based.

The key to tapping the parsimonious coffers of Government invariably depended upon threat of invasion. The frantic rebuilding of dockyard defences which followed the Restoration can be directly attributed to the threat posed by the Dutch and the defenceless state of the coastline.(8) The amphibious attack by the Dutch fleet under De Ruyter on a recently constructed fort at Sheerness and on the Medway in 1667 was to have a number of repercussions on future dockyard defence. Pepys records the fear and panic which the Dutch assault engendered in the local vicinity and indeed in Government.(9) Subsequent attempts by the Dutch to penetrate the Thames defences were repulsed though a large force did land at Harwich. Two general conclusions may be drawn concerning the effect which this assault had on Government policy towards the provision of dockyard fortifications. The first was to impress on the authorities the necessity of having permanent fortifications to protect the dockyards and indeed the fleet, if laid up in harbour, from enemy assault. Secondly, attention became focussed on the potential danger of amphibious attacks on the dockyards. Whilst the sea approaches to the dockyards were relatively secure from assault, the possibility of a combined attack by sea and land as undertaken by De Ruyter, would find the dockyards completely exposed and vulnerable on their landward side. The outlying forts were designed to withstand land attack but the threat of amphibious operations against the dockyards themselves seriously weakened the yards total security for

up until the mid-eighteenth century the dockyards were surrounded on their land side only by a brick wall, intended more as a defence against pilferring than against external attack.

As a result of the Dutch raid the Board of Ordnance, which from the 1660s was the Government body responsible for the design, construction, contracting out and supervision of defence works, proposed a series of designs for new dockyard defences, not all of which were implemented. The Henrician Thames defences were modernised on the 'bastion' principle and moats added according to designs by Sir Bernard de Gomme, a Dutchman who was Engineer-in-Chief of the King's Castles. In March 1669 two additional brick redoubts were ordered to be constructed to defend the lower reaches of the Medway at Gillingham Fort and Cockham Wood and Sheerness Fort was reconstructed on a much larger scale.(10)

At Portsmouth, de Gomme began a major reorganisation of the town's defences, introducing some of the recent advances in fortification design from the Continent. The ramparts were altered to incorporate the new bastion system and a number of ravelins, outworks and a moat were constructed.(11) An important feature of this new system which was to have a number of repercussions on future urban development in these areas was the 'glacis' and this aspect is discussed in greater detail later in this chapter. As part of the same scheme the sea front defences were extended and Southsea Castle was improved by the addition of a dry moat and glacis.(12) Gosport on the opposite side of the harbour was also brought into Portsmouth's defence scheme and two towers were constructed, one at the entrance to the harbour, thereby complementing the Portsmouth defences, and a second on Burrow Island opposite the dockyard.(13)

Although Plymouth was not established until 1691 the existing

defensive works on Drakes Island and the Citadel on the eastern end of the Hoe, which straddled the deep water entrance to the Hamoaze, were well placed to protect the new dockyard.

At the beginning of the eighteenth century therefore, the sea and river approaches to the dockyards were defended by a number of strategically placed forts constructed at some distance from the dockyards. With the exception of Portsmouth, (and even here the township was situated some distance to the south of the dockyard), none of these defences encroached on, or had any direct impact on, the immediate area containing the dockyard establishment or adjacent settlements. During the eighteenth century, however, a second major phase of fortification was to change this.

Bastion Fortifications and the Morphological Development of the Dockyard Town

The factor largely responsible for bringing about the second major phase of dockyard defence schemes was the fear of a possible amphibious attack. During this phase of fortification extensive systems of defences were constructed to completely encircle the dockyards on their landward side at Portsmouth, Sheerness, Chatham and Plymouth Dock. Included within the fortifications were the settlements which had recently sprung up adjacent to the dockyards. The development of the bastion system of fortification not only stimulated massive investment in dockyard defences but had a major impact on subsequent dockyard town morphology. This impact was to a large extent determined by the nature of bastion

fortifications which had been developed on the Continent to defend towns against increasingly powerful cannon.

The basis of the new defence system, the best known practicing exponent of which was Sebastien le Prestre de Vauban (1633-1707), was that all component parts of the system were designed to lend mutual support.⁽¹⁴⁾ Great defensive qualities were obtained by pushing works out from the main walls and ensuring an uninterrupted enfilade of gun fire over all surrounding ground. Straight sections of 'curtain wall' or earthen ramparts were interspersed by angular projections or 'bastions' designed to allow cross-fire along the walls and ditch. The angular form of bastions overcame the defects of 'dead ground' associated with the medieval round tower which they effectively replaced. In profile the extensive width of the defences is pronounced and a gradation of levels allowed each tier of the defences to fire simultaneously.

Immediately inside the ramparts a continuous military road at ground level provided an effective ring road for communication within the defences.^(Figure 7.1) Adjacent to the ramparts were barrack blocks in which, from the late eighteenth century, troops were billeted.⁽¹⁵⁾ A wide 'terreplain' provided the main artillery firing platform and the infantry fired from the banquette. Great importance was attached to the encircling ditch which was often wet and therefore wide. Occasionally, as at Sheerness, the ground immediately in front of the defences was flooded with water to create an 'inundation'. Circumstances necessarily had to be favourable to obtain such a defensive feature, but often an 'inundation' merely formed a receptacle for the towns' waste. Where no water was available, as at Chatham, then the ditch was narrow and sufficiently deep to prevent an enemy jumping into it. Beyond the ditch was a further firing platform and the glacis, a zone of cleared ground designed to

afford minimal cover from the fire of the fortress to an advancing enemy. The slope of the glacis, of between 1:16 to 1:40, presented a low profile of the main ramparts to an enemy whilst allowing the defenders complete freedom of fire over the glacis. Duffy refers to the glacis, or 'killing zone', as a 'zone of servitude' on which all building was prohibited or temporary buildings allowed only on the understanding that they would be demolished in the event of an attack.(16)

Early schemes to implement this new design in respect to the dockyards during the late seventeenth century went unfulfilled despite the fact that the landward vulnerability of the dockyards was well recognised.(17) At Portsmouth in 1713, for example, Colonel Richards considered,

the [present] fortifications could only protect the Harbour from being insulted from the sea, where by reason of the Situation of ye Spit, the ships are obliged to pass very near so great a number of Guns, that 'tis improbable they will attempt so warm a piece of worke, when 'tis scertaine they may land men, both beyond Southsea Castle and the present fortifications.(18)

He continued,

This has been ever allowed by all Engineers and military people well acquainted there, and for these reasons it has been often proposed to make other workes for the security of her Majesties Docks, Stores and Navy laid up there, in so much that Intrenchments have formerly been thrown up both at Gosport and ye Dock.

Similar designs had been made in 1708 for the defence of Chatham dockyard 'to prevent an insult upon it by land.'(19) A major reason for the delay in implementing such schemes was the State's assessment that the country was not in sufficient danger of attack to warrant their immediate construction. A further reason was the occasionally lukewarm response of the Admiralty to the potential restrictions which such schemes would place on the dockyards. A plan for the defences of Portsmouth dockyard, for example, was dismissed as unsuitable by the Navy Board because such works,

do show a very great inconvenience to the Navy if they are to be so performed being to join close to the end of the boat house of the Yard, without giving a foot of ground without the back yard of the dock where the navy is most in need of it. Doubtless it is the most imprudent thing that may be if the yearly augmentation of the Navy be considered..... to destroy the best avenue for our workmen and materials.(20)

To the Navy Board room for expansion for the dockyard complex and for the accommodation of the work-force outweighed the defensive advantages to be gained and the scheme was not implemented.

During the first decade of the eighteenth century, however, Government was provoked into purchasing land surrounding the dockyards in anticipation of building defences in the future. This decision was prompted by the occurrence of haphazard and unplanned encroachments of habitations on this land.

Unauthorised house building was worrying the authorities before the end of the seventeenth century. In 1684 the Board of Ordnance had requested the Governor at Portsmouth, 'to take the best care to hinder the buildings between the town and dock'.(21) Despite this, encroachments at Portsmouth were such that by 1701 they were under the very walls of the fortress and obscuring the fire of the town's armament. Such was the concern of the Governor that he threatened to fire on these houses if they were not removed.(22) The inhabitants of Portsea appealed to Queen Anne against this threat and in 1708 the Board of Ordnance estimated that a further 200 houses had been constructed on Portsea common surrounding the dock to the further detriment of the fortress's field of fire.(23)

This conflict of interests, exemplified at Portsmouth, between Board of Ordnance and local inhabitants was a feature of the fortified dockyard town. On the one hand the Board was required to maintain defences around

the dockyards and this entailed, up to the nineteenth century, the maintenance of ramparts and earthworks and an obstacle-free glacis. The local inhabitants, naturally sought accommodation as close as possible to the place of employment, the dockyard. At the end of the seventeenth century the old town of Portsmouth was severely constrained by its corset of fortifications and could expand no further. Further settlement had to take place outside the restricting defences but this movement was in direct conflict with the defence requirements of the Board of Ordnance. The compromise reached has given the dockyard town a unique pattern of urban development.

The presence of settlement adjacent to the dockyards complicated matters considerably for the Board of Ordnance. A scheme to purchase and then demolish these encroachments at Portsmouth was considered but rejected, not least because part of the dockyard and Gun Wharf also obscured the Garrison's field of fire.(24) A long term approach to the problem at Portsmouth lay in deterring further encroachments by purchasing extensive tracts of land.

.... tho' at present the nation may not be in a condition to disburse such sums as may be necessary for these fortifications yet it may deserve consideration whether twill not be still advisable to purchase the lands Since what shall be built further on them will be of farther prejudice and make the purchase also dearer.(25)

Accordingly, existing buildings were allowed to remain but the surrounding land was purchased.

The manner of land acquisition pursued by Government amounted to a form of compulsory purchase. Under an Act of Parliament of 1708 owners of land and tenements under consideration of purchase by the Board at Chatham and Portsmouth were forewarned that in cases

where any Proprietors designing to obstruct the Publick service or to make any unreasonable Gain to themselves insist

on extravagant Rates twill be necessary to have recourse to the usual Methods that have been taken in such like Cases.(26)

The nature of these 'usual Methods' were outlined in a following Act designed to allow purchase of the lands to proceed. Those who failed to agree a price would be presented with an assessed 'true value', determined by a jury elected for the purpose by the Sheriff of the county. A refusal to accept the amount proposed by the jury would result in certificates for the money being deposited with the Clerk of the Peace and the lands concerned taken by the Board of Ordnance.(27)

Not until the mid-eighteenth century when the peace of the previous thirty years was shattered by the Seven Years War (1756-1763) did the threat of invasion provoke Government to consider once again erecting landward-facing defences around the yards.

A wider strategic reason also lay behind the decision to heavily fortify the dockyards at this time. Government hypothesised that an invasion would come from France. To defend the whole length of the southern coastline, let alone the eastern and western shores, from a concerted attack emanating from Europe was clearly impossible. The Royal Navy was considered the country's first line of defence against a sea-borne attack but in such a defensive mode the Royal Navy lost the advantage of an offensive role in any war. William Pitt, in debate, indicated the importance of the Royal Navy having a safe base from which to operate and pointed to the difficulties involved in making such a base secure.(28) Extensive fortifications would, he claimed

afford complete security to the dock yards ... [and] enable our whole fleet to go on remote service, and carry on the operations of war at a distance, without endangering the materials and seeds of future navies from being liable to destruction by the invasion of an enemy.(29)

The dockyards, by defending the Royal Navy, were key elements in the

defence structure of the country.(30)

The destruction of a country town or city could never decide the fate of the war; but the demolition of the principal docks and naval stores of the kingdom would strike at the very root of our naval power; and it must be of the highest importance to guard against such a blow(31)

During the Seven Years War the dockyards at Chatham, Portsmouth and Devonport were fortified on their landward side by a continuous line of ramparts, bastions and ravelins constructed on land purchased earlier in the century.(Figures 6.1, 6.2, 8.4, 9.4, Plate IX) Access to these towns and dockyards was then restricted to passages through ravelins. The decision to implement these schemes, as with later extensions, was heavily influenced by international affairs.

By reason of the hostile intentions of the Courts of France and Spain to invade these Realms, and of the great Preparation made in the said Kingdoms for that purpose, it is become absolutely necessary, for the present and future Protection and Security, as well of His Majesty's Docks, Shippes of war and stores as of the Town to erect and raise additional fortifications and Intrenchments.(32)

Importantly, the decision was taken to include the settlements of Brompton, Portsea and Plymouth Dock within the defences though the basis of this decision, as discussed earlier, had been determined by 1710. In large measure the inclusion of settlements within the fortifications was due to the enormous cost and dislocation which would have resulted from large-scale demolition of these areas. Well might Captain Talbot Edwards, in submitting his designs for the fortification of Portsmouth dockyard earlier in the eighteenth century, wistfully comment, 'In foreign countries if a palace were in the way of a fortification it's taken down rather than spoil a design and hazard the loss of all.'(33)

Perhaps surprisingly the inhabitants of these settlements were not necessarily averse to these defence schemes. In 1745, for example, a petition from the inhabitants of Portsea Common pointed out that although Portsea now equalled, if not exceeded, the population of the fortified

town of Portsmouth yet the town was unfortified. Furthermore, following rumour of an enemy landing on the coast of Sussex they were, 'given to understand that in case of the Enemies Approach the first business of the Garrison would be to fire on and beat down and demolish this whole place [of Portsea] to prevent a lodgement of the enemy'.(34) The practicality of such a scheme, whilst leaving the dockyard and gun wharf untouched, is questionable for as the petitioners claimed, the ruins would provide ample coverage from which an enemy could destroy the dockyard which was surrounded by only 'a garden wall'.(35) The incident emphasises the fierce concern of the military to maintain an obstacle-free glacis and the vulnerability felt by those inhabitants immediately outside the defences.

From the mid-eighteenth century, therefore, fortifications and Ordnance land encircled the dockyard settlements of Portsea, Brompton, Plymouth Dock and Blue Town at Sheerness. These defences placed severe restrictions on public use of surrounding land, especially following the imposition of tighter controls by the Board because of the difficulties experienced at Portsmouth in the early eighteenth century and land ownership became the principal means by which Government controlled urban development adjoining the dockyards. An 1808 Act of Parliament, for example, extinguished 'the Rights of Way over a Lane or Road leading across the Exercising Ground [the glacis] in front of Chatham Lines, and vested the soil in the Board of Ordnance'. With the road, the farmsteads of Upberry and West Court were also demolished. The reason given for this action was that, 'the use by the publick of the said Lane or Road might prove prejudicial to the defences of the said Lines and Works, in as much as the said Lane or Road could not be kept dry without Ditches and that such ditches would afford cover to an Enemy'.(36) Acts of Parliament concerning dockyard defences invariably contained the restriction 'that no

Building or Buildings shall be made or erected upon any of the lands vested by this Act'.(37) Thus this land formed a physical barrier to urban expansion and became a sterile zone destined to remain undeveloped.(Plate X)

Such constrictions on dockyard settlements placed greater demands on the remaining available land especially as population increased. The land available for building within the defences was scarce and plots became smaller and narrower and the buildings taller, though there are unsupported suggestions that the height of buildings in Portsmouth for example were not to exceed that of the ramparts. Increasing demands on the housing stock led to extensive multiple occupation of houses and great congestion. The density of population in these towns placed them amongst the most densely populated towns in the country. As population increased all available space was utilised. In particular the gardens of earlier houses were built on and this gave rise to a multiplicity of alleys and courts which form a prominent feature of dockyard towns.(Plates XI , XII)

Whilst this intensification of land and housing use provided short term relief, in the long term the expanding dockyard workforce and population, were eventually to reach a point when demand for accommodation exceeded that of supply. Such a critical point was reached by the dockyard towns at various times during the first half of the nineteenth century. In all cases further development was forced to take place on private land beyond the Board of Ordnance land. Thus a process of 'colonisation' took place beyond the fixation line of the fortifications and glacis and new settlements were created at New Brompton, Landport, the suburbs surrounding Devonport and at Mile Town. The decanting of inhabitants from the 'mother' settlement and the influx of migrants as dockyard employment increased soon swelled the rapidly growing colonies.

This process, had of course, already occurred once before at Portsmouth when encroachments and housing overspilled on to Portsea Common and the glacis in the eighteenth century. Landport was thus the second colonising movement to take place in the area. The various stages in the creation of each colony and the progress of their development are detailed in Chapters 8 and 9.

The timing of this colonising movement depended on a number of factors. Without exception the process was stimulated by rapid expansion of employment in the dockyard establishments. Whilst some of this population increase could be accommodated in the housing market because of slack from the previous slump, the increase during time of war was dramatic and placed immediate pressure on the limited resources of the dockyard settlements. Once a critical point based on 'push' factors such as lack of accommodation, congestion and cost of housing was reached an initial move was made beyond the glacis and the rapid growth of these settlements reflect the pent-up congestion of the 'mother' settlements. The fact that this release point was not reached until the first half of the nineteenth century despite extreme overcrowding in the dockyard settlements, indicates firstly the friction on movement and inertia which distance from the dockyard engendered and secondly the hurdle which a wrench away from the focus of activity and facilities of the dockyard town entailed.

The rapid growth of these new colonies, unfettered by Government constraints, in a short time led to the old settlement being overtaken, both in terms of areal extent and population. The old town was supplanted as the focus of urban growth by the colony. This was largely a result of the uni-directional nature of the colonising movement and the continued

constraints under which the 'mother' settlements remained.

Because of the riparian nature of the dockyard site and the restrictions imposed by landward fortifications the direction of movement outside the dockyard settlement was such that the 'mother' settlements could not retain a central position as the areal focus of subsequent development. Urban growth took place away from the old town and while for a number of years the towns retained their importance, especially as commercial centres, the outward spread of population shifted the population centre of gravity outwards and away from the mother towns. By the end of the nineteenth century the 'colonies' had acquired their own tertiary centres and New Brompton, the Commercial Road area at Landport, Mile Town at Sheerness and Union Street in Plymouth became the focus of subsequent development. The old enclosed towns were left stranded, cut-off from the new urban development which had a new centre. The fossilisation of Board of Ordnance land in the form of parks and open space land use following the demolition of the ramparts and glacis in the 1870s maintained the fixation lines and separate nature of 'colony' and 'mother' town and retained the latter in isolation from subsequent urban development.

During the twentieth century the 'mother' towns have all followed a very similar pattern of decline. As areas of old, dense and poor quality housing which also suffered substantial destruction from air attack during the Second World War, these areas became blighted. They became zones in transition containing remnants of previous housing, high-rise developments, council housing, vacant waste land and small-scale industry. All have lost their previous importance as commercial centres and the relict street name of 'High Street' in these areas is now incongruous in the extreme. (Plate XIII)

Beyond the Ordnance land the housing market was allowed to fend for itself and planning controls and restrictions on building by Government were exercised only through limited land ownership. At Mile Town in Sheerness, land purchased by Government was used to curtail urban expansion of the colony which the authorities considered was too near the new fortifications.(Figure 9.5) This action brought about the creation of a second colony at Marine Town.

In many respects the fortified dockyard town bears greater resemblance to the fortified towns of Europe than to the mainstream of urban development in Britain. On the battlefield of Europe the extensive land frontiers facilitated invasion and it was common practice until the nineteenth century to fortify strategic towns.(38) Few fortresses were constructed on the Continent solely as military establishments,(39) indeed the Frenchman, Marshall de Saxe, was the only important figure to argue such a case.(40) 'Fortified towns rather than castles became the pivots of the new defensive system.'(41) Invariably major strategic towns were fortified and the bastion system developed in response to this need and had a great impact on the development of urban life in Continental towns.

In Britain, in contrast, only a few coastal forts, strategically situated to protect vital points, were erected against external assault. By the end of the seventeenth century a powerful monarchy and central Government had ensured that the need for internal fortifications was minimal. Only on the troubled internal borders with Scotland were the defences of Berwick-upon-Tweed and Carlisle extensively maintained, and following the Act of Unification and the failure of the 1745 rebellion even the need for these powerful frontier town defences was reduced. Thus

at the time of extensive urban fortification schemes on the Continent, Britain was in the final phase of fortifying towns. Only in the case of the strategically vital dockyards was the process of intensive fortification on the Continental model just beginning. As a result of adopting the bastion system for the dockyards (which schemes closely followed the Dutch school of defence), the dockyard towns closely resemble urban development and morphology on the Continent.(42) Outside of these four dockyard areas no other British town was fortified in such a manner at such a late date.

Whilst a number of dockyard towns were fortified in this manner, a number were not. No bastion defences were constructed around the Thames yards, which came under the general defence network of London, nor were they constructed around Pembroke Dock. Despite the fact that Sheerness was encircled by a new system of bastion trace defences at about the time that Pembroke Dock was being created, by the time Pembroke Dock was firmly established as a permanent naval dockyard rapid technological changes had made bastion defences obsolete.

The Final Phase

The final major phase of dockyard defence measures occurred during the middle years of the nineteenth century as a result of dramatic improvements in the power and range of the cannon. Such advances in ordnance, as discussed in chapter 6, revolutionised dockyard defences. The limited range of the old standard 32 pounder cannon had largely dictated the nature of earlier fortifications and their distance from the dockyard. The developments in gun and shell technology which the Paixhans

gun inaugurated dramatically increased the range and power of ordnance. No longer was an enemy forced to run the gauntlet of shore defences or advance by land before the fortifications in order to attack the dockyard. Improved ordnance now permitted such an assault to take place from positions a considerable distance away. Furthermore, the introduction of fast manoeuvrable steam-driven armoured ships, no longer dependent on the vagaries of the wind and capable of evading the defensive wall of the Royal Navy, posed further problems to dockyard defence.

The effect of these technological changes on Government policy towards the dockyards was to instigate a major defence building programme. This scheme made the bastion fortifications of the previous century obsolete. During the 1840s and 1850s there were requests made in Parliament and pressure exerted by the military for improvements to be made to the dockyard defences to counter the recent advances in ordnance.(43) Fear of a sudden French attack contributed to this reappraisal.(44) Cobden records in detail the sequence of invasion scares which swept through Britain toward the end of the 1850s.(45) Napoleon III's invasion of Italy in 1859 and the building of the Gloire, the first ocean going iron-clad warship, did nothing to allay these fears.

As a result a Royal Commission was appointed in 1859 to consider the defences of Great Britain. Its Report, published in 1860, recommended substantial expenditure on a construction programme of forts and batteries for the major dockyards.(46) The Commissioners recognised the continuing necessity to protect the dockyards as bases for the Royal Navy and as vital strategic points in the country's defence network. To counter the threats posed by the naval and ordnance revolution the Report recommended the construction of an encircling ring of detached forts with powerful

guns about the dockyard areas.

Such a system closely resembled the Prussian system of 'ring forts' and continued the trend of adopting defence schemes developed on the Continent.(47) The design was revolutionary in concept and on as great a scale as the earlier bastion fortifications. The forts were polygonal in shape to increase direct fire and the system was designed to provide a ring of independent but interlocking and supporting zones of defence around the naval base.(Figure 7.2, 7.3) The nature of these defences was dictated by the vastly improved performance of the cannon:

The defences should be calculated, not only to prevent the enemy from obtaining immediate and absolute possession of the Dockyard and Arsenals, which was the limited intent of the old [bastion] works, but to keep him, if possible from easy cannonading and bombarding distance of them, which is the design of the present proposition.(48)

Not all the dockyards were equally affected by the scheme. The defences at Portsmouth, Devonport and Chatham underwent major reorganisation based upon the ring fort principle though Portsmouth received by far the greatest attention.

Portsmouth has always been considered the point, which, of all others in Great Britain, required defences It contains the principal Naval Arsenal in the Kingdom, and consequently ought to be protected from any sudden enterprise, and laying on the flank of the great line of coast most accessible to an enemy, it occupies a very important strategical position in case of invasion. Another important consideration arises from the fact, that the country round it contains great natural advantages for defence, in strong positions at the most desirable distance from the Arsenal, i.e. at a distance beyond that at which bombardment would be effectual.(49)

Deptford and Woolwich were approaching the end of their useful lives as naval dockyards and they remained under the protection of London's defences. There was a proposal in the report to construct a defensive ring around Woolwich, costing almost four million pounds, but this was rejected by Government.(50) Sheerness for its part acquired a further defensive ramparted moat cut on the landward side of Marine Town with a

fort at each end, (Plate XIV) while the defences at Pembroke Dock were augmented by the construction of forts to guard the Haven and defensible barracks overlooking the dockyard.

The impact of these later defences, unlike the bastion fortifications, was on the environs surrounding the dockyards rather than on their immediate vicinity. In the Report of 1860 the Commissioners calculated that an enemy should be kept at least 7300 metres from the dockyard to safeguard the yard from bombardment.(51) Devonport, Chatham and Portsmouth were therefore encircled by a ring of forts placed at a sufficient distance away from the dockyard to force an enemy out of range of the dockyard. Where possible the natural defensive qualities of a site were utilised. At Portsmouth, extensive tracts of land were purchased along Portsdown Hill for the construction of the forts. Some 1900 acres were purchased for this purpose and the land cleared to form a glacis and improve the field of fire.(52) Six forts were built along the crest of Portsdown Hill and five others constructed to guard the Gosport approaches in the west. Fort Cumberland guarded the entrance into Langstone harbour thereby preventing an attack from the east and Hilsea Lines, reconstructed and with a deepened moat, formed a second line of defence behind the outlying forts to the north.(53) All ring forts faced outwards away from Portsmouth in anticipation of a land attack and were completed by 1868.(54)

The dockyard and harbour would still, despite these land forts, be open to long range assault from the sea and to prevent this event occurring, large armour plated forts were constructed in the Solent. By the date of their completion in 1880 the Solent forts provided an interlocking field of fire powerful enough to prevent unauthorised access to the Solent, dockyard and harbour and would force enemy ships beyond the

range at which they could bombard the dockyard from the sea.(55)

These defence schemes, stretching over 250 years, emphasise not only the military function of the naval base and their place in national defence but also the integral role of Government in the operation and development of the dockyard-urban system. The decisions to undertake these schemes and the timing and the selection of sites to undergo such works were taken by Government and the existence of this central control is reflected in the similar defence schemes of these towns and the common patterns of dockyard and urban development which resulted.

The defence schemes themselves had extensive impact on the development of the dockyard towns. The bastion defences fixed the extent of early urban development adjacent to the dockyards and created a sterile zone, in the form of the glacis, around the entire area. Such defences were defunct by the time of the fortification schemes of the 1860s which encircled the naval base and environs but at a greater distance. At Chatham and Sheerness remnants of the bastion works still remain whilst those at Portsmouth were largely demolished during the 1870s and 1880s. In most cases ownership of these lands remains in the hands of Government and vestiges of these defences can be seen in the green belts which now form part of the dockyard urban plan. Land which was given by the Board of Ordnance to the local authorities often had conditions attached which prevented the land from being built on. Such was the case of Southsea Common leased to Portsmouth Council in 1880 and bought by them in 1930. Such restrictions have preserved extensive open tracts of land for use as recreation areas and parks as at Portsmouth and Devonport. At Chatham the Great Lines have been put to similar recreational use while a substantial proportion remains as open waste in much the same form as when it played a vital role in the defence system of the dockyard.(Plate X.) The

development of air power and even more powerful guns soon outmoded even the later defences which are now relics in the present day landscape of the dockyard towns.

Two broad points arise from the dockyard fortification schemes as they reflect upon the relationship between Government and dockyard urban development. The first expounds a theme developed in Chapter 6 regarding Government policy towards the dockyard system and the impact of technological change. Government had recognised for some time before adopting first the bastion and then ring fort defences that some improved form of defence was desirable to counter advances in ordnance technology. Furthermore, it had seen suitable schemes developed, employed and tested on the Continent. However, the decision to undertake such schemes in England was based upon Governments' appraisal of the foreign and defence situation, the availability of funds and the likelihood of attack on the dockyards in the near future. Fear of invasion was the spur for Government to outlay vast sums of money to finance these schemes. The decision by Government to fortify the dockyards was thus based on a number of considerations and although technology was a powerful stimulus for change in the dockyard system its importance lay in the way it influenced Government policy with respect to the dockyards.

A second aspect concerns the conflict of interests which clearly surrounded the fortified dockyard town, between the desire for accommodation close to the dockyard and the restrictive military requirements pursued by the Board of Ordnance. The resulting compromise between these two requirements led to a unique pattern of urban development shared by the fortified dockyard towns. When necessary and in the immediate interests of the country Government was prepared to dictate

events in the localities surrounding the dockyards. Yet it was reluctant to become involved in planning or managing the settlements which grew as a result around the dockyards. Government, by abdicating direct involvement in the management and affairs of the dockyard towns, relied on a series of 'negative' controls to pursue its own aims. It sought by the expedient of land purchase to direct urban development away from certain areas and its reluctance to pursue long term plans for dockyard settlements resulted in the towns developing piecemeal under the sway of market forces but constrained by Government restrictions.

Notes

1. Corney, A. (1965), Fortifications in Old Portsmouth, Portsmouth City Museum, 4.
2. Corney, A. (1967), Southsea castle, Portsmouth City Museum.
3. Corney, A. (1965), op.cit., 3.
4. Ibid., 5.
5. Saunders, A.D. (1960), Tilbury Fort and the development of artillery fortifications in the Thames estuary, Antiquaries Journal, XL, 154.
6. Ibid., 154-5.
7. Tomlinson, H.C. (1975), The Ordnance Office and the Navy 1660-1714, English Historical Review, CCCLIV, 20.
8. On the east coast forts existed only at Harwich, Hull, Tynemouth, Berwick and Holy Island. No permanent fortifications existed on the west coast - though a fort was proposed at Bristol in 1626-7 and Milford Haven was surveyed in 1691. None were built. Tomlinson, H. (1973), The Ordnance Office and the King's ports 1660-1714, Architectural History, 16, 9.
9. Pepys, S. (1966), The diary of Samuel Pepys, edited by Waddington, J., Everyman, Dent, London.
10. B.L. Kings Mss. 44 f.20.
11. Corney, A. (1965), op.cit., 8.
12. Corney, A. (1967), op.cit., 9-10.
13. Ibid., Corney, A. (1965), op.cit., 7.
14. For the following discussion see Duffy, C. (1975), Fire and Stone: the science of fortress warfare 1660-1860, David and Charles, Newton Abbot; Saunders, A.D. op.cit., Hogg, I.V. (1975), Fortress: a history of military defence, MacDonald and Jones; Blomfield, R. (1938), Sebastien de Prestre de Vauban 1633-1707, Methuen, London; Hall, A.R. (1958), Military technology, in Singer, C. (ed.) A history of technology 1500-1750, Clarendon Press, Oxford, III.
15. At Devonport, for example, six barrack blocks utilised all the space between the ramparts and the township.
16. Duffy, C. (1975), op.cit., 63.
17. Tomlinson, H. (1973), op.cit., 9-10; B.L. Add Mss. 16370 f.37.
18. B.L. Stowe, Mss. 477 f.11.
19. P.R.O. W.O. 46/6 f.90-1; W.O. 47/25 f.320; Tomlinson, H. (1973), op.cit., 9.

20. Admiralty Commissioners 9 February 1697, cited by Tomlinson, H. (1973), op.cit., 10.
21. P.R.O. W.O. 47/14 f.5.
22. B.L. Add. Mss. 5439 f.193.
23. P.R.O. W.O. 46/6 f.90-1.
24. B.L. Stowe Mss. 477 f.11.
25. Ibid.
26. Act of Parliament 7 Anne cap 26.
27. Act of Parliament 8 Anne cap 23.
28. 'Debate on Fortifying the Dockyards', Cobbett's Parliamentary History, (1786), 25, 1098.
29. Ibid., 1110.
30. Mahan, A.T. (1892), The influence of sea power upon history 1660-1783, Sampson Low and Marston, London, 433-4.
31. Cobbett's Parliamentary History, (1786), op.cit., 1110; James Luttrell, Surveyor General of the Ordnance.
32. Act of Parliament 20 George III cap 15. Further Acts were passed in 1781 and 1783.
33. B.L. Stowe Mss. 477 f.26.
34. Ibid.
35. B.L. Stowe Mss. 33057 f.555.
36. Act of Parliament 48 George III, 23 June 1808.
37. As for example in the Act of Parliament of 20 George III cap 15.
38. De La Croix, H. (1972), Military considerations in city planning: fortifications, G. Braziller, New York.
39. Ibid.
40. Duffy, C. (1975), op.cit., 26-7.
41. Hall, A.R. (1958), op.cit., 369.
42. De la Croix, H. op.cit.
43. Saunders, A.D. op.cit., 167; A number of reports and papers were also prepared on the subject by the Inspector General of Fortifications General Sir John Fox Burgoyne and Assistant Inspector Major Jervois, B.L. Add Mss. 41410.
44. Patterson, A.T. (1967), Palmerston's Folly: the Portsdown and

Spithead Forts, Portsmouth Papers, 3, Portsmouth City Council.

45. Cobden, R. (1862), The three panics: an historical episode, sixth edition, Ward, London.
46. Report of the Commissioners appointed to consider the Defences of the United Kingdom, 7 February 1860.
47. The system was initiated by the Prussian and Austro-German confederation in the period following the Napoleonic War and was adopted by the French during the 1840s in the Paris defences; Duffy, C. op.cit., 68-9.
48. B.L. Add Mss. 41410 f.28-35, Memo by J.F. Burgoyne, Inspector General of Fortifications, 20 July 1857.
49. Ibid.
50. Hogg, I.V. (1974), Coastal defences of England and Wales 1856-1986, David and Charles, Newton Abbot, 20.
51. Patterson, A.T. op.cit., 7.
52. Ibid.
53. B.L. Add. Mss. 41410.
54. Patterson, A.T. op.cit., 14.
55. Hogg, I.V. (1975), op.cit., 87-89.

CHAPTER 8

URBAN AND SOCIAL STRUCTURE IN THE DOCKYARD TOWN

'The principal productions of ... Chatham ...,' says Mr Pickwick, 'appear to be soldiers, Jews, chalk, shrimps, officers, and dockyard men. The commodities chiefly exposed for sale in the public streets are marine stores, hard-bake, apples, flat-fish, and oysters. The streets present a lively and animated appearance occasioned chiefly by the conviviality of the military. ... A superficial traveller might object to the dirt which is their leading characteristic; but to those who view it as an indication of traffic and commercial prosperity, it is truly gratifying.'

Dickens, C. (1975), The Pickwick Papers, Penguin Books, Aylesbury, 83-4, First published 1836.

The town [of Woolwich] is in a state of unparalleled prosperity, but is perhaps the dirtiest, filthiest, and most thoroughly mismanaged town of its size in the kingdom.

Ruegg, R. (1847), Summer evening rambles round Woolwich, Woolwich, 4.

Introduction to the Case Studies

The impact of Government on the internal structure of the dockyard towns has been extensive and in examining aspects of the urban development, social structure and socio-spatial structure of the towns recourse has been made to the use of case studies to draw out major comparative features whilst indicating dissimilarities where they exist. The desire to pursue an in-depth investigation into the social geography of the dockyard town is inverse to the resources available to collect and process the mass of data necessary for such an analysis. Such criteria impose the need to be selective and for these reasons and on the basis of their representing major types of dockyard town development the dockyard townships of Sheerness, Woolwich and Chatham have been selected for detailed examination. The basis of these typological divisions will become clear as the studies themselves unfold.

The examination of urban social geography in an historical context poses a number of difficulties which are largely a reflection of the nature of the source material available. Relatively little has been written about the social characteristics of, or socio-spatial variation within, dockyard towns and therefore extensive use has been made of the nineteenth century census enumerators' schedules. The detail and scope of these schedules surpass anything that had gone before, both in the extent of personal information gathered and the universality of the census coverage over the whole country. This latter aspect is particularly important in the context of a comparative study. Further, the ability to relate the census data to specific locations within a town permits socio-spatial variations to be discerned to a high degree of accuracy. No available source compares, at this scale and time period, with the census schedules in the exposition of socio-economic and demographic structure in

a spatial dimension,

The period of the mid-nineteenth century was an important time in the development of the dockyard towns for, as a result of rapid population expansion, the population of the fortified dockyard towns were outstripping the available space within the restricting girdle of the defences and new colonies were being established outside the confines of Government land which surrounded dockyard and mother settlement. It was these new developments which were to shift the centre of gravity away from the old dockyard settlements to the new residential and commercial centres beyond the fortifications. At the same time, and connected with this urban expansion, the industrial base of the towns, the naval dockyards, underwent great technological change which had far reaching effects. The middle decades of the nineteenth century therefore marked a watershed in the development of the dockyard town, the culmination of centuries of development and the embryonic basis of further growth in the twentieth century. The necessity to choose one point in time at which to undertake a detailed study of the dockyard towns would point to these decades and as they coincide with the existence of the enumerators' schedules this is particularly fortuitous.

Details concerning the choice of census date used for each of the case studies are contained in Appendix D along with the methodology of data collection and analysis.

Chatham: the Case of the fortified dockyard town

The impact of bastion fortifications on the urban morphology and socio-spatial structure of a number of dockyard towns was sufficiently great for them to be considered as a distinct typological group within the dockyard-urban system. Into this species fall Portsmouth, Devonport, Chatham and Sheerness. The latter whilst conforming in general to this type of dockyard town is, for a number of reasons, sufficiently distinct to warrant separate examination which is pursued in Chapter 9. For the rest Chatham is examined as a representative example of the 'fortified' dockyard town.

Dockyard and urban development

The small town of Chatham just to the south of the initial site of the dockyard provided a natural base for both seamen and dockyard workmen. The town also contained a victualling yard set up in 1551 which was a necessary establishment in the early years of the yard for nearly the whole of the fleet was laid up in the Medway during the winter months.(1) Up to the 1620s the yard was fully within the parish of Chatham but thereafter as the yard expanded northward along an isolated stretch of the Medway between Chatham and St Mary's Creek the yard came within the parish of Gillingham, a small village to the east of the dockyard and separated from it by three kilometres of undulating countryside and from Chatham Reach by St Mary's Island.(Figure 8.1) The village of Gillingham had little direct contact with the dockyard and its economy was largely based on agriculture (possessing some fine orchards), market gardening, and fishing especially harvesting the oyster beds of the Medway.(2) The village supplied food to the dockyard and indeed drew upon dockyard labour during the harvesting season but, despite the relative proximity of the dockyard to the village, Gillingham remained an isolated rural community until late into the nineteenth century when it became engulfed by the rapidly expanding dockyard colony of New Brompton.

Despite small additions of land and buildings during the latter half of the sixteenth century the yard was principally concerned with repairing and maintaining the fleet which anchored during the winter months in the Medway.(3) This limited function was to change, however, following a massive modernisation and extension programme between 1618 and 1626 when a double-dock, wharves, mast ponds, storehouses and a rope yard were constructed. This large investment of capital constituted the 'New Yard', a northward extension of the original dockyard installations adjacent to St Mary's Church which now became incorporated into the Ordnance 'Gun Wharf'.(4) The greater part of the land utilised for this extension, amounting to 71 acres, was leased from Sir Robert Jackson, Lord of the Manor of Chatham, and further leases amounting to nine acres were obtained from the Dean and Chapter of Rochester Cathedral and the Manor of Westcourt in Gillingham parish. This land can be identified as that labelled as 'The Queen's' on a map of 1708 (Figure 8.2) though it is not known when the leases were converted to freehold.(6) As a result of this extension and the construction of docks the yard became a major naval ship building and repair base and grew in importance especially during the Dutch wars of the middle decades of the seventeenth century and in the years following the establishment of a yard at Sheerness in 1665 which effectively formed a limb of Chatham dockyard.(7)

Not until late in the seventeenth century did settlement occur on land adjacent to the dockyard and up to this date the workforce lived in Chatham and especially that part of the town known as the 'Brook' to the east of St Mary's Church and which connected with the 'new yard' by Dock Road.(8) (Figure 8.3) The dockyard authorities at Chatham, as at Portsmouth and Devonport, never constructed houses for the dockyard

workmen though officers of the yard did reside in houses within the yard provided by the naval authorities. The first reference to the new settlement of Brompton occurs in the year 1695 when a house of public entertainment was erected under the name of 'Sun in the Wood'.(9) The position of this public house was at the north-westerly end of what was later to become Brompton High Street and in what was then Brompton Wood. The construction of housing on this site and at this time can be attributed to a number of factors. After the mid-seventeenth century the workforce throughout the dockyard system attained a degree of permanency which did not exist before. In combination with this the number of workmen employed at Chatham increased as a result of the Dutch wars and the establishment of Sheerness dockyard. The sharp seasonal fluctuations in the demand for labour, which could amount to a variation of as much as one third of the workforce during a year, was considerably lessened as the fleet was laid up elsewhere during the winter months and thus a degree of employment stability was given to the town.(Figure 4,2) These factors, coupled with the construction of two dry docks and other installations between 1684-1688 and a further extension of the dockyard northwards away from Chatham toward St Mary's Island contributed to the development of Brompton on the brow of a hill overlooking the dockyard. Furthermore, the land upon which the settlement of Brompton was built formerly belonged to the Manor of Westcourt and the availability of this valuable building land at this time occurred soon after a Mr Rogers came into possession of the Manor in 1697 and this could be more than a mere coincidence.(10)

The development of Brompton appears to have been rapid for by 1708 the street pattern of the settlement had been laid out. Significantly in 1701, during the early stages of this development, the naval authorities proposed the purchase of lands surrounding the dockyard and Brompton in preparation for the construction of fortifications at a later date. At

the time the settlement was surrounded by land owned by Rogers and by the Crown, (Figure 8.2) If this purchase was prompted by the concern of the authorities for the potential defence of the yard then such a decision came a decade late for by the time the land was purchased in 1709 the settlement of Brompton was already well established, (Figure 8.3) In fact the purchase of this land was probably an attempt to restrict further expansion rather than to prevent the development of Brompton altogether and indeed the extent of settlement at Brompton did not expand beyond the area delimited by the purchases of 1709 for the next two centuries. Furthermore, it has been suggested by a chronicler of Brompton's history that the earliest buildings were in fact taken up by dockyard officials who were at the fore-front in developing this settlement. (11) Perhaps the lack of good officer accommodation had prompted such action for soon after the settlement had begun new residences within the dockyard were constructed to replace older houses which dated back to the 1620s and which were demolished. (12)

Bastion fortifications, as at Portsmouth and Devonport, were eventually erected between 1756-8 in response to the threat of invasion during the Seven Years War and stretched to include the entire extent of the dockyard and the settlement of Brompton. (Figure 8.4, Plate I, II) Subsequently during the 1780s further lands were purchased to the south of the defences to extend the lines overlooking Chatham and to construct powerful redoubts. A directory of 1793 describes the scene: 'Behind and on each side of Brompton is a tract of land, called The Works, on which there had formerly been redoubts, and a line of circumvallation was in the last war thrown up by way of security to the dockyard which is now under very considerable improvement: several outworks are also erected for the more effectual security of that important arsenal'. (13) (Plate I, X)

Access through the defences was via a drawbridge across a deep dry ditch and within the fortifications barracks for the Royal Marines, Royal Engineers and Royal Artillery, who were to defend the works, were constructed in 1778 and 1804 and in subsequent years.(14) (Figure 7.1) Additionally an Ordnance hospital was constructed in 1809.

During much of the eighteenth century Chatham dockyard had been somewhat neglected because of the shoaling and difficult navigation of the Medway and because of the strategic shift of naval activity to the Channel and south-western approaches. As a result the size of the workforce had fallen behind that of other yards. . With the outbreak of the Napoleonic War, however, the fortunes of the yard improved and additions to the storehouses and ropeyard were made.(15) By this time Brompton consisted of about 400 houses 'Most of which have been erected within the memory of persons now living, and from its pleasantness and near situation to the dockyard is continually increasing'.(16) Throughout the war Chatham dockyard prospered though plans to replace the up-river yards by a new establishment at Northfleet on the Thames left the future of the yard somewhat uncertain.(17) Brompton, unable to expand onto the surrounding Government land, met the increasing demand for accommodation by a greater intensity of housing-use and by infilling, notably by the construction of temporary buildings in the gardens of existing houses.(18) (Plate XI) These temporary huts soon became permanent dwellings and led to the creation of a number of courts and alleys within the town.

By 1815 plans to close the yard at Chatham had been abandoned and in 1821 185 acres of salt-marsh of St Mary's Island to the north of the dockyard were purchased.(19) Further purchases were made in 1847, when nineteen acres adjacent to the yard were acquired, and in 1854 when 186 acres were purchased.(20) Few improvements and additions were made to the

yard however, until 1859 when a dry dock was constructed, part of St Mary's Island embanked and the dockyard wall extended towards St Mary's Creek. In contrast, substantial change and investment in the yard was made during the next two decades and this was largely in response to the technological improvements which resulted from the introduction of iron and steam into naval architecture. In 1862 Parliament accepted proposals to expand Chatham dockyard and to strengthen its defences by the construction of forts at strategically vital points on its land-side. Work on the extension began in the same year and St Mary's Creek was converted into three tidal basins.(Figure 8.5) The first basin to be completed was opened in 1871 while the two remaining basins were finished in 1883. The whole extension, in which much of the manual labour was performed by convict labour, consisted of 380 acres compared with the original yard of 97 acres and was completed by 1885. Similar extensions were also constructed beyond the old bastion fortifications at Portsmouth and Devonport.(Figure 6.1, 6.2) In the mean time both the Thames yards had closed by 1869 and Chatham, supported by its outport at Sheerness became the sole remaining major east coast dockyard.

One effect of the dockyard extension was to dramatically increase the size of the workforce from approximately 1735 in 1860 to 4199 by 1885 and the old enclosed settlement of Brompton was totally incapable of coping with the resultant increase in demand for accommodation. As a result the construction of housing was forced beyond Board of Ordnance land to the east.(Plate X) The tithe map of 1841 indicates the initial stage of this development which took place at two locations beyond the Government 'Great Lines'.(Figure 8.6) The first was at the point where the main Brompton to Canterbury road extended beyond Ordnance land onto private land thereby permitting direct communication with Brompton and the dockyard. The

second development took place further to the north on the road between Brompton and Gillingham village. The new settlement underwent dramatic growth and in a very short time exceeded in size the existing settlements of Brompton and Gillingham. There is no doubt that the rapid growth of the 'colony' was in response to the excessive pressure on housing in Brompton which was unable to expand further because of the constraints of Government land. As a contemporary newspaper observed ... 'Brompton still extends, ... new roads laid out point to a greater extension of Brompton where alone it can extend - if we may be pardoned a bull at New Brompton'.(21) Furthermore, though the initial development of the colony began before work on the dockyard extension was begun the expansion of the dockyard on to St Mary's Island boosted the value of this adjacent land as prime building land. Once the embryonic settlement had been established the subsequent pace of building indicates the latent pressure of population and overcrowding in Old Brompton. The development was boosted by increased activity in the dockyard generated by the Crimean War and the influx of workers which resulted from the dockyard extension scheme and also from the favour in which the new housing was held by other local communities in the Medway Towns.(22)

Many of the houses are of first class character, and the whole have been erected within so short a period - the great number daily increasing - that the construction of Aladdin's palace in a single night will appear no longer fabulous to those who have witnessed the rapid and extensive conversion of bricks and cornfields into streets, shops, terraces, and villas. It appears indeed almost incredible that so extensive a piece of land could have been covered in such a short space of time. 'The cry is still they come', for I was informed by a respectable builder that the houses are frequently occupied before the inward decorations are finished, and many wishing to obtain residence in that locality are frequently obliged to wait for a favourable opportunity to meet with a vacant house.(23)

Without doubt the principal demand for housing in New Brompton stemmed from workers at the dockyard and other Government establishments in the area 'as one would be soon convinced on seeing them stream across the

Lines from all points of the compass, morn, noon and night, to and from work'.(24)

Socio-spatial structure

By 1871 the colony of New Brompton was already extensive and was spreading eastwards from the delimiting edge of Ordnance land toward the still comparatively isolated village of Gillingham at a rapid rate. Even so the density of population in Old Brompton was still over double that of New Brompton which was able to grow at a lower density and without the overcrowding so characteristic of the enclosed dockyard settlement.(25) The extent of Old Brompton and Gillingham meanwhile had altered little from their earliest days though for differing reasons and their economies were in stark contrast. The latter was overwhelmingly concerned with agriculture and brick-making and though military and dockyard personnel were present they formed a very small element of the village population.

Old Brompton was dominated by four major occupational groups, military personnel, tertiary workers, labourers and dockyard workers. Significantly the largest group consisted of tertiary workers which amounted to 22% of the male working population in Old Brompton and formed an important sector of the local economy.(26) Although not a market town Old Brompton was an important retailing centre (27) which 'depended for ... [its] ... prosperity on those employed in the dockyard on the Lines and Fortifications, and the inhabitants of the barracks. In point of trade, Brompton is much more to be regarded than Gillingham'.(28) The centre of this tertiary sector was located along High Street and appendages leading from it.(Figure 8.7) A further important tertiary centre had rapidly developed at New Brompton and its location on the main thoroughfare linking dockyard, mother settlement and the colony bears marked resemblance to similar occurrences at Sheerness, Portsmouth and Devonport. Already by 1871 tertiary workers formed the third largest economic group in New Brompton.(29) In due course, as a result of its central position, the town became the focus of

tertiary activity in the area whilst the tertiary sector of Old Brompton waned.

A substantial number of military personnel, amounting to 19% of economically active males, formed the second largest group in Old Brompton.(30) Adjacent to the town were large numbers of military persons institutionalised in barracks and a number living with their families in the town.(Figure 8.8) High ranking officers lived in superior quality housing on higher ground to the east of the settlement. The lower ranks tended to occupy the heavily populated poorer quality housing areas to the west of High Street and in the back-alleys and courtways of the town though as a result of the construction of poor quality housing in the large gardens of the better quality houses the extremes of socio-economic class in Old Brompton are to be found in close juxtaposition.(31) (Plate XI) An excess of females in the population of Old Brompton reflects the presence of military personnel in barracks or on active service and references to 'soldier's wife' in the schedules is a recurring theme. Elsewhere in the parish the military tended to consist predominantly of officers who located in peripheral parts of New Brompton and Gillingham in good quality housing situated in favourable sites.

Perhaps contrary to expectation dockyard workmen did not constitute the major occupational group in Old Brompton despite the settlement's proximity to the yard. This group amounted to only fifteen per cent of economically active males in the settlement a large number of whom tended to be labourers or semi-skilled workmen. In contrast dockyard workmen formed well over one quarter of the male workforce of New Brompton and clustered heavily in those streets to the south of High Street (Figure 8.9) where they formed over half of the male workforce. Similar marked

concentrations can be found in the colony settlements of other fortified dockyard towns as for example in Marine Town, Sheerness as well as in unfortified dockyard towns such as Woolwich.(Figure 8.34, 9.24)

Such clustering reflects the level of wages and the quality and rental value of the housing but this tendency for dockyard workmen to cluster residentially was also be a reflection of the desire to locate according to social and occupational affiliations stemming from the place of work. Further discussion of this point is undertaken with reference to Woolwich later in this chapter but in view of the high degree of labour specialisation which had existed in the dockyard during the previous two centuries it is distinctly possible that this craft structure was transferred in similar fashion to the housing market. Certainly the tendency, as in New Brompton, for dockyard workmen with particular specialist skills to be associated with particular streets could be explained by such a process.(32) This process would also have been facilitated by the extensive construction of new housing in the colony which would have provided greater opportunity for people to residentially relocate and cluster as a result. Wheeler has drawn attention to the neglect of occupation as a factor in residential differentiation in preference to social area analysis. It would appear from an examination of nineteenth century census data for the fortified dockyard town that further investigation of occupational distributions would be especially fruitful.(33)

The concentration of dockyard personnel to the south of High Street in New Brompton is matched by a similar clustering of labourers in streets to the north of High Street which group formed fifteen per cent of the New Brompton male workforce.(Figure 8.10) This cluster would appear to be a reflection of the quality of housing and level of rent as well as of

sanitary conditions in this lower part of New Brompton for the local medical officer of health recorded that, 'in the whole of his experience he had never come across a place in such a disgraceful state'.(34) In 1872 this area was the centre of a smallpox epidemic.

In Old Brompton labourers formed ten per cent of the working population and, with their families, tended to locate in the back-alleys and courtways of the town thus reflecting their low socio-economic status. Although the source of employment was not specified many would have been employed in the dockyard for there was little alternative employment available in the town.

A further distinct occupational group present in the parish which is worthy of mention were the prison officers and warders of the civil prison of St Mary's situated to the north east of Old Brompton. (Figure 8.6, 8.11) The convicts were used as cheap manual labour during the dockyard extension and were housed in the prison for the duration of the project. The prison provided employment for approximately 190 men as warders of whom 60% lived in accommodation provided in St Mary's Vale adjacent to the prison, 34% in the northern part of New Brompton and the remainder, mostly officers, in Old Brompton and Gillingham village. The presence of this relatively large body of men located here by Government order for the duration of the dockyard extension scheme further contributed to the primary employment controlled by Government and boosted the purchasing power of the community.

The linear settlement connecting New Brompton to Gillingham shows a distinct west to east transition in which the presence of dockyard workers, prison warders and military personnel gradually gave way to

brickyard workers and farmers and farm labourers the nearer one moves to the village. In the whole of Gillingham village there were only twelve dockyard workers, no prison warders at all and but a few military personnel. Farm workers, brickmakers, professional persons and tertiary personnel are prominent, whilst labourers formed the largest group. The Reverend J.H. Leach, Vicar of St Mary's Church, wrote of Gillingham in 1868, 'the inhabitants are agricultural workers ... with many brickmakers, whose operations are gradually destroying the magnificent plum and cherry orchards for which Gillingham has been celebrated for years. There are still a few fishermen but their trade seems to have languished of late years, possibly through the tainting of the water by gasworks and sewage'.(35) Thus even at this late date the village still retained its rural character in contrast to settlement elsewhere in the parish.

The dockyard was thus the major employer in the area and the primary employment so generated and the presence of large numbers of military and naval personnel, and even convict warders, supported a substantial tertiary sector. The community was thus highly dependent upon Government for the well-being of the local economy. The unique morphological development of the town, brought about by the imposition of bastion defences, was also duplicated at Devonport, Portsmouth and Sheerness and the nature of these fortifications had a great influence upon the socio-spatial structure of the towns. The old enclosed town of Old Brompton, because of its inability to expand, became congested and overcrowded and following the development of the colony was largely left to the lower socio-economic classes though the tertiary sector was still important and enclaves of higher social classes persisted in the east of the settlement. Meanwhile the extensive relocation of population in the rapidly expanding colony of New Brompton gave rise to further socio-economic and occupational clusters.

Woolwich: the Case of the Unfortified Dockyard Town

The lack of encircling bastion fortifications around the dockyard and settlement at Deptford and Woolwich and the later development at Pembroke Dock distinguished urban development at these locations from those dockyard locations which developed under the constraint of these defences.

Early development

For a dockyard which is acknowledged to be the mother of British naval dockyards (36) surprisingly little is known about the development of Woolwich dockyard and the town. Even the dockyard chroniclers of 1774 dismissed the yard with only a few comments, most of which were related to comparisons with its neighbour at Deptford. The presence of Deptford a few miles up-river from Woolwich is one reason why the latter gained such little attention for although both yards were established at about the same time and generally 'the conveniencys and inconveniencys belonging to Woolwich are much the same as those of Deptford' (37) it was Deptford which became the superior yard of the two. This superiority largely stemmed from Deptford's position adjacent to London and the administrative hub of the dockyard system for ships had relatively greater difficulty reaching Deptford than Woolwich and the former also suffered from 'the inconvenience of getting large ships down river after they are launched'. (38) However Woolwich could claim, because of the dockyard, Royal Arsenal and extensive military presence in the towns, to be one of the foremost military towns in this country.

The yard at Woolwich was established on a chalk promontory of higher elevation than the surrounding marshland and the site possessed most of the factors considered necessary for a naval yard. Defoe recorded that,

The Thames is here at high water near a mile over, and the water salt upon the flood; and as the channel lyes strait east and west for about three miles, the tide runs very strong; 'tis entirely free from shoals and sands, and has seven or eight fathoms of water, so that the biggest ships, and a great many of them, might ride here with safety even at low water.(39)

With the exception of the conversion of a single dock into a double dock toward the end of the sixteenth century few additions were made to the yard during the early years of its existence.(40) Subsequent small extensions were made to the yard during the middle decades of the seventeenth century along with the addition of a further single dock and some storehouses (41) but the yard remained cramped and much smaller than the yard at Deptford.(42) During this period the fortunes of the yard underwent a number of vicissitudes including a period following 1618 when the yard was temporarily closed and the work, especially shipbuilding, was transferred to Deptford and to the recently modernised and extended yard at Chatham.(43) The interdependence of the dockyards was evident even at this early date. Despite this set back the yard was not abandoned and in 1625 was enclosed by a brick wall and wharves were added.(44) Woolwich remained the smallest of the up-river yards at this time and that it continued in operation at all may be due to its possession of the only double dock capable of receiving the largest ships of the day.(45)

No Commissioner resided at Woolwich and the yard came under the direct supervision of the Navy Board and the officers at Deptford (46) but with the appointment of its own master shipwright in 1676 Woolwich assumed a degree of autonomy separate from Deptford.(47) By the end of the seventeenth century the yard possessed a double and single dry dock of which the latter was enlarged in 1701 to accommodate first rate ships.(48)

(Figure 8.12) Vincent suggests that the extent of the yard was restricted on account of the ownership of land surrounding the yard being in the hands of the Bowater family as Lords of the Manor.(49) However most of the land over which the dockyard was subsequently extended was purchased from the Bowater family though it appears that these purchases took place only after protracted negotiations as in the extension of the yard eastwards between St Mary's Church and the Thames in 1753.(50) (Figure 8.13)

The earliest settlement took place to the east of the dockyard and adjacent to the Thames though development was restricted in the east by the ownership of the Warren, later to become the Royal Arsenal, being in the hands of the Board of Ordnance. Further settlement had taken place opposite and to the south of the dockyard but was restricted to a linear development by extensive sand pits to the south.

The rise of a military town

With the exception of a small gun platform erected in the Warren Woolwich did not possess extensive land or sea defences in the immediate vicinity of the town.(51) Nonetheless it was particularly well endowed with other forms of military activity notably in the form of the Royal Ordnance Arsenal and as a garrison town for the Royal Marines, Royal Artillery and Royal Engineers. The Royal Arsenal was established on land purchased for the use of the Board of Ordnance in 1667 when the task of proving ordnance was transferred there from Moorfields.(52) Subsequent to an accident at Moorfields in 1716 the casting of ordnance was also transferred to the Warren.(53) In 1718 it was estimated that some 200 people were employed in the Arsenal compared with about 1000 employed in the dockyard and ropeyard and about 100 persons employed in the town

independent of both.(54) In 1777 the Warren was enlarged from 42 acres to 100 acres and again in 1810 to 140 acres and in 1805 was renamed the Royal Arsenal. By 1871 the Arsenal had reached 264 acres in size excluding a further 32 acres in Woolwich Marshes which was used as a practice range.(55) Employment in the Arsenal could be substantial for during the Napoleonic war employment amounted to no less than 2500 people but, as with the dockyard, the level of employment varied according to military considerations and Government dictate and in 1837 amounted to only 500 persons.(56)

To the south east of the Arsenal was the Ropeyard erected in 1574 on Crown property. During the eighteenth century the yard was the major source of cordage for both Woolwich and Deptford dockyards as well as for the foreign yards.(57) The Ropeyard employed on average 200-300 people and in 1740 as many as 400 but as Government invested in other Ropeyards at Chatham, Portsmouth and Devonport so the yard at Woolwich was reduced and eventually closed in 1835.(58)

The urban plan and economy of Woolwich was further influenced by the presence of a number of military barracks in the town.(Figure 8.14) The earliest barracks at Woolwich were constructed in 1719 for the use of the Royal Artillery and were placed adjacent to the south-western part of the Warren.(59) The Royal Military Academy was established in 1741 and in 1775 the Royal Artillery regiment transferred to new barracks built on Woolwich Common to the south of the town.(60) These barracks were further extended in 1802 at which date the War Office owned some 200 acres of land on Woolwich and Charlton Commons to the south of the town.(61) Other military appendages were attracted to the town as a result of the military presence and in 1780 the Royal Artillery hospital was established and in 1778 the Royal Artillery Repository for military machines was built

adjacent to the barracks on Woolwich Common.(62) In 1787 the Corps of Military Artificers, more lately known as the Royal Engineers, were based in Woolwich and in 1805 a new division of Royal Marines was established at Woolwich to complement those divisions at Chatham, Portsmouth and Devonport.(63) Three years later Government purchased a brewery and adjacent land between the dockyard and Woolwich Common and converted the premises to accommodate the Marines and in 1847 these buildings were demolished and replaced by the more functional Cambridge Barracks. In 1859 a new Royal Marine Infirmary was constructed alongside these barracks thereby replacing an older infirmary to the east of the land containing the barracks.(64)

In the early eighteenth century Defoe referred to Woolwich as being 'a town on the bank of the [Thames], wholly taken up by, and in a manner raised from, the yards and public works, erected there for the publick service'.(65) A century later the town was still dominated economically and physically by military and naval establishments. In 1861 military personnel alone comprised over sixteen per cent of the total population and the extent of the establishments severely constrained urban development. The dockyard and Arsenal between them limited development adjacent to the Thames and to the south east whilst expansion southwards onto the common was prevented by the Royal Artillery barracks. The thickly inhabited streets were thus hemmed-in within the remaining area though even here settlement was hampered by extensive sand pits, the Royal Marine barracks and hospital and by Mulgrave Pond, acquired in 1803 by the military to supply the barracks and Arsenal with a supply of water.(66) All the dockyard towns possessed a military presence of varying degrees because of their defences and naval function but Woolwich was perhaps dominated as much by this military component as by that of the naval

dockyard.

From the mid-eighteenth century problems associated with the navigation of the Thames began to affect the operational use of the yard. Woolwich was better placed than Deptford in this respect but the necessity of having to send stores and equipment in lighters to Northfleet Reach or Gravesend in order to supply and fit-out ships because of the shallowness of the river was a substantial disadvantage.(67) As a result of these difficulties and with the shift in naval activity to the western Channel, Woolwich specialised in shipbuilding and further land was acquired from the Bowater family in 1779 and 1784 to extend the dockyard to the west. The yard was extensively utilised during the Napoleonic War because of the particularly heavy demand placed upon the dockyard system but as at Chatham the future of the yard was in doubt for 'on account of the distances from the sea, the difficulty and delay in navigation, shallowness in front of the yards and the want of accommodation for ships within their precincts' Rennie was proposing the closure of Woolwich dockyard and the retention of Deptford only as a supply and victualling yard.(68)

Dockyard closure and urban decline

In the event the dockyard was retained in the post Napoleonic period and was reduced in line with other dockyards to a peace time establishment. In 1839-40 a Steam Factory was constructed on land purchased to the west of the yard as part of a scheme in which Woolwich was to specialise in the repair and construction of steam vessels and steam machinery.(69) (Figure 8.14) In addition two dry docks in the yard were also modernised. However, the rapid adoption of the new technology at other dockyards and the inability of Woolwich to cope with the site requirements of the new breed of warship forced eventual closure

on the yard on 1 October 1869. The closure was timed to coincide with the completion of the first stage of the dockyard extension at Chatham to which yard most of the machinery and some officers and workmen were transferred.

The closure of the dockyard came as a great blow to the township and was aggravated still further by extensive reductions, for reasons of economy, in the workforce of the Royal Arsenal. Furthermore the Royal Engineers were removed from Woolwich to their new base at Chatham in 1868 and in consequence of the dockyard closure the Woolwich division of the Royal Marines was disbanded and its personnel, consisting of over 1000 men were dispersed amongst the other dockyard divisions. Also the Military Clothing Store, which provided employment for a large number of women in the town in the manufacture of military clothing was closed and its work transferred to Pimlico.(70)

In response to these closures and reductions a 'Relief and Emigration Fund' was established in November 1868 as the reductions from the dockyard and Arsenal began. By April 1869 The Times estimated that relief had been given to an average of 500 families during this time (71), that 150 men and families had moved to other parts of the country on the promise of work for them, and forty six adults had emigrated to Queensland and a further 100 to Canada.(72) However the fund had almost expired and yet another 474 applicants had applied to emigrate and 703 were still receiving weekly relief.(73) At this time a further 1000 workmen were discharged from the Arsenal and more discharges were expected.(74) As a result of these reductions the tertiary sector in the town was badly depressed and it is recorded that many shopkeepers had either closed or were in the process of closing their shops.(75)

In response to the extreme distress in the town a number of deputations visited the Admiralty, War Office and Government representatives to seek increased employment in the town and assistance for the discharged workmen to emigrate. Such a request as the latter was not a precedent for £6,000 had been granted by Government to assist in the emigration of discharged workmen from Woolwich at the time of the conclusion of the Crimean War.(76) In view of the severe distress caused by reductions in Government establishments Government consented in 1869 to aid the emigration of some 2500 persons from Woolwich to Canada on board naval ships after having first made enquiry of the Canadian Government whether they would take the workmen and what employment opportunities awaited them upon arrival.(77) Three naval ships took some 1800 persons to Quebec in May and July 1869 and a further 600 in the Spring of 1870. These were subsequently taken to Toronto where they were 'judiciously distributed amongst the rural districts in the neighbourhood'.(78)

Such action by the authorities was uncommon and reflected the severe distress caused in the town by the dockyard closure, discharges from the Arsenal and removal of the military from the town. In the nineteenth century Government could overcome the social cost of dockyard closure by exporting unemployment to the colonies. Such a facility was not available nor acceptable in the twentieth century and dockyard closures and reductions during this period have been made in the light of the social and economic cost to the community, town and region.

The population structure of Woolwich in 1861

The growth of population in Woolwich during the nineteenth century reflects the dependence of the settlement on the vicissitudes of Government defence spending and events in the military-naval

establishments in the town.(Figure 8.15) During the war years 1801-1811 the population growth of Woolwich approached 75%. By 1821 however, in the wake of the severe retrenchment in the armed forces following the Treaty of Vienna in 1815 the population of Woolwich between 1811-1821 had registered zero growth. In 1821 9% of the housing stock in Woolwich was uninhabited and this suggests that extensive out-migration from the town had occurred in the years following 1815.(Figure 8.16) Not until the 1830s, in response to the construction of the Steam Factory and increased activity in the Royal Arsenal and a greater military presence in the town, did the population of Woolwich return to its previous rate of growth. Between 1831 and 1861 the population more than doubled as the Crimean War boosted military activity in the town. The dramatic reversal which overcame the town during the late 1860s and 1870s has already been recounted. In 1871 over 10% of the housing stock was uninhabited and from a projected population of 41,000, based on the growth rate of the previous three decades, the town slumped to 30,000.(Figures 8.15, 8.16) Whilst such vicissitudes had occurred before in Woolwich the reductions were of much greater magnitude and permanency than in previous years.

From 1841, when such information first becomes available, the institutionalised military component in Woolwich ranged from between 14% to 16% of the total population of the town. In reality this figure underestimates the military presence for a large number of military personnel resided not in barracks but in private accommodation in the town. In 1851 Rawlinson estimated that some 500 Royal Marines alone lived with their families in the town.(79) The size of this military presence in Woolwich is in line with that recorded for other dockyard towns at about this time.(80) With their dependents the military formed a substantial sector of the population and boosted the purchasing power, and

therefore the tertiary sector, of the community. Furthermore, since the 1770s a large number of convicts had been stationed in three hulks moored off the dockyard and Arsenal in which yards they were employed on menial tasks. In 1841 these convicts amounted to 1115 and with their warders further increased the demand for tertiary services in the town. In 1855 the convicts were transferred to Chatham to work on the proposed dockyard extension there. In this way the local economy was dependent not only upon the employment provided by Government in military and naval establishments in the town but also upon a substantial number of persons whose activities and presence in the town were also determined by Government.

As in other dockyard towns this military presence was reflected in the composition of the civilian population. Females comprised 50.8% (81) of the civilian population thereby reflecting the presence of a number of wives whose husbands were absent on active service. Rawlinson in 1851 drew attention to the problems which this element of the population posed to the dockyard town;

but there is still a large class, consisting of ... wives and children of soldiers, who by the regulations of the service cannot be sent with their husbands, or fathers to the foreign stations when they go upon duty; and of the widows and children of these same soldiers who die, leaving nothing for their families. The aggregate of these form a pauper population, which presses heavily upon the poor rate, and among whom, crowded as they are in small ill-ventilated dwellings, disease in its most fatal form is always found to prevail(82)

The employment structure of the sub-district of Woolwich Dockyard (Figure 8.17) very closely resembles that of Sheerness (Figure 9.9) in which the dockyard was the major source of employment in the town. Just over one third of the active male workforce was employed in the dockyard, a figure which in reality was likely be much greater given the large number of labourers (15.5% of the male workforce) whose place of work was

unspecified but of whom a large number could be expected to have been employed in the dockyard.

The tertiary sector formed the second largest economic activity for males and also provided employment for a large number of females. Within the town resided a number of military personnel amounting to 4% of the total civilian population which when added to the figures of military personnel in barracks increases the extent of military personnel in the town to a level approaching 20% of the total population.

Employment opportunities for females in this male dominated town were severely limited to domestic service, dress-making, laundry work and tertiary employment. Vincent suggests that females had been employed in the Arsenal but that in the period following the Crimean War female employment was discontinued though that in the Cartridge Factory continued until 1872 when all females were also dismissed.(83)

The population of Woolwich in 1861 was more cosmopolitan than that of most dockyard towns with native born comprising only 33% of the population. This is perhaps a reflection of the town's proximity to London and the busy River Thames (Figures 8.18-8.23, 9.10-9.11) though its position at the nexus of a number of counties might confuse the picture here slightly. Certainly the origins of migrants in Woolwich closely reflects the major patterns of the other dockyard towns which can be grouped broadly into four categories.(Figure 8.19, 8.21, 8.23, 9.11) Firstly, as would be expected, neighbouring counties were large contributors of migrants reflecting, amongst other things, the ease of travel and the greater availability of information regarding employment and housing opportunities in the local area. Secondly, a large number of migrants came from those counties containing naval dockyards, primarily Hampshire, Devonshire,

Kent, South Wales and the London region.

The next largest group of contributing areas comprised maritime and coastal counties. Migrants from these counties were attracted to the dockyard town as a result of the demand for their ship-working and seamanship skills required by the dockyard and naval authorities. In addition, the availability of a relatively cheap and accessible mode of transport by sea facilitated movement and the flow of information about such places. The inland counties, and especially the agricultural counties contributed the fewest migrants to the dockyard towns.

The ready availability of travel by ship did much to facilitate movement to the dockyard towns, and indeed many migrant ships from Ireland stopped at Devonport and Portsmouth on their way to London.(84) The Irish presence in Woolwich is greater than that of the other dockyard towns being the second largest contributing area of migrants to Woolwich and this possibly reflects the importance of the metropolis and the Thames as a magnet for Irish emigrants in the period following the Great Famine. The presence of foreign-born migrants indicates the close link between the British Empire and the Royal Navy and although it is not always stated whether the individual was a British subject or not, many were born at locations containing a naval base or military establishment.

Socio-spatial structure of Woolwich in 1861

In the course of examining the social geography of Woolwich a matrix was constructed in which the rows consisted of 118 street blocks into which the town had been divided and the columns comprised eighteen variables reflecting the population characteristics of each street. The latter were based on socio-economic, demographic and ethnic information

contained in the census enumerators schedules of 1861 and are detailed in Table 9. A principal components model was applied to the data matrix and the results are contained in Tables 8 and 9. For the first four components, which accounted for some 53 per cent of the total variance explained, factor score plots have been produced (Figures 8.24 - 8.27) and in combination with location quotient plots based on the above eighteen variables have been used to produce a relatively detailed picture of the socio-spatial structure of Woolwich at this time.

The first component accounted for eighteen per cent of the total variance and indicates streets characterised by multiple occupancy and a high population density, the presence of military personnel, Irish migrants and a young population. The streets so delineated were sandwiched within that area between the Royal Marine barracks and the Royal Artillery barracks and consisted largely of back-streets and courtways. (Figure 8.24) Whilst the component is predominantly a measure of the intensity of housing use (Figure 8.28, 8.29) the area largely contained the residences of the families of military personnel (Figure 8.31) and particularly those of low rank. (Figure 8.31) These streets were marked by the absence of residents of high social class who located in streets to the south west and north east of the town and along the main Woolwich to London thoroughfare facing the dockyard to the north. (Figure 8.24, 8.32)

The second and third components accounted for sixteen and twelve per cent of the total variance respectively and are measures of high and low socio-economic status. Component two was marked by high positive loadings on the variables of servants 'living-in' and of social classes I and II and streets possessing residents with these characteristics occurred predominantly in those areas skirting the town to the south, east and

north east.(Figures 8.25, 8.32, 8.34) With the exception of the latter street the above areas generally contained the most recently constructed houses in the town and by occupying the high ground were also amongst the more healthy parts of the town. It is noticeable that these streets occurred in close juxtaposition to areas of low socio-economic status which tended to form the back-streets to these better quality houses fronting the main streets. An interesting feature however is that dockyard employees were highly residentially differentiated from areas of high social status and clustered in a number of streets in the north west of the town.(Figure 8.25) In fact the location quotient plot (Figure 8.33) suggests that dockyard employees occupied a very sharply defined neighbourhood and this pattern bears marked resemblance to the distribution of dockyard workers in New Brompton and Marine Town.(Figure 8.9, 9.24) Furthermore, this occupational group was also negatively loaded on component three which is a measure of low socio-economic status. Thus dockyard personnel dominated this area to the exclusion of persons of high and low socio-economic status.(Figure 8.26) This aspect and the duplication of such patterns in the other dockyard towns is discussed in greater detail later in this chapter.

Streets indicated by the third component as being characterised by residents of low socio-economic status are located to the north of the Royal Marine barracks and behind the street fronting the dockyard.(Figure 8.26, 8.35, 8.36) This area contained some of the oldest housing in the town and consisted 'of narrow streets in which the houses ... stand upon a damp and undrained subsoil; they are badly built, and are unduly crowded'.(85) Furthermore, because of the lack of a proper system of drainage throughout the town, 'the sanitary conditions of the older and lower portion of the town is made worse, in consequence of the surface

drainage from the higher portions being passed into it'.(86) In 1851 the death rate in this area reflected its general character and at 28 per 1000 was double that of streets to the south of the town adjacent to the common.(87)

Component four is predominantly a measure of male lodgers in the town and, to a lesser extent, of tertiary workers. Streets associated with these characteristics dominated the linear development in the north of the town fronting the naval dockyard.(Figure 8.27, 8.37, 8.38) This street contained the oldest houses in the town and because of their location and size had been adapted as lodging houses, public houses and shops. In this respect the character of the street was similar to that of High Street opposite the dockyard in Blue Town Sheerness.

Subsequent components added little to the further interpretation of social patterns in the town and are not discussed here. Residential differentiation in Woolwich was thus based upon socio-economic and occupational criteria and housing quality. Ethnicity could not be said to have been an important element.(Figure 8.39-8.41)

Before discussing the implications of these patterns it is possible to obtain an overall view of the socio-spatial patterns in Woolwich by classifying streets by means of a discriminant classification procedure. This procedure creates an optimal classification of streets according to their factor scores on the four components by maximising inter-class variation whilst minimising intra-class variation. The resulting map (Figure 8.43) represents a generalised picture of residential patterns in the town based upon the similarities of streets across four components and because of this facility to differentiate and classify streets according

to a combination of components the map is a relatively accurate portrayal of such patterns. Thus patterns discerned by the previous factor score and location quotient plots can be identified on the resultant map though some have been subsumed within a combination of components which were representative of the population characteristics of those streets.

On the basis of inter-class and intra-class variation a classification involving nine groups was found to be the most effective. (Table 10) The first group represents streets which were characterised by the presence of lodgers and residents of low socio-economic status. These streets largely consisted of small streets in off-street locations and were dispersed throughout the town. Residents in streets contained in group two were similar in character to those of the previous group and were of low socio-economic status though lodgers were absent from these latter streets. These streets were also small and located predominantly in back-street locations in the known low social class areas to the north of the Royal Marine barracks.

Streets in group three were characterised by the absence of residents of high and low social class and by the presence of dockyard personnel. Such streets dominated the area to the north west of the town. Noticeably streets in group five were similarly dominated by dockyard personnel and marked by an absence of residents of high and low social status, lodgers, multiple occupation and a high population density. These streets formed a hard core surrounded by streets of group three which were not quite so dominated by dockyard personnel.

Streets in group four were characterised by a high population density and multiple occupancy and residents of high socio-economic status. These

streets dominated the area between the Royal Marine and Royal Artillery barracks. To the west of this group and to the east and north east of the town streets delimited by group nine similarly contained residents of high social class but without the high population density and multiple occupancy characteristic of group four.

Group six indicates streets noted for the presence of lodgers but a low population density and low multiple occupancy. The streets in group seven occur predominantly to the north of the Royal Marine barracks and are characterised by residents of low socio-economic status. Finally streets in group eight dovetail with those of group four in reflecting areas of multiple occupancy and high population density but without the concentration of residents of high social class characteristic of streets in group four.

Thus a number of relatively homogeneous residential areas can be discerned in Woolwich in 1861. Military personnel were present in substantial numbers in the south of the town especially in that area between the Royal Marine and Royal Artillery barracks. This area had largely developed since the beginning of the century in response to the establishment of these barracks and although located in the healthiest part of the town nonetheless the demand for accommodation by military personnel with families resulted in the streets being marked by overcrowding and a high population density as well as by the presence of court housing. Indeed so great had the demand for accommodation by married soldiers become that Government constructed over one hundred huts to the south west of Woolwich Common for their use and these were reputedly still in use in 1861.(88)

Intermixed within this area and to the south west, east and north

east of the town were areas of high socio-economic status. Vincent records that the elite of Woolwich was comprised largely of military officers, who with their families resided predominantly in the south west of the town, along with a number of retired officers who had remained in the area.(89)

To the north of the Royal Marine barracks was an area which contained some of the oldest housing in the town and because of its position in the unhealthiest part of the town was characterised by residents of low socio-economic status. This area was bounded to the north by a linear development which comprised the oldest houses in the town.

Perhaps the most interesting aspect of the socio-spatial structure of Woolwich at this time was the residential segregation of dockyard employees in the area to the north west of the town and to the south of the Steam Factory. Such a sharply defined enclave bears remarkable resemblance to similar clusters in New Brompton to the east of Chatham dockyard and in Marine Town Sheerness. In both the principal component analyses of Woolwich and Sheerness it is noticeable that dockyard personnel were highly negatively loaded on components reflecting high and low socio-economic groups.(Tables 6, 9) If this were accompanied by similar negative loadings for tertiary personnel and local trades then this group could be accepted as representing a middling socio-economic class between the two extremes. That this does not occur however, suggests that the dockyard workers segregated as an occupational group rather than as part of a generalised class position. Indeed in the three case studies it is most noticeable that the extremes of socio-economic status were often residentially closely juxtaposed in the dockyard town and that it was the dockyard personnel who tended to be most segregated

within the community.

As suggested earlier in this chapter such residential clustering largely stemmed from workplace status and affiliations. The work of Crossick on the development of a Victorian artisan elite is particularly illuminating in accounting for the social distance of dockyard employees from the remainder of the dockyard town community.(90) Crossick contends that the workplace and its relationships were central to the process of stratification within the working class and, as can be discerned in the case of the dockyard towns, the development of an artisan elite.(91)

The artisan elite was separated from lower strata by a complex of social, economic and cultural characteristics, and to some extent divided internally amongst precisely demarcated crafts. This aristocracy of labour, and the skilled workers who shared its aspirations if not its achievements, was defined by more than income alone. Social status, opportunity and behaviour reinforced the elitist potential offered by a stable and relatively adequate income. These artisans were conscious of their superiority over other sections of the working class, especially their labourers and the 'dishonourable' sections of their own trades, and they held an ambiguous position at the very time when they were the only organised section of the working class, organised within trade unions and, with those white collar and petit-bourgeois groups with which they were seen by contemporaries to merge, dominating the benefit societies, building societies, co-operatives and working men's clubs. ... Their superiority rested partly on earnings and job security ... and the type of work done.(92)

The dockyard clearly dominated the employment structure of the towns and the workforce comprised skilled 'established' (permanent) workmen and unskilled 'hired' (temporary) workmen. This distinction between the skilled craftsmen and the rest of the workforce was reflected in the higher wages and greater status of the former and was maintained by a lengthy and restricted apprenticeship system. This demarcation in the workforce appears to have spilled over into the residential structure of the town for the skilled 'elite' segregated residentially from the remainder of the community. The permanency of employment as well as the level of wages must have played an important part in this process for the

fluctuation in employment discerned in Chapter 4 predominantly revolved around the laying-off and taking-on of hired personnel. The residential areas of these workers therefore were characterised by a highly transient population comprised largely of those of low socio-economic status. This was in distinct contrast to the higher paid, skilled established workers who clustered as an artisan elite in a particular residential area.

The process by which this segregation took place in the dockyard town was greatly facilitated by the construction of specifically artisan dwellings during the colonising process which permitted dockyard personnel to relocate in areas considered to be socially acceptable and distant from unacceptable neighbours. Such a colonising process though was not a prerequisite for such segregation as the case of Woolwich demonstrates. However the development of new housing estates was an important factor and applicable in the case of Woolwich for the dockyard elite in the town had clustered in streets built in the decades following the establishment of the Steam Factory. Such residential segregation of the dockyard elite was therefore primarily a result of the nature of dockyard employment and the development of an artisan ideology though the extensive construction of new housing facilitated the spatial expression of this workplace elitism.

A final point to be made with regard to these areas is that the dockyard artisan elite was comprised of hierarchies of dockyard occupations and indeed hierarchies within occupations. As was noted in the case of New Brompton this resulted in differentiation occurring by street within the dockyard elite neighbourhood based upon the particular type of dockyard skills of the residents.

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31. See Carter, H. and Wheatley, S. (1980), Residential segregation in nineteenth century cities, Area, 12, 1, 57-62, for a discussion on the question of scale in the analysis of residential segregation.
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70. The Times 22 February 1869, 5.
71. Ibid., 10 April 1869, 12.
72. Ibid.
73. Ibid.
74. Ibid. 22 February 1869, 5.
75. Ibid., 1 September 1869, 10.
76. Ibid., 16 January 1869, 12.
77. Parliamentary Papers, 1869, XXXVIII, 483.
78. Parliamentary Papers, 1869, XXXVIII, 491, 495.
79. Rawlinson, R. op.cit., 32.
80. As for example in Sheerness, see chapter 9.
81. This figure would necessarily be dramatically altered if those institutionalised in barracks, which in 1851 amounted to 4317, were included.
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CHAPTER 9

SHEERNESS: A QUASI-COMPANY TOWN?

Such a town is scarce to be found again in England.

Wesley, J. The journal of the Reverend John Wesley, 1906,
Everyman, 3, 316.

Urban and Dockyard Development

In many respects Sheerness closely reflects the processes and patterns found in the fortified dockyard town and indeed in this respect this case study augments that of Chatham dockyard in illuminating a number of features common to this type of dockyard-urban development. However in its role as an outport and as the recipient of Government investment in workmen's accommodation Sheerness differs from other types of dockyard town and for this reason warrants greater attention. The involvement of Government in the provision of accommodation at Sheerness and its subsequent withdrawal from the housing market to a position more in line with events in other parts of the dockyard system presents an opportunity to examine closely the relationship and attitude of Government toward the local community and town development.

Early development

In its role as an outport to the up-river yards of Chatham, Deptford and Woolwich, Sheerness operated under a number of constraints which contributed to it remaining the smallest of the dockyards.(1) The yard was laid out on the lee-side and beyond the walls of Sheerness fort which extended on the landward-side in the form of bastion fortifications.(Figure 9.1, Plate VII) In this respect it differed from other fortified dockyards whose bastion defences were erected at a much later date though Sheerness was subsequently enclosed by further bastion-trace defences in the early nineteenth century. As a result of the proximity of the defences the dockyard was continually hampered by a chronic shortage of space and much of the yard was subsequently built on reclaimed land, 'below what was antiently high water mark'.(2) As part of the process of reclamation numerous vessels were sunk as breakwaters on the mud-flats in

front of the dockyard wharves during the early years of the yard and as they broke down they were incorporated into the foundations for making new ground.(Figure 9.2) Between 1673 and 1737 some twenty three warships and hulks were sunk to extend the yard in this manner (3) and 'a small but exceedingly useful Dockyard and Gun Wharf [was] formed'.(4) Due to the shortage of space these hulks were also utilised as storeships and offices and, as discussed later in this chapter, as accommodation for the workforce. The lack of space also necessitated the dockyard authorities utilising buildings within the fort as offices and storehouses.(5) (Figure 9.1, 9.2)

In addition to the lack of space the site also suffered from a number of other disadvantages including a poor subsoil which necessitated extensive piling before buildings, docks and wharves could be constructed. The locality was also deficient in fresh drinking water and this was a great problem to the inhabitants and to the dockyard because of the ships which called here for supplies. Furthermore, although the yard was protected by a powerful fort it was situated in an exposed position at the mouth of the Medway and was the most vulnerable of all naval dockyards. That it remained in service indicates the great utility of the yard to the naval authorities.

Throughout its history the strategic position of Sheerness was a vital factor in the development of the dockyard. Because the approaches to the up-river yards suffered from hydrographic and navigational difficulties, it was the practice for ships to be examined initially at Sheerness and, if major repairs were required, forwarded to one of the up-river yards. For similar reasons, Sheerness was also an important supply base, though due to limitations on the size of the yard only small

repairs could be undertaken at Sheerness or at the anchorages at the Great and Little Nore. The anchorage at Sheerness was particularly valuable in this respect for capital ships could be accommodated here which were unable to be laid up afloat at Chatham or the Thames yards.(6)

For much of the eighteenth and nineteenth centuries Sheerness remained heavily dependent on Chatham. Not until 1823, when a major reorganisation of the dockyard was nearing completion, did Sheerness have its own resident Commissioner. Prior to this date the principal officers were subordinate to the resident Commissioner at Chatham, 'who visits ... [the yard at Sheerness] ... as often as he sees necessary', (7) though in time of war a temporary Commissioner was sometimes appointed.(8) This reliance upon Chatham was reflected in many other respects, particularly in the supply of essentials to the dockyard and workforce and indeed in the provision of workmen themselves.(9)

Besides being a supply and repair base the yard also undertook the role of a naval base and maintained a cruiser squadron which patrolled the eastern Channel and the North Sea and monitored the Dutch fleet and the French fleet when at Dunkirk.(10) For these reasons the yard was particularly busy in war-time but, because it was expensive to maintain due to all necessities having to be imported from other dockyards by ship, the yard was slack during peace-time.

Government provision of accommodation

One of the most important aspects which distinguishes Sheerness from other dockyard towns was the involvement of Government in the large-scale provision of accommodation for the workforce. In large measure this was a reflection of the difficulties experienced in attracting workmen to the yard and retaining them thereafter. The remoteness and inhospitable

nature of the site at Sheerness greatly contributed to these difficulties. The pristine site provided little that could be of help in supporting a large workforce and the two nearest settlements at Minster and Queenborough were some distance away. Initially workmen travelled daily by boat from Chatham to Sheerness or lodged on board ships provided by the naval authorities and moored in the harbour.(11) Almost every necessity had to be brought to Sheerness by water from Chatham for land communication with the mainland via King's Ferry, 'that whimsical ferry', was poor and very time consuming.(12) Indeed, almost a century after the inauguration of the yard Wesley referred to the isolated community of Sheerness as being 'in a little corner of the land, shut up, as it were, from all the world'.(13) Building materials, especially timber, were in very short supply and for the most part also had to be imported. Furthermore, the subsoil and marshland surface provided further problems to would-be house builders.

The unhealthy nature of the site, for which Sheerness was renowned, contributed in no small way to the difficulties experienced in attracting suitable labour to the dockyard. Philipot referred to Sheppey as being 'more celebrated for the fertility of the soil than salubrity of the air, which is grosse and thick causing aguish infirmities that keep long residence when they get possession'.(14) Hasted also made reference to the unhealthy nature of the island and to the 'vapours from the soil'.(15) Nor was this limited to the early years of the yard, for in 1849 the medical officer of Sheerness dockyard reported to William Ranger, the superintending inspector of the General Board of Health,

that ague and intermittent fever prevail more or less all year round, that the inhabitants are subject to diarrhoea and that there is always a number of men from the dockyard on the sick list,... The public service suffers not only from this cause, but also from the fact of the men at Sheerness being allowed each 2 shillings extra, chiefly on account of the present

unhealthy state of the district and place.(16)

The large number of open drainage ditches containing stagnant water which surrounded Sheerness must have contributed considerably to the prevalence of malaria in the district.(17)

There are numerous references to the dislike felt toward Sheerness by the workmen, dockyard officers and military personnel sent there, especially in its early years, and to the toll which the place exacted on their health.(18) In 1743 the Sheerness officers reported that, 'Sheerness has not the best of Characters for health, the people round the country do not care to send their sons here, so readily as they do [to] other yards'.(19) Again in 1774 it was recorded that, 'The Country adjacent to this place is all Marshy and has always been reputed unhealthy.... therefore it has been difficult to procure Artificers and Labourers to reside there and indeed for the great part we have have been bred there'.(20) Under such circumstances and in order to maintain a functioning dockyard Government was compelled to provide more than just temporary accommodation. As the Commissioners of Visitation in 1814 recounted, Sheerness

had always the reputation of being unhealthy. At one period indeed fevers and agues were so very prevalent that Shipwrights and other artificers were literally impressed and compelled to reside at this point, for which purpose it was necessary to provide them with lodgings at the expence of the public.(21)

The nature of these lodgings took two forms. The earliest workers in the yard were accommodated on board hulks moored in the harbour which was a common procedure for overcoming a temporary shortage of accomodation at new sites. Soon, however, the workers were petitioning the Navy Board for houses, a market and a minister.(22) Uncharacteristically the response of the Board was a positive one: 'A petition being read from the officers of Sheerness, complaining of the suffering through the unwholesomeness of the

place, from the want of convenient dwelling-houses for themselves and families there; Agreed that for the sake of his Majesty's service, as well as in charity to the men, some provision of habitations may be fit to be provided'.(23) Thus toward the end of the 1680s a house was built for the accommodation of workmen employed in the yard and a further provision of lodgings 'for shipwrights and other Artificers entertained there' was made in 1692.(24) These lodgings were located within the walls of the fort and appear to have been similar to the barrack-like buildings occupied by the military.(25) (Figure 9.1, 9.2) Additionally the hulks were used in a dual role of breakwater and workmen's accommodation. There would appear to have been some early policy aimed at differentiating accommodation on the hulks and lodgings between married workmen and their families and single men but this does not appear to have continued for long.(26) In the course of time the hulks attained the status of permanent streets in the face of the housing shortage at Sheerness and in 1734 the 'workmen's lodgings' within the Garrison were made permanent and rebuilt in brick.(27)

There can be little doubt that the provision of accommodation at Sheerness was closely linked to the need to attract workmen to the yard. 'Hence Government has been obliged', recorded the dockyard chroniclers in 1774,

to grant them [the Sheerness dockyard workers] Advantages for their Encouragement that they have not in other Yards, that is, they and their Familys are provided with lodgings part of them in Houses and part of them in old ships laid there as Breakwaters. Viz 425 persons in 192 rooms, and 551 in 258 Cabbins, Total 976.(28)

At this time some 469 workmen were employed in the dockyard.(29)

A shortage of accommodation at Sheerness continued throughout the eighteenth century especially during time of war. In 1742 it was recorded

that lodgings 'are extremely much wanted on this encrease of people in the yard, several of whom are obliged to go upwards of two miles after they leave work at night, for lodgings, And which they pay very dear for, after trouble and Pains....'.(30) The dockyard authorities were compelled, in the face of this chronic shortage, to continue to provide accommodation although in this they were aided by the continuous programme of sinking hulks as breakwaters adjacent to the yard which provided a ready source of accommodation.(31)

The large-scale provision of accommodation for dockyard workmen and their families as at Sheerness is all but unknown at other dockyards. Government involvement in the provision of accommodation here was in response to the lack of private construction and speculative investment in housing which was a reflection of the dislike felt toward this isolated location by all concerned. Dockyard and military officers alike tended to transfer elsewhere at the earliest opportunity and the availability of capital for housing ventures was not forthcoming as in other dockyard locations. The transient nature of the workforce, many of whom were on temporary transfer from the up-river yards, also depressed demand for permanent private accommodation.(32) Furthermore, the early provision of accommodation by Government must in itself have deterred investment in private housing. Like companies elsewhere who were involved in specialised and company towns Government was forced through economic necessity to make good the housing shortfall.

Despite the provision of accommodation and a market place the naval authorities had from an early date declined suggestions to take on a more extensive mantle of responsibility for community and town building. As early as 1678 Major Nathaniel Darell, commander of Sheerness fort, had forwarded proposals to the Lord Treasurer suggesting that,

As the lands of the son of Alderman Mennel, deceased, called the level, adjoining the fort and other lands abutting thereon, are going to be sold cheap [then] the Lord Treasurer might buy them to great advantage he will much consult his interest by the resale of some of these lands, and certainly a little town may be built there in short time, and besides the houses, the Lord Treasurer will get a good rent for them, and will thus have an entire domination over the corporation of Queenborough to dispose of it at his pleasure.(33)

Such a proposal was not pursued. Instead Government took the least costly and least involved course compatible with maintaining the nucleus of a workforce necessary to operate the dockyard without becoming embroiled in a field which the authorities considered lay outside the scope of the State.

That the dockyard authorities had little intention of undertaking a paternal role toward the dockyard community is illustrated by events concerning the supply of water in Sheerness. Great difficulties had always been experienced at Sheerness because of the shortage of local water supplies, 'there being no fresh water on the whole island sufficient to supply this place' (34) and in the early years of the yard all water was brought in barrels by ship from Chatham. Attempts by the Navy Board to bore for water within the fort in 1724 failed (35) but supplies were obtained from a well at Queenborough. However the Navy Board attempted to reserve this supply for the sole use of the dockyard and naval ships only and it was not until the Treasury intervened that the Navy Board was forced to open the supplies to the public.(36)

Government involvement in the provision of accommodation at Sheerness continued for well over a century though as private housing began to be constructed towards the end of the eighteenth century on land adjacent to the fort at Blue Town the authorities considered ways of closing down the hulks.(Figure 9.2, 9.3) In 1767 the Reverend John Wesley had noted

In the Dock adjoining to the Fort, there are six old men of war. These are divided into small tenements, forty, fifty or sixty in a ship, with little chimneys and windows, and each of these contained a family. In one of them where we called, a man and his wife, and six little children lived; and yet all the ship was sweet and tolerably clean, sweeter [sic] than most sailing ships I have been in.(37)

However, other reports concerning the hulks present a less than glowing testimonial to their character and certainly as accommodation in Blue Town increased they became no more than an unwanted nuisance to the yard and fort authorities. Access from Blue Town to the hulks was via a passage through the dockyard and by 1800 Commissioner Isaac Coffin was complaining of 'the inconvenience [which] resulted from...[the yard]... being a common resort of Whores and Rogues by day and night; the conduct of the former [being] more shameful and atrocious by a ready access to the Gin 'shops in the Old Ships'. He left it to the Navy Board 'to come to a determination most likely to put an end to the practice' (38) and in 1802 Coffin forcibly closed the hulks amidst riotous conditions.(39)

Government had in the mean time made some attempt to provide alternative accommodation to the hulks by rebuilding in 1794 the 'Great Alleys', the barrack-like accommodation within the fort, for even toward the end of the eighteenth century accommodation was still in short supply in the town. After 1802 the Alleys were the only remaining source of Government accommodation for civilian dockyard workers and they remained functional until the 1820s when it was reported that large numbers of workmen were leaving the workmen's lodgings in the Garrison to hire cheaper accommodation in Blue Town and the more recent development at Mile Town.(40) In the process of dockyard reorganisation and the development of Mile Town during the 1820s Government extricated itself completely from the housing market.

Central to the withdrawal of Government sponsored accommodation was the development of private settlement, first at Blue Town and then at Mile Town. By 1738, after some sixty years of dockyard existence the first private houses had been constructed under the name of 'The Blew Houses' on private land situated as close to the dockyard as was possible without encroaching onto land owned by the Board of Ordnance or the naval authorities.(41) (Figure 9.2) Not only were the early house builders confronted by poor terrain but also a severe shortage of building materials for the site was tree-less and timber elsewhere on the island had been procured by the dockyard authorities.(42) It is commonly accepted that as a result of these shortages the town was constructed of timber taken from the dockyard as 'chips', supposed waste pieces of timber or 'cut-offs' less than six feet in length which dockyardmen were permitted to remove from the yards as a perquisite. In view of similar accounts of houses built of chips in Portsea and of the well known abuses of the 'chips' privilege there is good reason not to dismiss these claims.(43) The houses in Blue Town were constructed in typical shipbuilding 'clinker' style and were still to be seen in Blue Town until recently when slum clearances removed the last vestiges of them.(44) The name of Blue Town, it is claimed, stems from the colour of paint taken from the dockyard and used to paint these houses. Under the circumstances it seems reasonable to speculate that early private housing in Blue Town during the eighteenth century was undertaken by dockyardmen working on a do-it-yourself basis and using materials obtained from the dockyard and was not based upon injections of private speculative money. This process of self-help would partly account for the slow and cautious development of Blue Town.

Prior to the Seven Years War (1756-63) Blue Town had not expanded to any great extent beyond the addition of two further terraces of houses

(45) though the proven utility of the yard during the war (46) led to plans being drawn up by Sir Thomas Slade, Surveyor of the Navy, in 1763 to expand the dockyard and to construct docks capable of taking larger ships. The proposal seems have been to construct an entirely new yard at Sheerness for the plan had 'little or no regard to the preservation of the yard as it then existed'.(47) However, due to the poor friable subsoil, which was liable to flood any dock which was deepened, and the problems of obtaining fresh water and the confined space of the yard Slade's plan was not implemented.(48) Furthermore, an infestation of Toredó Navalís, or 'the ship worm', at Sheerness at this time was causing substantial damage to wooden-hulled warships moored in the harbour and naval ships which were not sheathed in protection against the worm could not safely be harboured in the vicinity.(49)

Despite these difficulties and the rejection of Slade's plan the dockyard was not abandoned, for in the event of a northern war it was considered highly desirable to have a yard in this area (50) and the strategic advantages of Sheerness were considered to out-weigh the physical defects which could, in any case, often be ameliorated.(51) However, until the basic deficiencies in the yard were overcome, and despite an extension to the yard in 1774, the workforce remained small and the dockyard continued in a state of near dereliction.(52)

Dockyard expansion and urban colonisation

Toward the end of the eighteenth century the dockyard thus was in a poor condition.(53) A number of short term improvements had been made to the yard since the rejection of Slade's plan and a continuous programme of piecemeal land reclamation had alleviated the problem of space to some extent but at the expense of an unplanned and inefficient yard.(54)

Further plans to reorganise the yard in the 1780s were not pursued, (55) and by 1802 the Commissioners of Visitation recorded that 'much inconvenience appears to be produced by the want of sufficient space, the dock being contracted, and many of the storehouses very small and scattered in different parts of the yard and the Garrison'.(56) The disadvantages of the site, well known for many years, continued to deter the large-scale reorganisation and investment which the yard by now so urgently required.

although it has the advantage of depth of water and a situation to the North of the Forelands, yet the nature of the soil (in most places a quick sand) the very confined extent of wharfage near deep water and its being on the wrong side of the harbour with respect to the prevailing winds, are disadvantages that should prevent the expenditure of any considerable sums of money upon repairs (now much wanted) if another place can be found that is not liable to the same objections.(57)

The need for an outport to the up-river yards was stressed by Inspector General Bentham in his proposals for improving the dockyard system (58) and in a reappraisal of alternative sites to Sheerness Bentham preferred a site at Blackstakes, near Coleman Creek on the Isle of Grain a mile or two to the west of Sheerness.(59)

The Commissioners of Visitation of 1802 were impressed with Bentham's plan and surveys and estimates for both Blackstakes and Sheerness were made. In the event the Blackstakes scheme was abandoned and repairs to the wharves at Sheerness were, unsuccessfully, undertaken by Bentham. Quite why Blackstakes was abandoned is not known though it did coincide with a much larger scheme proposed by John Rennie the elder to close the up-river dockyards altogether and construct a new yard at Northfleet on the Thames. Rennie was also of the opinion that the yard at Sheerness, 'composed only of some old wooden ships embedded in the mud, a few storehouses, a wretched basin lined with wooden walls, and some timber jetties,' should, because of the cost of renovation, be abandoned and his

plan was enthusiastically accepted by the Prime Minister William Pitt and land purchases at Northfleet were begun.(60) The project however was abandoned on the death of Pitt in 1806.(61) In view of the favourable response which this plan received it may have precipitated the abandonment of Bentham's original scheme.

By 1808 little improvement to the yard had been accomplished and Commissioner Boyle wrote to the Navy Board calling their attention, 'to the defective state of this Dock Yard, which is growing more so every day'.(62) This state of affairs was fully confirmed by a subsequent survey by Rennie and the Master Attendant at Woolwich, Joseph Whidby; 'The timber of the wharves generally speaking is rotten, the foundations in many places have slidden outwards - the earth and pavement are sunk. A part of the side of the wall of the Mud Dock at the small launching slip has tumbled down, and indeed the great bulk of the Yard may be said to be a wreck'.(63)

the offices of the several officers of the yard are scattered about in the most inconvenient manner the storehouses are dispersed in the same irregular manner over the yard, some being within and some without the garrison ... [and] ... very much inconvenience ... arises to the Public Service. ... The storehouses are besides in a most wretched condition with regard to repair, as well as being ill-calculated for the purpose to which they are applied ... many of them are old buildings that have been erected in the infancy of our Naval Power, and others ... have been added as temporary expedients. No systematic arrangement has ever been thought of in any one part of this establishment'.(64)

They concluded that the yard was, 'not to be kept up by partial or temporary repairs. Its constituent parts are gone, patching and mending will only prolong the evil day for a short time, but the time will come, and this not very distant, when the whole must be thoroughly repaired...' and nothing short of a complete reorganisation and modernisation programme was required.(65) Importantly though, they were now of the opinion that whatever the course of events at Chatham, Deptford or Woolwich, or even if

a new yard was established in a better situation than Sheerness nonetheless the yard should be retained for fitting and repairing ships (66) for it was considered as being of 'almost indispensable utility'.(67) Because of the pressure of wartime service no improvements could be made to the yard but toward the end of the Napoleonic war the Admiralty Board instructed the Navy Board to draw up plans to reorganise the dockyard.(68) In 1815 work began on reorganising the yard according to plans drawn up by Rennie and by the time work had finished in 1827 the yard had been entirely rebuilt.(69)

By 1815 increases in the military and civilian population had resulted in Blue Town growing to the maximum areal size possible within the constraints of the surrounding Board of Ordnance land. The town covered a triangular stretch of land adjacent to Sheerness Fort and the dockyard and was surrounded on all sides by Government land.(Figure 9.3) It was unusual for the authorities to allow the construction of private housing so close to the defences during the eighteenth century. Whether this was deliberate policy to encourage such private building or the inability of Government to purchase this land is not known. Certainly by the 1790s the Board of Ordnance had accepted that the landward defences of Sheerness Fort were obsolete due to the presence of Blue Town on its immediate flank and allowed private houses to be constructed on Ordnance land to the north of High Street adjacent to the inundation.(70) (Figure 9.3) This section of the glacis contained only a 'burying ground' and standing water and by 1800 encroachments extended for some several hundred yards along the northern flank of High Street and the western side of West Street (71) but the houses were allowed to remain only on condition that the parties concerned should give up possession when the land was required by Government.(72) Despite the obsolescence of the defences the action of

the Board to allow such encroachments on to the glaciis was uncharacteristic and such leniency reflects the severe housing and land shortage which existed in the town.

As part of the defence schemes which were taking place at other dockyard locations during the 1780s the Board of Ordnance purchased further land encircling the settlement of Blue Town on its landward side and began construction of a second outer defence system part of which, Fort Townsend, existed in 1782.(Figure 9.3) In this area encroachments were fiercely resisted and the limits of urban expansion of Blue Town firmly fixed.

During the reorganisation of the yard the Commissioners of Visitation negotiated for Major's Marsh and the now obsolete defences to be transferred to the navy authorities (73) for the land was 'wholly useless as works of defence by being surrounded with buildings [of Blue Town]', and was appropriate 'for no other use than as a receptacle for every kind of filth'.(74) The Board of Ordnance ceded the land but retained part of the defences along the shore facing the Thames. The remaining fortifications were levelled and the height of the land raised six feet using earth excavated from the dockyard extension to cover the filthy mud and prevent standing water from accumulating.(75) (Figure 9.4)

The dockyard expanded freely onto the Ordnance land and residences for dockyard and military officers were amongst the first buildings to be constructed.(Figure 9.4, Plate XVI) In contrast the settlement of Blue town had reached saturation point and infilling had proceeded as far as was possible. The tall narrow houses built during this period reflect the great pressure on land space.(Plates XVII, XVIII) A number of factors combined at this time to force the movement of population out of Blue Town

beyond the surrounding Ordnance land toward Mile Town. Following the extension of the dockyard onto the glacis the naval authorities demanded that the houses which had encroached onto the glacis along High Street should be vacated and demolished. By this date the buildings were 'generally of the most temporary description and let at very exorbitant rents such as generally reimburse the Parties both Principal and Interest in the course of four or five years after they have built', and were largely occupied by 'Artificers employed in the Dockyard' and tradesmen.(76) Whilst the tenants petitioned several times for the evictions to be cancelled or delayed Government feared little trouble from them for as dockyard employees they 'would not wish to give offence for fear of dismissal'.(77) Demolition of these houses was accomplished by December 1818.(78) Furthermore, other plans were implemented at this time to purchase a strip of private land containing houses adjoining the dockyard on the western side of West Street to gain additional room and to reduce the risk of fire.(79) The importance of these actions was that they coincided with the boom conditions of the Napoleonic War which even though drawing toward a conclusion was then being boosted by large numbers of workmen employed on the dockyard extension. The town, stimulated by the closure of the hulks and the war had utilised all available space for housing such that by 1815 no accommodation was to be had in the town.(80) A covering letter by Major General Rudyard, commanding officer of the Royal Engineers at Sheerness, to a memorial sent from those tenants faced with eviction from Ordnance land to the Board stated that he had

'witnessed the consternation and real distress [which] the notices [of eviction have] ... occasioned, and [was] of opinion that the memorial ... is not exaggerated, but falls short of the suffering many of them must experience ... and were it even that Accommodations could be obtained in Blue Town or its neighbourhood which from my thorough knowledge of the place there is no lodging to be procured even for a small family therefore it would be entirely out of their power to remove at so short notice...'.(81)

So severe was the shortage of accommodation that hulks were made available by the Navy Board to the contractors undertaking the dockyard modernisation work, Jolliffe and Banks, to accommodate a large number of their workmen. A further storey was also added to the workmen's lodgings in the Garrison.(82)

Requests by the inhabitants of Blue Town to the Board of Ordnance to allow the construction of housing on Ordnance Marsh to the south and east of Blue Town were rejected. Only sites beyond Ordnance land 'at a considerable distance from the dockyard and from the pier or landing place on which all the necessaries of life are obliged by law to be landed' were available for development.(83) This latter factor was especially important to those tenants threatened with eviction for 'being principally tradesmen with large families whose means of support depend solely upon their trade and situation of their Houses ... (from the sudden and unexpected peace) [had] very considerable stocks remaining on their hands which can neither be immediately disposed of nor suddenly removed'.(84)

These forced removals and a congested Blue Town triggered the movement of inhabitants beyond Government land in the search for building land. An initial proposal was to develop a site to the south of the town on the road to Queenborough but only a footpath connected this area with Blue Town and the dockyard and permission was required from the Board of Ordnance to construct a road over ordnance land.(85) A report from the local agent to the Navy Board noted no material objection that could give the Navy Board cause to oppose the proposal, and considered that, 'the situation ... selected for building their habitations on is in my opinion, the most eligible in the neighbourhood, and certainly likely to be less expensive to them than any other owing to its contiguity to the Medway and the present landing place or pier ...'(86) No settlement was constructed

in this area however and it is possible that the Board of Ordnance vetoed the plan for the land proposed for the settlement was subsequently purchased by the Board to become part of the glacis of the new defences.

In the event the colonising movement took place toward Mile Town beyond Ordnance land to the east of Blue Town on the road from Blue Town to Minster. The small settlement of 'Mile Houses' was in existence from the early eighteenth century but by 1815 it contained no more than a few farms and outbuildings.(87) (Figure 9.3) Early inhabitants of the colony comprised mostly clerks and artificers employed in the dockyard 'lately removed from Blue Town in consequence of the houses being taken down there'.(88)

The colonising movement was further stimulated by a proposal by Rennie that the site of Blue Town itself should be purchased and included within the dockyard extension. An Act of Parliament for this purpose was obtained in 1816.(89) Rennie's advice to the Navy Board was to purchase the freehold interest of all land proprietors and to refuse to renew leases as they neared completion or to purchase the leaseholds on moderate terms or if this proved impossible, on terms determined by a jury under the terms of the 1816 Act.(90) By 1819 no action had been taken in this respect and the inhabitants of Blue Town petitioned for a decision regarding the proposed purchase.(91) An agent was eventually appointed by the Navy Board in January 1820 to enquire into the terms upon which the freehold property in Blue Town could be purchased, 'and so to frame future leases as to render the total removal of the town'.(92) The agent estimated that more than 500 houses were under consideration and the number of owners very great.(93) A Bill was drawn up in May 1821 to proceed with the purchase of 'the whole of the ground on which Blue Town

stands', but was held in abeyance pending final instructions to proceed from the Navy Board.(94)

It is unclear, despite the preparation of this Bill, to what extent Government seriously intended to proceed with the purchase and subsequent demolition of Blue Town. In 1819 the Commissioners of Visitation commented that if 'the space now occupied by Blue Town is likely to be required for Naval or Military purposes then undoubtedly it ought to be purchased at an early period but as relating to the Dock Yard the Committee do not think there is the most remote prospect of its being wanted'.(95) In 1820 the Navy Board again noted that they were 'not aware of the necessity or advantage for the purposes of the dockyard of having Blue Town and ... suggests that the Act may be repealed'.(96) Despite these statements of disinterest by the Navy Board, preparation of the Bill to purchase the town was allowed to proceed but the delay in implementing it brought about a spate of petitions to Government from house owners in Blue Town demanding a decision.(97) In 1821 the Navy Board forwarded a petition to the Admiralty Board stating that they could not 'but forward the enclosure for their Lordships consideration without remarking that the state of suspense in which the proprietor's of houses are now left, is calculated to produce the most injurious effect upon their property, both as it respects any sales thereof or the repairs of Buildings standing on the Freehold in Question.' The Navy Board requested an end to the suspense by repealing the Act of 1816 and the proposed Bill.(98)

Quite why the proceedings were not ended earlier is unclear though the position of the military in this matter requires greater clarity. Certainly the costs estimated by the agents in 1820 may have been an important factor:

The moment the Act was passed for the purchase of Blue Town

the people began to entertain unreasonable and exorbitant expectations of the value of their property, and in order to urge the Government to make the purchase they complained as a matter of hardship that the Act of Parliament was hanging over their heads which as they said kept them in a state of continual suspense as well as daily loss on their property and it was in consequence of this that the Act was repealed'.(99)

The events of the early decades of the nineteenth century illuminate a number of aspects regarding the relationship between the dockyard and military authorities and the dockyard town community. Military and naval requirements necessarily changed through time and yet the 'slate' upon which dockyard, defences and townships were drawn could not be wiped clean without considerable financial and social cost. What is particularly noticeable in the clearances of population from High Street and West Street and later the proposed demolition of Blue Town was that the authorities made no proposals for relocating the evicted inhabitants elsewhere. Proposals made to the authorities by the inhabitants involving Government land were rejected. The authorities appear to have pursued a 'negative' role, stipulating where settlement could not take place rather than undertaking a more positive approach and planning for future development in order to lessen the conflict between civilian and military objectives. This is particularly well illustrated by events surrounding the development of the colony of Mile Town during the 1820s. During this period the colony grew steadily from a small hamlet into a small town. The greater part of the land upon which Mile Town was constructed was owned by James Chalk of Queenborough (100) but was mortgaged to Sir Edward Banks (1770-1835) who eventually came into full possession.(101) (Figure 9.5) Banks was joint partner with Jolliffe in a leading firm of building contractors who undertook the Sheerness dockyard extension under the superintendence of the Rennies.(102) During the 1820s the proximity of the growing colony to the new bastion defences increasingly concerned the authorities because of the narrow glacis and as a result a section of land within 600 yards of the defences and including the land surrounding Mile

Town was purchased by the Government from Banks in 1827. This purchase effectively enclosed Mile Town within Government land and because building on this land was not permitted, further expansion of Mile Town was curtailed. In view of the size of Mile Town by this time such a step was probably too late to have been effective in securing the continued effectiveness of the defences and yet by preventing further development of Mile Town Government contributed to a further colonising movement to the north east beyond the recently purchased Government land to Marine Town.(Figure 9.6)

Government policy toward dockyard settlements appears to have been short-term and in relying on responding to situations was therefore largely a matter of expediency. Having restricted the areal expansion of Blue Town and stimulated population movement to Mile Town Government then proceeded to also check, by land purchase, expansion of this settlement which brought about a second colonising movement. That the rapid growth of Mile Town in front of the fortifications was not foreseen nor sites for future settlement set aside indicates the limited role which the authorities took in the development of dockyard settlements. In time the presence of Mile Town and Marine Town before the defences led to a further ramparted moat being constructed to the east of Marine Town in 1862 which thereafter prevented the eastward expansion of Marine Town.(103)

In many respects the action of Sir Edward Banks in the development of Mile Town was in stark contrast to that of the naval authorities. Banks became extensively involved in the development of large parts of Mile Town including the construction of houses in part of Mile Town which became known as Banks Town. He gave land for the construction of Holy Trinity Church (104) and in an attempt to develop Sheerness as a watering place

introduced a tri-weekly steam boat service from London to Sheerness and paid for the restoration of the pier.(105) In this way Banks undertook an active role in the towns which the naval authorities were so reluctant to do.

The Population Structure of Sheerness in 1871

The dominant role of Government in the development of Sheerness is reflected not only in the morphology of the town but also in the structure and socio-spatial distribution of the population. The influence of Government over the population structure can be identified in two ways. Firstly, by the presence of a large number of military and naval personnel who were resident in Sheerness as a direct consequence of Government directives. Secondly, by the way in which the demand for labour by the dockyard authorities influenced the nature of the civilian population attracted to the town. Both of these considerations are applicable to all dockyard towns.

The military presence

A large distinct body of military and naval personnel had been present in Sheerness since the yard and its defences first came into existence. Between 1841 and 1871 this group varied between 10-15% of the total population in common with other dockyard towns and in 1871 consisted of 450 soldiers and 1086 Royal Naval personnel.(106) (Figure 9.7) Additionally 291 women and children were recorded as resident in the barracks and a further large number of military personnel amounting to 3.6% of the civilian population were resident in the town. Thus the military presence in Sheerness, both institutionalised and otherwise, was

substantial and if dependents were included then this sector amounted to a considerable proportion of the total population. Additionally between 1812 and 1827 some 500 convicts were directed by Government to be stationed at Sheerness on board the 'Retribution' and 'Zealand' hulks moored in the harbour. The use of convict labour was common at all dockyards undergoing extension schemes and dock excavation and with their guard the convict presence amounted to a further considerable number of personnel located in Sheerness on the orders of Government. The importance of the convict and especially military presence in Sheerness, however temporary their residence, lay in the considerable boost they gave to the tertiary sector of the town and the local economy. Indeed when the convicts were removed to Woolwich following a petition for their removal from the inhabitants of Sheerness Turmine records, 'it is supposed they will again petition for their recall, thinking, perhaps the nuisance is preferable to the loss of trade'.(107)

The structure of the civilian population

The military presence can also be seen reflected in the composition of the civilian population. Excluding those in barracks and on board ship there is a dominance of females to males, 50.6% of the population to 49.4%, which is perhaps surprising for a town dominated by a male employing industry.(108) This excess of females represents the wives of military personnel who were absent on active service. The enumeration of a large number of female head's of families who were recorded as 'wife of seaman' or 'wife of soldier' emphasises this point. This imbalance is also reflected in the age distributions of each sex which shows a dominance of females between the age of fifteen and thirty and an excess of males between the age of forty and sixty.(Figure 9.8) The former possibly reflects the absence of males from Sheerness on duty or resident

on board ship or in barracks while the latter could reflect military personnel taking up residence in the dockyard town following retirement from the armed forces; a common practice to which numerous references occur in the enumerators schedules.

The specialist labour requirements of the dockyard authorities largely determined the occupational characteristics of the population and the labour market from which the dockyard drew its labour. Alternative male employment, other than in the tertiary sector, was extremely restricted. (Figure 9.9) The dockyard dominated male employment and employed no females at all. At least thirty eight per cent of the economically active male workforce were employed in the dockyard, a figure which was in reality was likely to be much greater given the large number of labourers and artisans whose place of work was not designated. Close scrutiny of the employment details in the census schedules suggest that as much as half of the male workforce was directly employed in the dockyard. Alternative employment outside of the dockyard was largely confined to the tertiary sector and local trades, and there can be no doubt that they were heavily reliant upon the primary employment afforded by the dockyard and the purchasing power of the substantial military presence. Sheerness was without doubt a single industry town heavily dependent upon the dockyard and Government and the town clearly falls within Smailes's criteria of a specialised town.

Very little employment opportunities existed to utilise the pool of female labour and only 16.4 per cent of all females were employed, 8.3 per cent of the total population as against 27.8 per cent for males. The range of female employment was also severely limited to domestic service and, to a lesser extent, the clothing trade and more menial jobs. Many of these jobs were likely to be of a part-time nature.

The extent to which the dockyard authorities discouraged other industries from locating in the area is not known. This was probably not a problem at Sheerness for labour was difficult to attract and the area possessed few advantages, except surplus female labour, sufficient to attract other industries. Limited access to the water frontage and naval restrictions on the use of the harbour coupled with the extensive land ownership of the Board of Ordnance around the township was probably a considerable deterrent to manufacturers contemplating locating here.

In 1871 less than half the population of Sheerness was native born, 54.7 per cent being migrants. (Figure 9.10, 9.11) As outlined in Chapter 8 and in accordance with the other dockyard towns the migration field of Sheerness was dominated by neighbouring counties and the dockyard counties of Hampshire, Devonshire and Pembrokeshire. The establishments at Woolwich and Deptford on the River Thames which had recently closed in 1869 and Chatham on the Medway further increased the contribution of migrants from the neighbouring counties to Sheerness. These counties were followed in importance by the maritime areas whilst the smallest contributing areas were the inland counties of England. A crude comparison between the migrants from coastal and inland counties emphasises the relative importance of the former. If the large contributions from neighbouring counties and dockyard counties are excluded from the calculations and the remaining thirty counties which each contributed less than one per cent to the total population of Sheerness are examined the twelve coastal counties contributed twice as many migrants to Sheerness as the numerically superior eighteen inland counties. If all counties are included then the dominance of English coastal counties is considerable, forming 71.2 per cent of all migrants in

Sheerness as against 14.7 per cent from inland counties and this reflects the demand for specialist skills by the dockyard.

The dominance of a number of nodes, principally the dockyard towns, in the migration network of Sheerness has already been recounted.(109) Such patterns reflect the demands for labour by the dockyard authorities and emphasise the dominant influence of Government over the type of migrant attracted to the dockyard town.

Migration into Sheerness was, therefore, spatially selective. It was also demographically selective for although migrants and native-born were of almost equal numbers the age distributions of these two groups differ markedly. (Figure 9.12) In contrast to the age distribution of migrants, native-born residents dominate the age group up to twenty years of age whereas from the age of twenty five years the number of migrants exceeds native-born by almost two and occasionally three to one throughout the remaining age groups. The simplified table showing the age structure of both groups exemplifies the contrasting distributions.(Table 11) Of those born in Sheerness and the neighbouring settlements of Queenborough and Minster, almost seventy per cent were below the age of twenty years, whilst the equivalent figure for the migrant group was only twenty seven per cent. After the age of twenty years, however, the position is reversed and migrants totally dominate the age group from twenty five to forty years. Thus migrants formed the major child bearing sector of the population and, importantly, provided the major part of the workforce. Thus although those who were native-born accounted for approximately half of the total population the majority of these were very young and economically inactive, whereas migrants contributed far more to the workforce than their fifty per cent proportion would initially suggest.

The population of Sheerness was relatively youthful.(Figure 9.13) To a large extent the town had grown as a result of migration which tends to be age-selective towards young adults of child-bearing age who swelled the birth-rate once they arrived in Sheerness. As such the bottom-heavy anvil shaped age pyramid reflects a young population in which the main working and child bearing sections of the population between the age of fifteen and fifty five comprised fifty five per cent of the population.

It is noticeable that the sex composition of migrants with respect to county of birth does show some interesting patterns.(Figure 9.14) The small number of migrants from some counties must preclude any general statement but there is a clear dominance of female migrants from the dockyard counties of Devonshire and Hampshire where female migrants exceeded male migrants by as much as a third. This imbalance could be due to the absence from Sheerness on active service of male spouses born in these counties. Not least the extensive movement of dockyard workers and naval and military personnel through dockyard counties would also contribute to an excess of marriages to females born in those dockyard counties.

Overall there was certainly a distinct tendency for migration from particular counties to be selective toward certain occupations and this was especially the case with respect to the dockyard counties. Just under half the migrants from Devon and Hampshire, for example, who were resident in Sheerness in 1871 were skilled dockyard craftsmen. In contrast little more than three per cent of migrants from these counties resident in Sheerness were labourers. As would be expected the situation is almost reversed in the case of migrants of Ireland. Both Devonshire and Hampshire also contributed substantial numbers of army and naval personnel

though no county exceeded the high proportion of military personnel, many of high rank, which emanated from Scotland. The large presence of Scottish soldiery has also been noted in other dockyard towns.(110)

Sheerness was a town dominated by persons of social class III and IV, the skilled and semi-skilled categories. Comparison with similar figures produced by Armstrong for York (111) and figures from Marsh for England and Wales in 1951 (112) suggest that Sheerness had a greater than average proportion of social class III.(Tables 12, 13) In contrast, social classes I and II constituted only eight per cent of the sample and in comparison with figures for York and England and Wales were under-represented in the town. Social class V is also small in comparison. Further, there is a good case to be made for placing many dockyard labourers in the category of semi-skilled workers more in line with the tasks which they performed in the yards in which case social class V would be even smaller and social class IV reciprocally enlarged.

Overall the town was dominated by skilled dockyard workers and tradesmen which enlarged social class III, though as Armstrong points out, this class would always tend to be swollen given the schema of the Registrar General's classification.(113) There was certainly a lack of extreme in the range of social class in Sheerness in which social classes I, II and V were under-represented and the town was comprised largely of skilled and semi-skilled workers and traders in keeping with the known major occupations and sources of employment.

What becomes clear is that the particular requirements of the dockyard authorities for labour had a marked impact on migration which was socially, occupationally and demographically selective. Furthermore, migrants dominated the child-bearing and workforce section of the

population. The town was dominated by the dockyard and associated military presence and variations in the activities of either of these had a major impact on the economic welfare and population structure of the town as a whole.

Socio-spatial structure

The socio-spatial structure of Sheerness was greatly influenced by the employment structure and morphological development of the town. The process of colonisation imposed upon the township by the restrictions of fortifications and Government ownership of land resulted in newer houses being constructed at an increasing distance from the dockyard.

Intra-urban residential movement and in-migration during the various stages of this process resulted in social patterns which closely reflect the various stages of urban development.

In examining the socio-spatial structure of Sheerness a matrix composed of the population characteristics of each street block into which the town had been divided was subjected to principal component analysis and the resultant patterns augmented by location quotient plots of particular variables. The database of socio-economic and demographic variables was constructed from information contained in the census enumerators schedules for 1871 and as detailed in Table 6. Principal component analysis was successful in summarising much of the total variance of the census data into just a few components.(Tables 5-6)

The first two components are clearly measures of contrasting socio-economic status.(Table 5) The first component accounted for fifteen per cent of the variance and high loadings on variables of social class I and II and servants 'living-in' reflects high socio-economic status. In

contrast, dockyard employees and labourers were highly negatively loaded on this component and would appear to have been particularly absent from areas of high socio-economic status. High positive scores on component one show concentrations of streets containing persons of high socio-economic status in three distinct areas of Sheerness: in that area of Blue Town consisting of High Street and West Street, the Broad Street area of Mile Town and parts of the more recently constructed Marine Town, particularly those streets fronting the sea.(Figure 9.15) The location quotient plot of social classes I and II bears close resemblance to the pattern of scores on component one though it is noticeable that some streets, notably in High Street and West Street in Blue town and some streets in Marine Town, do not completely correspond with the factor score plot.(Figure 9.16) These streets were marked more by the presence of servants (Figure 9.17) than by persons of high socio-economic status and the large presence of lodgers in these streets probably contributed to this pattern.(Figure 9.18) The remaining clusters of servants largely relate to the known tertiary area in Mile Town, to the residences of military and dockyard officers and high quality housing in Banks Town and part of Marine Town.(Figure 9.19, 9.20)

Component two accounted for nearly fourteen per cent of the data variance and is a measure of low socio-economic status in which social classes IV and V, labourers and Irish born are all heavily loaded on the component.(Table 6) Noticeably dockyard employees were highly negatively related to those of low socio-economic status. Streets with high positive scores on component two are concentrated in the older settlement of Blue Town and a distinct gradient from west to east can be discerned in which streets containing residents of low socio-economic status are clustered in the west.(Figure 9.21) These streets were also marked by the presence of labourers and Irish born residents who were concentrated in the central

and south eastern section of Blue Town. (Figures 9.22, 9.23) In Mile Town such clusters occurred in the backstreets, alleys and courtways of the town but were much less extensive than in Blue Town. Marine Town was practically devoid of labourers and low socio-economic groups.

The pattern of high negative scores which denote an absence of persons of low socio-economic status and the presence of dockyard personnel is in contrast to the previous distribution in that the gradient runs from east to west. This pattern dovetails with that of the location quotient plot of dockyard workers which group dominated much of Marine Town and the extremities of Mile Town. (Figure 9.24) There is little doubt that the older and congested parts of Blue Town and the poorer parts of Mile Town had been taken over by the poorer classes whilst skilled dockyard artisans had removed to peripheral parts of Mile Town and especially to Marine Town. The older settlement of Blue Town had been vacated almost completely by skilled dockyard workmen and those of high socio-economic status who, it can be surmised, moved first to Mile Town and subsequently to Marine Town whilst their place in Blue Town and to a lesser extent in Mile Town was succeeded by those of low socio-economic status and immigrants.

The third component, amounting to eleven per cent of the variance is a measure of high population density coupled with a youthful population in which Scottish born and military personnel were present. (Table 6) The pattern of factor scores on this component is complex and is partly a reflection of the difficulty in equating the number of people residing in a house with the size of that house. (Figure 9.25) 'Population density' can be somewhat misleading in this instance for small houses containing a number of families would be considered equally with large, high quality

housing in which a number of servants resided.(Figure 9.26) For this reason little emphasis is placed on patterns of population density. The military element of this component and those of Scottish descent are relatively evenly dispersed throughout the town though small clusters do occur.(Figure 9.20, 9.27)

The fourth component is clearly related to tertiary activities which were distinctly clustered in central and western parts of Blue Town and in a linear stretch along the western part of Broad Street in Mile Town.(Figure 9.28, 9.29) The traditional trading area had been High Street and West Street in Blue Town and this sector appears to have been quite extensive in 1871 and supported by a number of tertiary workers resident in streets behind the main frontages. In due course the tertiary sector in Blue Town was to wane dramatically during the twentieth century in favour of the more centralised sector in Mile Town.

The fifth component is an indication of the intensity of housing use in which the number of lodgers, degree of multiple occupancy and population density are important elements (Figure 9.29) The lodging house area was clustered in Blue Town, particularly in the main fronting streets' (Figure 9.18) and the clusters in Mile Town and Marine Town shown by component five are thus less a reflection of the presence of lodgers and more a measure of 'population density' (Figure 9.26)

Whilst subsequent components added to the level of explained variance, nonetheless they contributed little to the further interpretation of social patterns in Sheerness and have not been pursued here.

The factor scores from these five components were subjected to a

discriminant classification procedure as detailed in Chapter 8 and a classification involving ten groups was found to be the most effective on the basis of inter and intra-class variation and each group was labelled according to its loadings on the original five components. (Figure 9.31, Table 7) The streets in group one represent areas of high socio-economic status in which dockyard personnel, labourers and tertiary workers were notably absent. The streets are clustered in those parts fronting the sea and to the west of Marine Town. The streets in group two represent areas of low socio-economic status which possessed a low population density and in which tertiary personnel were particularly absent. Such streets occur almost exclusively in Mile Town. Group three indicates the tertiary sector in Mile Town and that in central Blue Town. The tertiary sector of High Street and West Street in Blue Town have, because of the presence of other elements (notably lodgers) in the street population, been placed in a separate grouping. Streets in group four, were characterised by residents of low socio-economic status and a notable absence of high socio-economic groups and lodgers. These streets occurred largely in off-street locations in Blue Town and Mile Town. Streets in group five dominated central Mile Town and reflect an area in which there was an absence of residents of high and low socio-economic status and in which tertiary workers and dockyard personnel predominated. No dominant component exists for group six and this probably reflects the extremely small size of the street populations.

Streets in group seven predominated in Marine Town and peripheral parts of Mile Town and reflect areas in which there was an absence of socio-economic extremes and of tertiary workers and, as identified previously, were areas associated with skilled dockyard personnel. Noticeably there is almost a complete absence of streets possessing these

attributes in Blue Town. Streets in group eight are characterised by the presence of Irish migrants and residents of low socio-economic status along with military personnel, multiple occupancy and high population density but a notable absence of dockyard personnel. Such streets were located largely in Blue Town and parts of Mile Town, but with one exception, did not occur in Marine Town. Streets in group nine contained residents of low socio-economic status and an absence of dockyard workers. These streets occurred in Blue Town and in the alleys and courtways of Mile Town but are again completely absent from Marine Town. Finally streets in group ten contained residents of high socio-economic status coupled with tertiary personnel, military personnel and a high population density. These characteristics applied to High Street and West Street of Blue Town, within the dockyard complex, in Banks Town and in part of Marine Town.

From the above analysis a very specific picture has been gained of the residential patterns of Sheerness in 1871 in which the structure of residential differentiation would appear to have been based heavily upon socio-economic status and occupational skills. There is a distinct gradient in terms of socio-economic status between Blue Town in the west and Marine Town in the east. Within this trend, enclaves of higher socio-economic groups, especially those concerned with tertiary activities, as in High Street, West Street and Broad Street, occur. This pattern had been heavily influenced by the nature of the morphological development of the town and in this Government could claim a dominant role. As a result of the colonising process the oldest most congested residential areas existed in Blue Town whilst to the east the housing was progressively more recent, the streets better laid out and the environment more pleasant. It is likely that sections of the population removed first from Blue Town to Mile Town and subsequently to Marine Town in the process

of obtaining better quality housing. This process enabled skilled dockyard personnel in particular to evacuate the older parts of the town, especially Blue Town, and to cluster in Marine Town. In this respect the pattern bears great resemblance to the residential segregation of dockyard artisans in the dockyard colony of New Brompton and in Woolwich. In the case of the fortified dockyard town the rapid expansion of the colony facilitated this relocation. The residential segregation of skilled dockyard workers, which resulted from workplace affiliations and occupational elitism as well as being a reflection of housing quality and of wage levels, is a particularly interesting aspect of the socio-spatial structure of the dockyard town especially in view of the duplication of this pattern throughout the dockyard system.

A number of other similarities exist between Chatham and Sheerness. Much of the older settlement of Blue Town as well as that of Old Brompton had been taken over by lower socio-economic groups though the tertiary sector remained an important component of the settlement, notably in the form of numerous public houses and the residences of dockyard and military officers.

At both Woolwich and Sheerness the importance of older, larger houses fronting the dockyard for tertiary and lodging purposes is apparent and certainly the development and location of the tertiary sectors in both Brompton and Sheerness is remarkably similar.

In a number of respects therefore there are marked similarities in the urban morphology and socio-spatial structure between the fortified dockyard towns and between all dockyard towns. In the case of the former much can be attributed to the intervention of Government and the

construction of bastion defences in the locality whilst the latter suggests that the nature of the dockyard function and specialist workforce had an important bearing on residential differentiation within the dockyard town.

Notes

1. ADM 7/6662, Visitation of 1775.
2. B.L. Kings Mss. 44 f.20.
3. Banbury, P. (1971), Shipbuilders of the Thames and Medway, David and Charles, Newton Abbot, 203.
4. B.L. Kings Mss. 44 f.20
5. Ibid.
6. Ibid.; B.L. Sloane Mss. 2448 f.39.
7. B.L. Kings Mss. 44 f.20.
8. Sheerness Times 7 September 1872.
9. N.M.M. CHA/M/1 f.20
10. Ibid.; Tanner, J.R. (ed.) (1922), Catalogue of the Pepysian Manuscripts, Navy Records Society, IV, 656; B.L. Kings Mss. 44 f.20.
11. B.L. Add. Mss. 9315 f.14, 40.
12. Wesley, J. (1906), The journal of the Reverend John Wesley, Everyman, 3, 357.
13. Ibid.
14. Philipot, R. (1659), Villare Cantianum, London, 379.
15. Hasted, E. (1972), The history and topographical survey of the county of Kent, reprint, IV, 679, first published 1798.
16. Ranger, W. (1849), Report to the General Board of Health on a preliminary inquiry into the sewerage, drainage, and supply of water, and the sanitary condition of the inhabitants of the town of Sheerness, H.M.S.O., London, 4-5.
17. Ibid.; Buchanan, G.S. (1906), Report on the sanitary circumstances and administration of, and as to prevalence of enteric fever in, the Urban District of Sheerness.
18. See for example C.S.P.D. Charles II, 7 March 1672; N.M.M. CHA/M/1, 30 October 1690.
19. P.R.O. ADM 106/3553, 21 December 1743.
20. B.L. Kings Mss. 44 f.4.
21. P.R.O. ADM 7/593, Visitation of 1814.
22. Oppenheim, M. (1926), Maritime history of Kent, VCH Kent, 1, 359; C.S.P.D. Charles II 12 July 1667, XXVIII, 532; N.M.M.

CHA/M/1, 30 October 1690.

23. Tanner, J.R. op.cit., 539.576, 587, 618.
24. B.L. Add. Mss. 10121 f.129, 30 September 1692.
25. P.R.O. MPH 112; PRO ADM 140/670; B.L. Kings Mss. 44 f.32.
26. N.M.M. CHA/M/1.
27. B.L. Add. Mss. 9315 f.48, 5 April 1734.
28. B.L. Kings Mss. 44 f.20.
29. Ibid., 4.
30. P.R.O. ADM 106/3553, 8 December 1742.
31. Ibid.
32. Baugh, D.A. (1965), British naval administration in the age of Walpole, Princeton University Press, New Jersey, 271.
33. C.S.P.D. Charles II 42, 68, 13 March 1678.
34. B.L. Kings Mss. 44 f.20.
35. P.R.O. ADM 106/3188 9 July 1726, 8 September 1726.
36. Oppenheim, M. op.cit., 369.
37. Wesley, J. op.cit., 316.
38. Letter from Coffin to the Navy Board, 17 July 1800, cited by MacDermott, A. (1950), Dockyard irregularities, Mariner's Mirror, 36, 92.
39. Oppenheim, M. op.cit., 384. It is claimed that occupiers of the hulks were granted £4 per annum 'cabin money' for the remainder of their lives as compensation for their eviction from the hulks. Sheerness Times, 7 September 1872.
40. The principal reason for this appears to be that the Garrison lodgings were liable to charge for poor relief, which in the period following the Napoleonic War was substantial, whereas many lodgings in the town were exempt from the rate. P.R.O. ADM 106/3190.
41. P.R.O. MPH 112.
42. Daly, A.A. (1904), The history of the Isle of Sheppey, Simpkin Marshall Hamilton, London, 214.
43. Bentham, M.S. (1862), The life of Brigadier-General Sir Samuel Bentham, Longman, London, 142-3. In 1802 the workmen at Sheerness 'had taken to going out [of the yard] as a body and carrying chips out with them three times a day'. P.R.O. ADM 7/663, Visitation of 1802.

44. Photographs of these houses before clearances can be seen in K.A.O. UD/SH/TPI/13, 2.
45. P.R.O. ADM 140/684; P.R.O. ADM 140/659.
46. Oppenheim, M. op.cit. 375-6.
47. P.R.O. ADM 7/593.
48. P.R.O. ADM 7/663; Oppenheim, M. op.cit., 377.
49. It was thought that the use of old ships infected by 'the worm' as breakwaters instigated this nuisance which was subsequently compounded by infected ships from the Levant being quarantined in Standgate Creek nearby. P.R.O. ADM 7/659, 7/660.
50. B.L. Kings Mss. 44 f.20.
51. The introduction of copper sheathing for example, in the late eighteenth century greatly reduced the harmful effects of the Toredos Navalis and Sheerness returned to favour as a result. Knight, R.J.B. (1973), The introduction of copper sheathing into the Royal Navy 1779-1786, Mariner's Mirror, 59, 299-309.
52. P.R.O. ADM 4/660, Visitation of 1773; P.R.O. ADM 7/661, Visitation of 1774.
53. P.R.O. ADM 106/3222, Visitation of 1785.
54. P.R.O. ADM 7/658 - 7/662.
55. Oppenheim, M. op.cit., 380.
56. P.R.O. ADM 7/663.
57. P.R.O. ADM 7/664.
58. P.R.O. ADM 106/3224; P.R.O. ADM 7/664.
59. Ibid.
60. Rennie, J. (1875), Autobiography of John Rennie, E. and F.N. Spon, London, 163.
61. Ibid., 22.
62. P.R.O. ADM 7/3189, 27 May 1808.
63. P.R.O. ADM 106/3192, 22 July 1808.
64. P.R.O. ADM 7/593, Visitation of 1814. Indeed so derelict had the yard become that 'by far the best store belonging to the yard was a ship'. Ibid.
65. P.R.O. ADM 106/3192, 22 July 1808.
66. Ibid., 15 July 1808.
67. P.R.O. ADM 7/593.

68. Ibid.
69. Rennie, J. op.cit., 164, 453.
70. P.R.O. MPH 293.
71. P.R.O. ADM 140/670.
72. P.R.O. ADM 106/3188, 2 November 1814, 3 June 1813. As acknowledgement of Board of Ordnance ownership of the land a small ground rent was levied and an annual perambulation made.
73. P.R.O. ADM 106/3195, 16 March 1813.
74. P.R.O. ADM 7/593.
75. P.R.O. ADM 106/3190, 21 July 1815; P.R.O. ADM 106/3195, March 1815.
76. P.R.O. ADM/3188; P.R.O. ADM 7/3189, 6 March 1815.
77. P.R.O. ADM/3228, 30 April 1814.
78. P.R.O. ADM 106/3188, 6 December 1814; P.R.O. ADM 7/3189, 30 November 1814.
79. P.R.O. ADM 7/593.
80. P.R.O. ADM 106/3228, 30 April 1814.
81. P.R.O. ADM 106/3188, 20 November 1814.
82. P.R.O. ADM 3196, 2 September 1813; P.R.O. ADM 7/3189, 14 June 1816; P.R.O. ADM 106/3188, 31 July 1810, March 1811.
83. P.R.O. 7/3189, 6 March 1815.
84. P.R.O. ADM 106/3228, April 1814; P.R.O. ADM 106/3188.
85. B.L. Add. Mss. 31323 G2; BL.ADM7/3189, 14 March 1815.
86. B.L. ADM 7/3189.
87. P.R.O. ADM 106/3553; P.R.O. ADM/670; K.A.O. P254/12/2.
88. P.R.O. ADM 7/3189, 28 January 1819.
89. 56 George III cap 74; P.R.O. ADM 106/3188.
90. P.R.O. ADM 106/3194.
91. P.R.O. ADM 106/3194, 2 January 1819.
92. Ibid.
93. P.R.O. ADM 106/3194, February 1820.
94. Ibid.

95. P.R.O. ADM 106/3190.
96. Ibid., 18 January 1820.
97. See for example P.R.O. ADM/3190, 21 May 1821; 18 January 1820.
98. Ibid., 6 June 1821.
99. P.R.O. ADM 106/3188, 25 August 1820.
100. Sheerness Times, 25 December 1897.
101. Ibid.; P.R.O. MR 1331.
102. Dictionary of National Biography, 1, 1046; Dickinson, H.W. (1931), Jolliffe and Banks contractors, Transactions of the Newcomen Society, XII, 1-8.
103. K.A.O. P254/B28/2; MacDonald, K.R. (1949), The Isle of Sheppey and the Swale, unpublished M.A. thesis, King's College, London, 114.
104. Turmine, H.T.A. (1843), Rambles in the Island of Sheppey, Sheerness, 32.
105. Dickinson, H.W. op.cit., 5.
106. Census Abstracts 1871, 97, 103.
107. Turmine, H.T.A. op.cit., 32.
108. A sex ratio of 97.81 per cent.
109. See Chapter 5.
110. Ravenstein, A. op.cit., 179.
111. Armstrong, W.A. (1972), The use of information about occupation, in Wrigley, E.A. (ed) Nineteenth century society, Cambridge University Press, 212.
112. Marsh, D.C. (1971), The changing structure of England and Wales 1871-1961, Routledge and Kegan Paul, London, 198.
113. Armstrong, W.A. op.cit., 212.

CHAPTER 10

CONCLUSION: The Typology Of Dockyard Towns

In model-building or the construction of a typology, the concern is less with congruence than with the teasing out of fundamental features of structure and process which, common to all individuals, form a basic entity stripped of superficial differences.

Porteous, J.D. (1977), Canal ports: the urban achievement of the canal age, Academic Press, 217.

Government and the Dockyard-Urban System

The previous chapters have shown that Government was central to the genesis and development of the dockyard-urban system. It was the executive in Government which determined policy and the level of resource allocation to the system and these decisions were implemented via various Governmental, naval and military agencies. (Figure 10.1) All decisions of importance concerning the dockyards were made in London and were based upon criteria such as defence and foreign policy, which were usually divorced from local and regional economic influences associated with the dockyard locations and to a very large extent outside the traditional trade cycle.

The development and well-being of the dependent dockyard towns was inextricably linked to activity in the yards and the primary employment generated therefrom. As a result, the towns were highly susceptible to the decisions and actions of Government and extremely vulnerable to fluctuations in the operational use of the yards. Very few alternative sources of employment existed in the towns and the stationing of military and naval personnel, the presence of Victualling yards and other military and dockyard appendages nearby further emphasised the dependence of the communities on the decisions of Government and upon the fundamental raison d'être of the dockyard system, the threat of war. The dockyard towns were largely the product of international warfare and the continuing need for national defence. The cyclical nature of dockyard activity, which swung between the extremes imposed by war and peace, resulted in the dependent townships undergoing a series of booms and slumps during which town development, employment and size of population fluctuated according to the war-like intentions of this and other countries. The dockyard town thrived during periods of greatest national danger and exhibited all the

characteristics of a boom town. In this respect they differed markedly from trading ports which invariably suffered heavily during periods of maritime warfare. Peace, in contrast, brought severe retrenchment to the dockyard-urban system though from the mid-nineteenth century intense international rivalry, spurred on by changes imposed by technological advances in naval design, augmented this underlying trend.

Within the system the common hand of Government in both the management of, and resource allocation to, the dockyards resulted in the yards being interdependent and events in one part of the system had repercussions throughout the network. The effect of this centralised control over the dockyard-urban system can also be seen in other ways, especially in the case of dockyard defences. The construction of these defences and particularly the imposition of bastion fortifications at several of the dockyard locations is clearly indicative of this centralised management for the resulting similarities between the towns is quite remarkable. Furthermore, the system existed in more than just name but as an operational network of industrial bases between which linkages existed and flows of labour, materials and equipment and information were channelled between the component parts under the auspices of Government.

The Naval Dockyard Town: Genesis and Development

A number of generalisations can be made regarding the origins and development of the dockyard towns. The dockyards were established by Government order according to the level of logistic and strategic support considered necessary for the Royal Navy and their location was determined

by a combination of factors including strategic criteria, local physical geography and, in the early years of the system, propinquity to London. The first and last of these factors generally resulted in the dockyards being established progressively further away from London toward the south-west and the approaches to the Channel and in the twentieth century northwards to Scotland and Rosyth on the coast of the North Sea. (Figure 10.2) Within the regions delimited for the establishment of a dockyard three types of dockyard site may be discerned; those of 'up-river' and 'haven', 'harbour' and 'outport'. Dockyards established in up-river sites, which comprised Chatham, Deptford and Woolwich, were predominantly early yards whilst those in 'haven' sites, including Pembroke Dock and Rosyth, were amongst the latest yards to be created. The up-river site provided security and proximity to London but, unlike the later 'haven' sites, subsequently suffered from navigational and hydrographic difficulties. Dockyards in 'harbour' sites which included the yards at Portsmouth and Devonport were located in land-locked harbours which contained an extensive expanse of deep water and narrow entrances which provided effective security from the weather and the enemy. Only Sheerness, (1) located in an exposed position at the junction of the Thames and Medway where it could best service the problematic up-river yards, qualifies as an outport.

In the process of siting a dockyard there was a constant conflict between the desire to obtain a safe secure site sheltered from both the natural elements and the enemy and at the same time maintain ease of access. Generally all the sites possessed good water access, free of navigational hazards though subsequent changes in the size of ships and altered hydrographic conditions reduced the favourability of some yards through time. The construction of defences could also facilitate defence against enemy assault though, as at Sheerness, some sites were left

considerably exposed.

It would appear that allowances were made for certain site deficiencies in lieu of particular advantages accruing to a site. The case of Sheerness in this respect is a good example for despite numerous disadvantages the site was considered strategically very important and the yard continued in use. Elsewhere a suitable firm site and the presence of local supplies of fresh drinking water were sought but not considered as prerequisites although adjacency to deep water was necessarily an important factor. Access to skilled labour and pre-existing settlement were not vital factors in locating the dockyard and indeed there appears to have been a preference for pristine sites which were distant from commercial ports, possibly for fear of losing labour to the higher paid private yards and a desire to restrict access to the waters and shoreline around the naval base.

With respect to the development of the dockyard towns, Government, as previously suggested, controlled many of the processes and, as a result, the towns form a unique type of urban development. There was not however just one model of dockyard-urban development but several and the nature of these sub-species depended upon a number of factors including the time-span of dockyard existence, site and location, and importantly the presence or absence of bastion fortifications. (Figure 10.3) The date at which a yard was established was necessarily influential for in certain cases two to three centuries could separate the creation of particular dockyards and circumstances could change substantially within this time-period. By the time Pembroke Dock was firmly established, for example, bastion fortifications were approaching obsolescence and were thus inapplicable in this instance. Thus process and pattern within the

dockyard-urban system must be considered in the light of the varying time-scale of each yard.

The site and location of a dockyard were further influential factors particularly with respect to the degree of fortification of the dockyard and town. The dockyard townships of Deptford and Woolwich, for example, came under the general defence umbrella of the Capital and their water approaches could be adequately protected by sites some distance down river. Extensive landward-facing fortifications immediately adjacent to the yards were not considered necessary. The up-river yard at Chatham along with Portsmouth, Devonport and Sheerness were, however, considered sufficiently at risk to warrant extensive bastion fortifications in addition to defences covering the water approaches to the yards.

The most important factor determining the typology of the dockyard towns was the presence or absence of bastion defences. On this basis dockyard town development and typological divisions can be examined according to the three principal stages of dockyard fortification.(Figure 10.4)

The first stage can be said to apply to those yards established before the advent of bastion defences and in which the dockyards and early settlements were, on the whole, broadly similar. Pre-dockyard settlement varied from non-existent, as at Sheerness and Plymouth Dock, to small townships as at Chatham and Portsmouth. Where settlement did exist, in most cases the pre-dockyard economy was based on fishing and agriculture and occasionally some trade. The early dockyard site was located in an isolated position away from existing settlement and consisted of a collection of workshops and storehouses, graving slips and occasionally, dry docks. The complex was initially enclosed by a hedge and subsequently

by a substantial wall which has since become such a dominant feature of the dockyard town. (Plates XIII, XV) In due course, in the face of large-scale investment in docks and facilities and piecemeal extensions to the dockyards, the temporary nature of the yards gave way to more permanent establishments. From the time that employment in the yards was placed on a more permanent basis a number of dockyard settlements were developed adjacent to the yards as at Brompton, Portsea and Plymouth Dock. In the case of the former two the settlements consisted of off-shoots from the existing settlement at Chatham and Portsmouth whilst that at Plymouth Dock occurred in response to the establishment of the yard in 1690. At Sheerness early accommodation was provided by dockyard authorities and private settlement did not occur on any scale until the mid-eighteenth century. Settlement at Deptford and Woolwich had taken place adjacent to the yards from the very earliest date. Already at this stage the basis of future variation in dockyard town development were being laid.

During the course of the second stage of development, which effectively dates from the land purchases by Government in the early 1700s, the yards became typologically divided into those which underwent bastion-trace fortification and those, as with Deptford and Woolwich, which did not. From this time on the urban development of these two sets of dockyard towns differ substantially for in the former group urban morphology, and to some extent residential structure, of the towns were largely determined by the nature of these bastion defences. Deptford and Woolwich, for reasons previously indicated, remained outside this process and developed without the immediate restrictions of fortifications though not without the impact of Government land ownership in the form of a number of military and dockyard appendages.

During the third stage, which effectively dates from the period leading up to the Crimean War, Deptford and Woolwich dockyards were closed. The environs of the fortified yards of Portsmouth, Devonport and Chatham underwent further defence schemes based on the ring fort principle to replace the bastion fortifications made obsolete by advances in ordnance technology and Sheerness acquired a further extensive moat to protect her land flank. Pembroke Dock developed too late to participate in bastion defence schemes nor was it considered a candidate to receive ring fort defences. The yard was defended by forts located adjacent to the Haven and by defensible barracks erected during the 1840s and overlooking the yard to the south. In this respect the yard approximates closest to the type of Deptford and Woolwich yards for the fossilised plan of bastion fortifications on Portsmouth, Devonport, Chatham and Sheerness was sufficient to differentiate them even into the twentieth century.

Since the mid-nineteenth century the dockyard system has been progressively reduced by the closure of Deptford and Woolwich due to the inability to adapt their sites to the requirements of iron and steam in naval shipbuilding. Pembroke Dock and Sheerness were closed in 1925 and 1959 respectively as part of rationalisation schemes for the Royal Navy. This process of rationalisation continues today for as a result of the reduced role of the surface fleet the 1981 defence review has proposed closure of Chatham dockyard and the reduction of Portsmouth dockyard to a care and maintenance basis. In this respect the reduction in the dockyard system should be seen as a continuation of the historical processes which led to the creation and development of the system and particularly the close links which existed between the size and role of the Royal Navy and the extent of the naval dockyard system. At this moment in time only Rosyth, commanding the North Sea and the Icelandic Gap, and Devonport at the strategically important western approaches to the Channel and eastern

Atlantic are assured of continued use. The vulnerability of the dockyard towns to the dictate of national defence and Government decisions in Whitehall has been demonstrated on several occasions during the course of the twentieth century and has as a result spurred the local authorities to lessen this dependence by diversification of the dockyard town economy, particularly since the early 1960s.(2)

Implications of the Study

In a number of ways the dockyard towns reflect many of the features of other single function towns and especially those settlements, like company towns, where the community was dependent upon a single major employer. The importance of the decisions made by this body to the community and in respect of urban development is inevitably a dominant feature, for upon the primary employment provided by the employer depended the activities of a host of other minor decision-makers whose actions necessarily had economic and geographical implications for the town.

However, in respect to the time-scale and extent of the dockyard-urban system the dockyard town differs markedly from other examples of specialised and company towns. Government involvement in this system of towns dates back to the early sixteenth century and eventually involved as many as a dozen locations in the British Isles. Such an extensive specialised-urban system under the control of one body and existing over such a period of time can scarcely have an equal in this country. Furthermore, whilst only Sheerness could be said to have approached the status of a company town, and that during the early part of

its existence, and despite the reluctance of Government to be drawn into town development and community affairs, the impact of Government intervention in the towns in respect to urban morphology and socio-spatial structure was substantial.

The duplication of morphological and social patterns in the dockyard towns reflects the central management of the system by Government, the nature of the dockyard function and the narrow employment structure of the towns. There would appear to be a considerable degree of uniformity in the response of the local communities to these common influences. In the case of the urban morphology such similarities might perhaps have been expected given the extent of the military restrictions placed on urban development in these towns, but the extent of similarities in the socio-spatial structure of the towns could not have been foreseen. The residential segregation of the dockyard elite in the dockyard towns is especially interesting not least because of the way in which the development of such patterns took place in conjunction with the colonisation process in the dockyard towns.

The role of a multi-site organisation, which possessed a central headquarters, in urban and regional development is well illustrated by the case of the dockyard system. In many ways the dockyard system was an early precursor of more recent trends in industrial organisation in which inter-site linkages and channels of information and personnel are increasingly important components of the national economic-geographical scene. Goddard has pointed to the importance of such systems as basic economic entities of the spatial system especially with regard to the transmission of change through these organisational channels.(3) The adoption by Government of technological advances in warship design during

the latter half of the nineteenth century which subsequently diffused throughout the dockyard system illustrates well the role of multi-site organisations in urban and regional development and the spatial impact which such a process had in terms of the distribution of employment opportunities.

In a related context McKay and Whitelaw (4) have indicated the role of Government organisations in generating flows of inter-regional migrants and Johnson and Salt (5) have also stressed the importance of labour migration within organisations, which they correctly consider forms a major component of aggregate patterns of population movement. Examination of the dockyard-urban system suggests that such movements are not a recent phenomenon and in the case of this system have historically formed an important element in patterns of migration and urban and regional development.

This study has largely been limited to examining a system of dockyard towns which are geographically confined to Britain. The dockyard system has however, been more extensive than this study would initially suggest, for there were a number of naval dockyard bases established abroad. Importantly, this global system of military-urban bases which at various times included Singapore, Gibraltar, Malta, Port Mahon, Antigua, Halifax, Esquimalt, Hong Kong and Simonstown to name but a few, came under the same decision-making and policy generating structure in London as did the home dockyards.(6) Necessarily a number of differences existed between the foreign yards and the home dockyards, not least because of the nature of their location and the often considerable distances which separated them from the naval administration and executive in London. However, in general terms the foreign yards were an extension of the home dockyard

system and policy and resource allocation toward the yards were tied to similar factors which influenced the British dockyards, albeit firmly set within a global context.

To a large extent the British Empire was founded on and maintained by the Royal Navy and the latter could only fulfil that world role if there existed a number of bases strategically located around the globe. These bases permitted the Royal Navy to dominate maritime trade and sea routes and although they were usually located in predominantly uninhabited locations, in a number of cases they subsequently became the catalyst for considerable urban growth and acted as spring-boards in the process of colonisation and empire-building. The dockyard-urban locations which formed this world system were dispersed throughout many countries and amongst differing cultures and yet the locations possess a common unifying theme which has, as yet, not been explored beyond a few empirical studies.

This theme may be further extended for the possession of a navy and naval bases was not the sole prerogative of Britain. A number of other nations possessed similar systems which had operated for part or all of the period encompassed by the English yards and under similar conditions of Government control as outlined in this work.(7) Importantly these national systems responded to a common stimuli, that of the threat of war, and resources were allocated much as in the British example. In reality therefore the national systems of naval bases were not closed systems but interdependent to a considerable degree because of the international repercussions of warfare. There would appear to be a valid case for identifying a number of such national and international systems of naval dockyards which appear to reflect several marked similarities in urban development.

Finally, the study of the development of the dockyard-urban system indicates that Government involvement in urban and regional development via national defence expenditure is not a recent phenomena. The naval dockyards form only one component of the armed forces yet it was through the naval dockyards that direct State intervention in the production of major weaponry in this country was introduced. The dockyards and Royal Navy were also long standing participants in what Todd refers to as the Military-Industrial Complex (8) in which manufacturing firms owe their level of well-being to the issue of Government defence contracts. Within the Complex, 'elements of the aerospace, electronics, motor vehicle and shipbuilding sections are noteworthy and the regions which contain significant portions of these activities are often caught-up willy-nilly, in the country's defence posture'.(9) A number of authors have recently commented upon the importance of defence spending to regional economies not least because this can vary quite considerably between regions.(10) In the process of contracting out defence work to the shipbuilding industry especially from the mid-nineteenth century the naval dockyards were pioneers of the Military-Industrial Complex. Indeed one author has recently gone so far as to call this relationship between Admiralty and private naval shipbuilders as 'incestuous' for at the present time Admiralty orders for ships account for nearly 75% of the orders on British Shipbuilders books.(11) In the twentieth century a change in focus from the naval dockyards to the geography of defence spending is but a short one for the dockyard-urban system was an early precursor of Government involvement via defence expenditure in urban and regional development.

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APPENDIX A

Dockyard Employment Data 1687-1886

The figures which have been recorded for the period preceeding the naval administrative reorganisation in 1832 consist only of 'workmen' employed in the dockyard and the ropeyard if such existed. Dockyard officials, or 'Inferior Officers', are not included in these returns. Their omission is not damaging for their number in most cases was small relative to that of the main workforce.

Where monthly or quarterly data exists figures have been taken for the month of March or for Lady Quarter, effectively the months of January, February and March. In cases where information for such a date cannot be traced then data from the previous quarter or following quarter, depending upon availability, have been substituted. In the early period of the dockyards seasonal fluctuations in some yards were marked and the choice of one point in the year for examination was intended to eliminate seasonal variation. Employment levels appeared to fluctuate seasonally between summer and winter extremes and the choice of a spring month was intended to avoid these extremes and reflect a position somewhere between the two.

Unfortunately there is some difficulty involved in obtaining comparable figures following 1832. Between 1833-65 the figures represent only 'established' or permanent employees to the exclusion of temporary or 'hired' workers. The latter made up a considerable proportion of the dockyard workforce and their exclusion (often replaced by a monetary summary) detracts from these figures being used in the context of this

study. From 1865-1886 such information data can be extracted though minor variations do occur as for example in the inclusion of 'salaried' or officer class employees who have been excluded to maintain comparability and 'writers' who were often employed on a temporary basis.

APPENDIX B

Previous Studies of Disaggregate Migration Paths

References to historical studies of migrant paths are relatively scarce. For the period before the advent of aggregate census data, researchers have of necessity resorted to studying migration at both the individual and spatially local level, largely because of the nature and availability of suitable source material.(1) Studies by Clark and Cornwall, (2) for example, of population movement in Kent and East Sussex in the late sixteenth and early seventeenth centuries utilised the biographical details contained in ecclesiastical court deposition books. From these they have calculated the moves made by witnesses and the distances travelled, and have correlated them with age and occupation. The ability to construct such paths is clearly determined by the sources available. Patten has utilised a series of apprenticeship indentures in a study of labour migration into three East Anglian towns claiming that: 'These sources are the only surviving (sic) for the sixteenth and seventeenth centuries for any town in East Anglia which give a coherent picture of geographical patterns of migration'.(3) Other sources such as settlement certificates, freeman records, parish marriage registers and even place-name surnames are biased in the type of people concerned and erratic in their occurrence.(4)

Sources for reconstructing the movement of population in the nineteenth century are better, but still limited. Diaries provide a possible means of reconstructing the residential movements of individuals and families and, just as important, can provide the underlying reasons behind the decision to migrate.(5) However, there is an inherent bias

toward the literate when using diaries, and even with a large number of diaries one is confronted with the problem of uniqueness. It is doubtful whether sufficient diaries that were comparable spatially, temporally and contextually, would be available to construct general trends.(6)

Directories and rate valuation lists have been used for tracing the movement of individuals but this can only be effective at the intra-urban scale where record linkage is possible in the local context for should an individual leave the locality for a new destination then such record linkage is almost impossible.(7)

APPENDIX C

Methodology

A sample of 5960 individuals resident in Sheerness was collected from the census schedules of 1871,(8) of which 9% were adults with at least one child born and recorded in a location other than Sheerness.(9) It is assumed that these adults had at some time moved to Sheerness from another location. Other possible migrants, such as single adults, those for whom no birthplace was recorded and those whose children were all born in Sheerness, were excluded. Information such as age, sex, occupation and social class were also recorded. The latter was discerned using the Registrar General's classification of occupations for 1951, (10) with modifications suggested by Armstrong, (11) and additions to account for the armed forces component not covered by the previous two sources.(12) An Ordnance Survey grid co-ordinate was assigned to the birthplace of each parent and to the birthplaces of their children and each child's date of birth was noted.

The distance between the place of birth of each adult and the birthplace of his or her first child, and distances between the birthplaces of subsequent children before taking up residence in Sheerness, were calculated and used to represent the distance moved on each link of the family's path. The need to use linear distances between locations necessarily oversimplifies the actual, but unknown, route by which migrants travelled.(13) The use of distances between birthplace locations does overcome problems associated with using counties as origin and destination units in analysing nineteenth century data.(14) One particular problem concerns the nonconformity of 'civil' and

'registration' county boundaries. Between 1851 and 1891 people were enumerated in the 'registration' _____ county, though in the census ^{possible that county} it is/of birth would be stated as the 'civil' county. If the two boundaries did not coincide, 'county'-based migration studies would register a move where in reality no such movement occurred.(15) Further, Darby has indicated the lack of comparability between the areal sizes of counties.(16) This is particularly relevant in the case of very large counties which reduce the amount of registered migration into surrounding areas, whilst increasing that from small counties. Short distance moves from border locations likewise distort county-based migration figures, especially if likened to short distance moves made within the centre of a county which go unrecorded. Similarly, internal movements within the county, which probably account for the majority of all moves, are excluded from examination.(17) It is to overcome these difficulties that this study has made use of actual birthplace, rather than merely county of birth.

The sample of 535 adults together with their children amount to 1526 individuals, and account for 26% of the total sample obtained for the town.(18) All but forty of the adult sample were born outside Sheerness. These forty, although born in Sheerness, moved out of the town prior to the birth of one of their children before returning to Sheerness. A further 35 adults had at some stage a child born in this town followed by another elsewhere, only to return to Sheerness by 1871. Ostensibly, therefore, this group of 75 people represents some form of return migration amounting to 14% of all migrating adults.(19)

APPENDIX D

Census Methodology of Data Collection and Analysis

Because of the 100 year ruling governing public access to the census enumerators schedules the choice of date for examining the social geographies of the dockyard towns was limited to the four censuses taken between 1841 and 1871. The earlier censuses, particularly that of 1841, were not as comprehensive as those of later years especially in regard to birthplace and occupation information and their utility suffers as a result. For this reason and the desire to capture the colonising process which largely took place after 1850 the latest available schedules of 1871 were, with one exception, utilised.(20)

In the case of Woolwich the use of the 1871 census was impractical, for the dockyard here was closed in 1869 following a short period of relative prosperity. The printed returns for Woolwich in 1871 indicate that over 400 houses were uninhabited and to use the 1871 census for Woolwich would entail its loss as a working example of a dockyard town because of the devastation caused by the dockyard closure. For the purpose of this study therefore the 1861 returns were used.(21)

As a result of this decision however further difficulties arose because only half the returns for Woolwich are extant. This is a problem particularly associated with the 1861 census in that a number of such schedules for locations throughout England and Wales are missing.(22) Disappointingly Woolwich proved to be one. However, of the schedules which have survived for the town, fortuitously those of the sub-district of Woolwich Dockyard are amongst them, whilst those for Woolwich Arsenal

appear to have been lost.

For every person sampled from the schedules of Woolwich and Sheerness socio-economic and demographic information including name and address, sex, age, relationship to head of household, marital status, occupation and place of birth by town or parish and county was collected. All except one variable came directly from the schedules and only the number of family units per house was calculated from the schedules.

Several transformations of the data from alpha-numeric format to a numerical format were undertaken and the resulting matrices consisted of twelve variables per case and 5960 observations or individuals for Sheerness and 8570 for Woolwich. A hierarchical arrangement of the data was maintained throughout to allow analysis to proceed at any level from the street block up to that of the town as a whole. The need for flexibility in data manipulation and analysis was maintained by allotting to each individual both spatial and hierarchical references which could be used as a basis for aggregation at a later stage.

In the case of Chatham a slightly different approach was used for data from the 1871 schedules which had been collected for a previous study by the author were utilised.(23) This data consisted of a complete survey of all males resident in settlements to the east of Chatham dockyard each of whom was subsequently plotted according to place of residence on a contemporary map of settlement in the area. Unlike the surveys of Woolwich and Sheerness, however, only occupational characteristics and place of residence were recorded from the schedules.

In the case of Woolwich and Sheerness it was decided to sample at a

ratio of at least ten houses per street recorded by systematic sampling. The start of this sampling within each street block, however, was determined by a random factor thereby reducing the bias inherent in sampling from the corner house each time. A grid system was initially considered as the framework for analysing the results and was imposed over an Ordnance Survey 25 inch map. This proved totally unacceptable for a number of reasons. Firstly, the large number of cells required to obtain the degree of detail required was excessive and would have necessitated an even greater sampling ratio. Secondly, the grid cells covered more than one street and any degree of differentiation by street was thus lost. Initial research suggested that residential differentiation was closely related to the street block and where roads were combined and courts and alleyways included with houses fronting the street such a spatial framework was unacceptable. Thirdly, the grid cell overlay was rejected because of the great difficulties involved in collecting data from the schedules and the subsequent allocation of the data to the cell format. There were a number of advantages however to be gained from utilisation of the street block as the areal unit of analysis. The census had been largely organised on the basis of enumeration districts comprising between 50-200 houses in named streets. The difficulties then involved of allocating individuals to areal units and of locating these streets on contemporary maps were greatly diminished. Many of the street blocks, however, consisted of fewer than ten houses and as such formed a full 100% sample. Furthermore it was found necessary to divide some very long streets into several sections because of the manner in which the data occurred in the schedules and because the character of a street tended to change over long distances.

The decision to use the street block as the areal unit and to sample a large number of houses per street increased the accuracy and the

confidence which could be placed on the results though the effect was to greatly increase the total percentage of the population sampled to approximately 50% for both towns. This was a disadvantage only in so far as it increased the amount of time and effort in collecting and analysing the data. Subsequent analysis involved the use of principal component analysis and, because of the generalised nature of this procedure and problems which are sometimes associated with factor analysis, location quotient plots.

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THE UNIVERSITY OF HULL

GOVERNMENT AND THE DEVELOPMENT OF A
SPECIALISED URBAN SYSTEM: THE
CASE OF THE ROYAL NAVAL DOCKYARD
TOWNS IN GREAT BRITAIN

being a Thesis submitted for the Degree of

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in the University of Hull

by

Trevor Michael Harris B.A.

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Table 1

Number of Moves Recorded for Adult Migrants

Number of moves	% of migrants
1	16
2	57
3	19
4	6
5	2

	100%
	N=535

Table 2

Mean Distance of Each Link in Migration Path

Number of moves	Mean distance of link in Kms				
	1	2	3	4	5
1	194				
2	122	102			
3	84	91	105		
4	194	108	156	157	
5	112	71	100	133	101

Table 3

Occupations of Male Adult Migrants and of
Total Sample Males in Sheerness 1971

	% of migrants	% of total sample
Labourers	7	12
Servants	0	2
Army and Royal Marine	4	3
Pensioner	10	7
Royal Navy	10	10
Dockyard	44	35
Tertiary	16	20
Local Trades	3	10
Miscellaneous	6	2
	----	----
	100%	100%
	N=252	N=1798

Table 4

Social Class of Employed Migrants and those with Employment
in the Total Sample of Sheerness 1871

Social class	% of migrants	% of total sample
1	4	3
2	6	7
3	63	49
4	26	25
5	1	16
	----	----
	100%	100%
	N=484	N=2323

TABLE 5

Summary of Results of Principal Components with
Eigenvalues greater than One for Sheerness 1971

	Component						
	1	2	3	4	5	6	7
Eigenvalue	2.72	2.50	2.02	1.52	1.44	1.35	1.17
Percentage explanation	15.10	13.80	11.26	8.44	8.00	7.48	6.52
Cumulative explanation	15.10	29.00	40.36	48.70	56.70	64.28	70.70

TABLE 6

Loading of the Original Variables on the First Five Principal Components: Sheerness 1871

Variable	Formulation	Loadings on components				
		1	2	3	4	5
1	*	0.074	0.531	0.097	-0.238	0.390
2	*	0.185	0.096	0.542	-0.194	-0.102
3	*	-0.153	-0.256	0.020	0.002	0.235
4	*	0.484	0.225	-0.138	-0.134	0.385
5	*	0.241	0.254	-0.264	0.331	0.529
6	*	0.648	0.016	0.381	0.289	-0.149
7	*	0.168	-0.123	-0.577	-0.085	-0.031
8	*	-0.571	0.044	0.506	-0.093	-0.077
9	*	0.149	0.456	-0.375	-0.450	0.128
10	o	0.772	-0.004	-0.005	-0.152	-0.217
11	o	-0.214	0.840	0.029	0.143	-0.218
12	+	-0.081	0.148	0.680	0.324	0.435
13	+	-0.146	0.225	0.184	-0.321	0.496
14	+	-0.540	0.221	-0.114	0.227	-0.018
15	o	-0.442	-0.728	-0.008	-0.292	0.218
16	o	0.256	-0.141	-0.077	0.693	0.099
17	o	-0.470	0.630	-0.250	0.125	-0.295
18	o	0.352	0.165	0.424	-0.334	-0.276

* as a percentage of population in each street block
o as a percentage of economically active persons in each street block
+ as a ratio of all persons in each street block

TABLE 7

Loadings of Groups One to Ten on Original
Five Principal Components for Sheerness

Group	Component				
	1	2	3	4	5
1	1.19	-0.10	0.18	-1.02	-0.81
2	0.05	-0.91	-1.48	-0.92	-0.21
3	0.61	-0.87	-0.69	1.18	0.08
4	-0.69	0.54	0.30	0.20	-0.72
5	-0.28	-0.23	-0.01	0.32	0.03
6	1.88	1.73	-2.32	-1.24	1.86
7	-0.62	-1.01	0.37	-0.57	0.41
8	-0.42	1.19	0.91	-0.80	1.25
9	-0.64	1.30	-0.93	0.44	-0.65
10	1.60	0.03	0.94	1.28	0.11

TABLE 8

Summary of Results of Principal Components with
Eigenvalues greater than One for Woolwich 1861

	Component					
	1	2	3	4	5	6
Eigenvalue	3.31	2.54	2.14	1.66	1.27	1.13
Percentage explanation	18.40	14.08	11.87	9.25	7.04	6.28
Cumulative explanation	18.40	32.48	44.35	53.60	60.64	66.92

TABLE 9

Loading of the Original Variables on the First Four Principal Components: Woolwich 1861

Variable	Formulation	Loadings on components			
		1	2	3	4
1	*	0.578	0.268	0.429	0.054
2	*	0.152	0.326	-0.401	-0.207
3	*	-0.212	-0.043	0.009	-0.472
4	*	0.364	0.382	0.005	-0.180
5	*	-0.089	0.369	0.095	0.616
6	*	-0.432	0.649	-0.158	0.262
7	*	-0.481	0.230	0.299	-0.316
8	*	0.680	-0.460	-0.265	0.085
9	*	-0.193	0.273	0.234	-0.465
10	o	-0.506	0.550	-0.259	-0.049
11	o	0.248	0.120	0.624	-0.182
12	+	0.776	0.347	-0.275	0.012
13	+	0.787	0.325	-0.285	-0.017
14	+	0.221	-0.228	0.043	0.456
15	o	-0.249	-0.624	-0.484	0.000
16	o	-0.157	0.429	0.042	0.443
17	o	0.299	-0.182	0.794	0.130
18	o	0.425	0.336	-0.247	-0.367

- * as a percentage of population in each street block
- o as a percentage of economically active persons in each street block
- + as a ratio of all persons in each street block

TABLE 10

Loadings of Groups One to Ten on Original
Four Principal Components for Woolwich 1961

Group	Component			
	1	2	3	4
1	1.01	-0.02	1.29	1.91
2	-1.13	0.74	2.56	-2.39
3	0.04	-0.76	-0.41	0.08
4	0.58	0.69	-0.25	-0.62
5	-0.56	-0.93	-0.87	-0.68
6	-0.39	0.26	-0.09	0.78
7	0.04	-0.58	1.32	0.15
8	2.92	1.15	-0.65	-0.94
9	-1.52	1.90	-0.44	0.42

TABLE 11.

Simplified age structure of those born in Sheerness, Minster and Queenborough

and those born elsewhere 1971

(all percentages are expressed as a percentage of the total sample population of 5960)

	Age						
	0-10	11-20	21-30	31-40	41-50	51-60	61+
Those born in Sheerness, Minster and Queenborough	1355 22.7%	652 10.9%	352 5.9%	227 3.8%	182 3.1%	118 2.0%	88 1.5%
Those born elsewhere	412 6.9%	411 6.9%	623 10.4%	654 11.0%	455 7.6%	257 4.3%	174 2.9%
Total	1767 29.6%	1063 17.8%	975 16.3%	881 14.8%	637 10.7%	375 6.3%	262 4.4%

Table 12

The social structure of Sheerness in 1871

social class	frequency	as percentage of social classes I-V
I	72	3.09%
II	157	6.75%
III	1141	49.09%
IV	572	24.61%
V	382	16.44%
	<hr/> 2324	<hr/> 100.0%
VI	3636	
	<hr/> 5960	

Table 13

The percentage of household heads in social classes I-V
for Sheerness and York and of occupied males in England
and Wales, 1951

	social class				
	I	II	III	IV	V
Occupied and retired males in England and Wales, 1951	3	14	52	16	15
Household heads in York, 1851 (3% missing)	8	14	49	13	13
Household heads in Sheerness 1871 (10.0% missing)	3	5	55	15	12

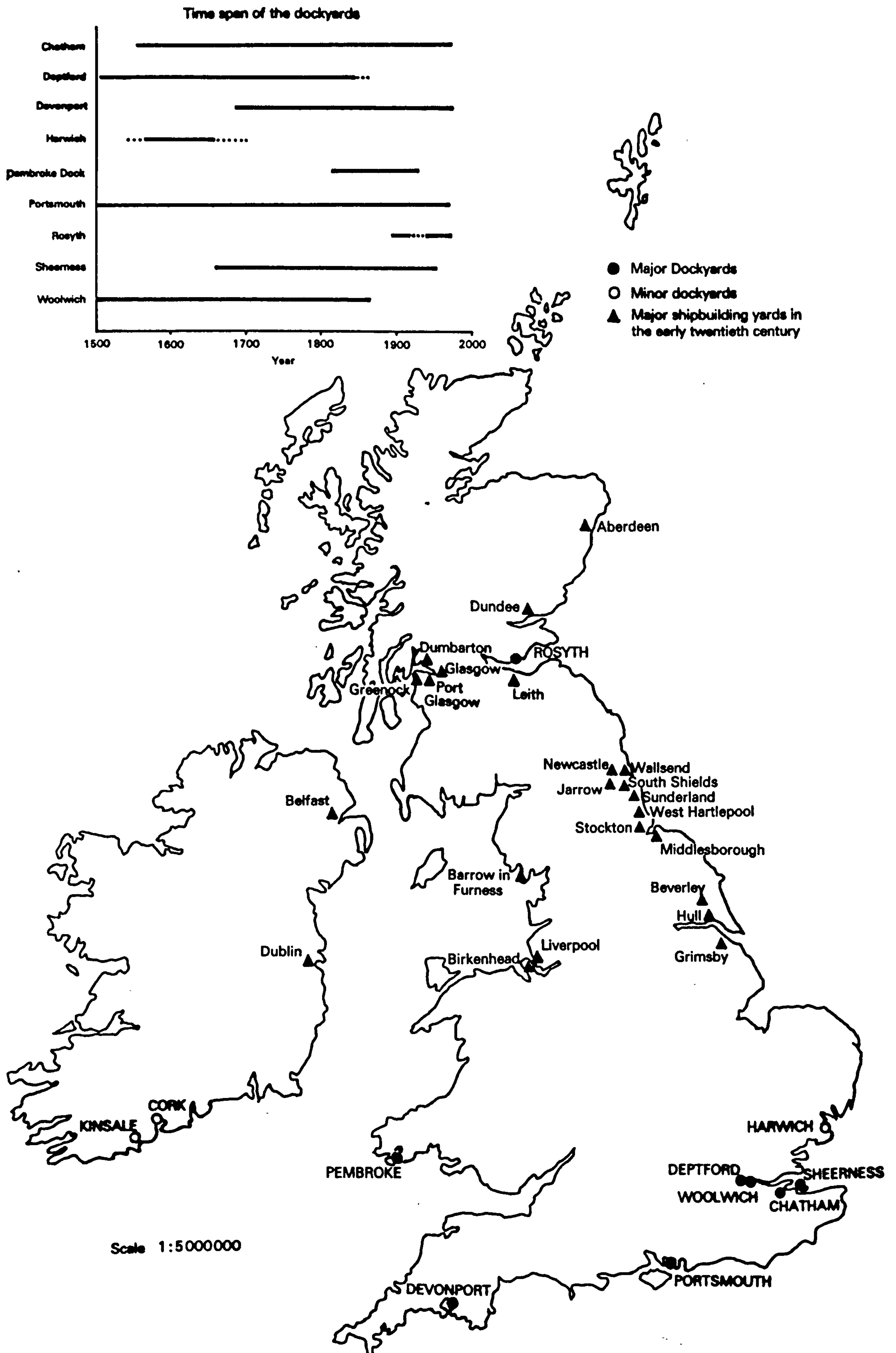


Figure 0.1 The location of naval dockyards and major twentieth century shipbuilding yards

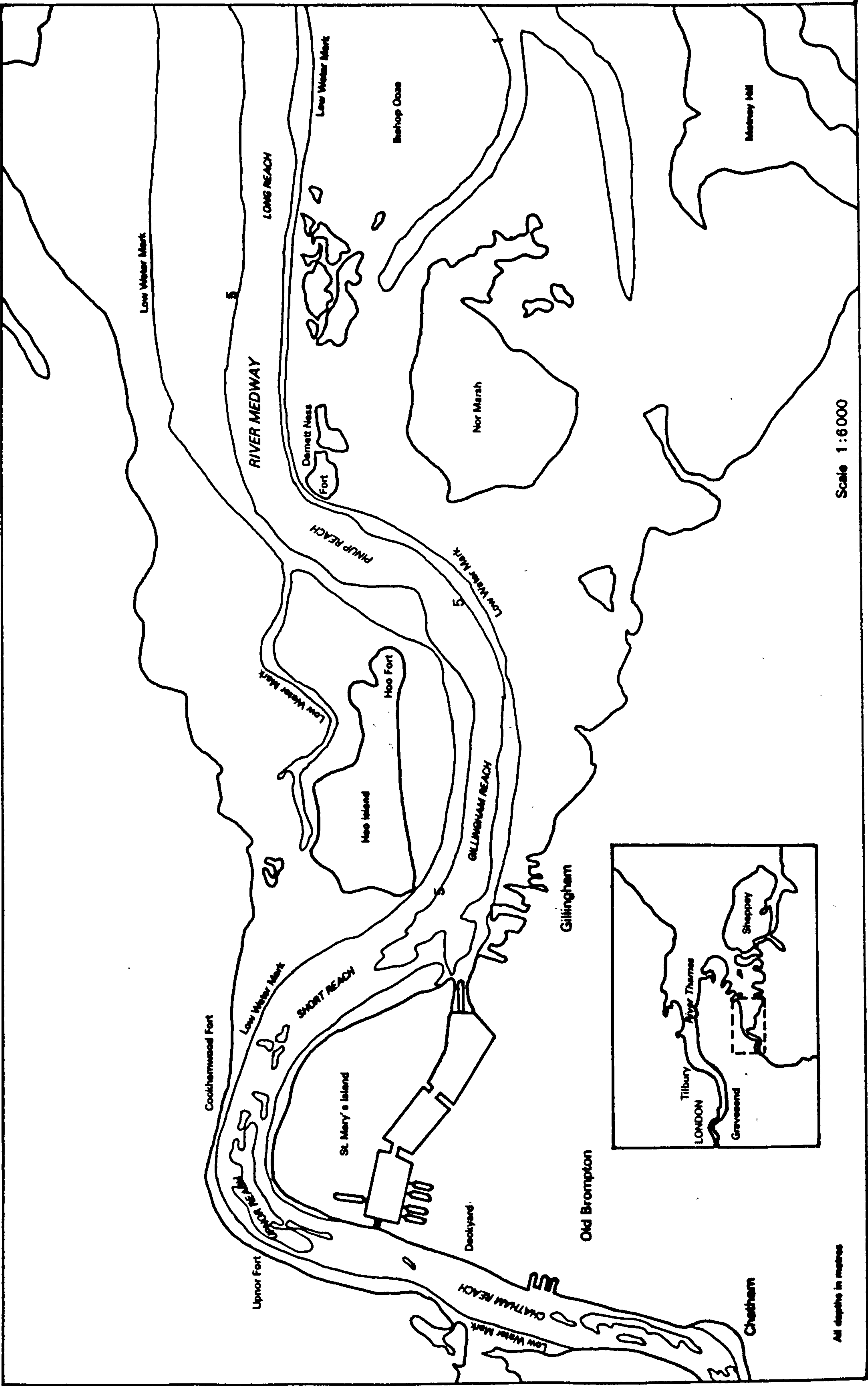


Figure 2.1 Site, situation and water approaches to Chatham dockyard

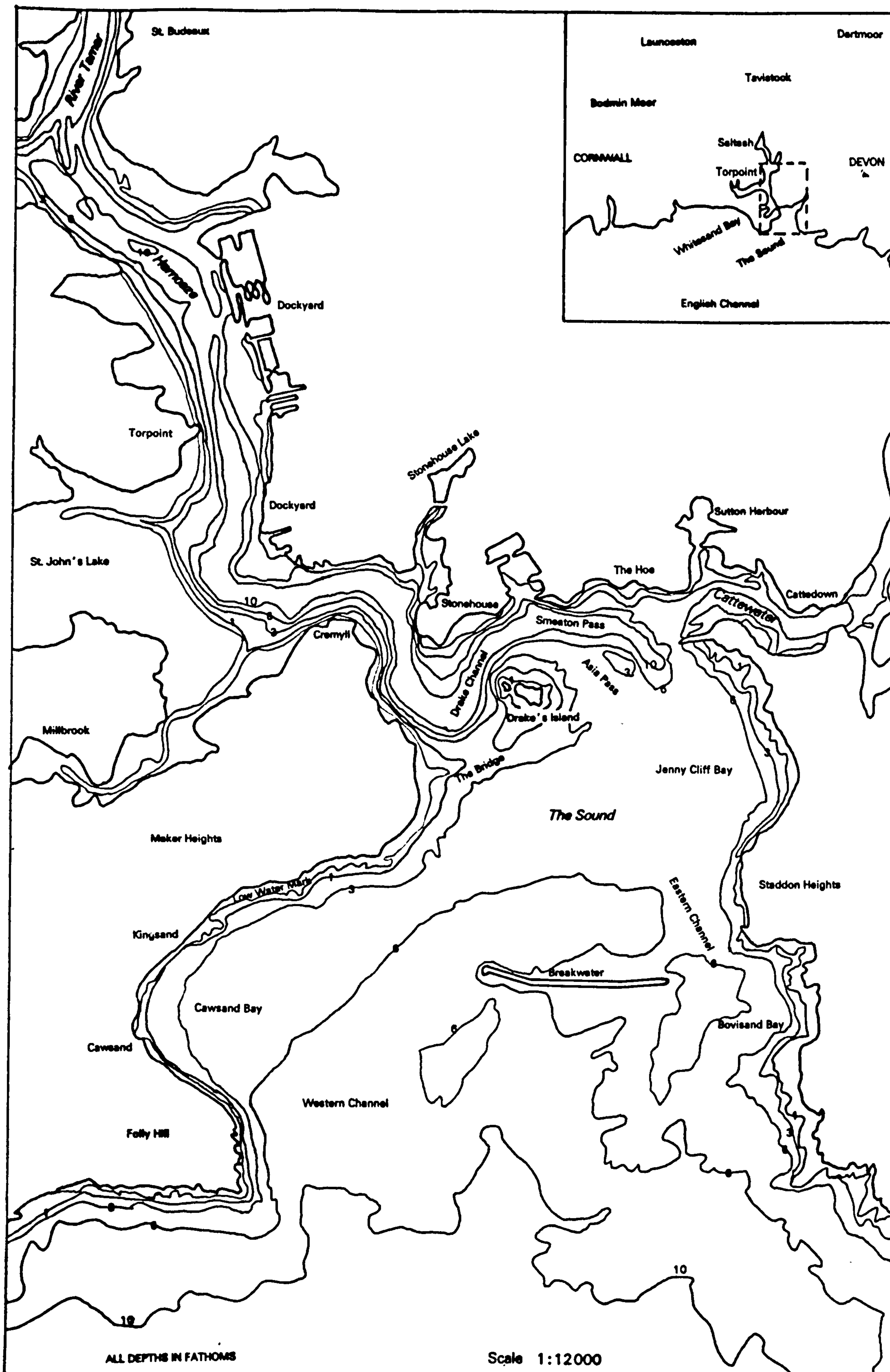


Figure 2.3 Site, situation and water approaches to Devonport dockyard

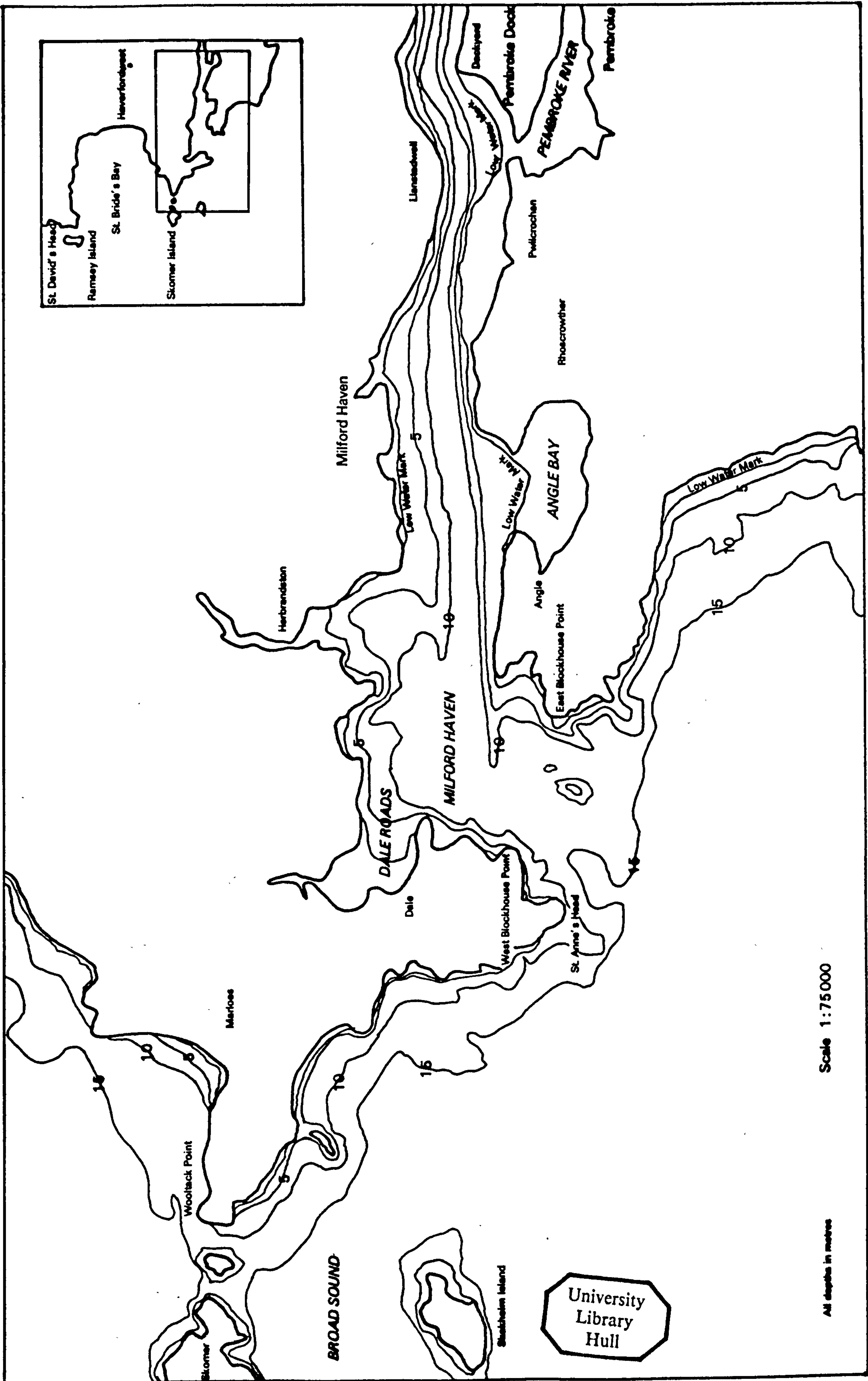


Figure 2.4 Site, situation and water approaches to Pembroke Dock

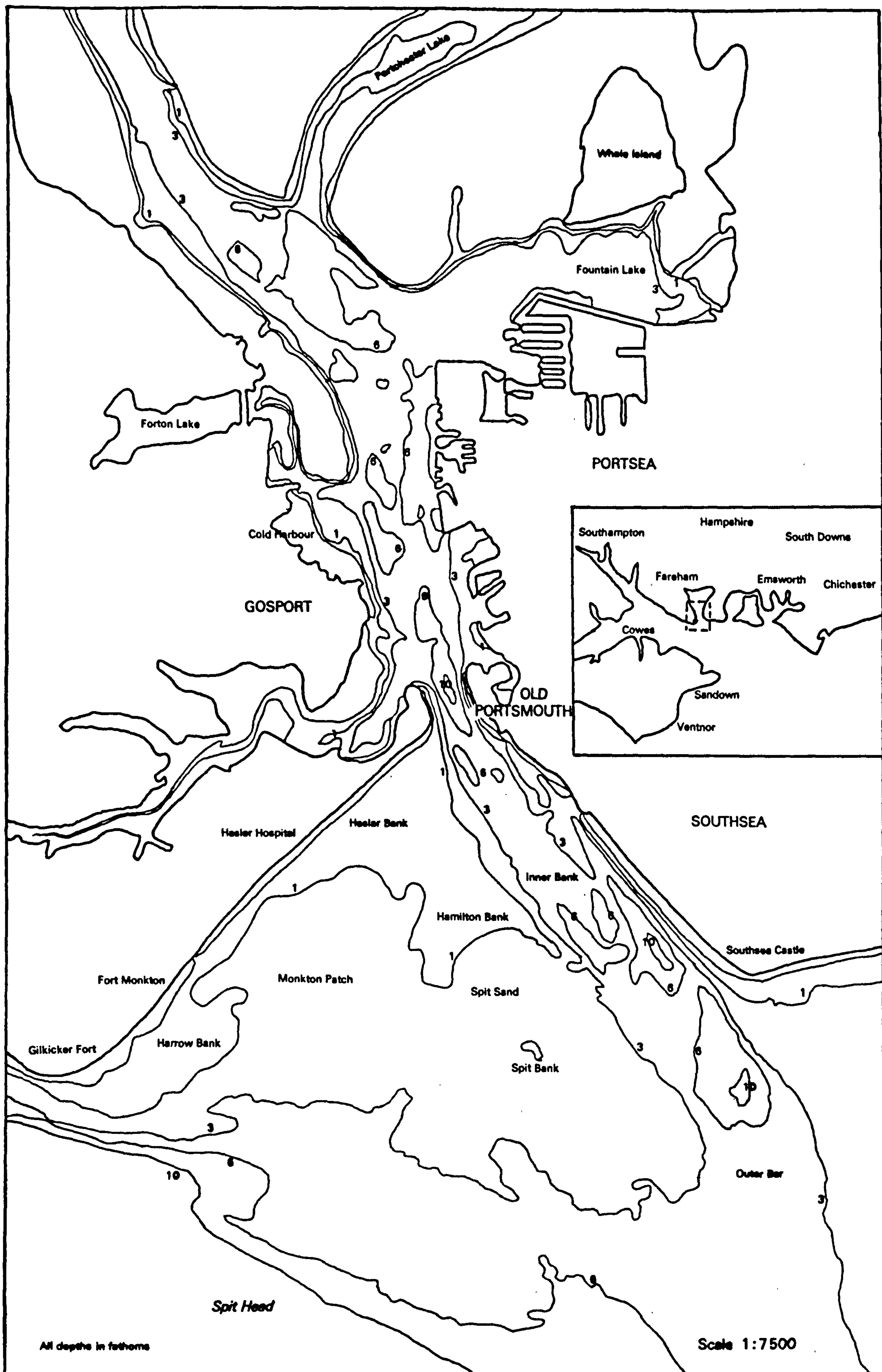


Figure 2.5 Site, situation and water approaches to Portsmouth dockyard

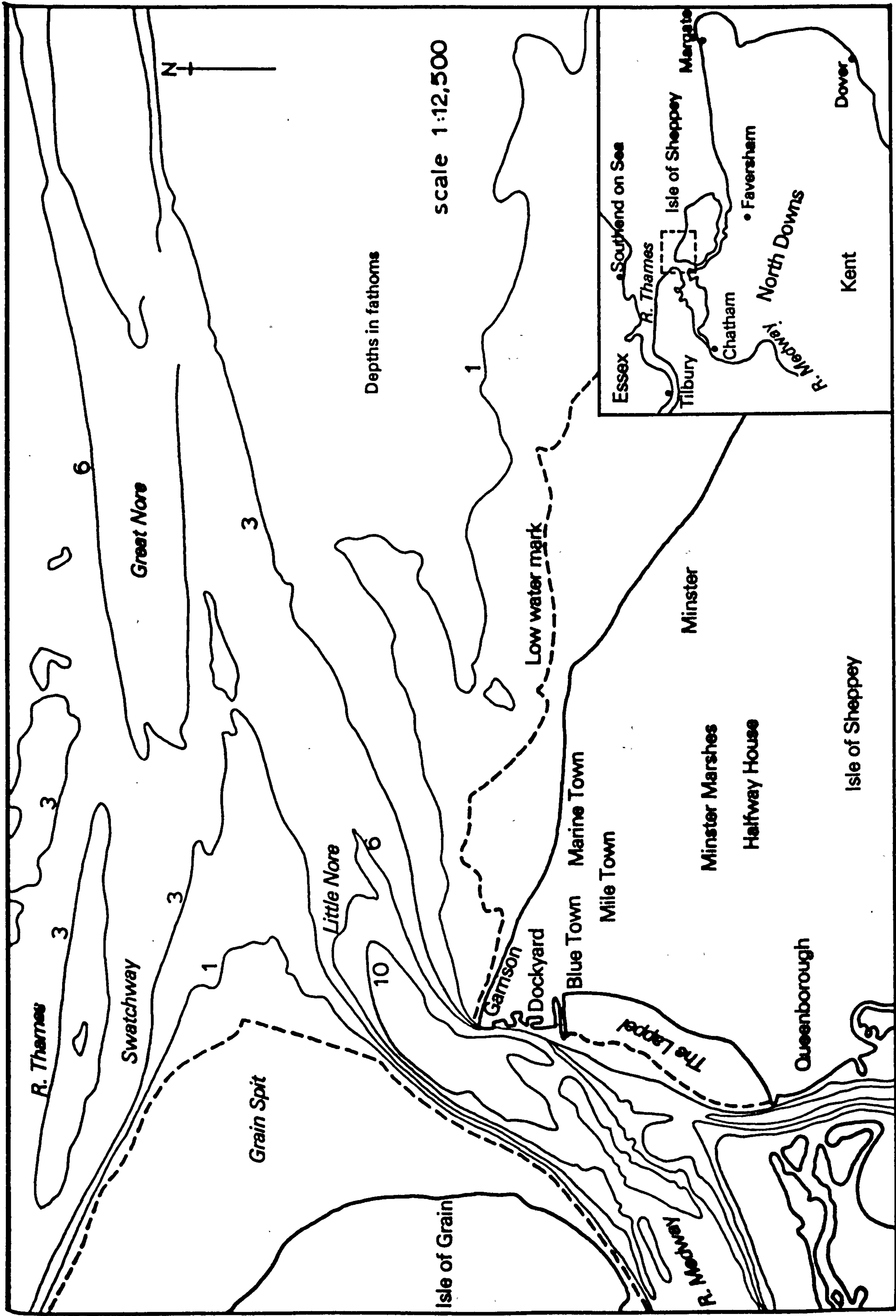


Figure 2.6 Site, situation and water approaches to Sheerness Dockyard

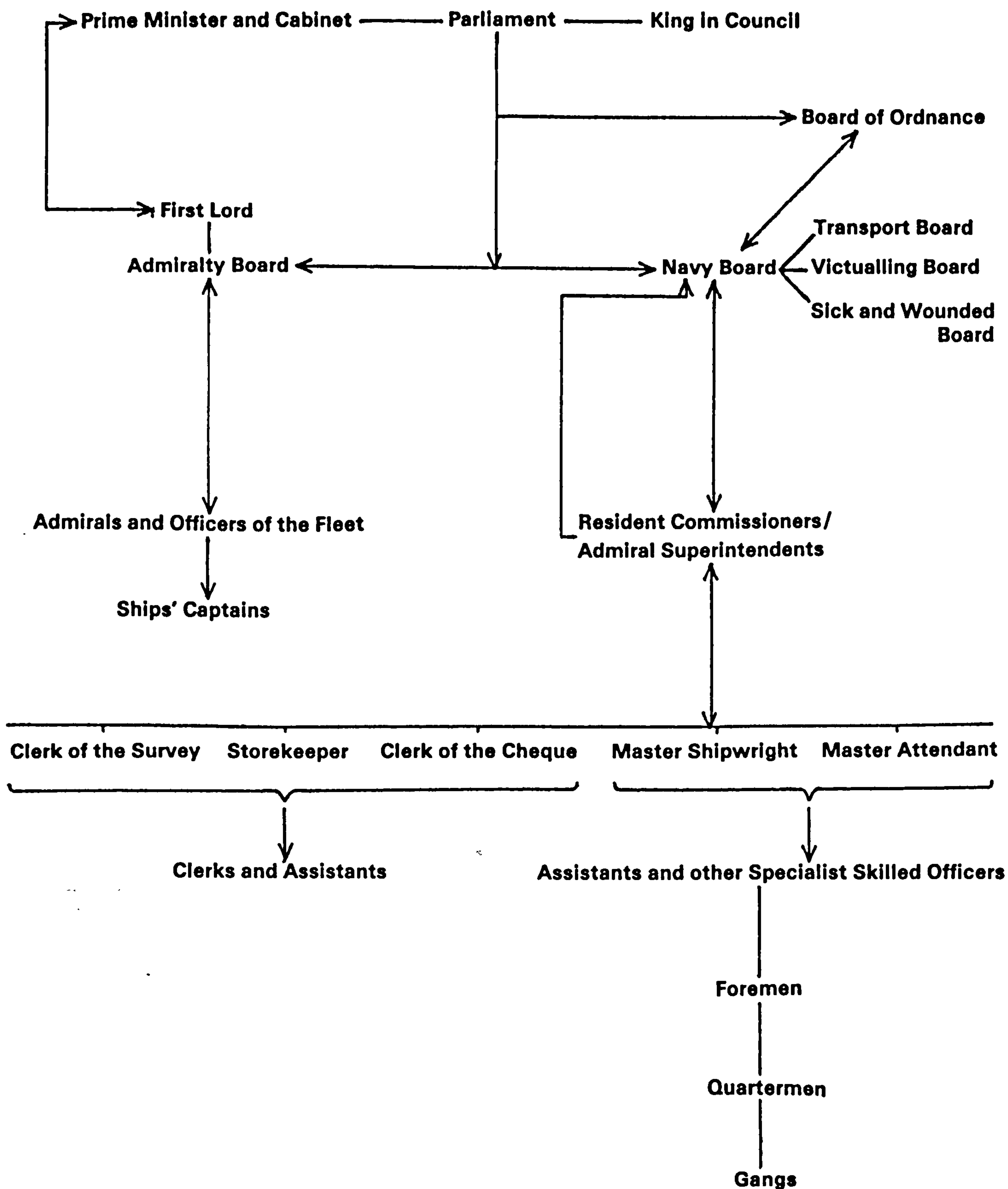


Figure 3.1 ADMINISTRATION AND DECISION-MAKING HIERARCHY

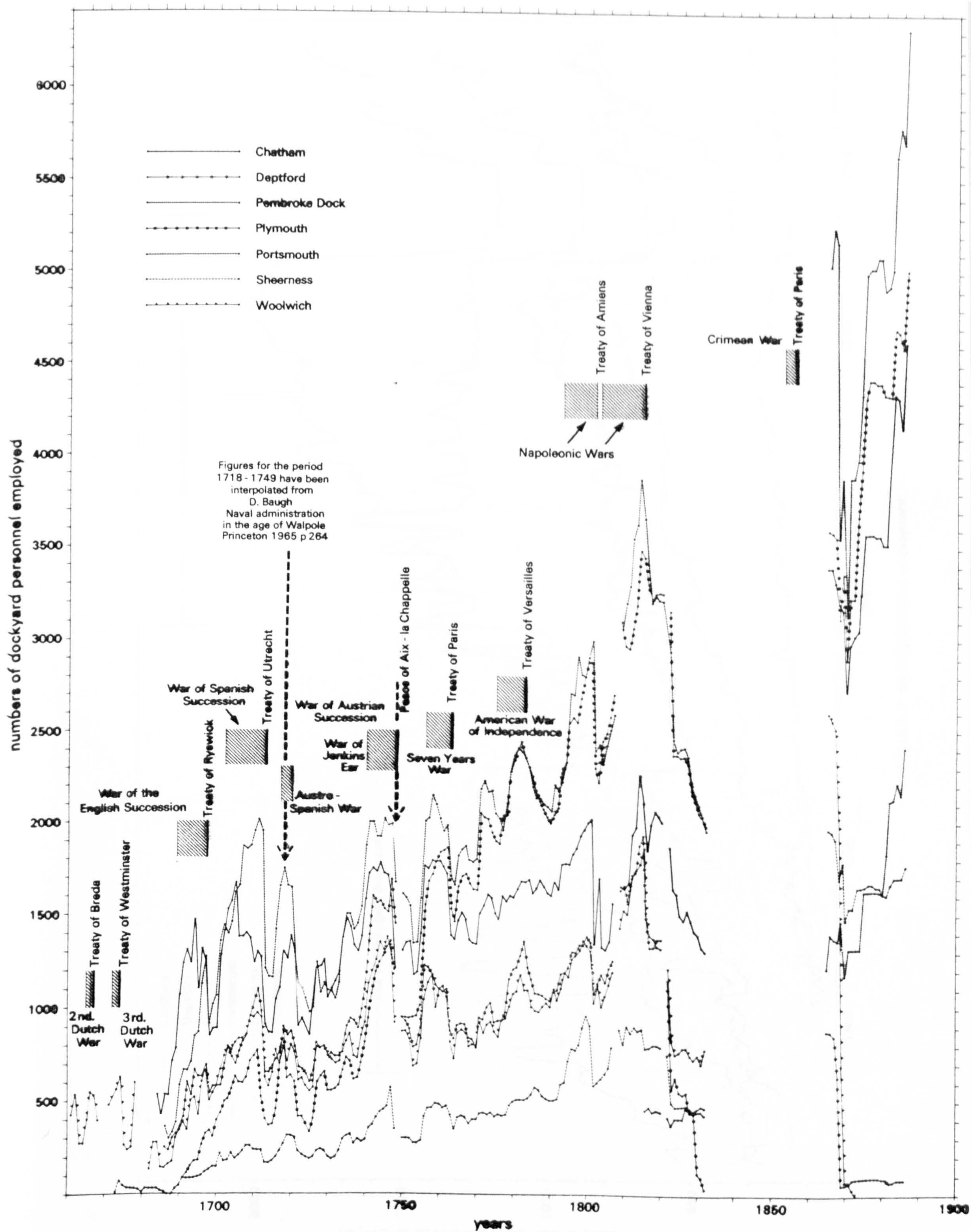


Figure 4.1 Annual dockyard employment

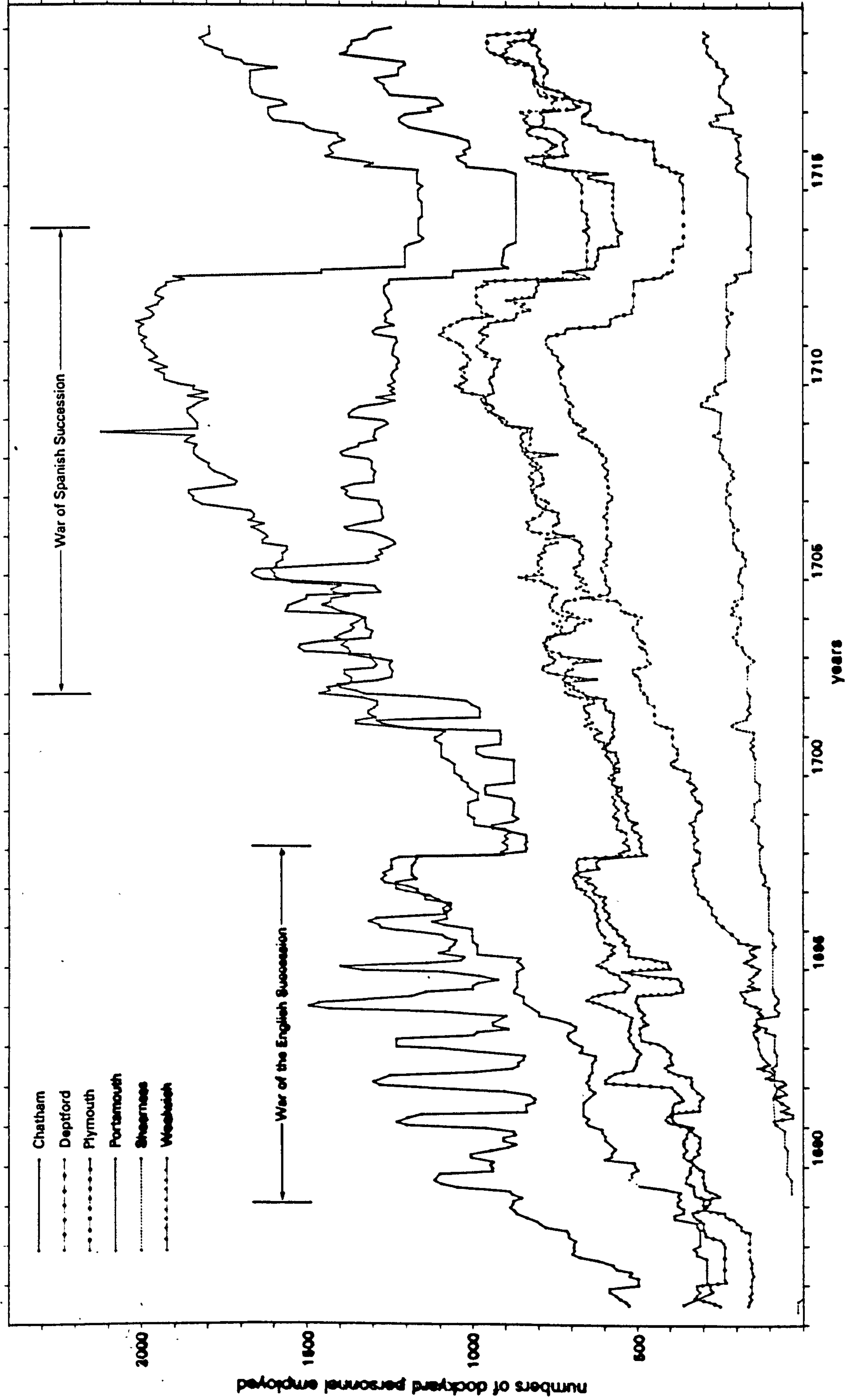


Figure 4.2 Monthly dockyard employment

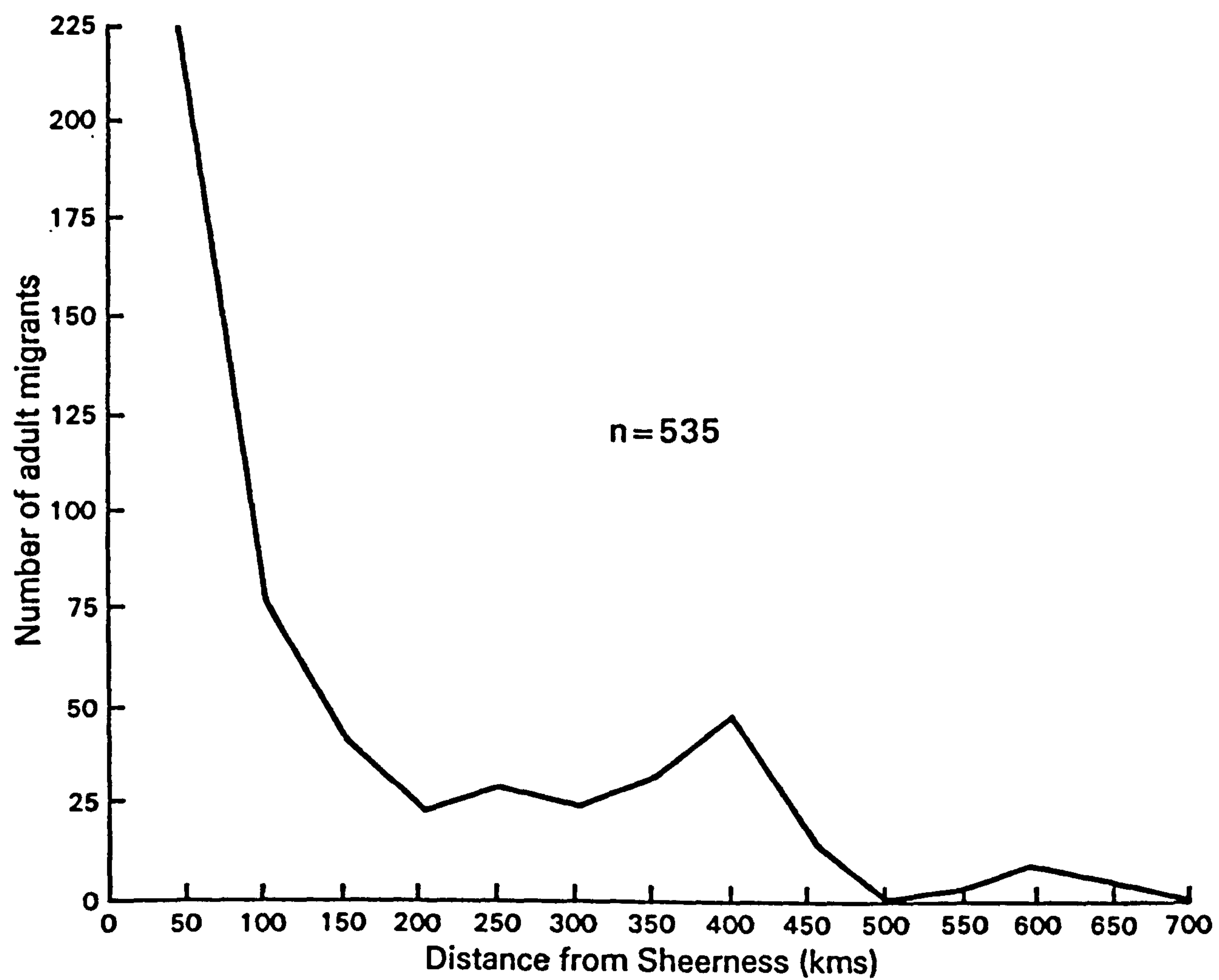


Figure 5.1 Distance distribution of the birthplaces of sample migrants

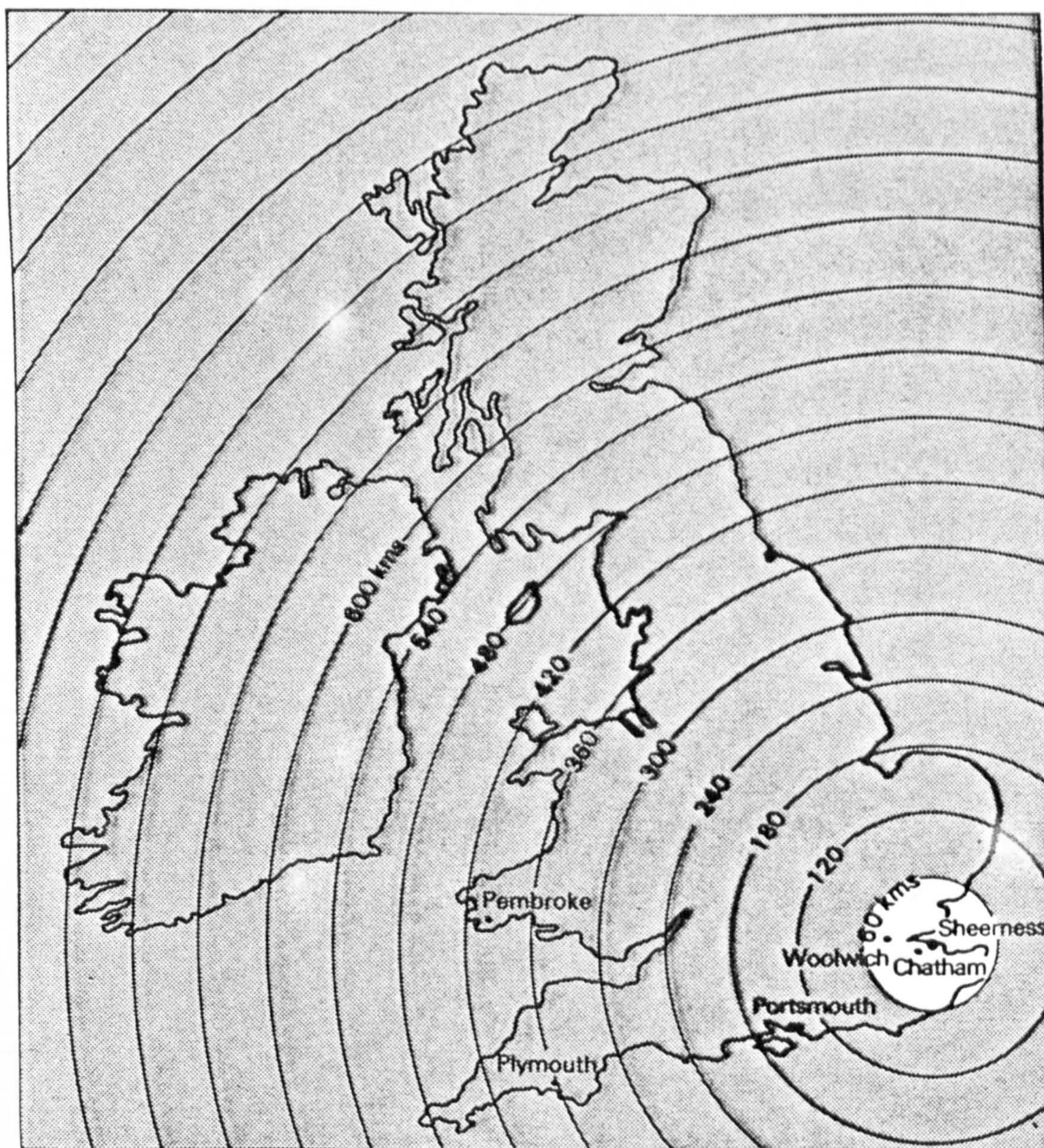
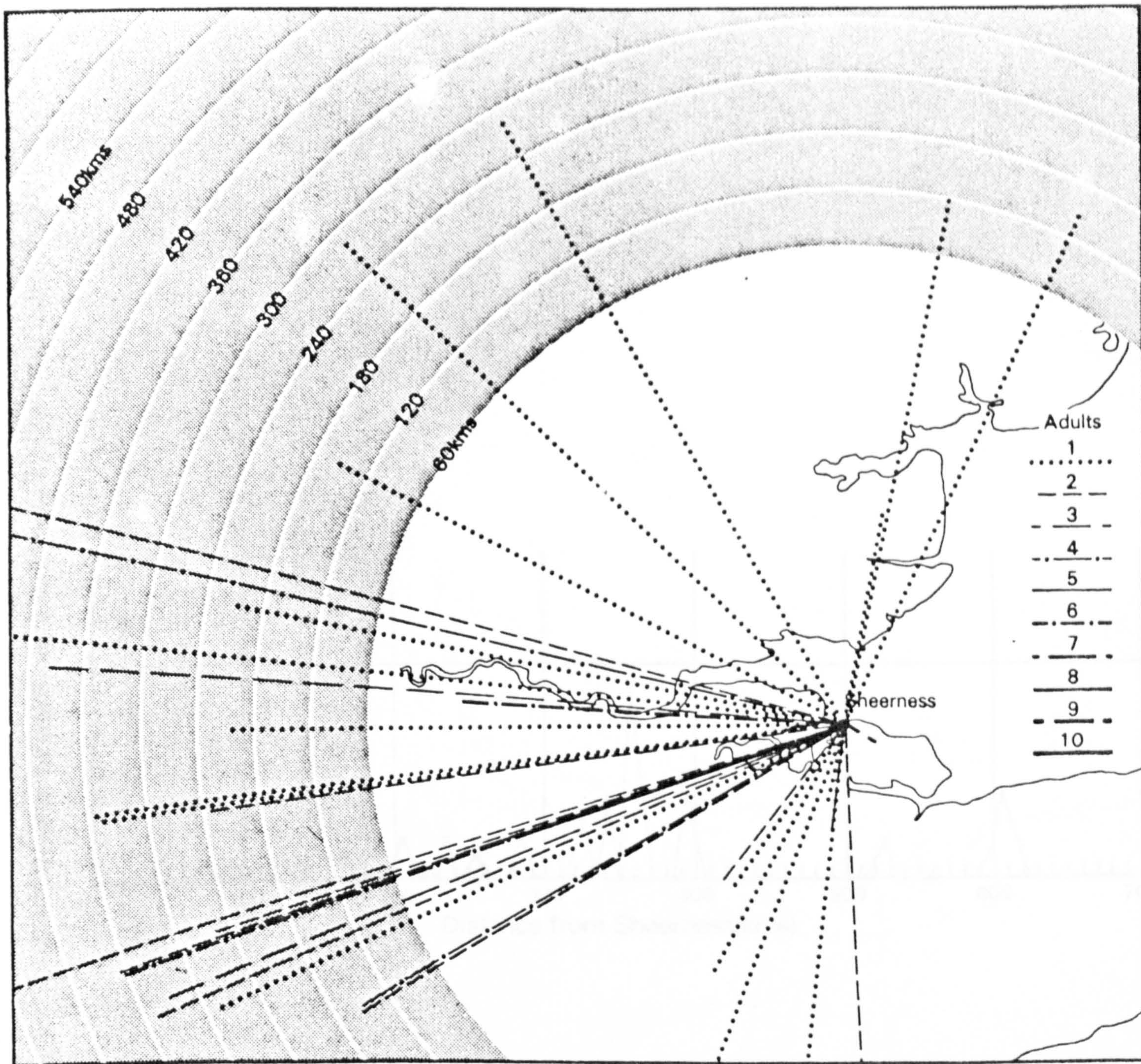


Figure 5.2 Key to following maps
 (The scale changes at 60 km radius from Sheerness.
 Scale in shaded area is 1 : 6666666 Scale in unshaded area is 1 : 800 000)



A dot at the end of a link represents the destination of that move
 Scale change at 60km radius from Sheerness. Centre circle is 1:800,000. Outer circles are 1:6,666,666

Figure 5.3 Links of those migrants who undertook only one move

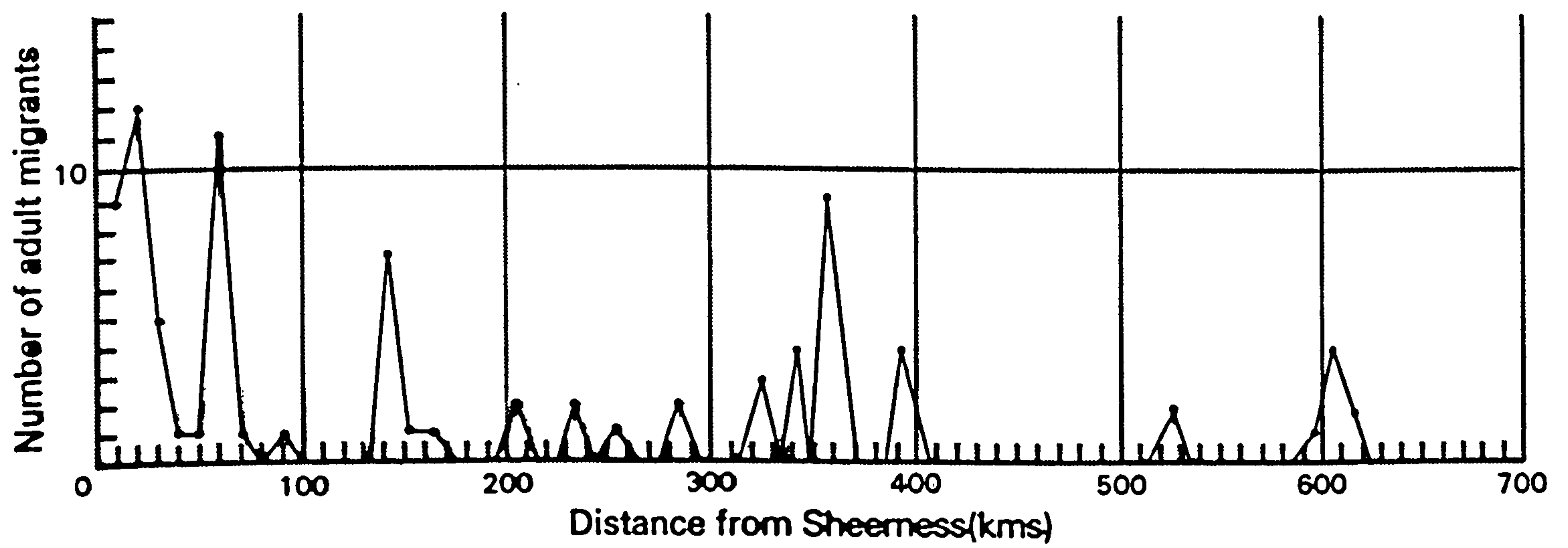
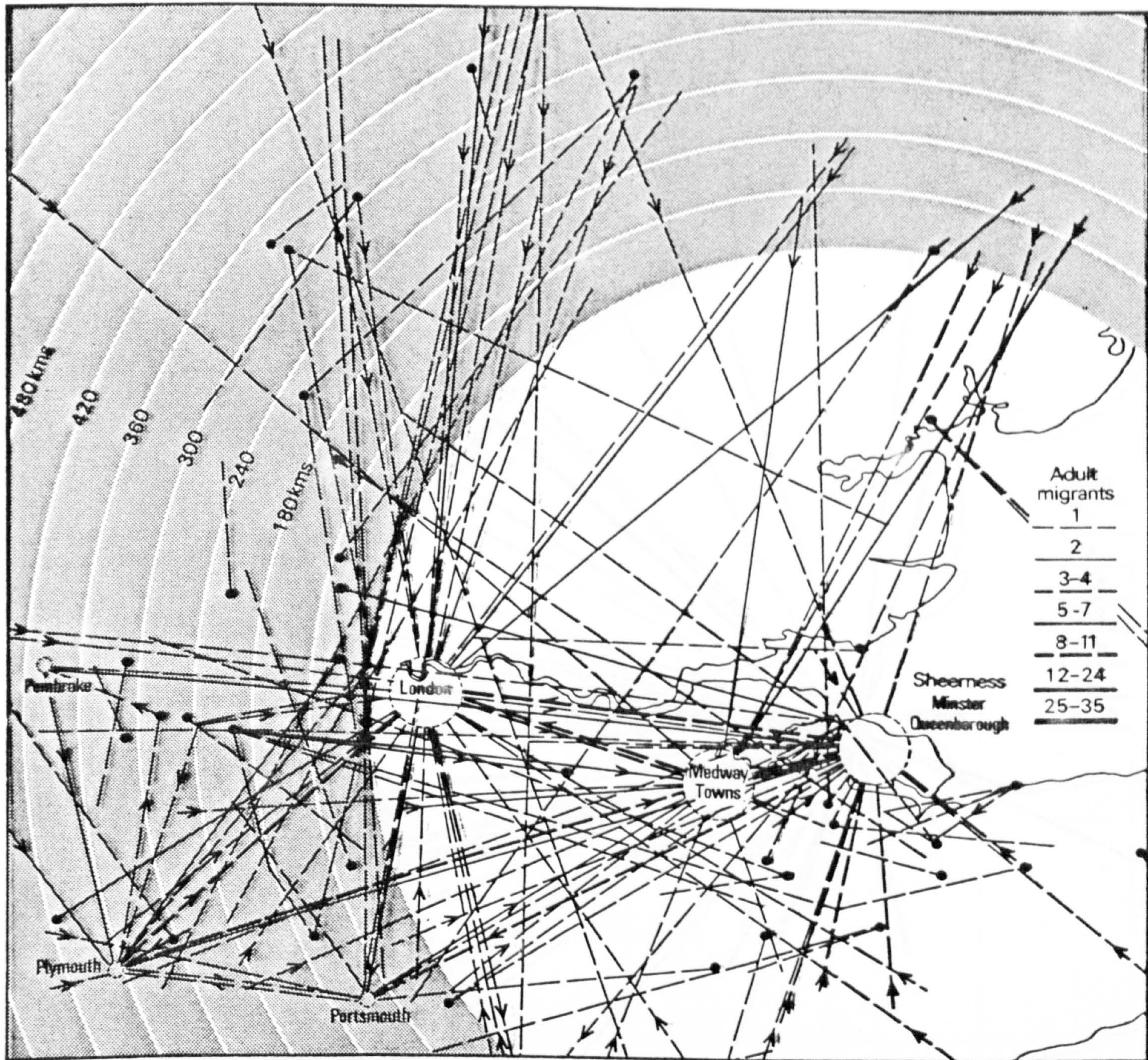
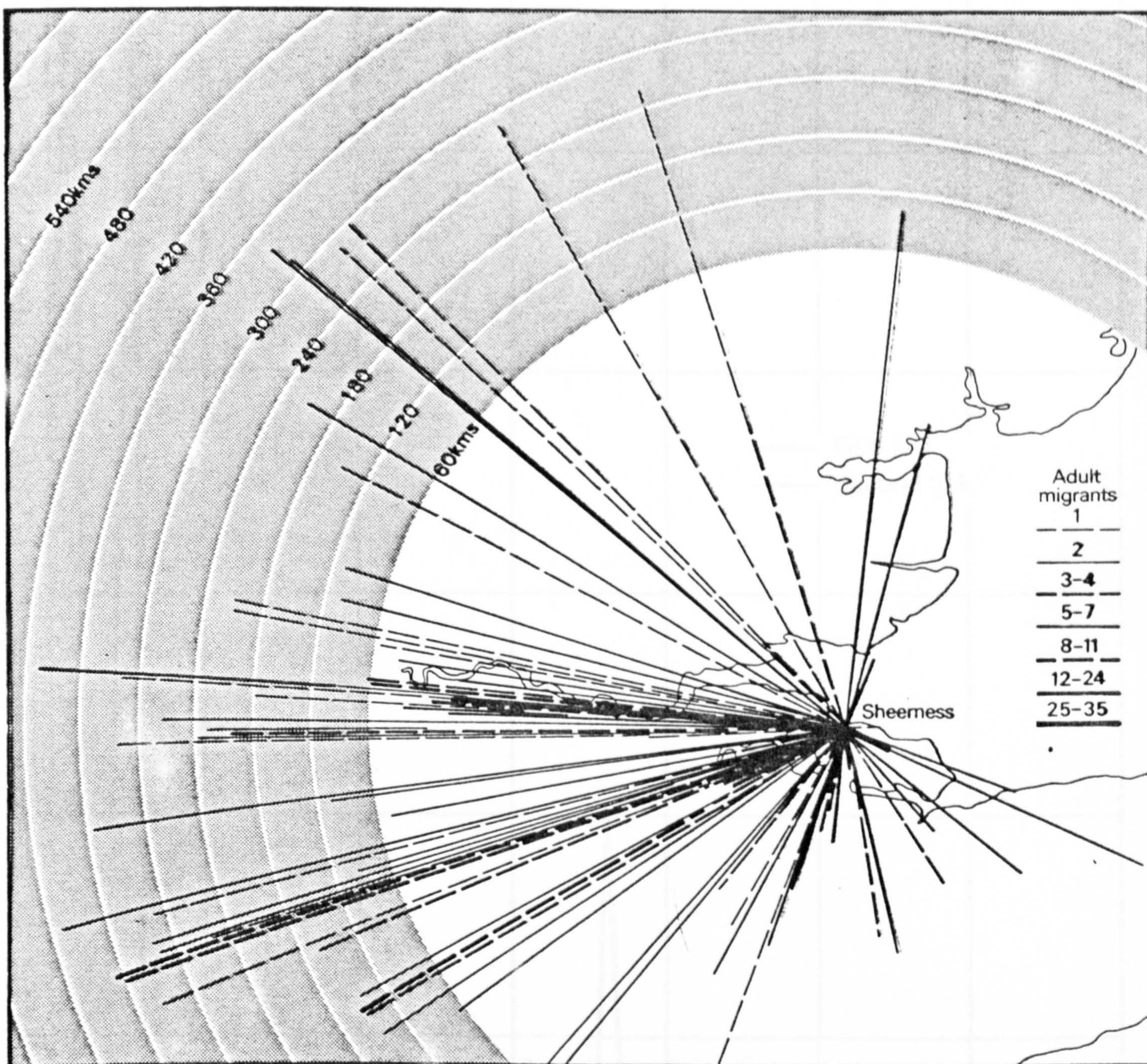


Figure 5.4 Distances travelled by migrants undertaking only one move



A dot at the end of a link represents the destination of that move
 Scale change at 60km radius from Sheerness. Centre circle is 1:800,000. Outer circles are 1:6,666,666

Figure 5.5 First link of migrant paths which contained two links



A dot at the end of a link represents the destination of that move
 Scale change at 60km radius from Sheerness. Centre circle is 1:800,000. Outer circles are 1:6,666,666

Figure 5.6 Second link of migrant paths which contained two links

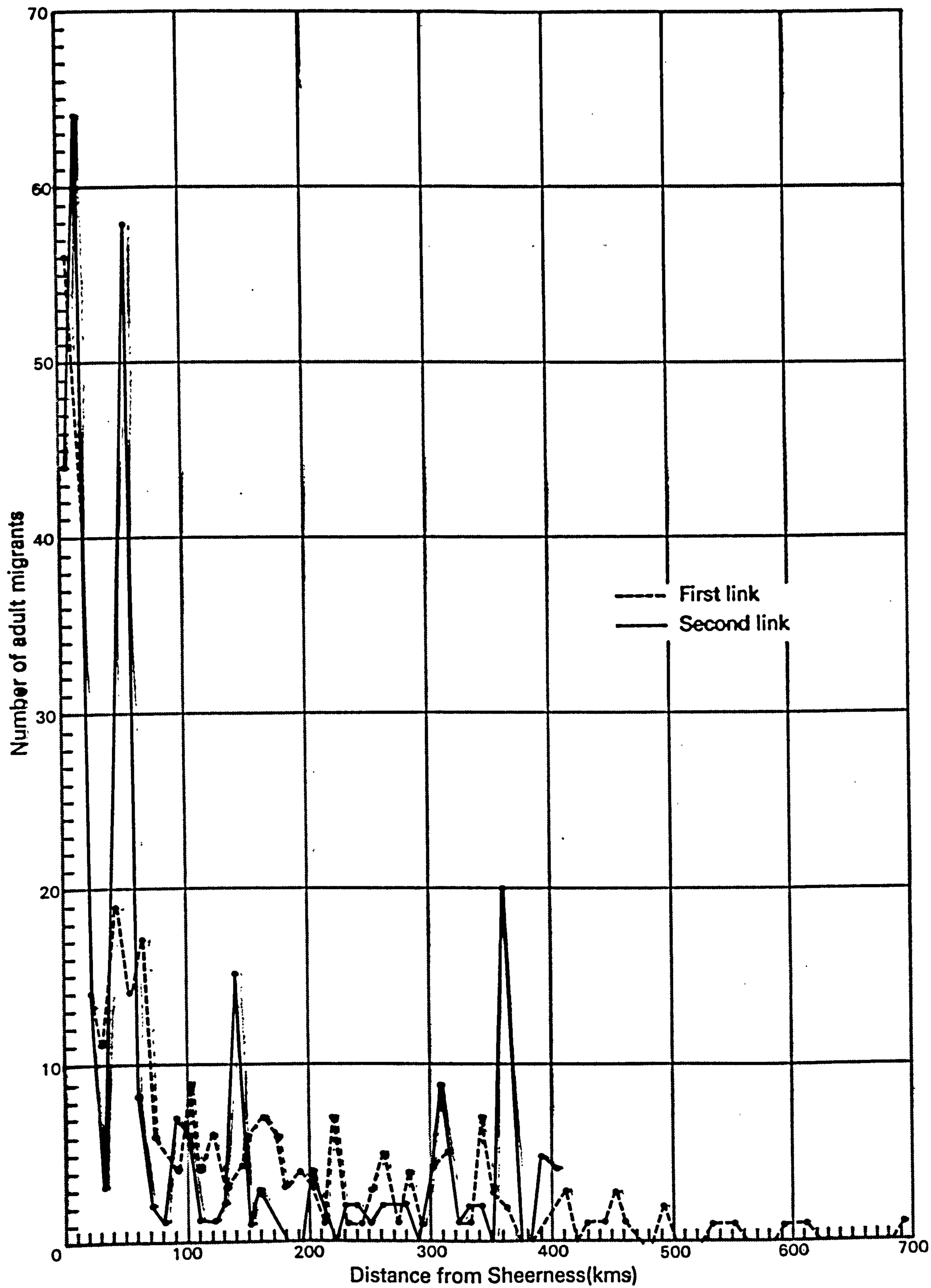
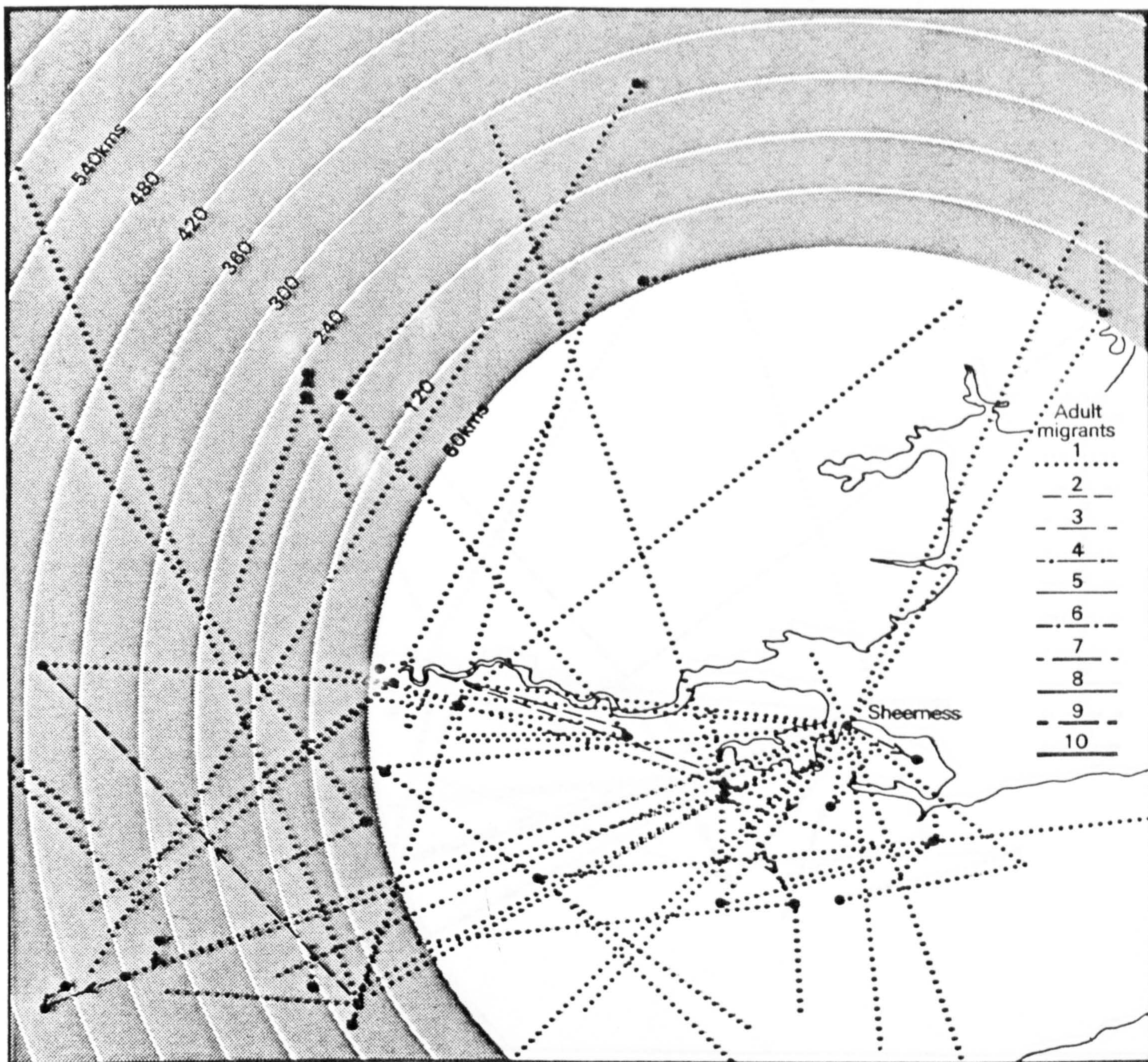
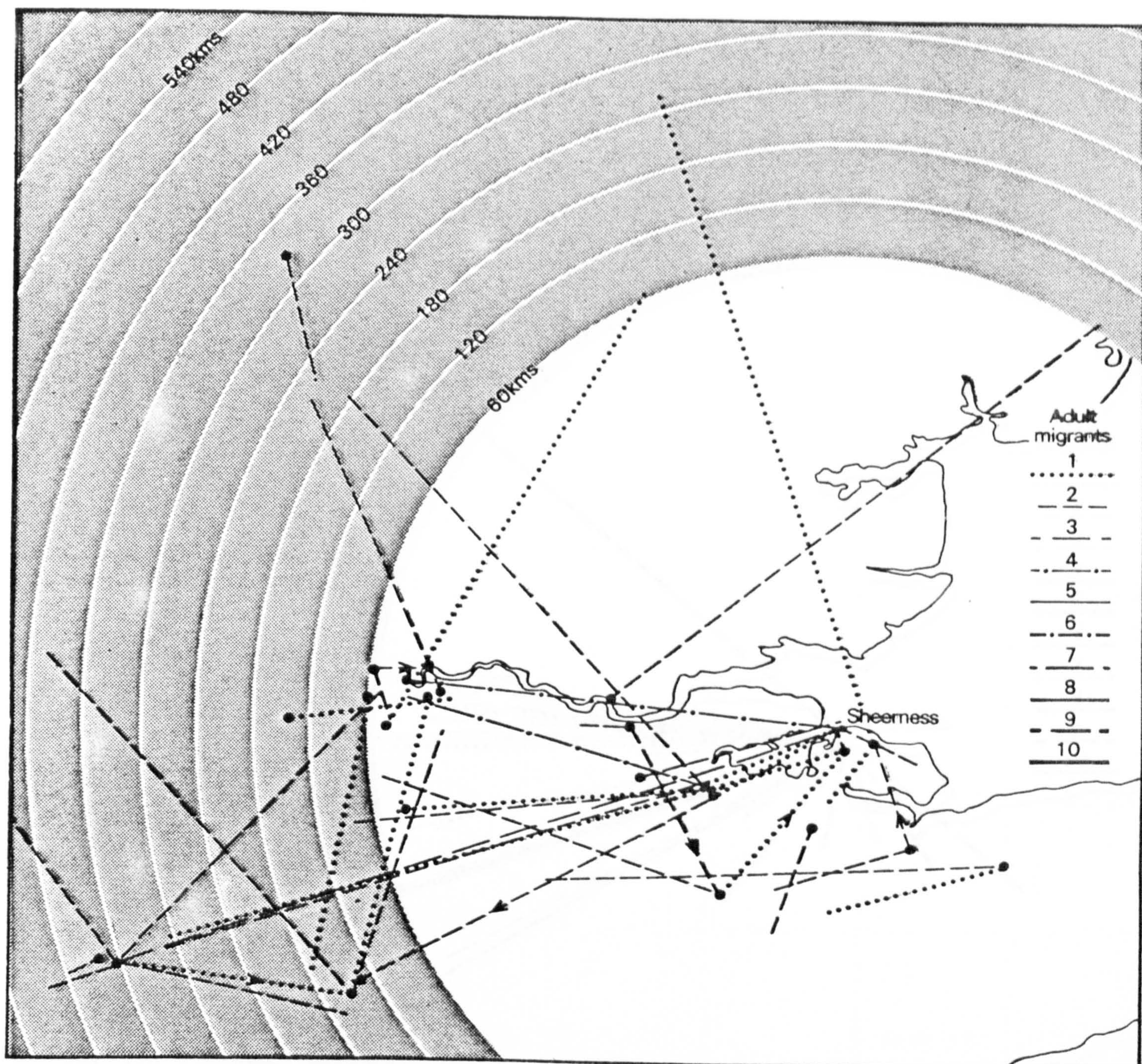


Figure 5.7 Distances travelled by migrants who had a path containing two links



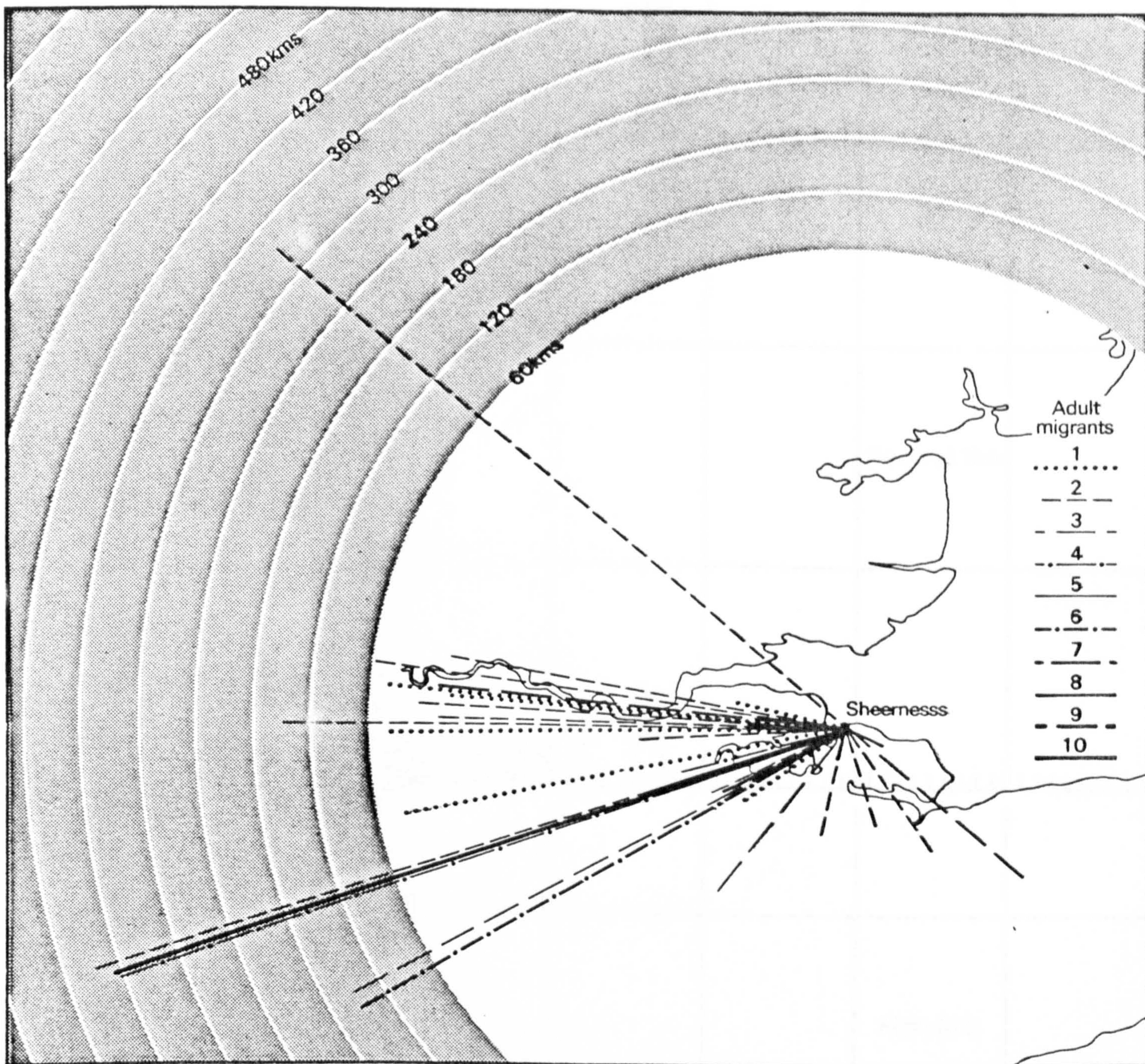
A dot at the end of a link represents the destination of that move
 Scale change at 60km radius from Sheerness. Centre circle is 1:800,000. Outer circles are 1:6,666,666

Figure 5.8 First link of those migrant paths which contained three links



A dot at the end of a link represents the destination of that move
 Scale change at 60km radius from Sheerness. Centre circle is 1:800,000. Outer circles are 1:6,666,666

Figure 5.9 Second link of those migrant paths which contained three links



A dot at the end of a link represents the destination of that move
 Scale change at 60km radius from Sheerness. Centre circle is 1:800,000. Outer circles are 1:6,666,666

Figure 5.10 Third link of those migrant paths which contained three links

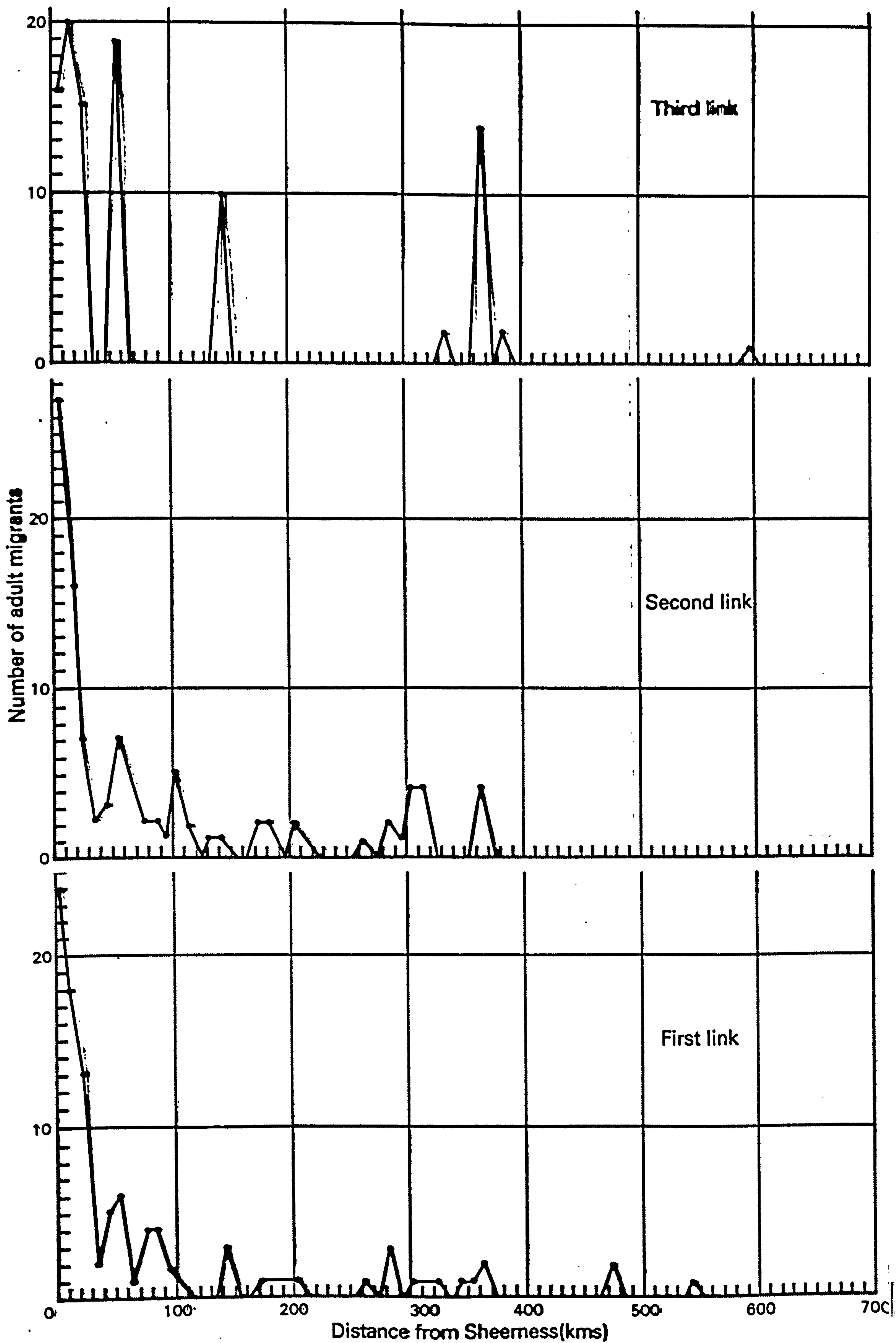
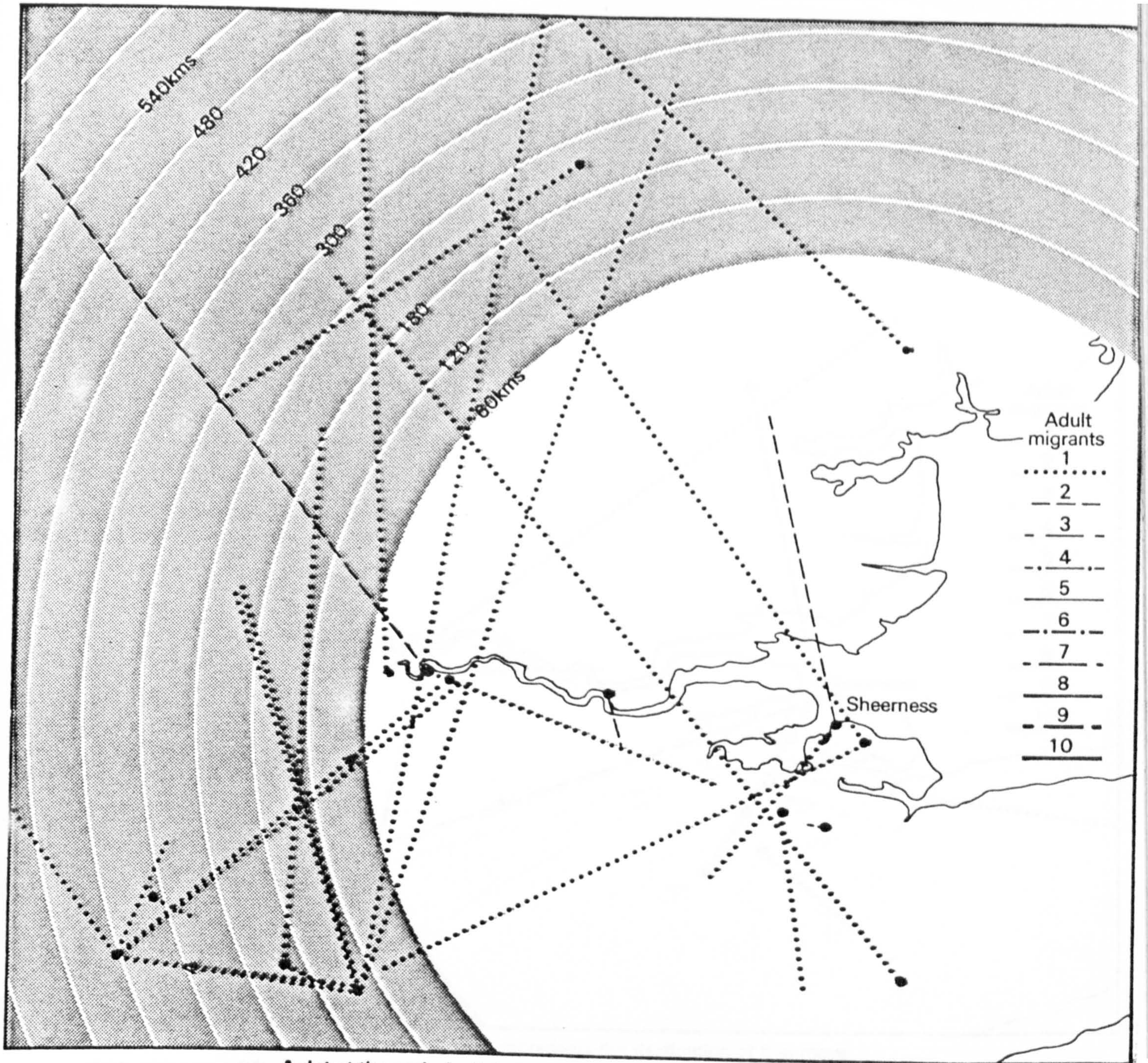
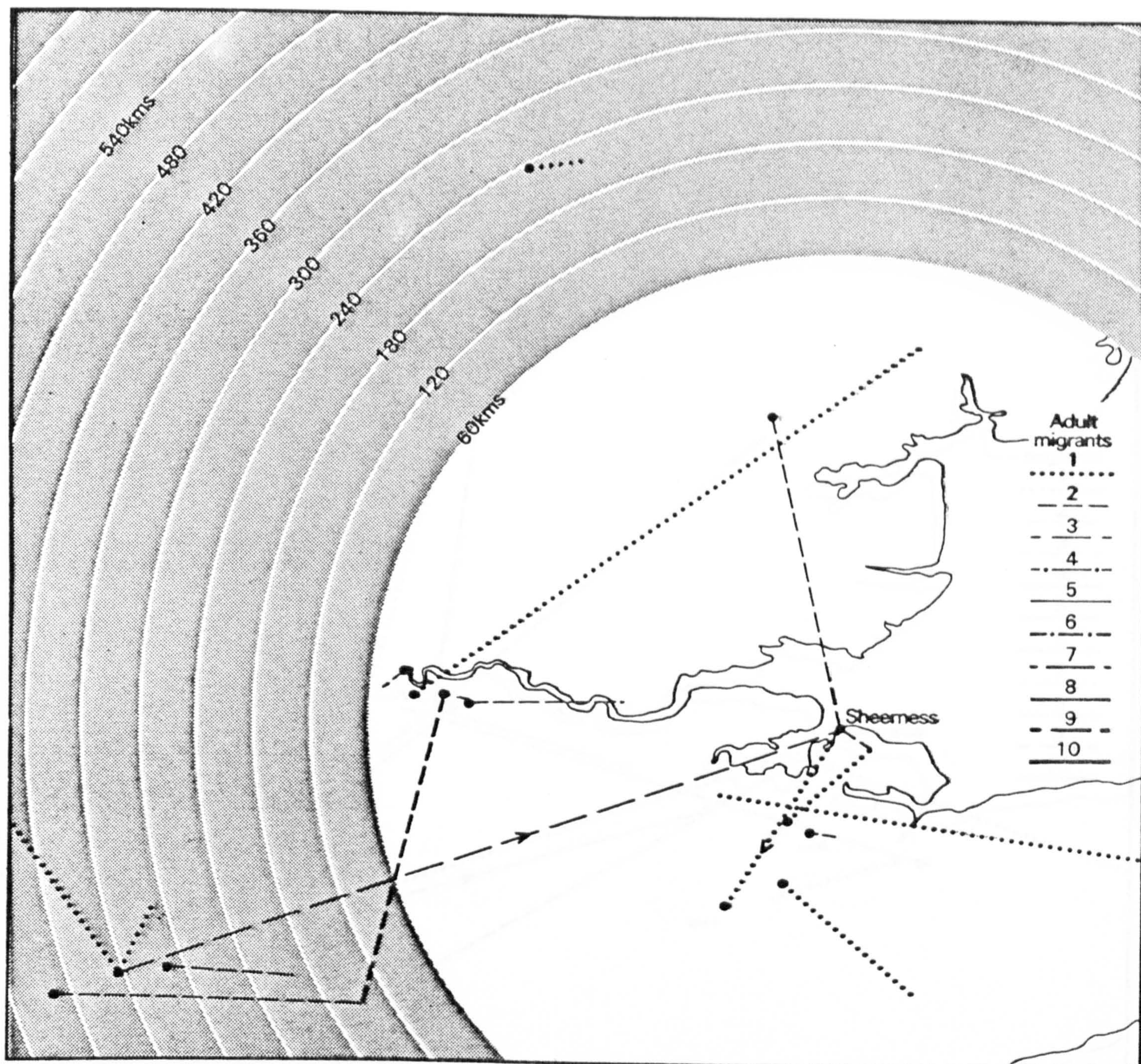


Figure 5.11 Distances travelled by migrants who had a path containing three links



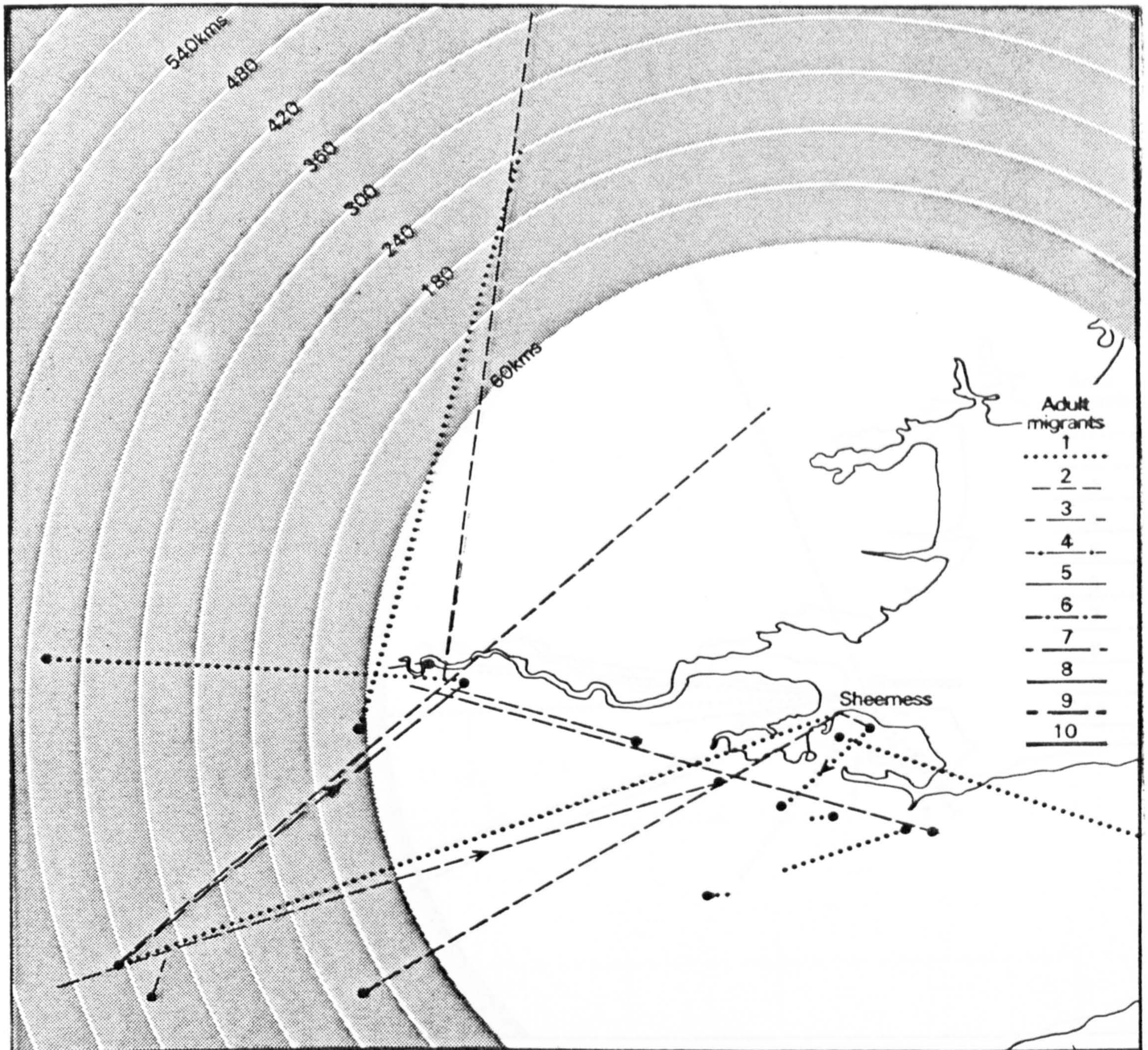
A dot at the end of a link represents the destination of that move
 Scale change at 60km radius from Sheerness. Centre circle is 1:800,000. Outer circles are 1:6,666,666

Figure 5.12 First link of those migrant paths which contained four links



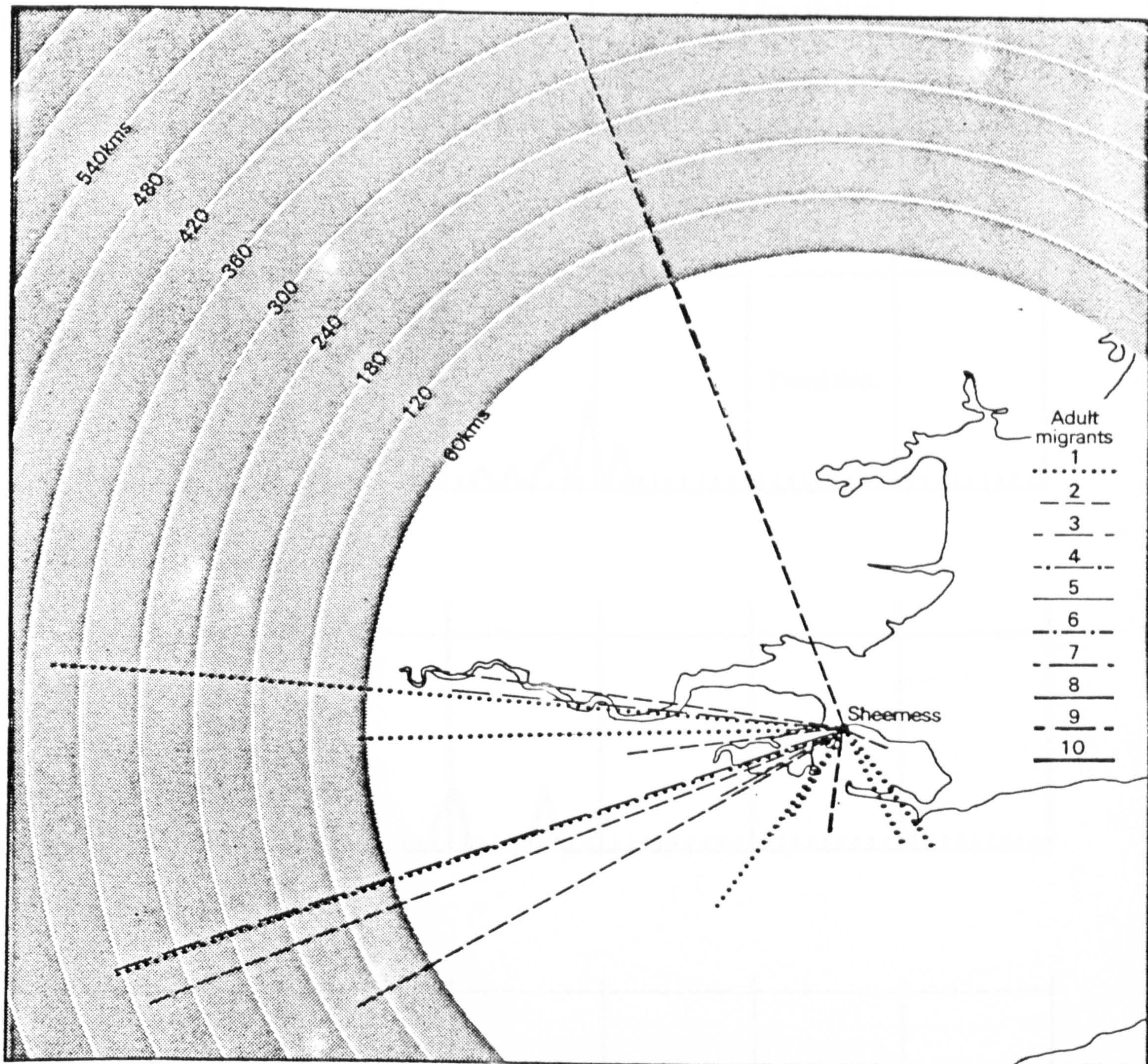
A dot at the end of a link represents the destination of that move
 Scale change at 60km radius from Sheerness. Centre circle is 1:800,000. Outer circles are 1:6,666,666

Figure 5.13 Second link of those migrant paths which contained four links



A dot at the end of a link represents the destination of that move
 Scale change at 60km radius from Sheerness. Centre circle is 1:800,000. Outer circles are 1:6,666,666

Figure 5.14 Third link of those paths which contained four links



A dot at the end of a link represents the destination of that move
 Scale change at 60km radius from Sheerness. Centre circle is 1:800,000. Outer circles are 1:6,666,666

Figure 5.15 Fourth link of those migrant paths which contained four links

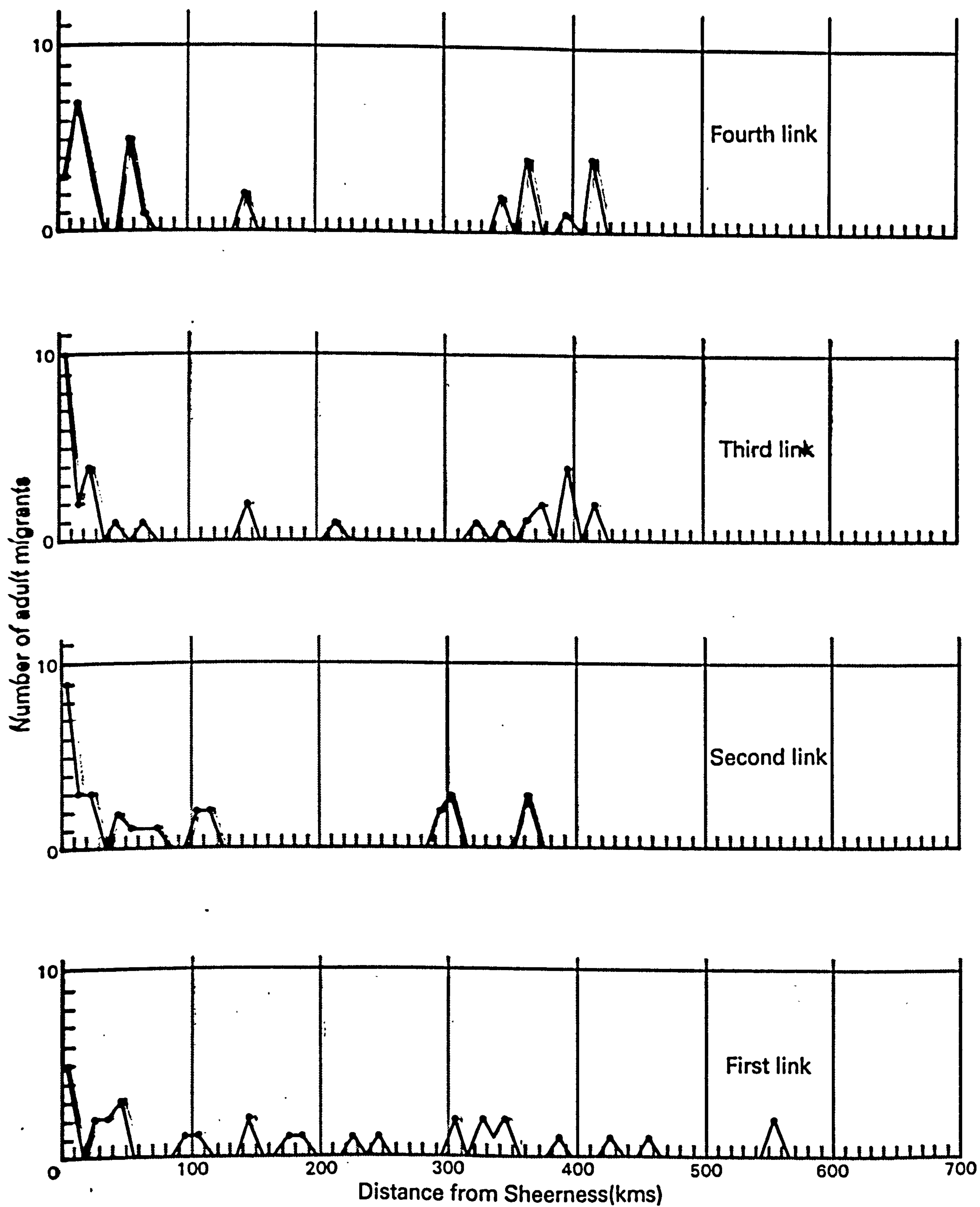
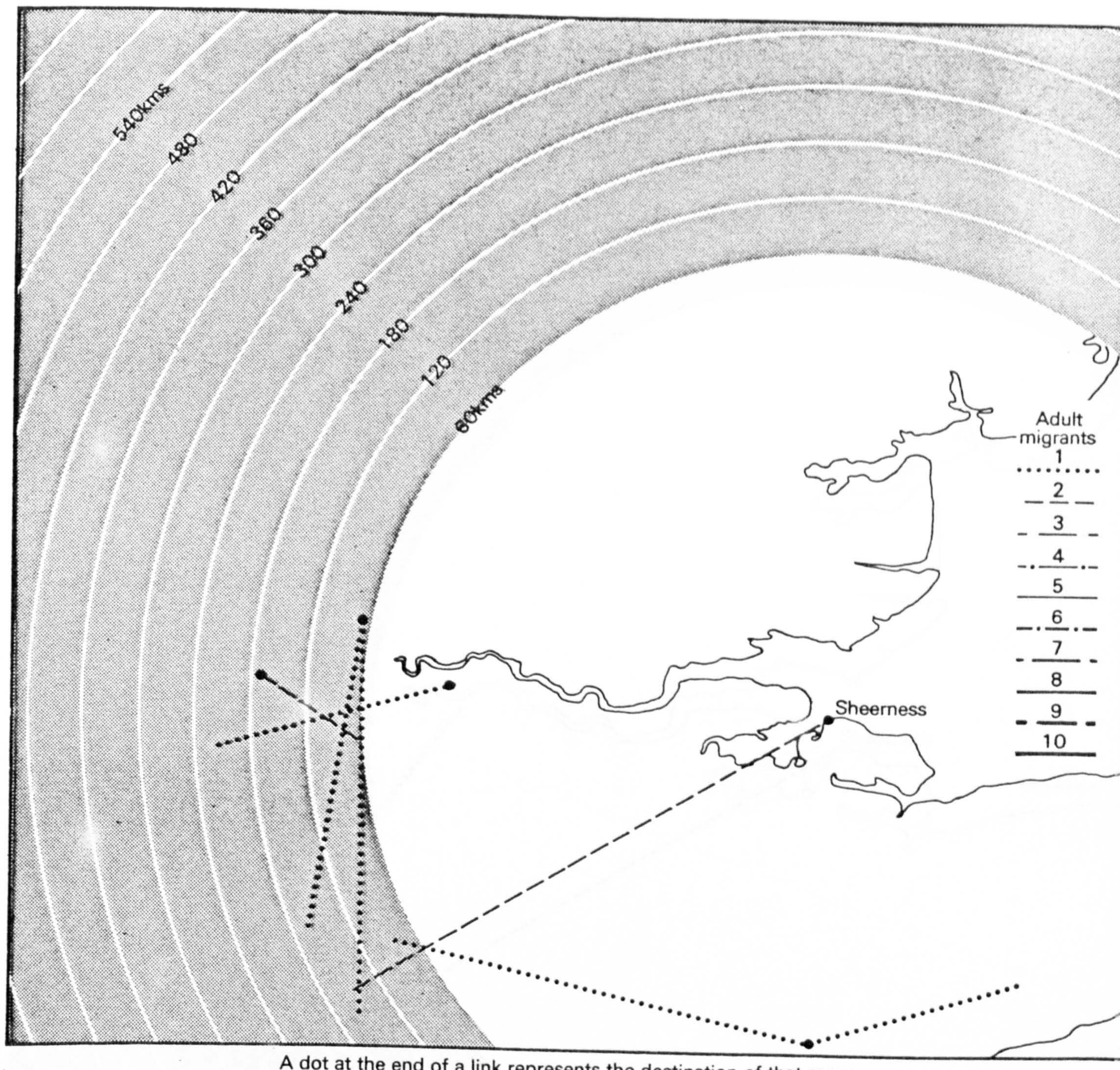
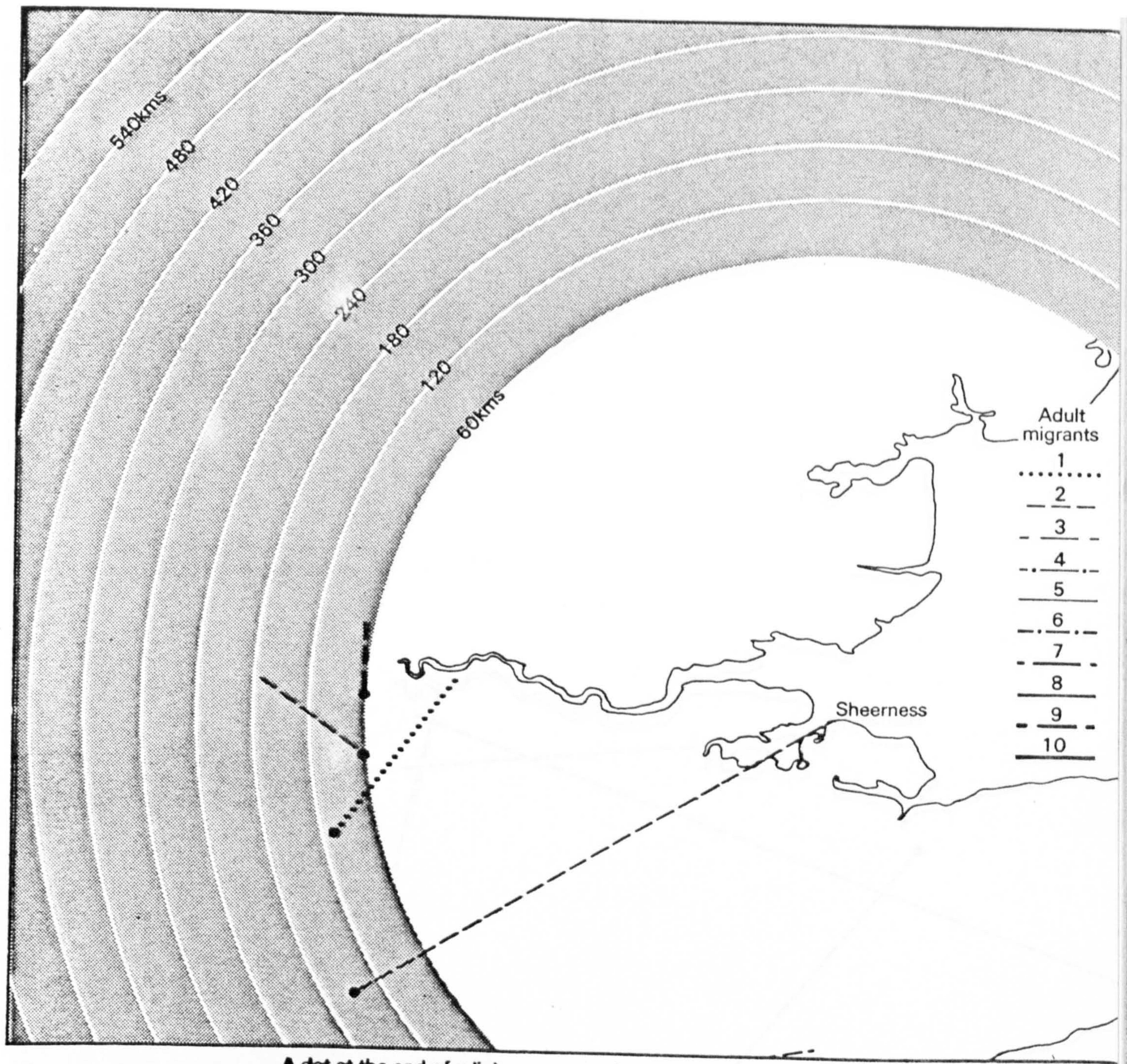


Figure 5.16 Distances travelled by migrants who had a path containing four links



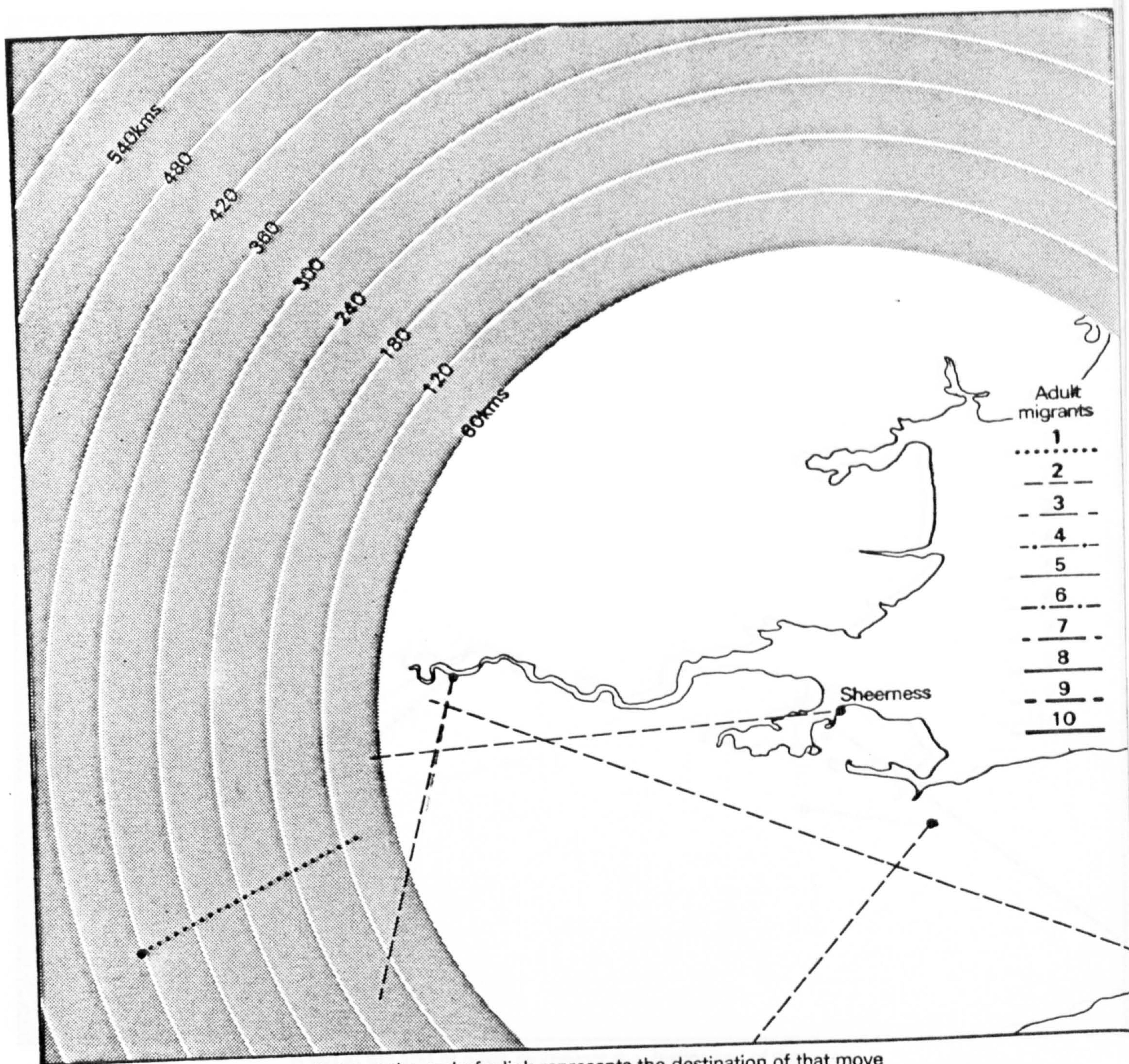
A dot at the end of a link represents the destination of that move
 Scale change at 60km radius from Sheerness. Centre circle is 1:800,000. Outer circles are 1:6,666,666

Figure 5.17 First link of those migrant paths which contained five links



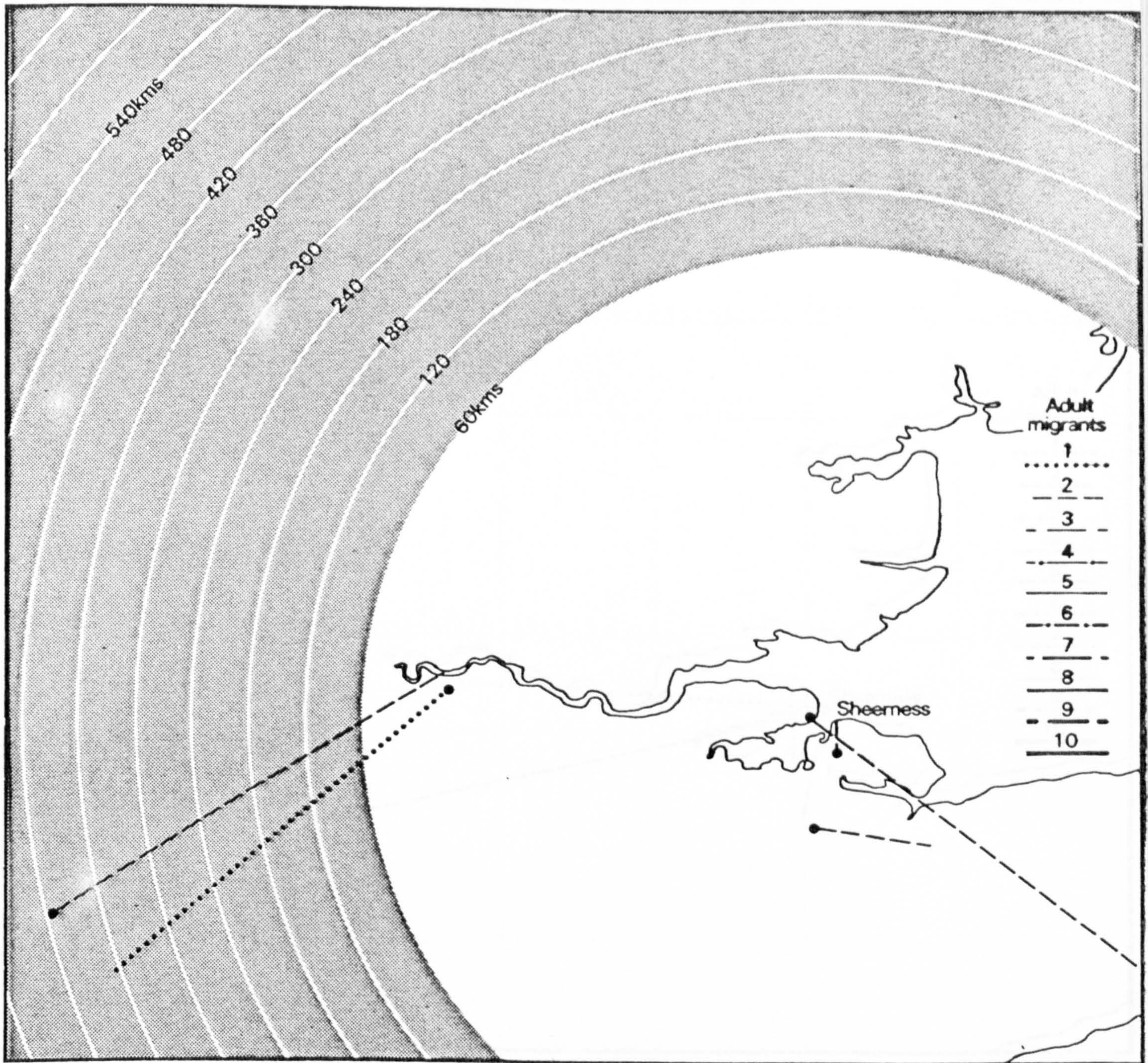
A dot at the end of a link represents the destination of that move
 Scale change at 60km radius from Sheerness. Centre circle is 1:800,000. Outer circles are 1:6,666,666

Figure 5.18 Second link of those migrant paths which contained five links



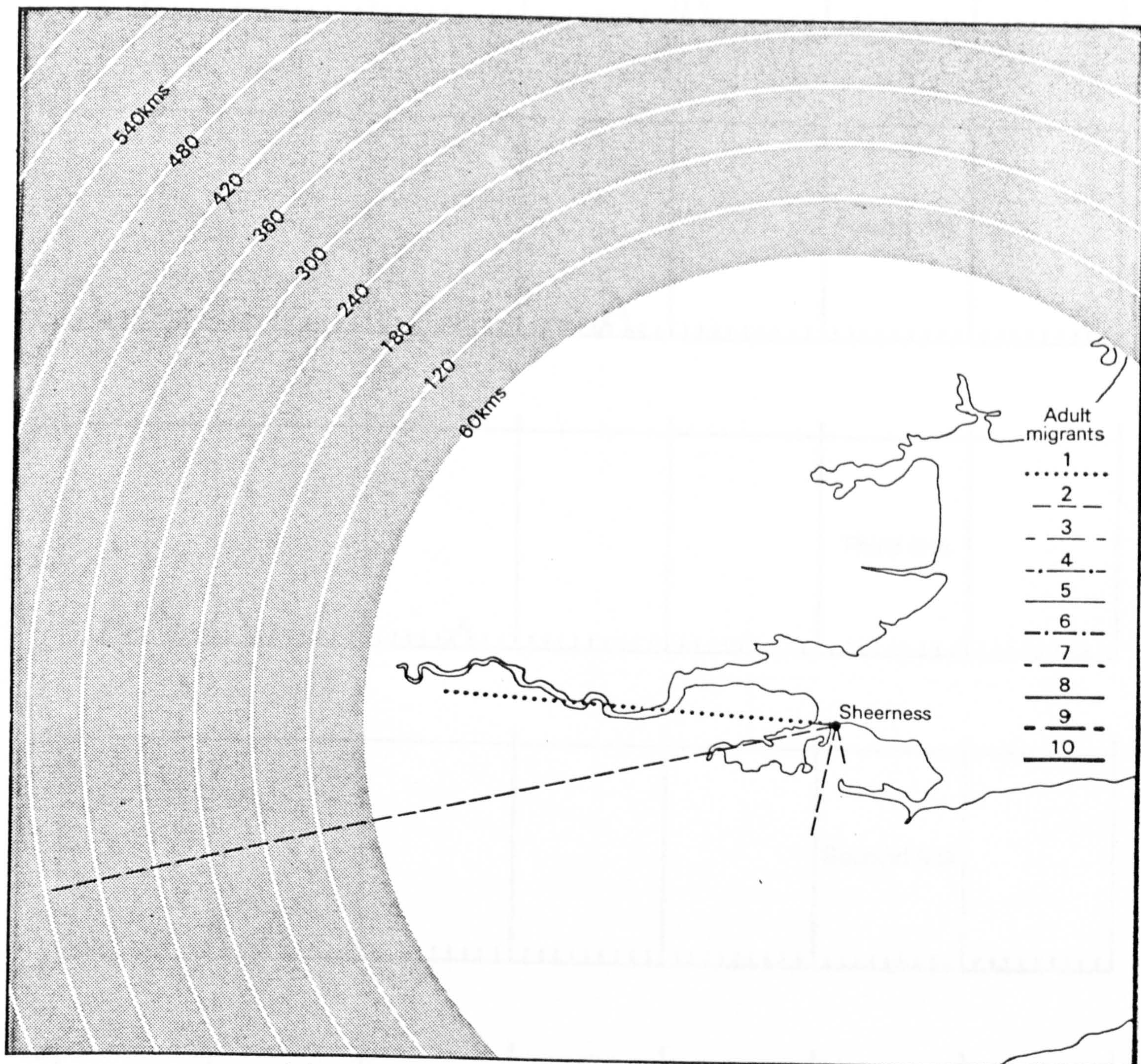
A dot at the end of a link represents the destination of that move
 Scale change at 60km radius from Sheerness. Centre circle is 1:800,000. Outer circles are 1:6,666,666

Figure 5.19 Third link of those migrant paths which contained five links



A dot at the end of a link represents the destination of that move
 Scale change at 60km radius from Sheerness. Centre circle is 1:800,000. Outer circles are 1:6,666,666

Figure 5.20 Fourth link of those migrant paths which contained five links



A dot at the end of a link represents the destination of that move
 Scale change at 60km radius from Sheerness. Centre circle is 1:800,000. Outer circles are 1:6,666,666

Figure 5.21 Fifth link of those migrant paths which contained five links

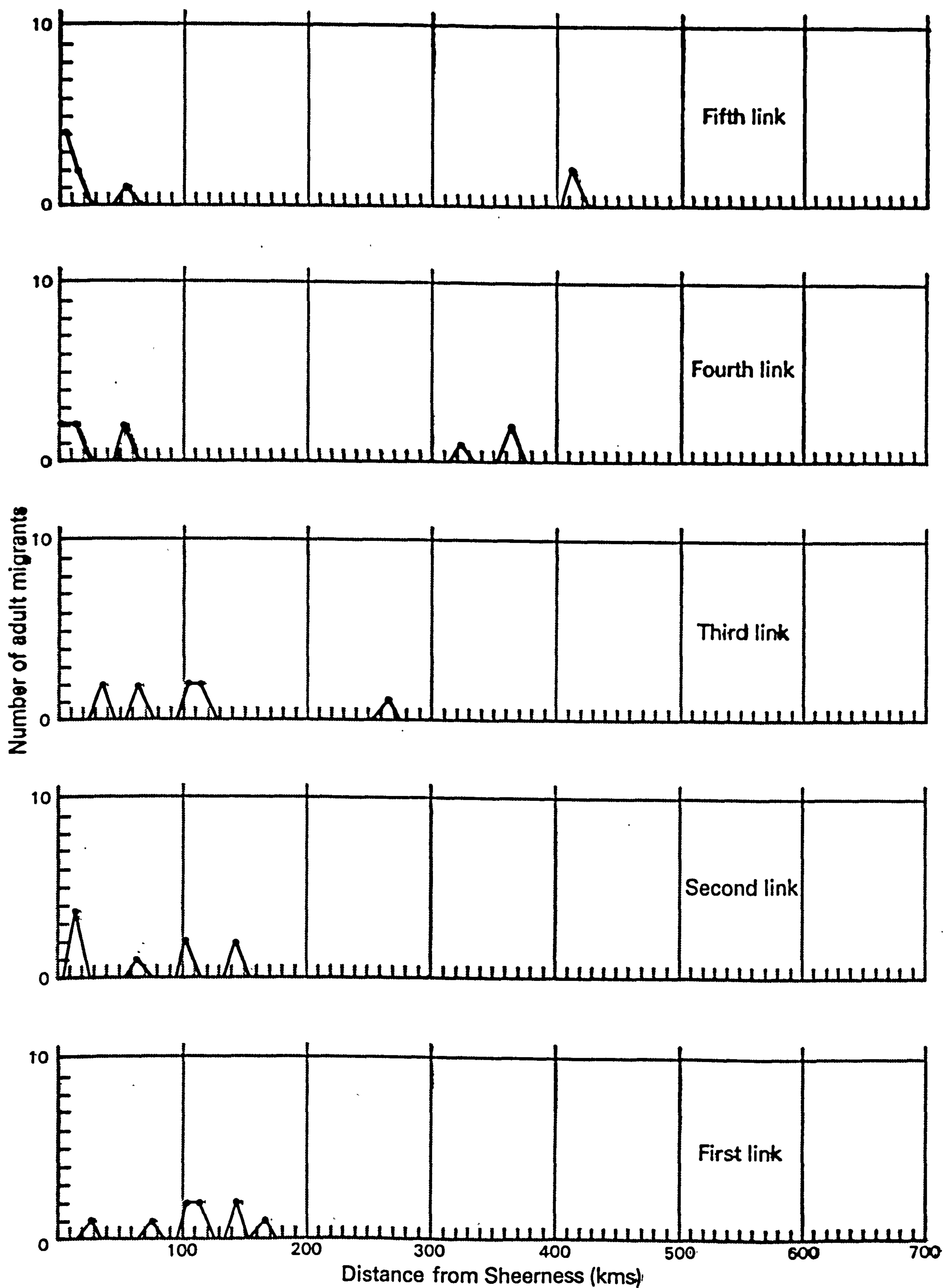


Figure 5.22 Distances travelled by migrants who had a path containing five links

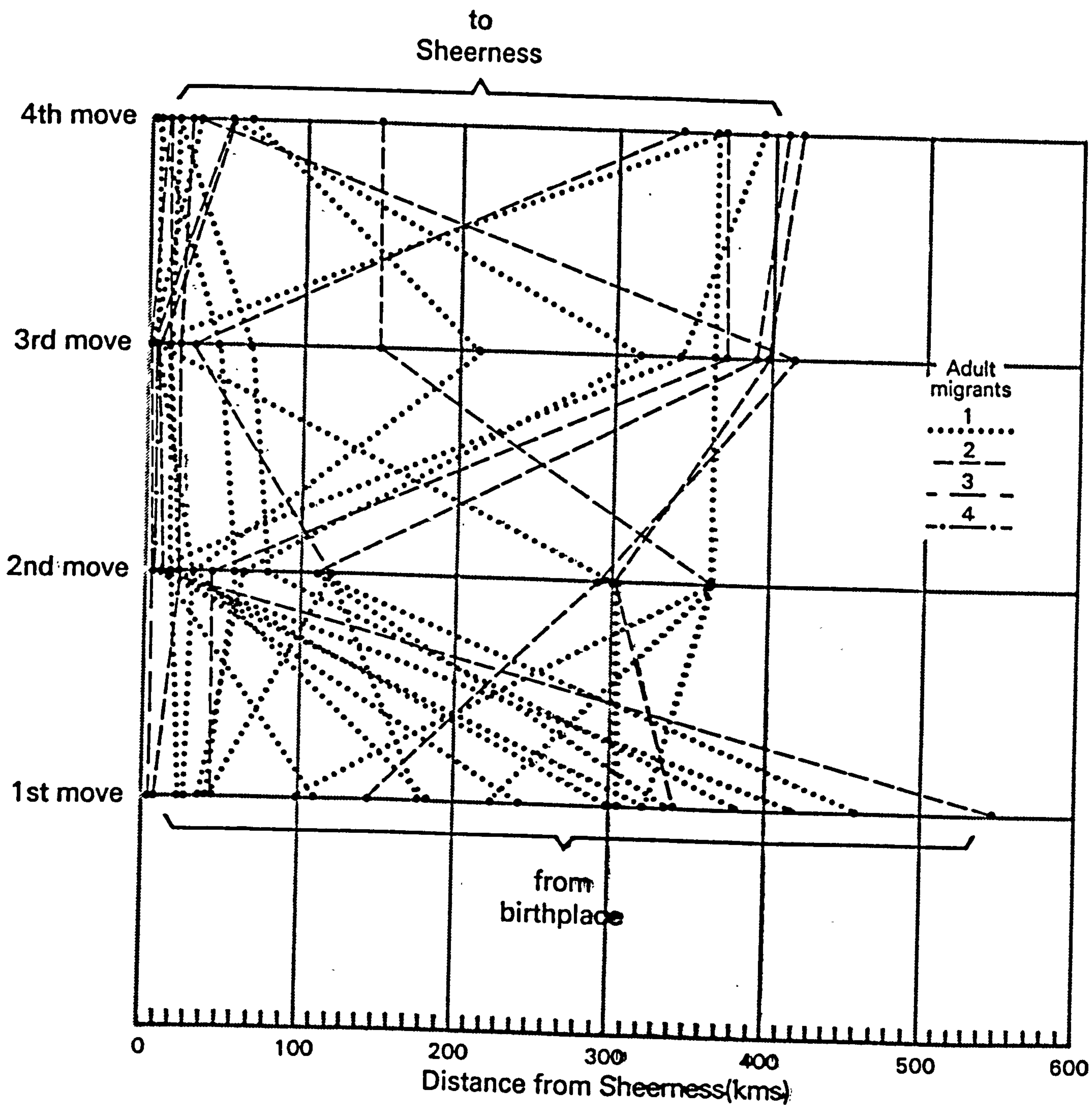
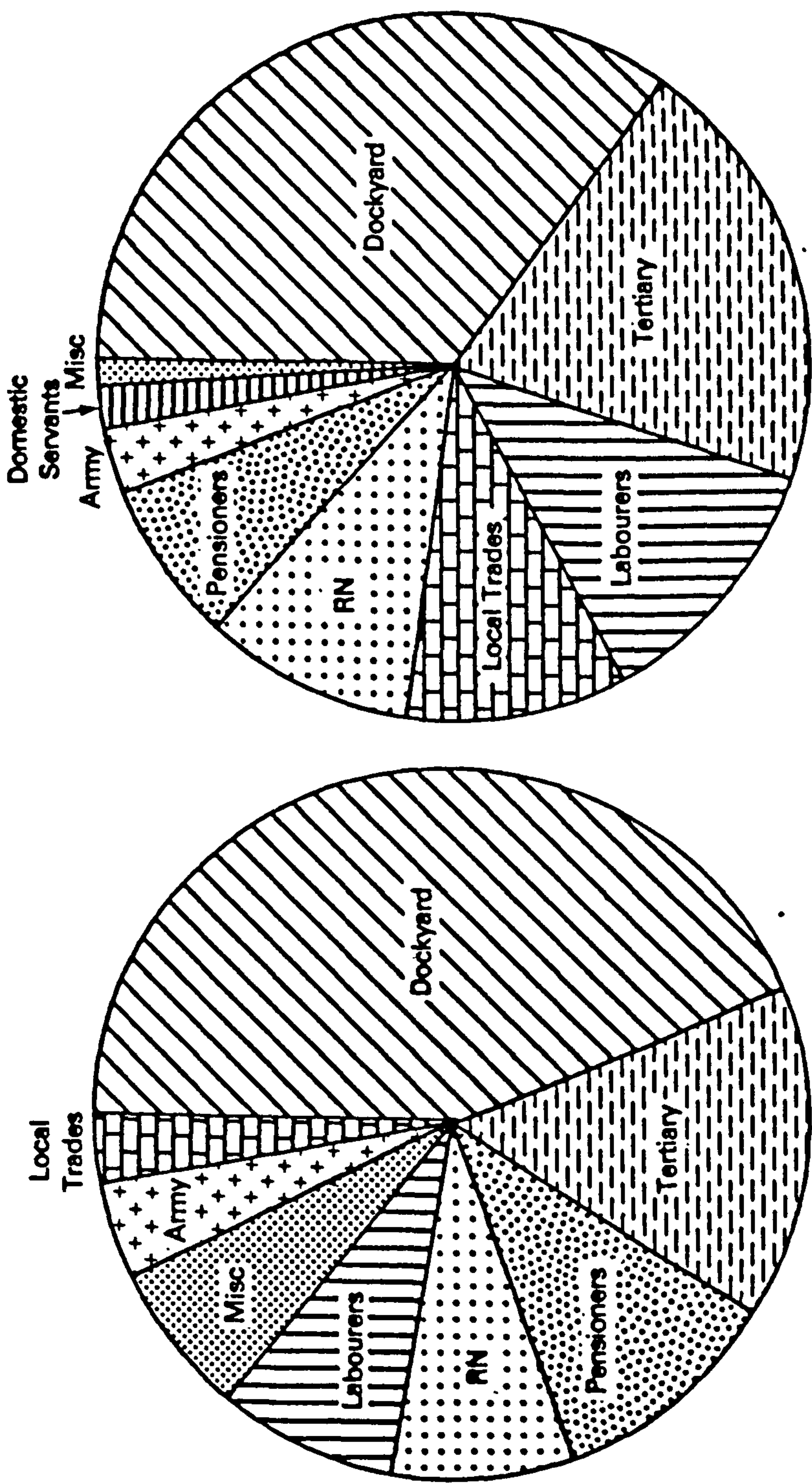


Figure 5.23 Comparative distances travelled by migrants who had a path containing four links



Migrant sample
n = 252

**Economically active males,
including pensioners
for total sample**
n = 1798

Figure 5.24 Occupations of sample male migrants and total male sample for Sheerness, 1871

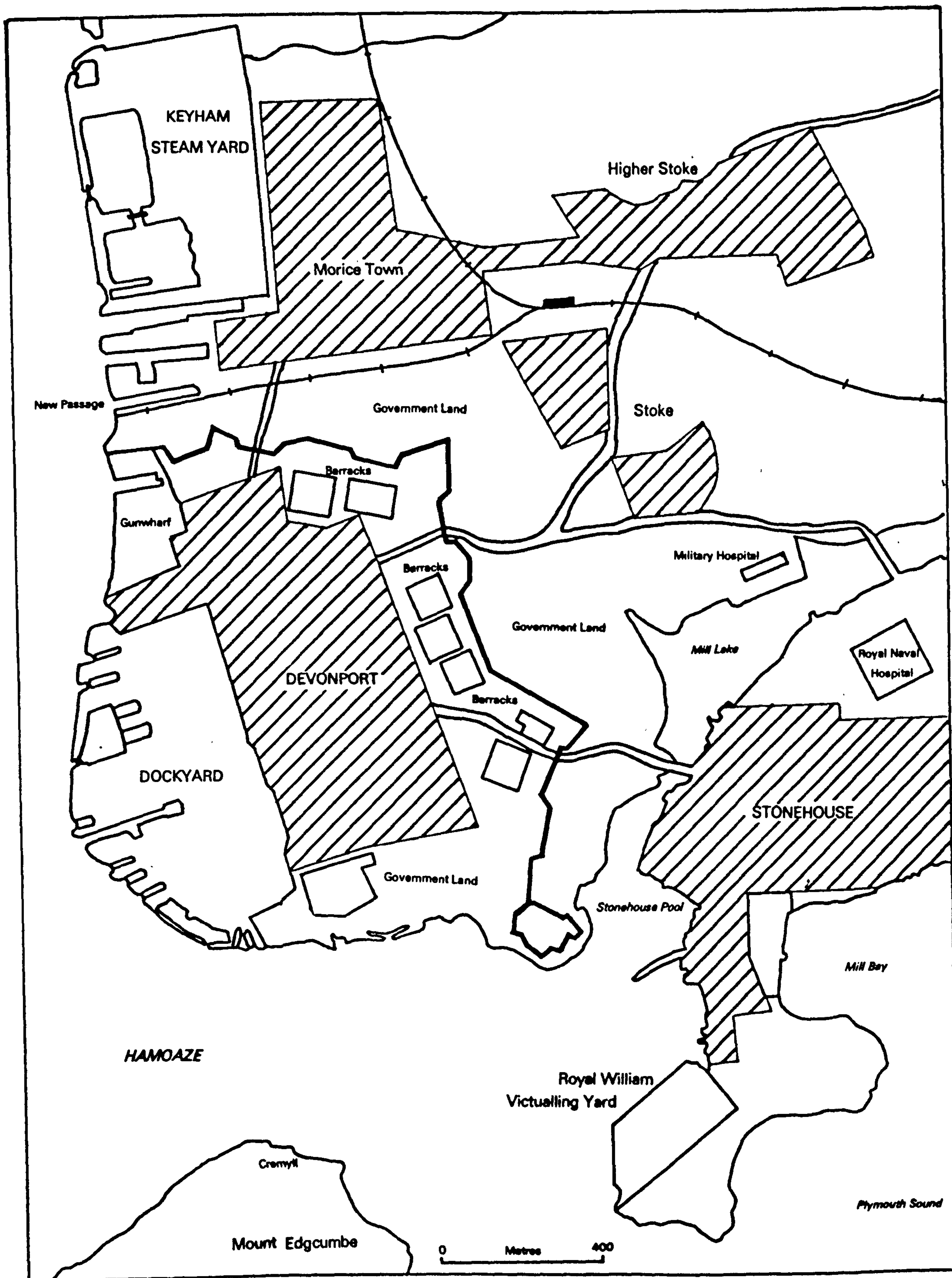


Figure 6.1 Devonport circa 1870

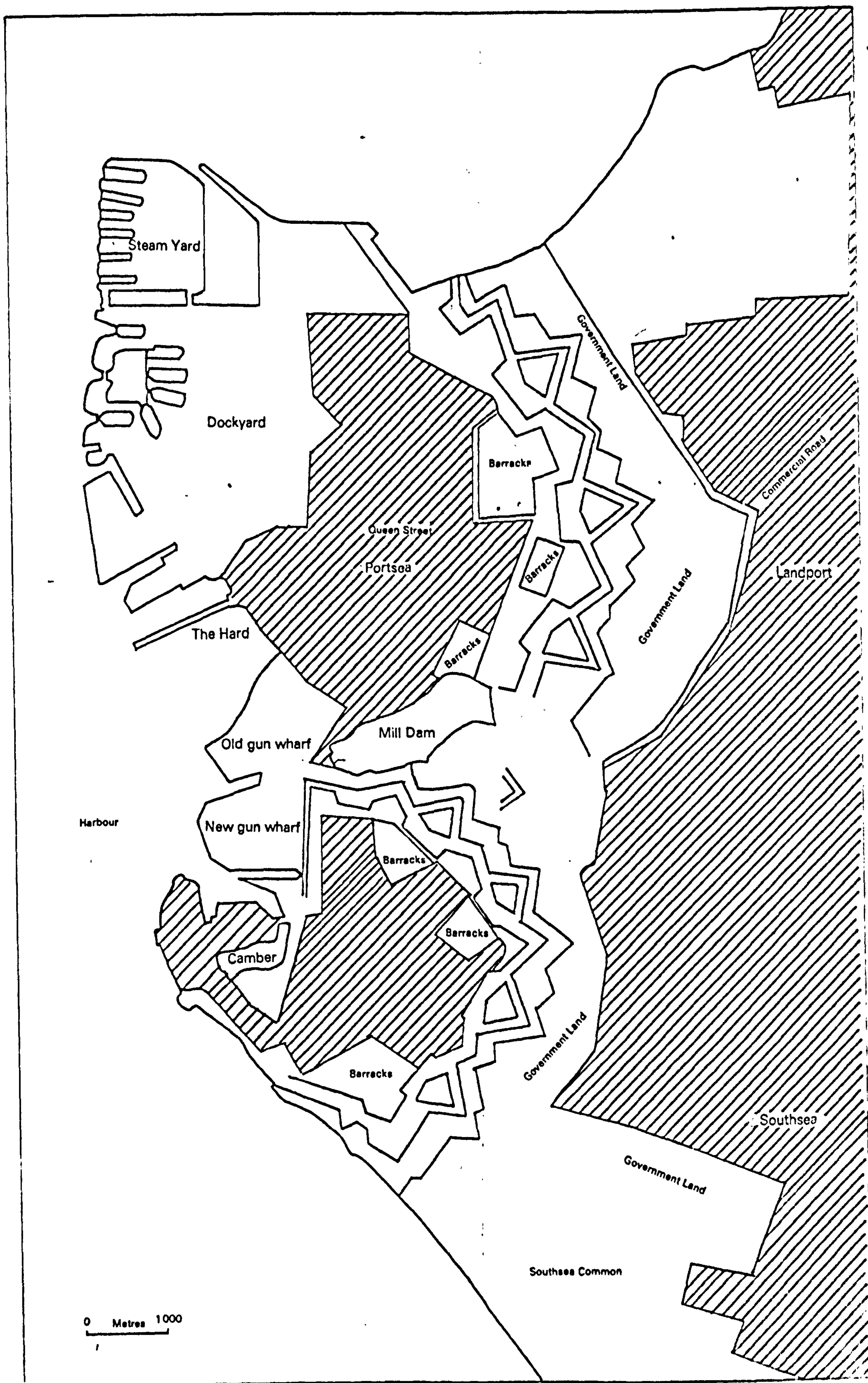


Figure 6.2 Portsmouth circa 1870

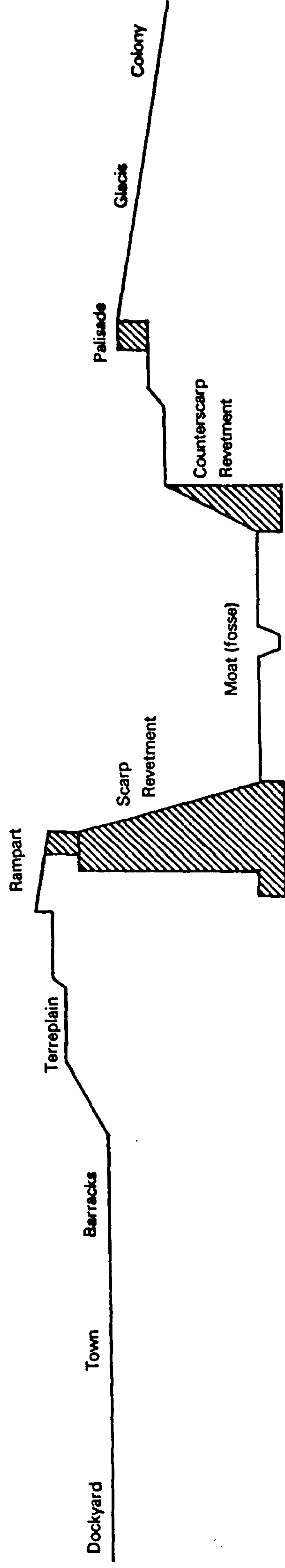


Figure 7.1 Profile of the bastion defences of the dockyard towns

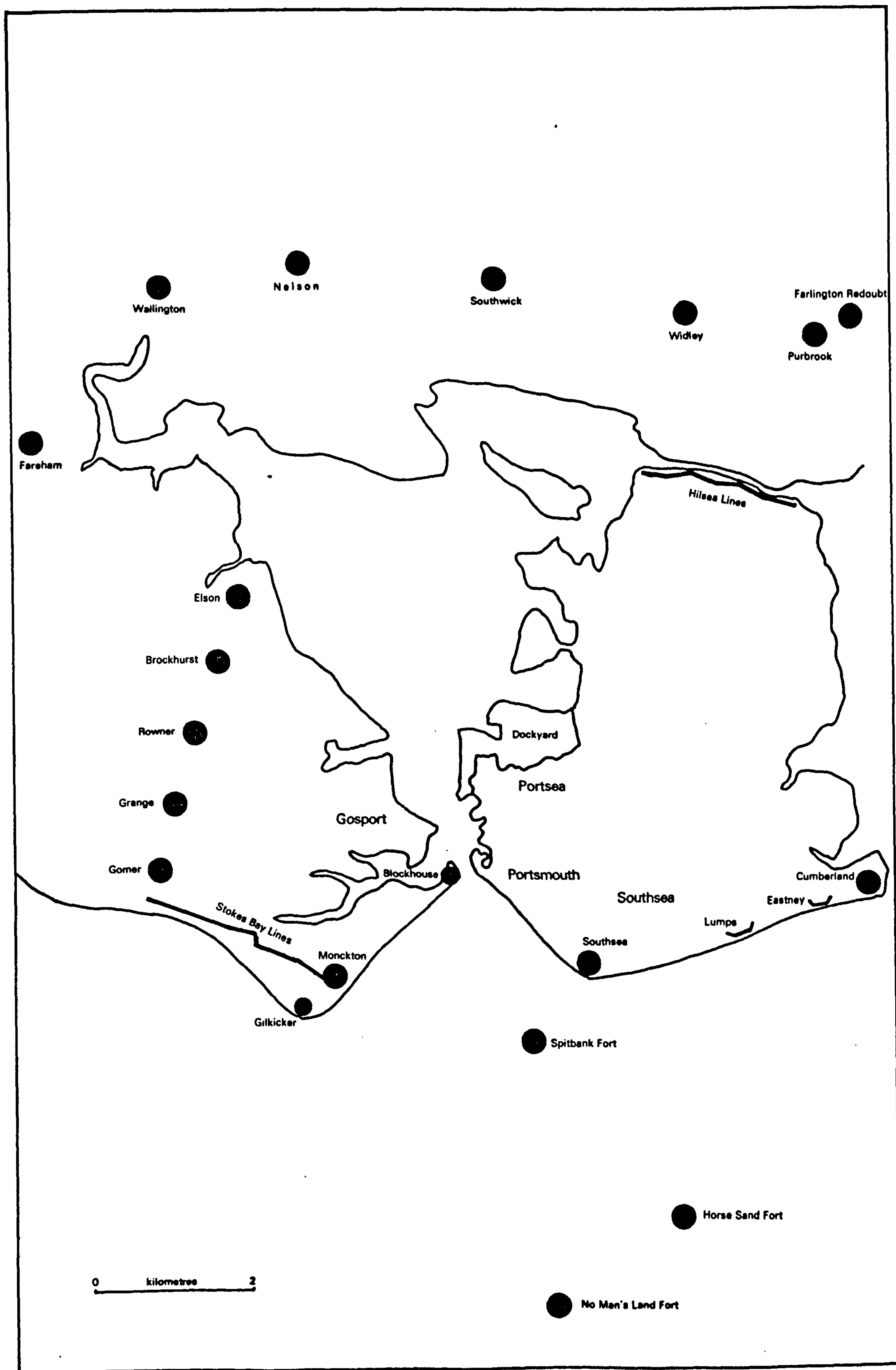


Figure 7.2 Ring fort defence system of Portsmouth, circa 1870

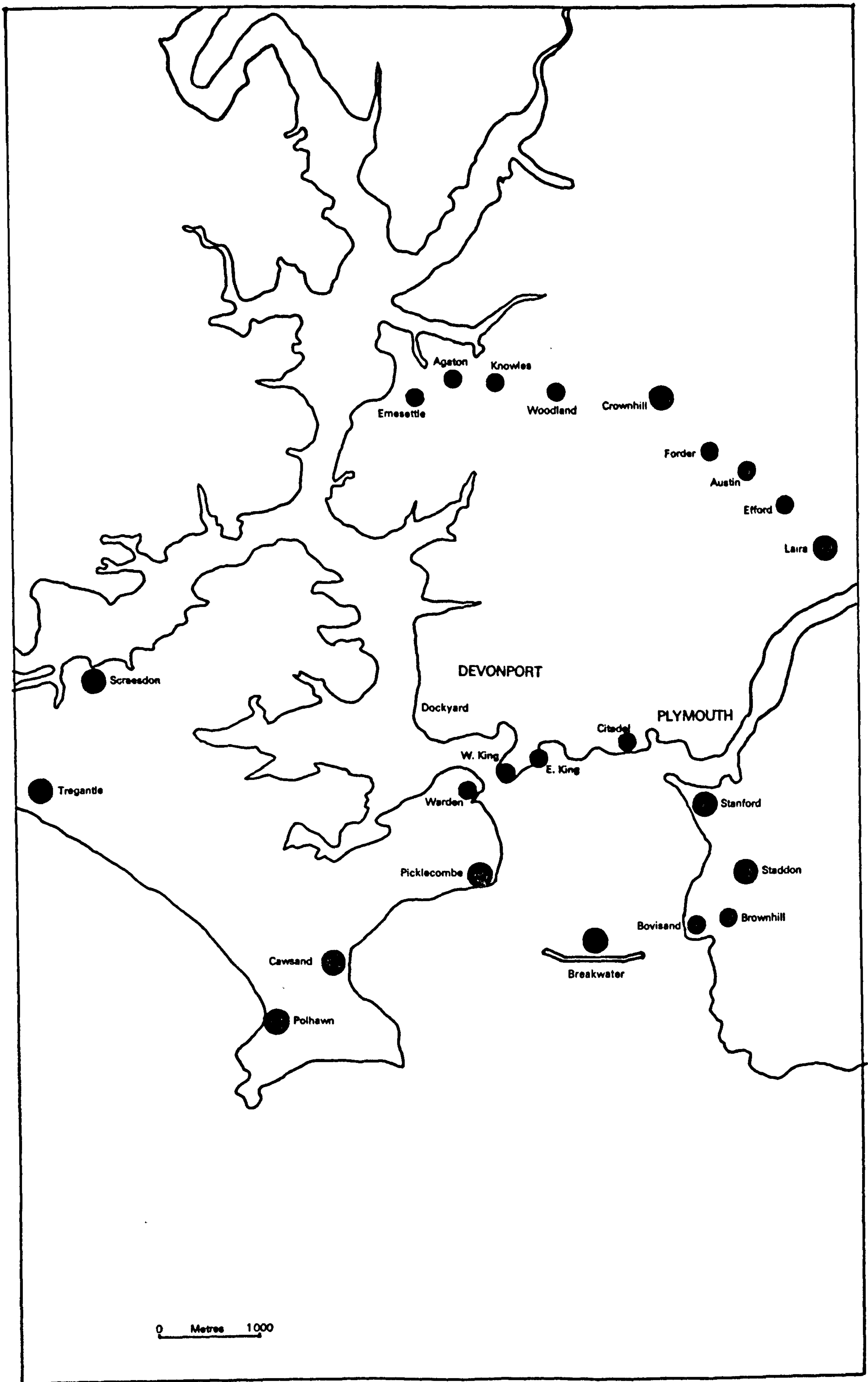


Figure 7.3 Ring fort defence system of Devonport, circa 1870

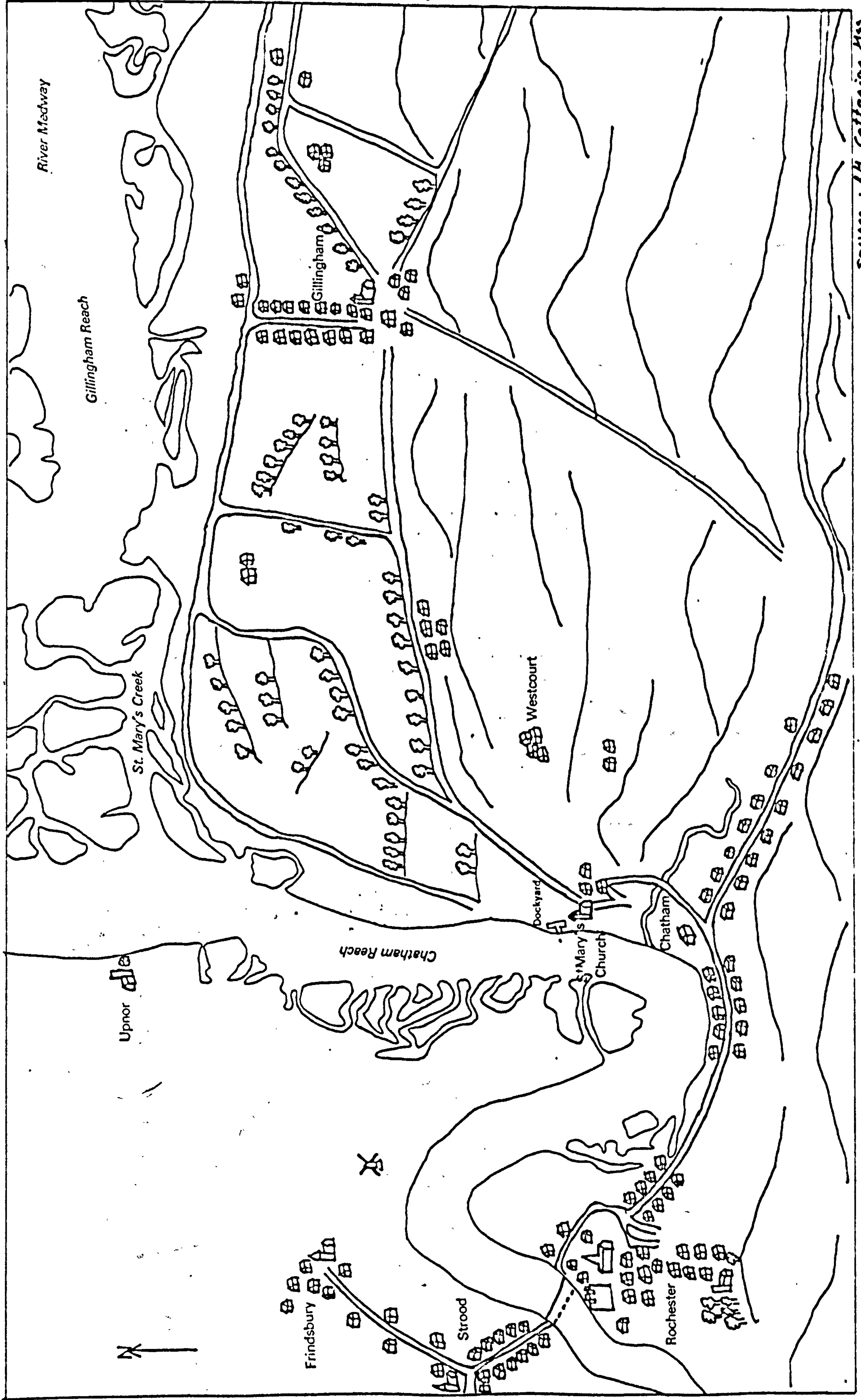


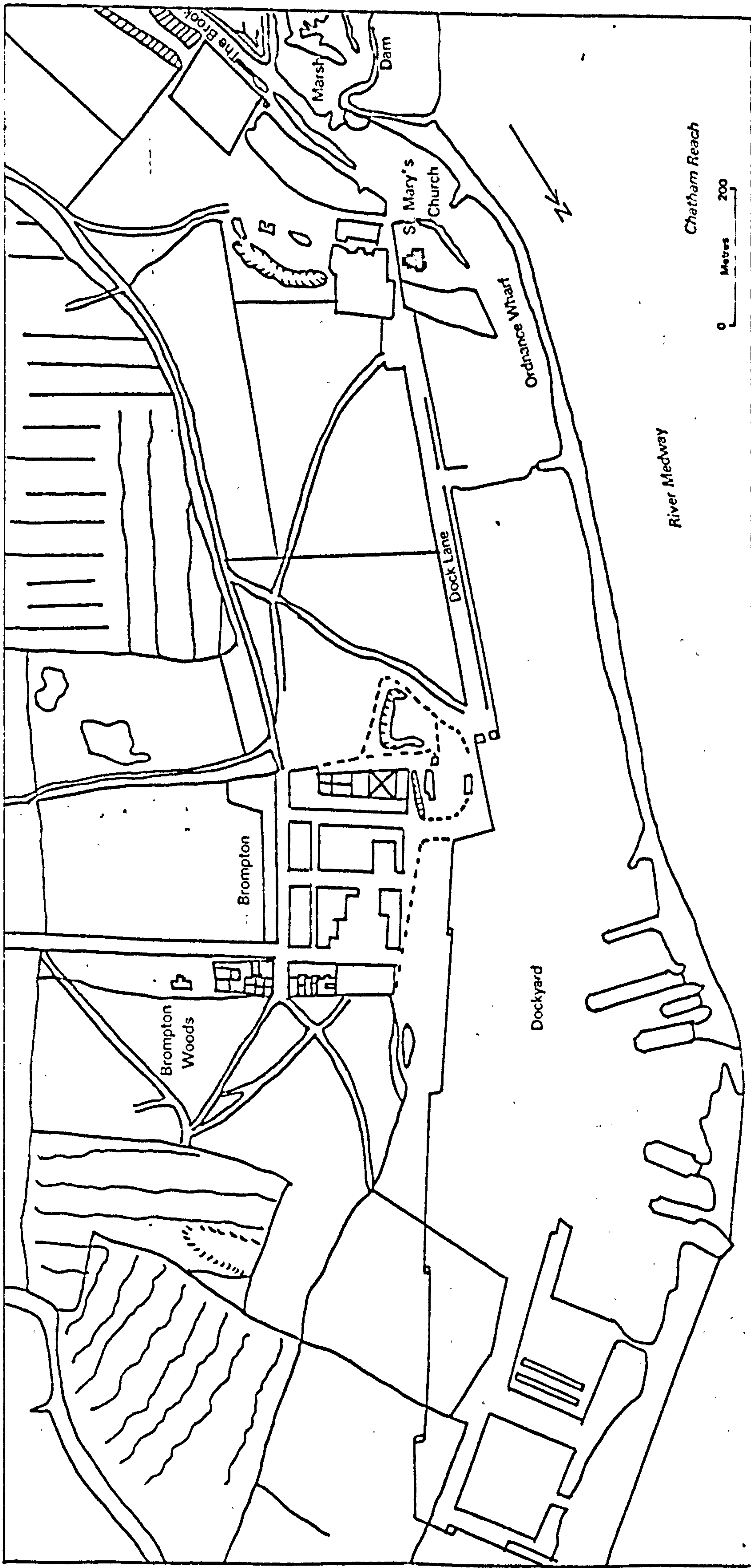
Figure 8.1 The lower Medw. r. circa 1600

Source: BH Cottonian Mss.



Figure S.2 Land ownership around Chatham Dockyard in 1708

Source: *KAO 01005 A1*



Source: A.H. Claydon 1719

Figure 9.3 Chatham Dockyard and Brompton, 1719

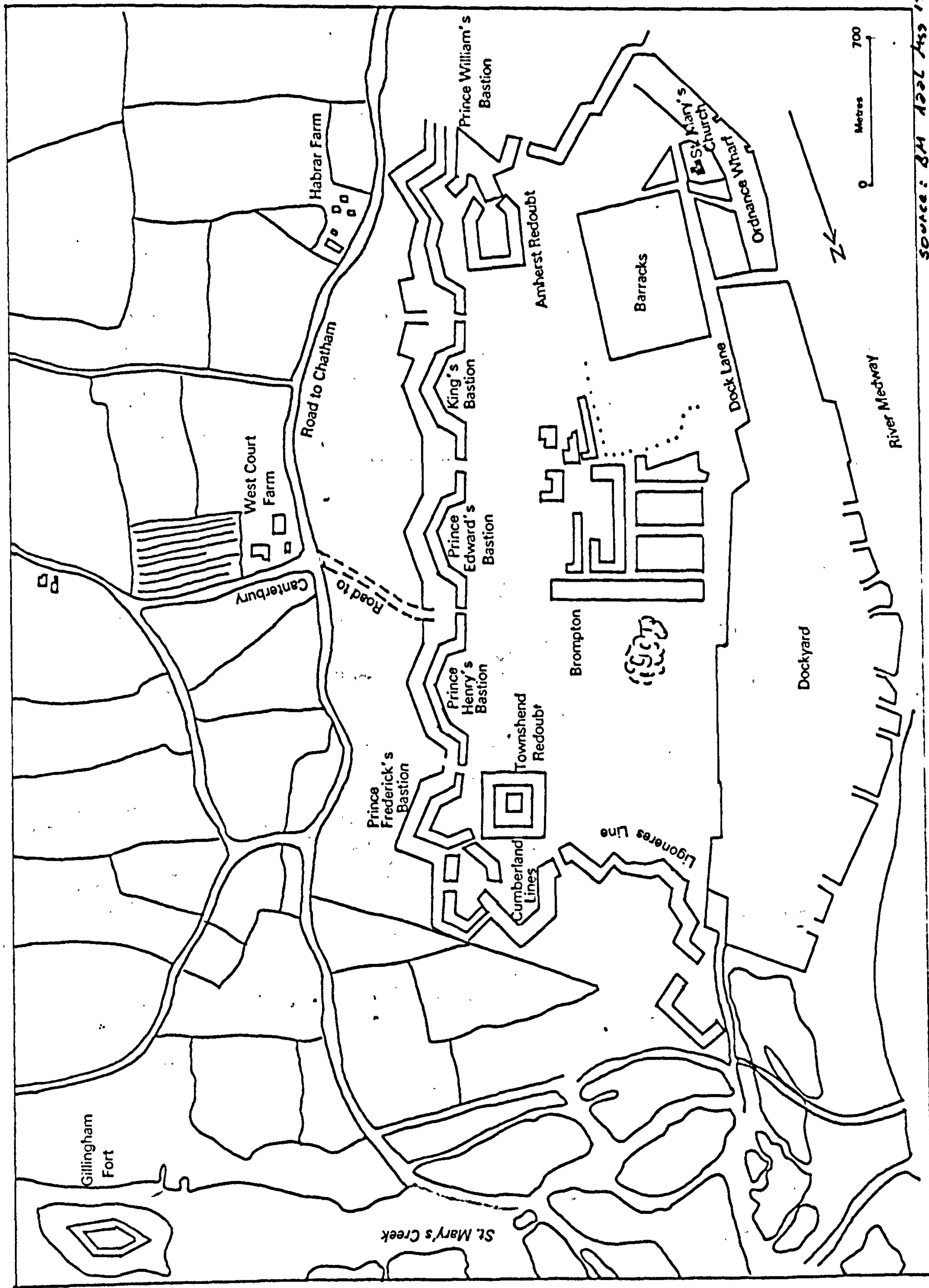
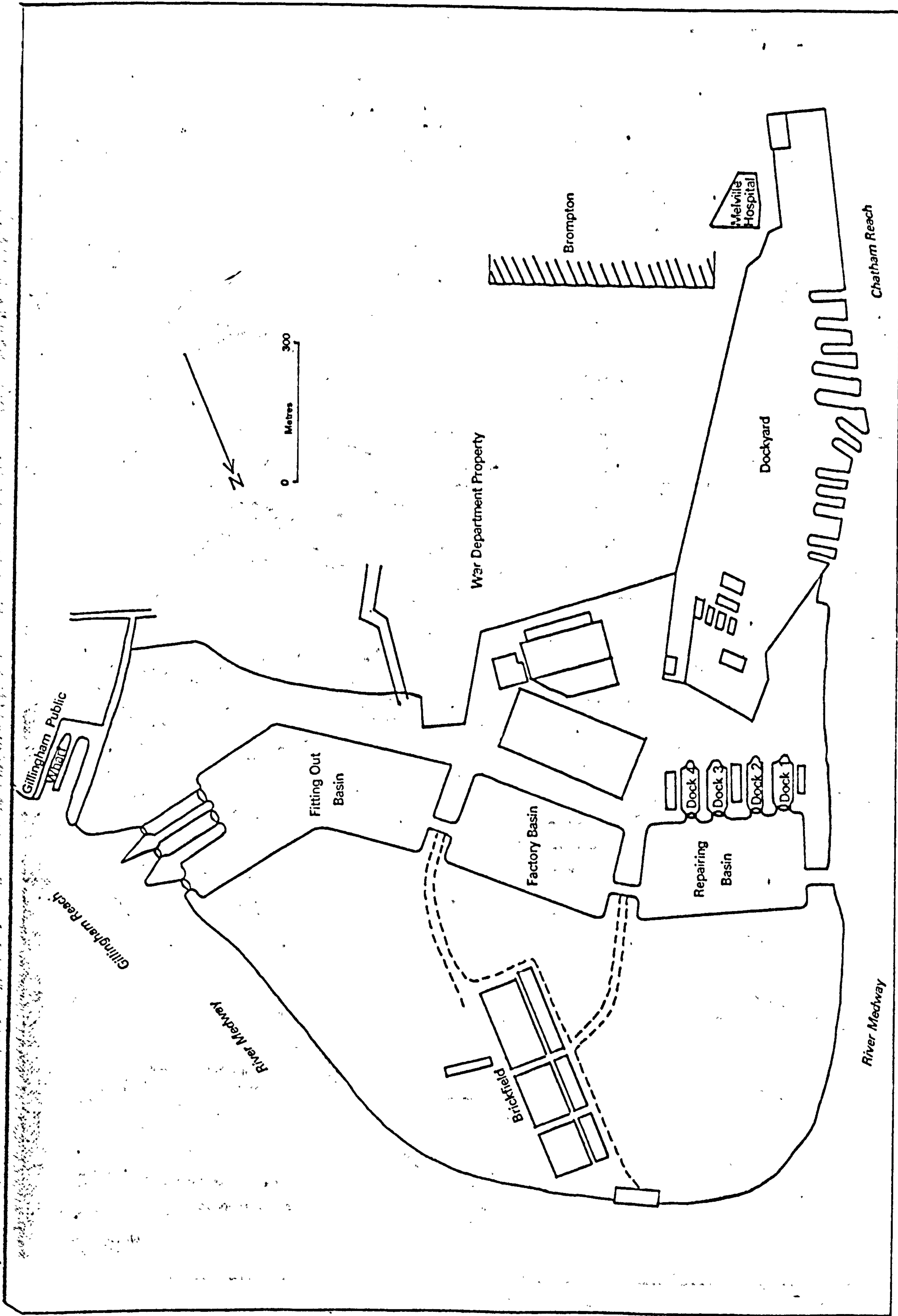


Figure 8.4 Bastion defences of Chatham Dockyard 1756

Source: BM 1226 455 1553262



Source: 1870 25 0.5.

Figure 8.5 Chatham dockyard extension scheme circa 1869

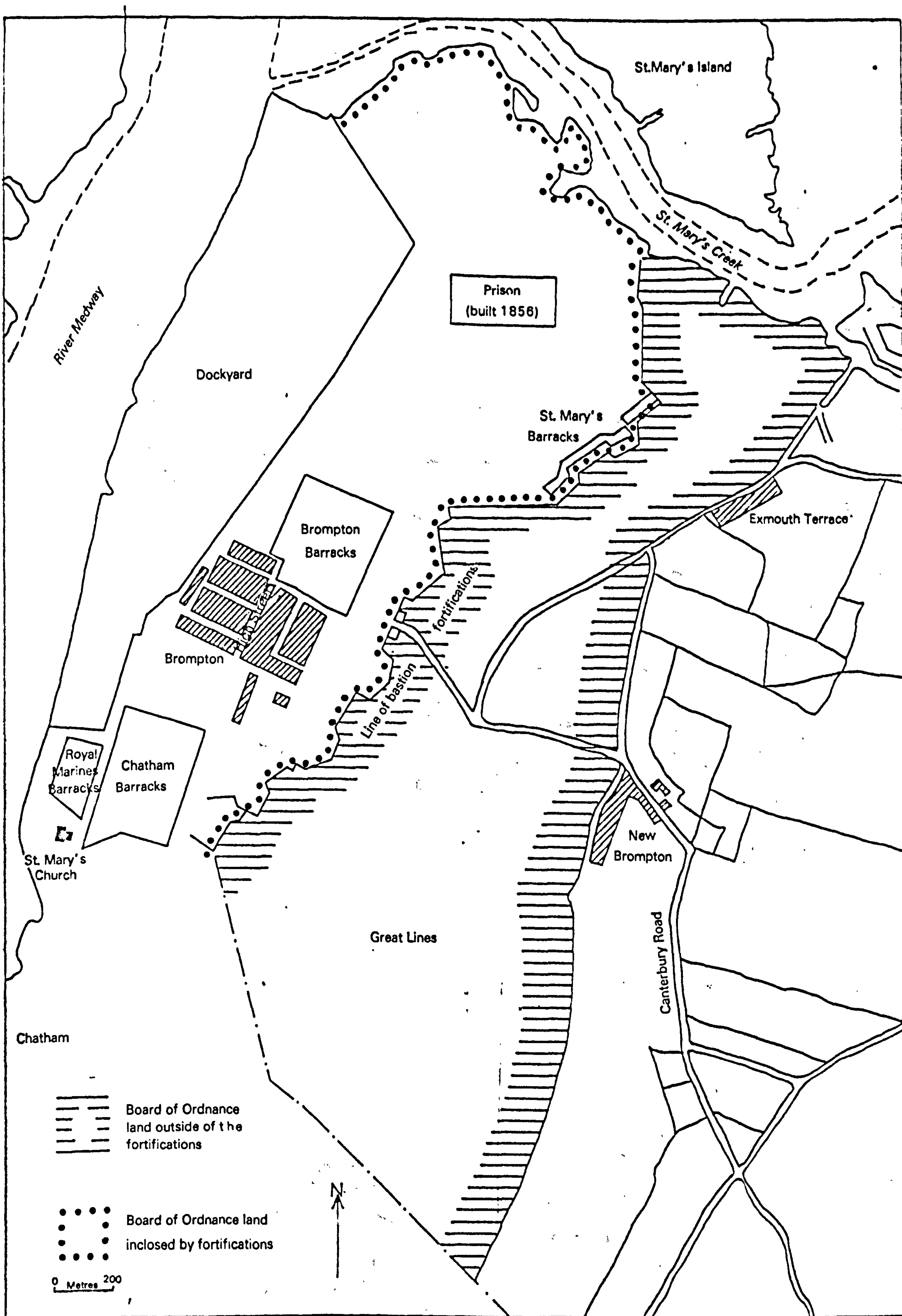


Figure 8.6 Chatham Dockyard 1841

source: Tithe map 1841
Gillingham Public Library

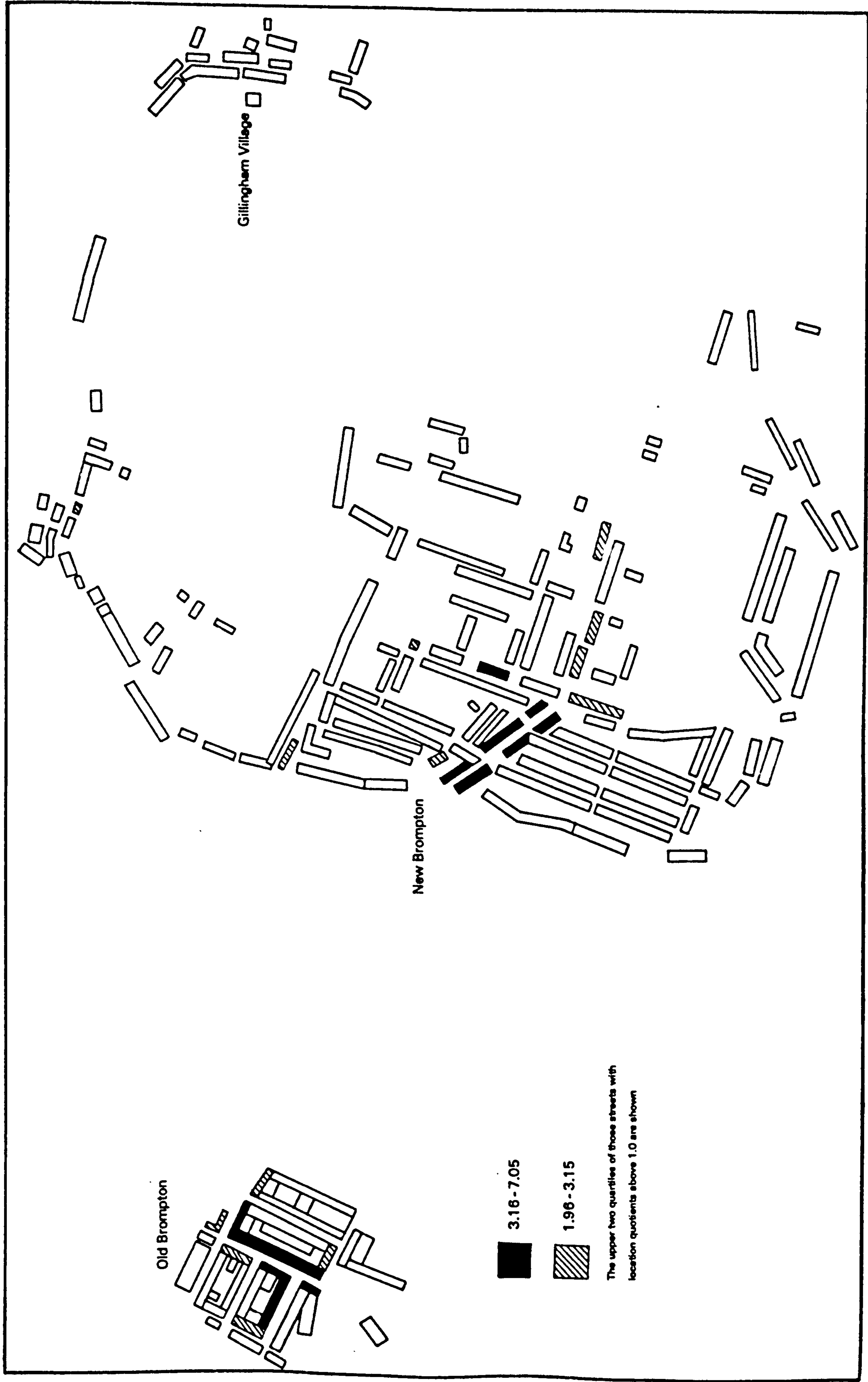


Figure 8.7 Location quotient of tertiary workers in Gillingham, 1871

Text cut off in original

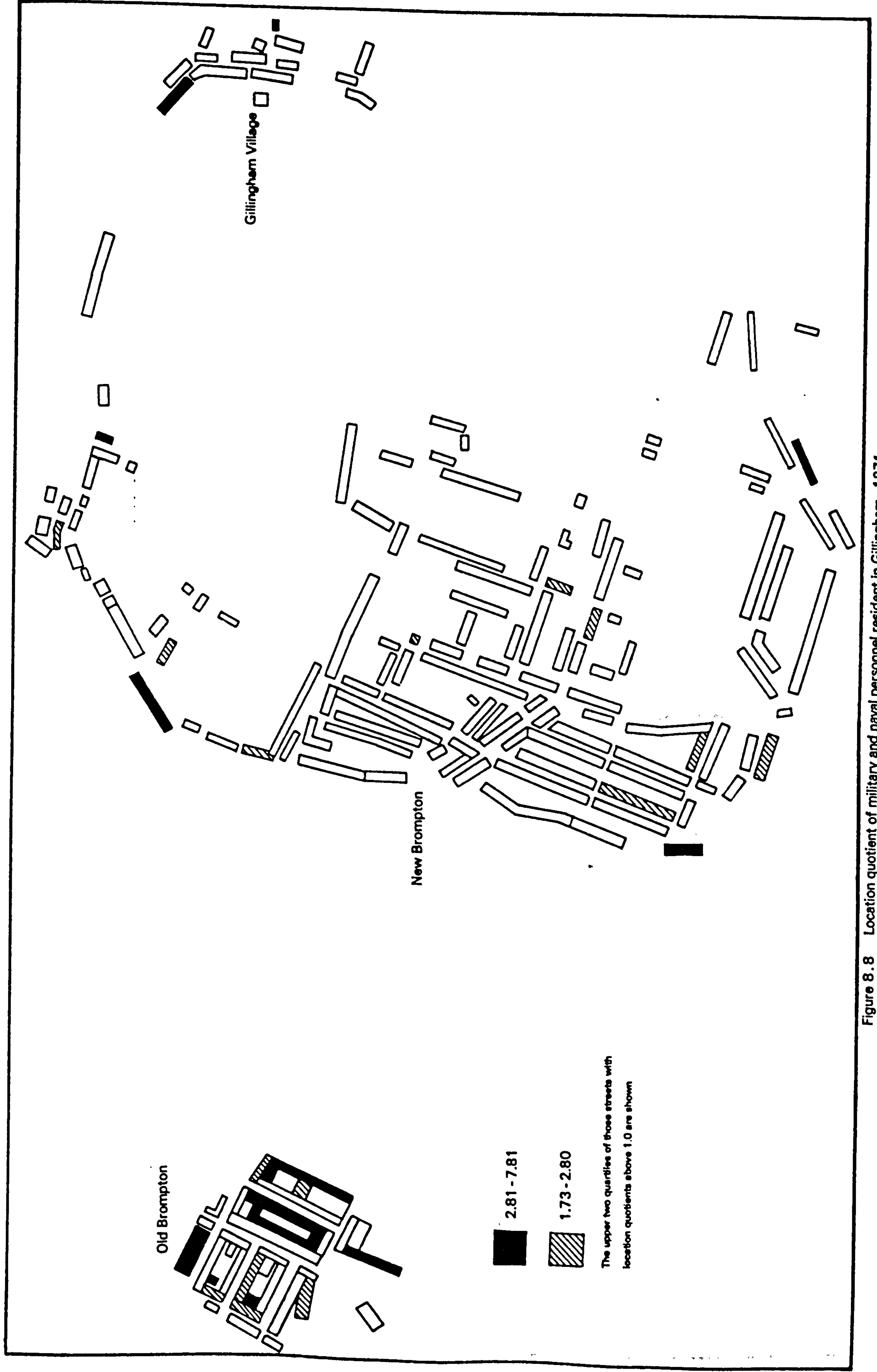


Figure 8.8 Location quotient of military and naval personnel resident in Gillingham 1871

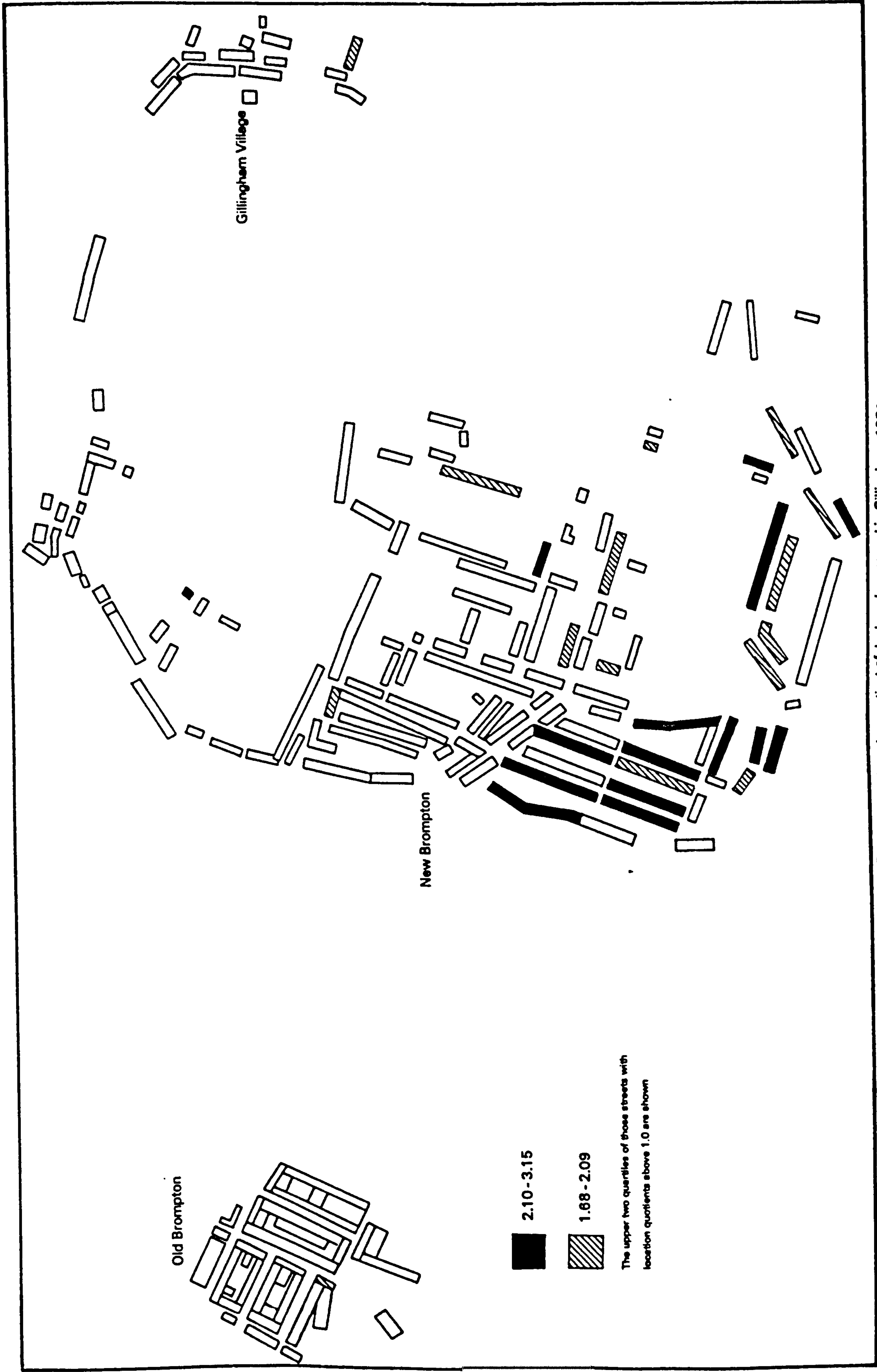


Figure 8.9 Location quotient of dockyard personnel in Gillingham, 1871

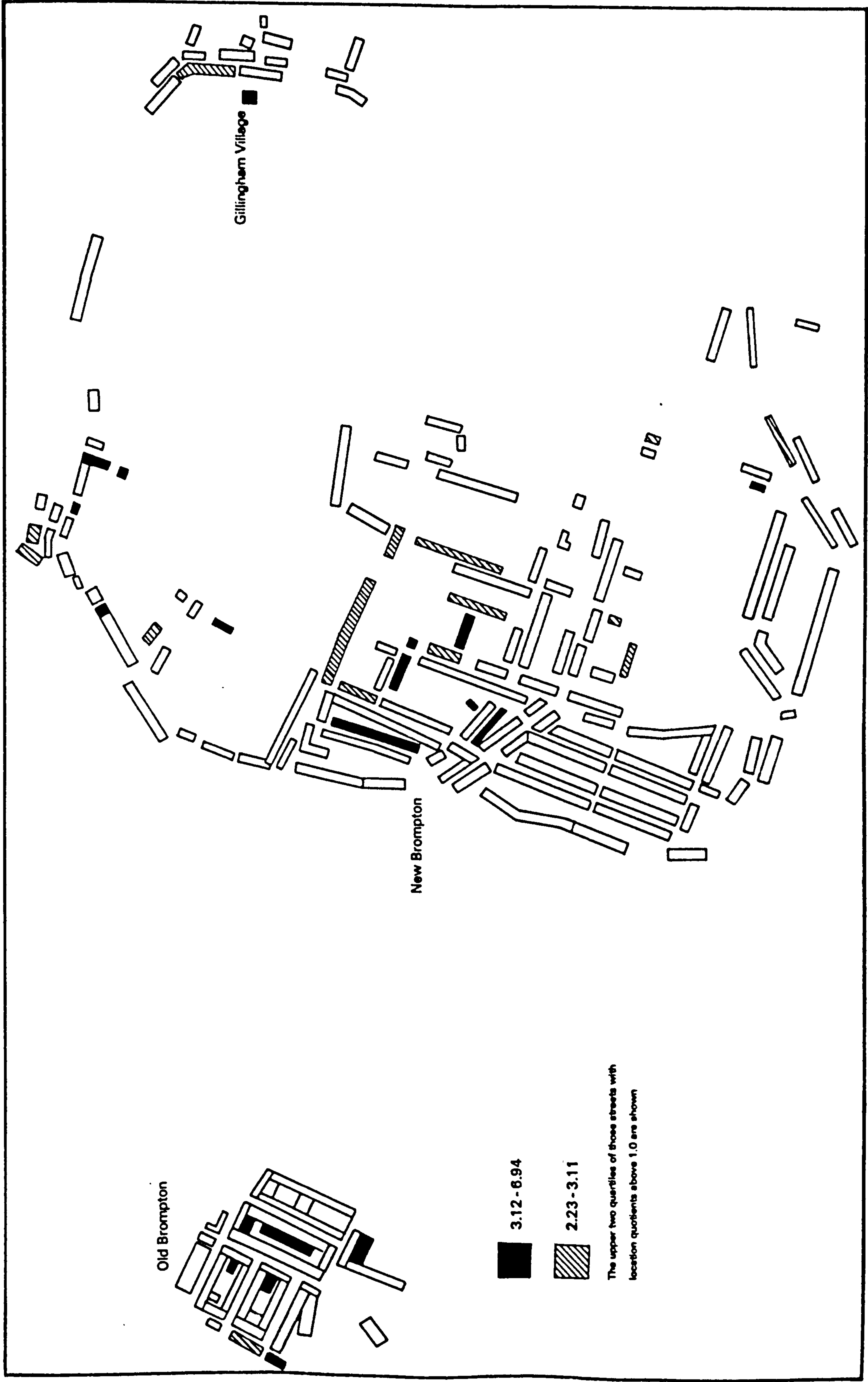


Figure 8.10 Location quotient of labourers in Gillingham, 1871

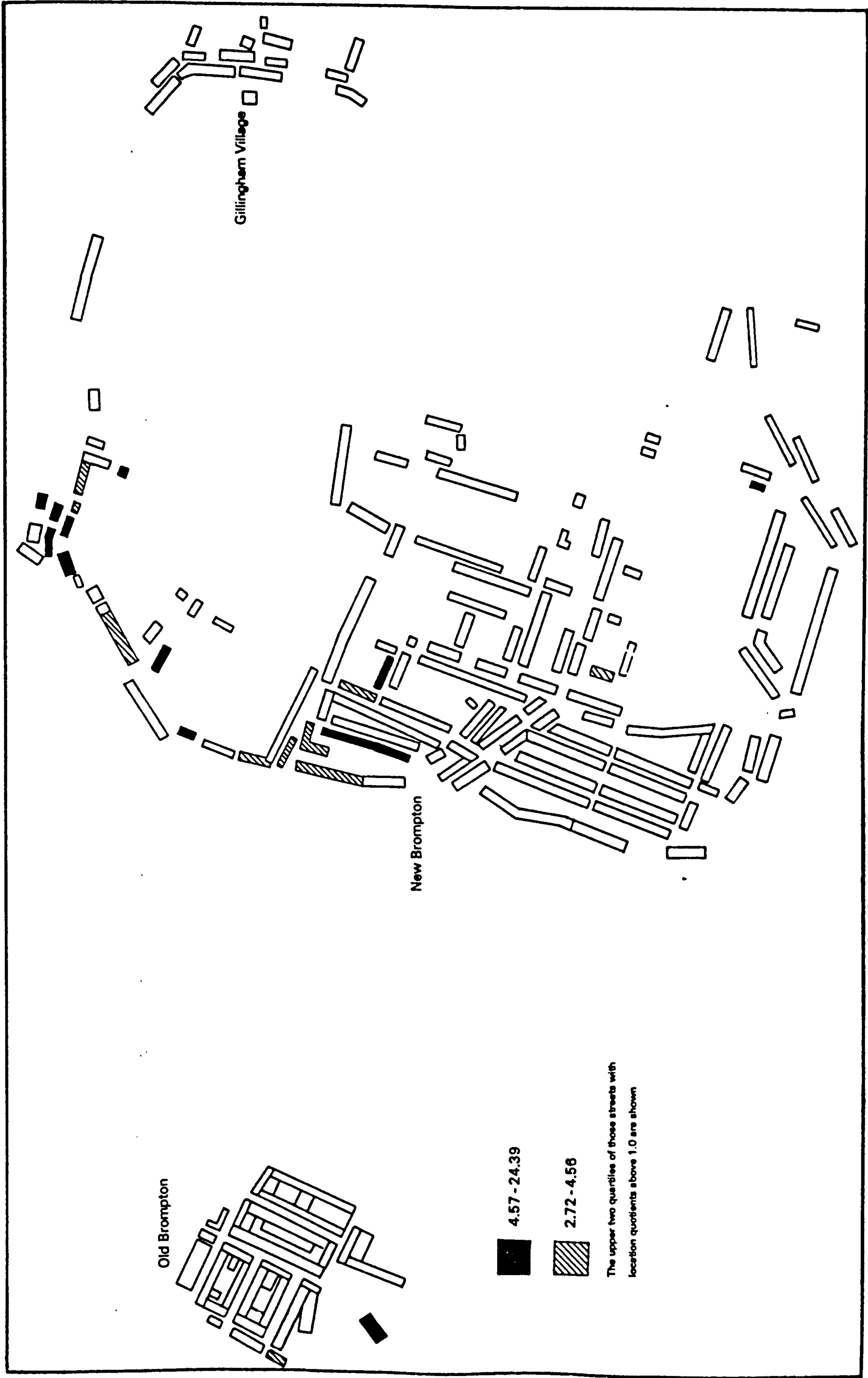


Figure 8.11 Location quotient of prison warders resident in Gillingham, 1871

- A Rigging House
- B Clerk of the Survey's House
- C Smith's House
- D Surgeon's House
- E Pitch House
- F Joiner's Shop
- G Storehouses
- H Master Attendant's House
- I Clerk of the Cheque's House
- J Storekeeper's House
- K Builder's House
- L Deal Yard
- M Mast House
- N Saw House

St. Mary's Church

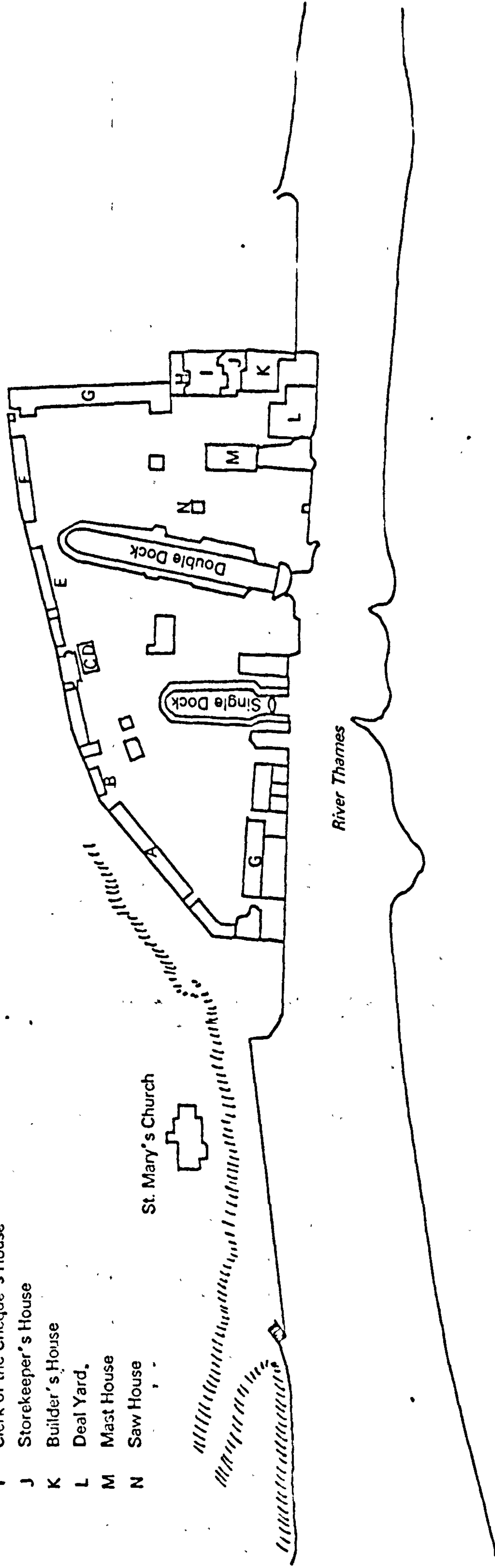


Figure 8 12 Woolwich Dockyard 1693

source: *BM Kings MSS 44*

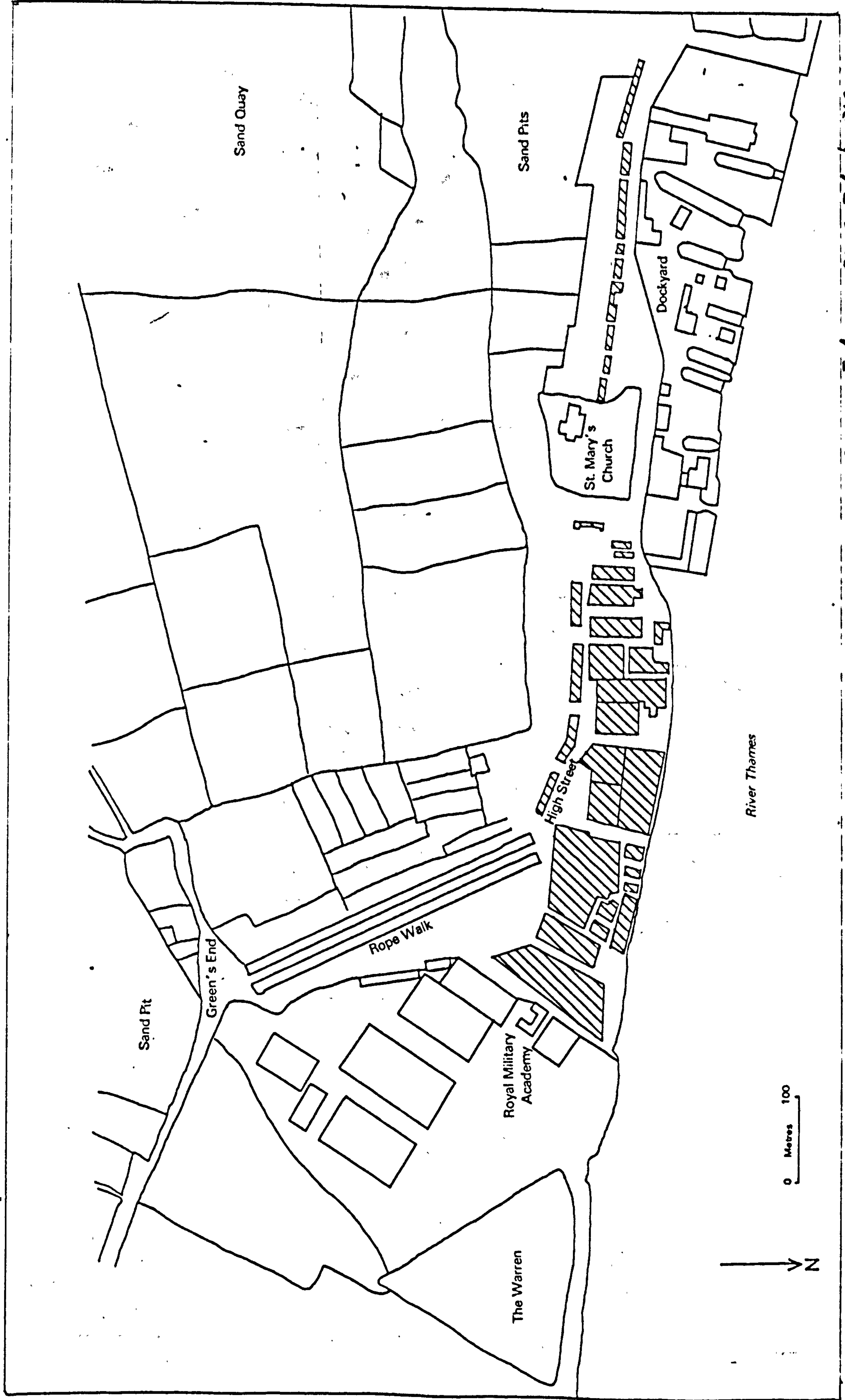
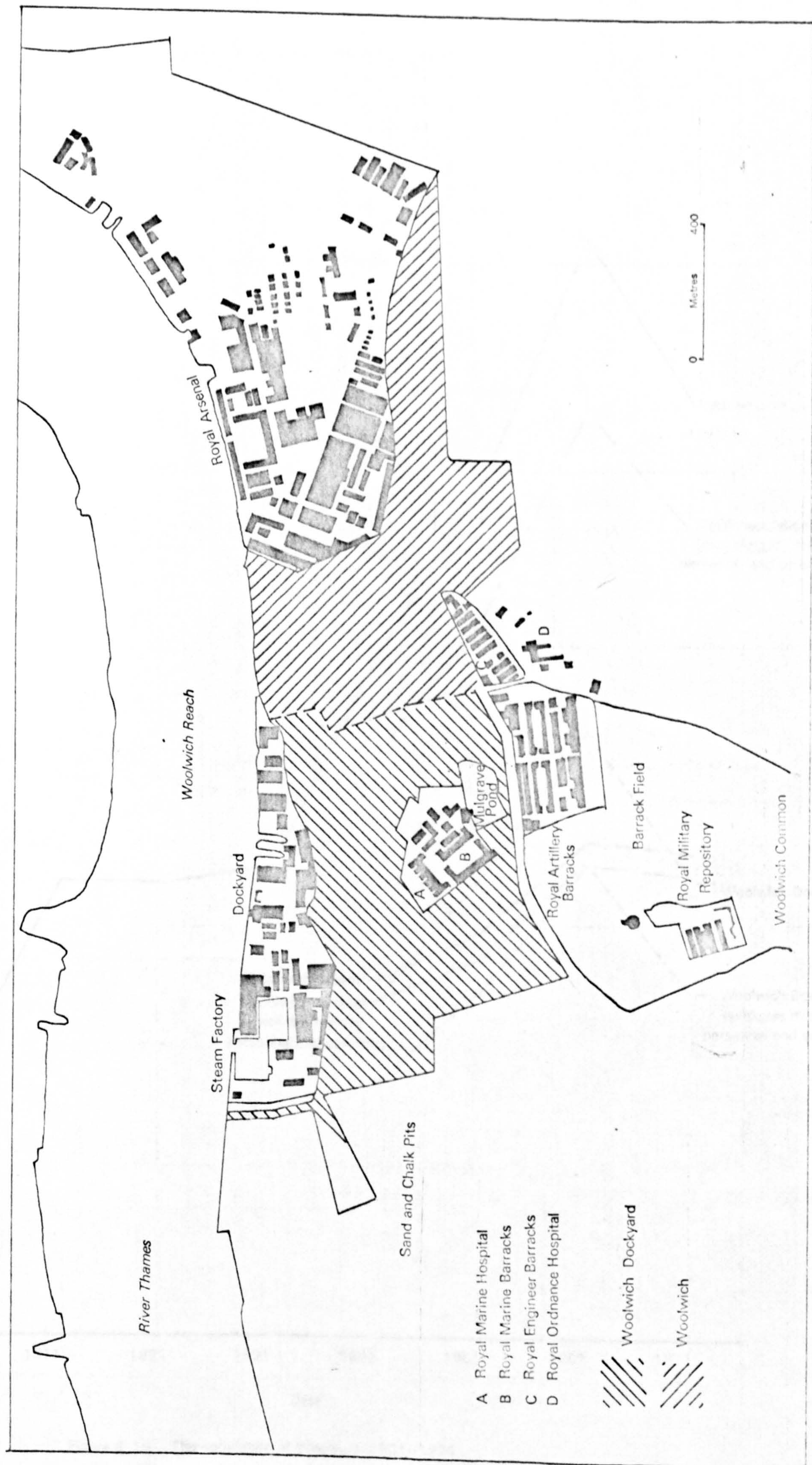


Figure 8.13 Woolwich: circa 1750

Source: J. Roque 1741-5, J. Gough 1749, T. Milles 1753 - Woolwich Local History Library; PRO ADM 140/1182



Source: 1st ed. 25" O.S.

Figure 8.14 Woolwich in 1861

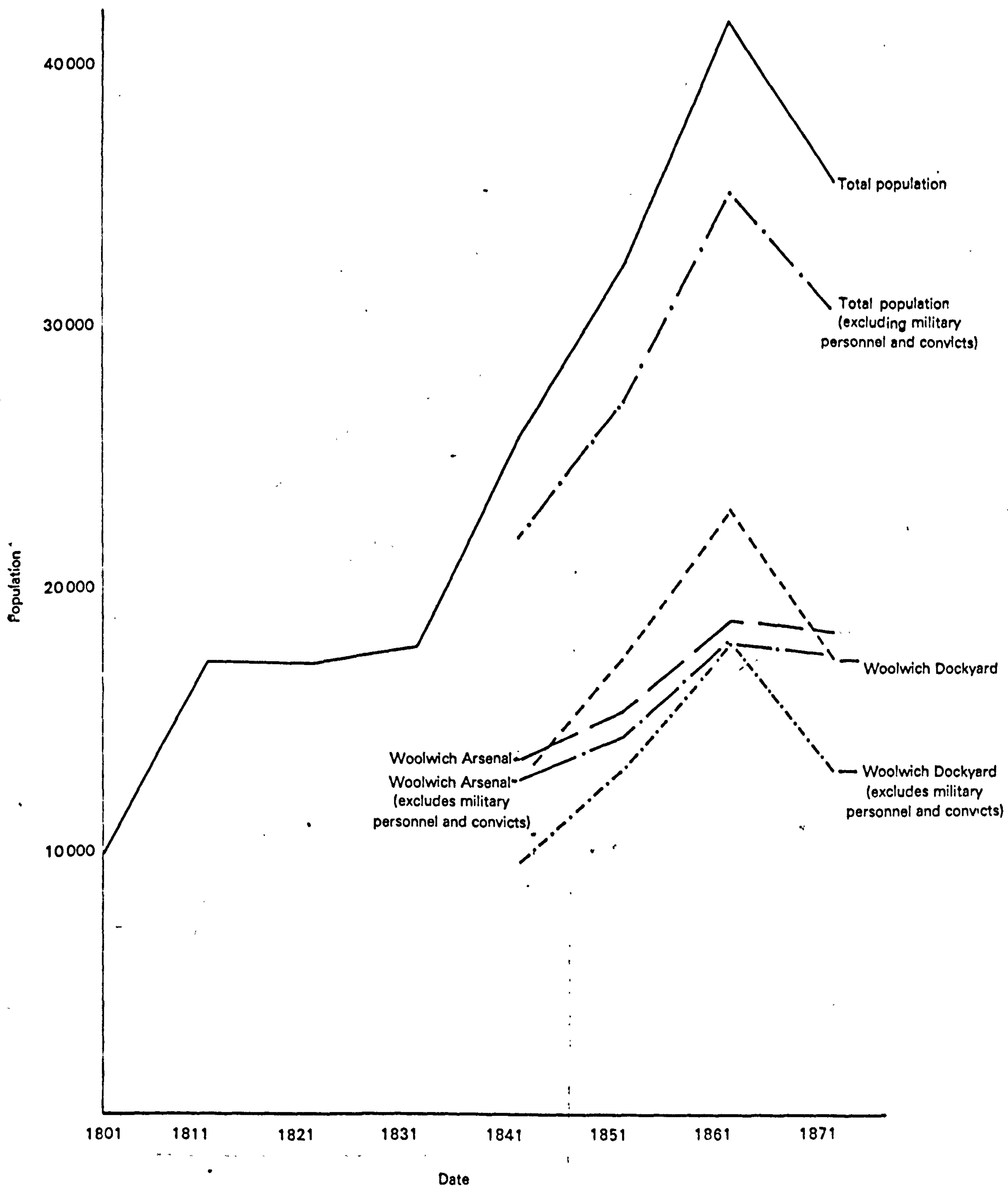


Figure 8.15 The population of Woolwich 1801-1871

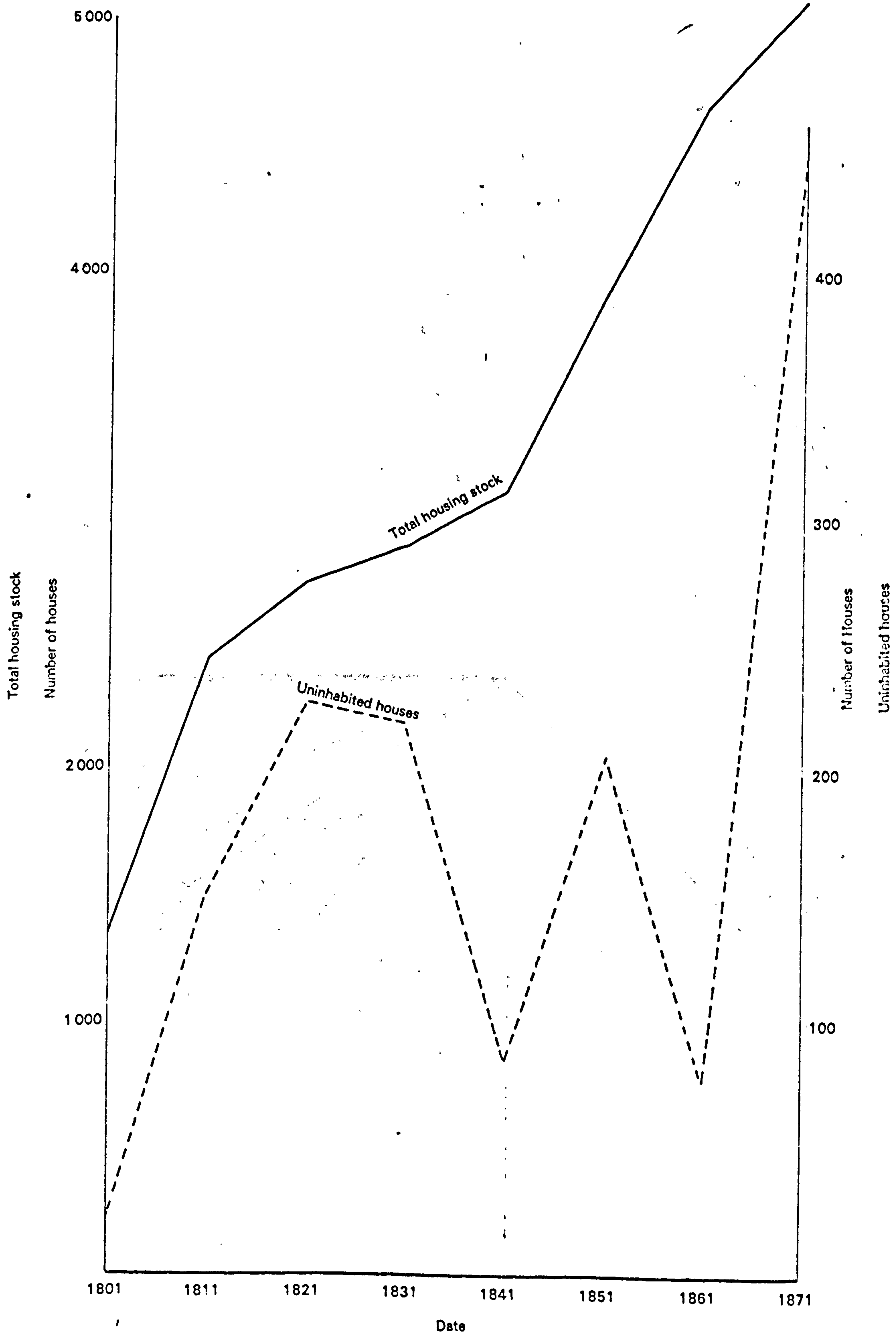


Figure 8.16 Housing in Woolwich 1801-1871

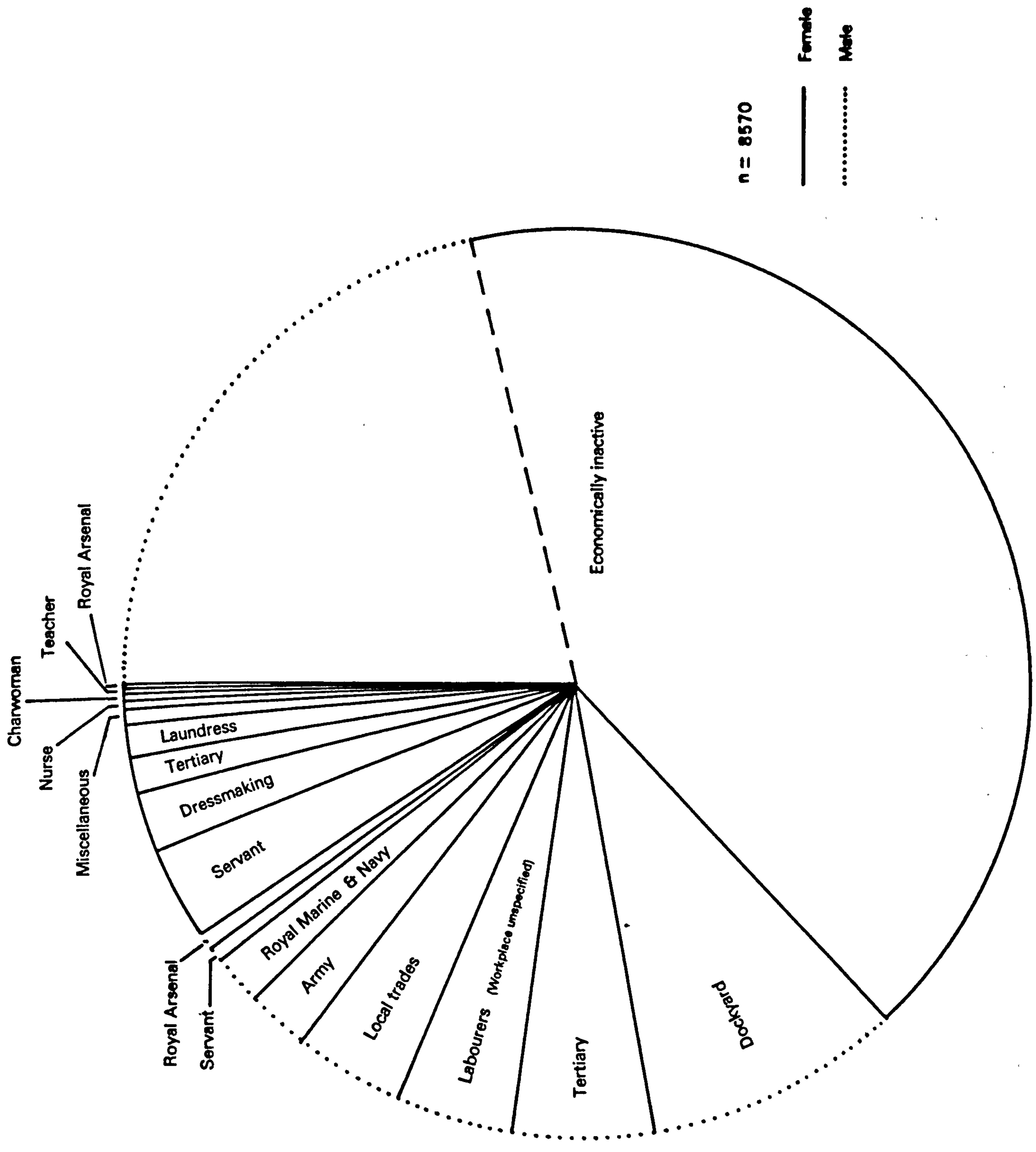


Figure 8.17 Employment structure of Woolwich, 1861

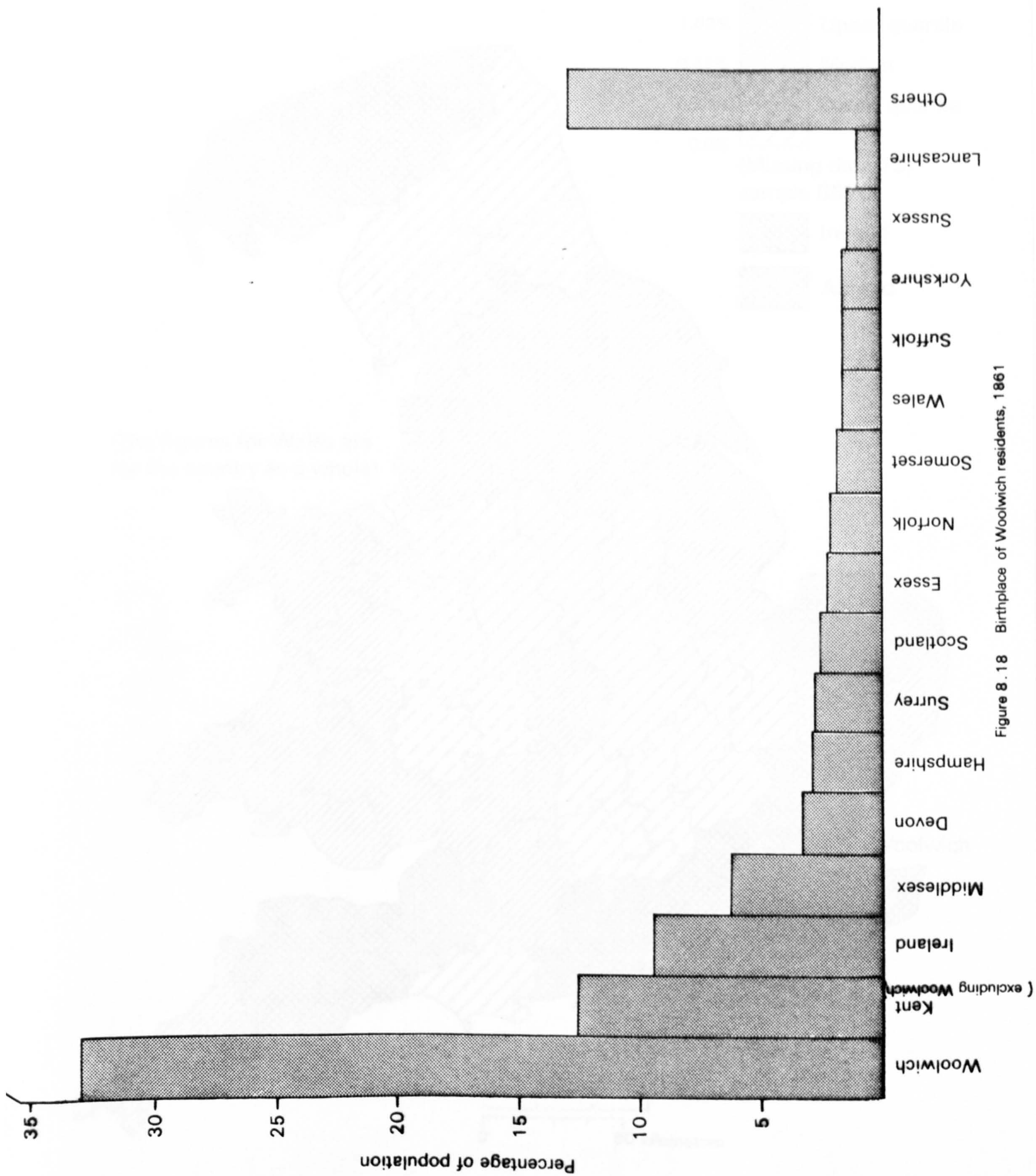


Figure 8.18 Birthplace of Woolwich residents, 1861

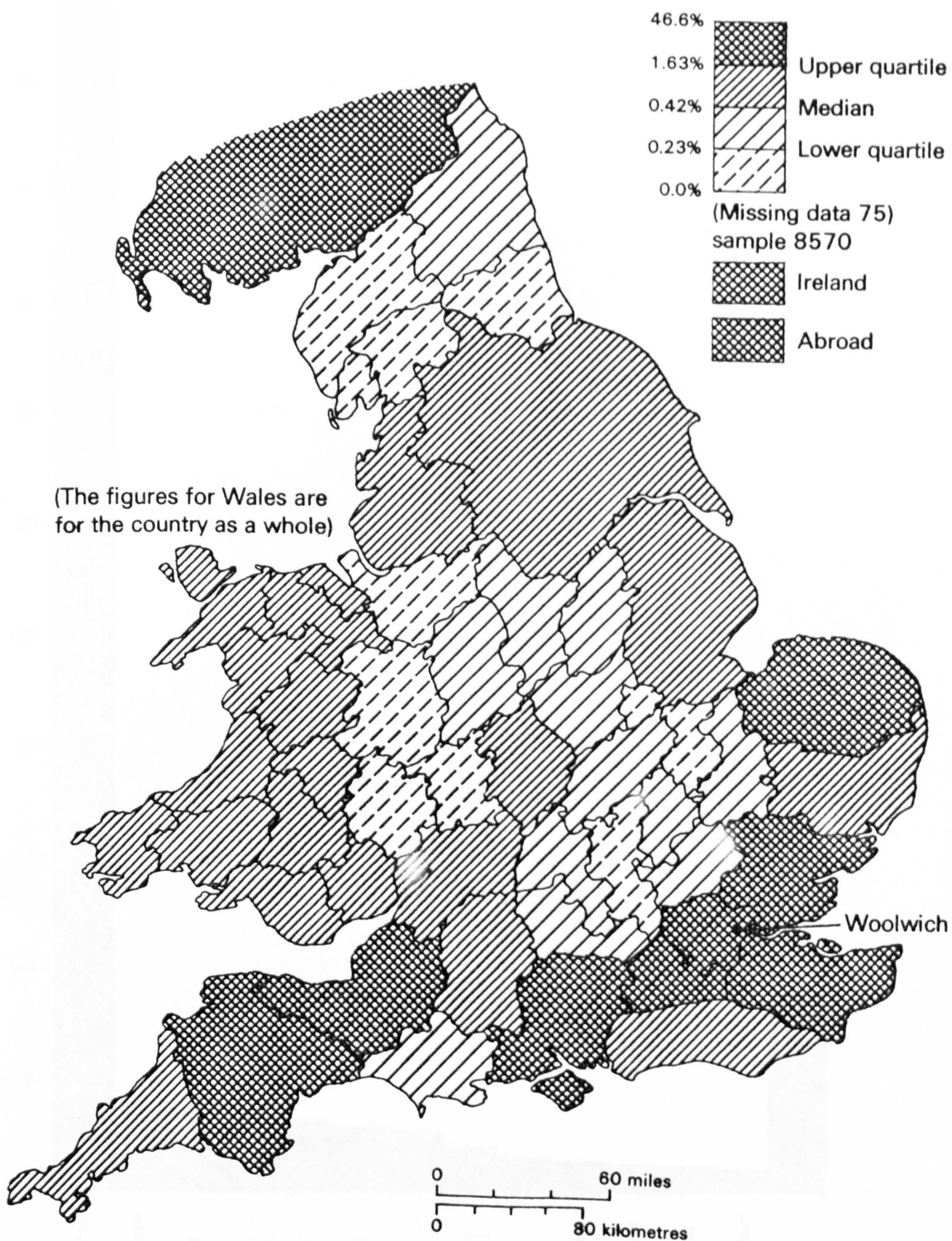


Figure 8.19 Birthfield of Woolwich residents, 1861

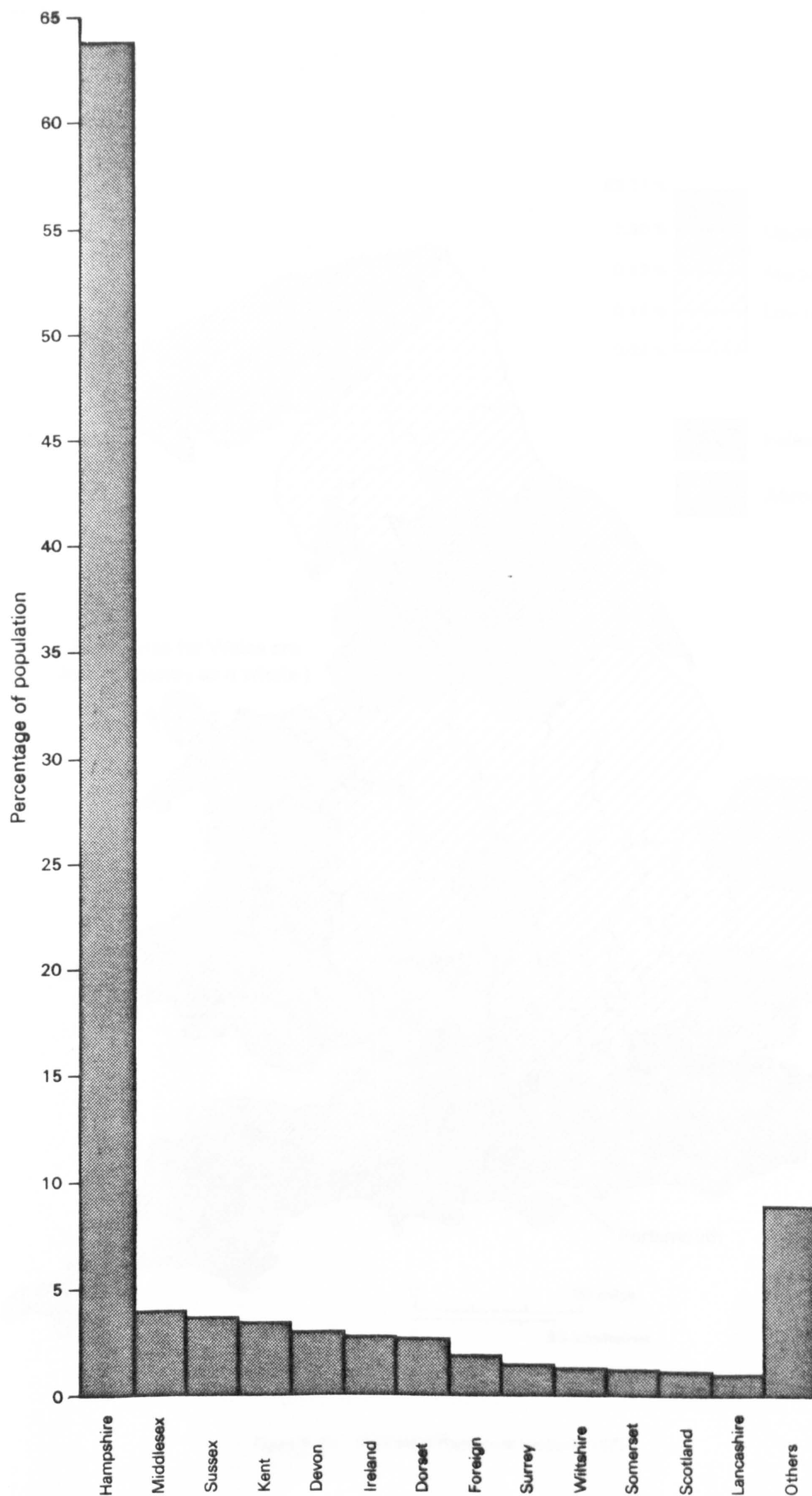


Figure 8.20 Birthplace of Portsmouth residents, 1871

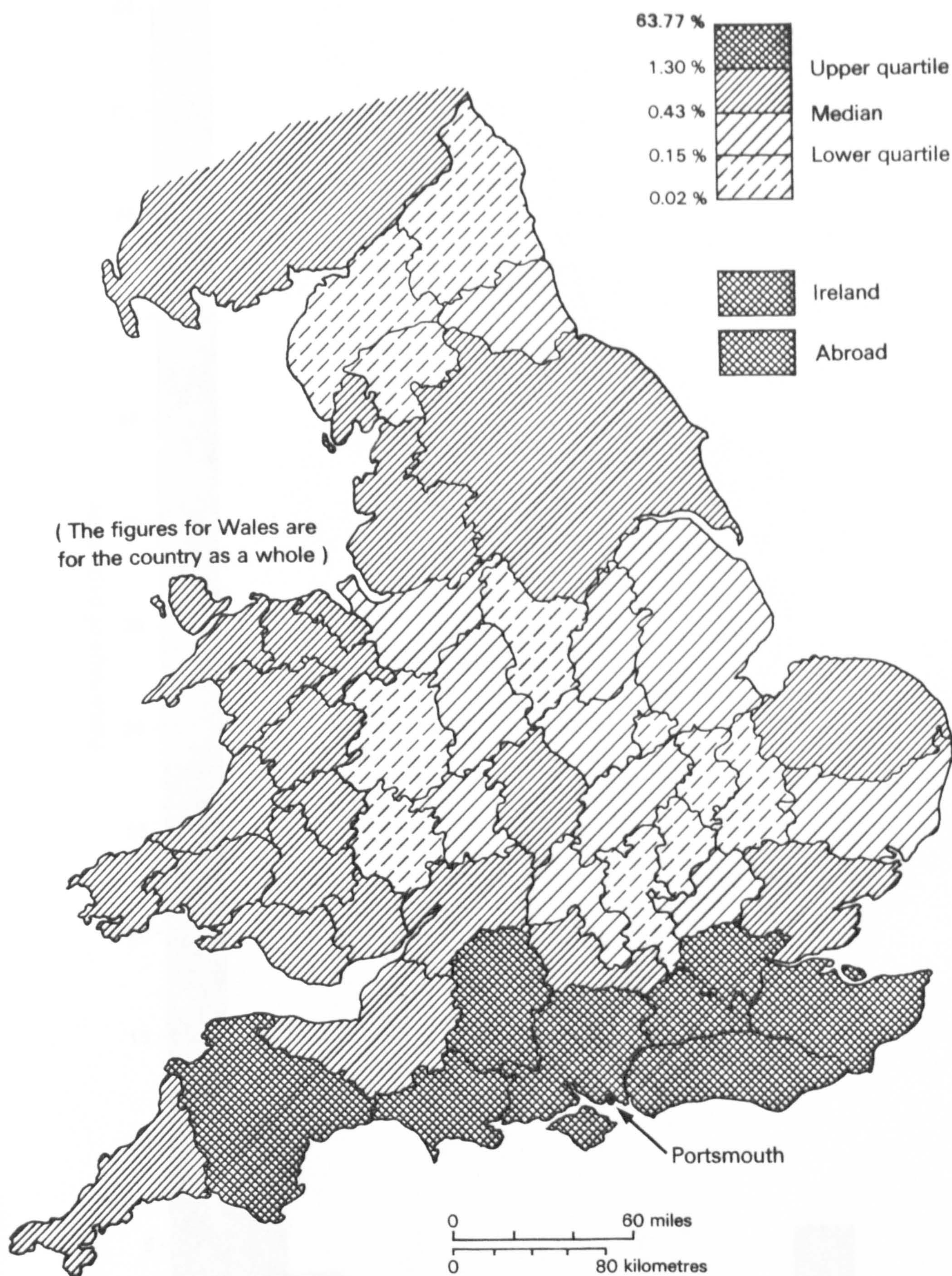


Figure 8.21 Birthfield of Portsmouth residents, 1871

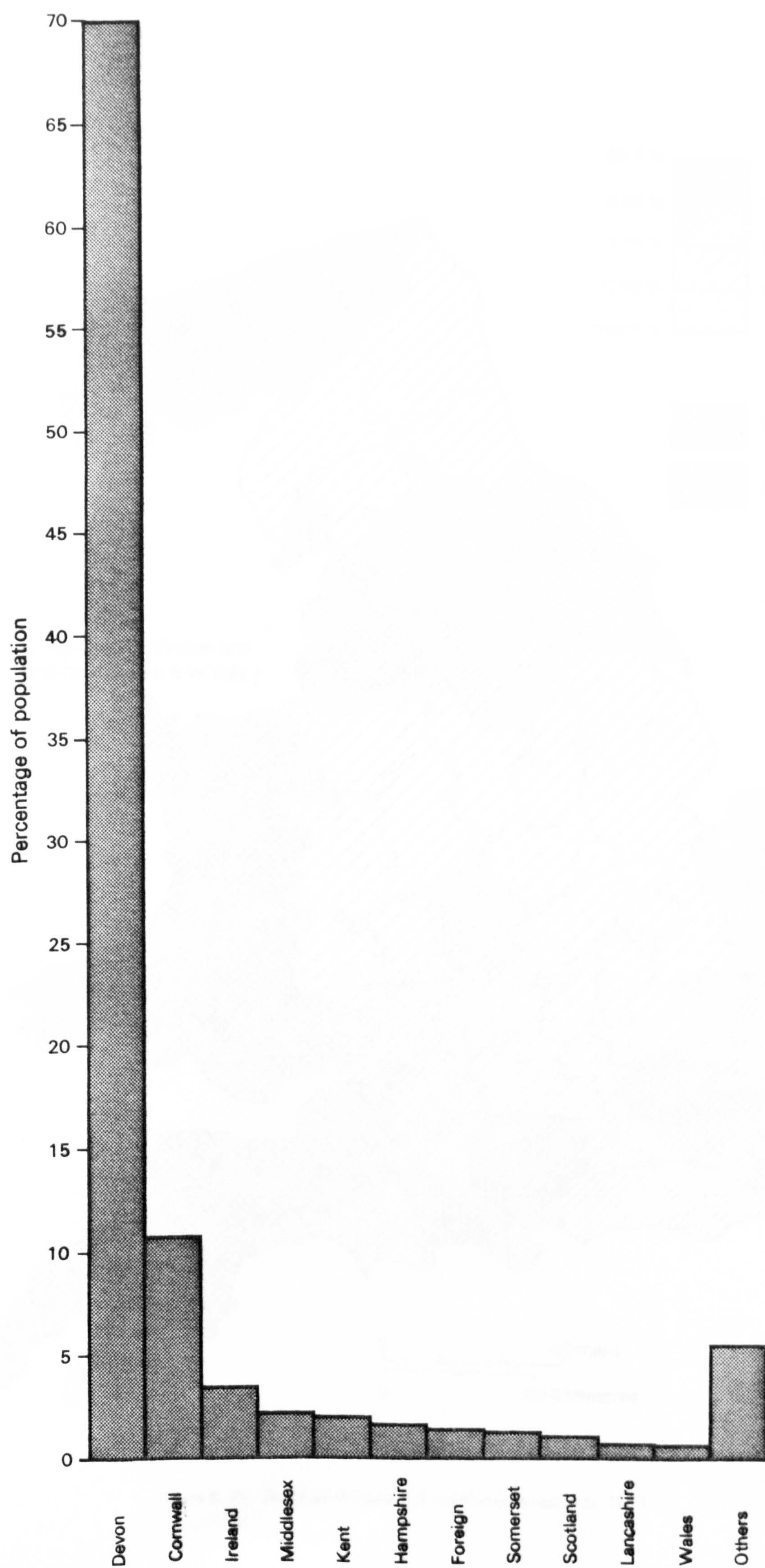


Figure 8.22 Birthplace of Devonport and Plymouth residents, 1871

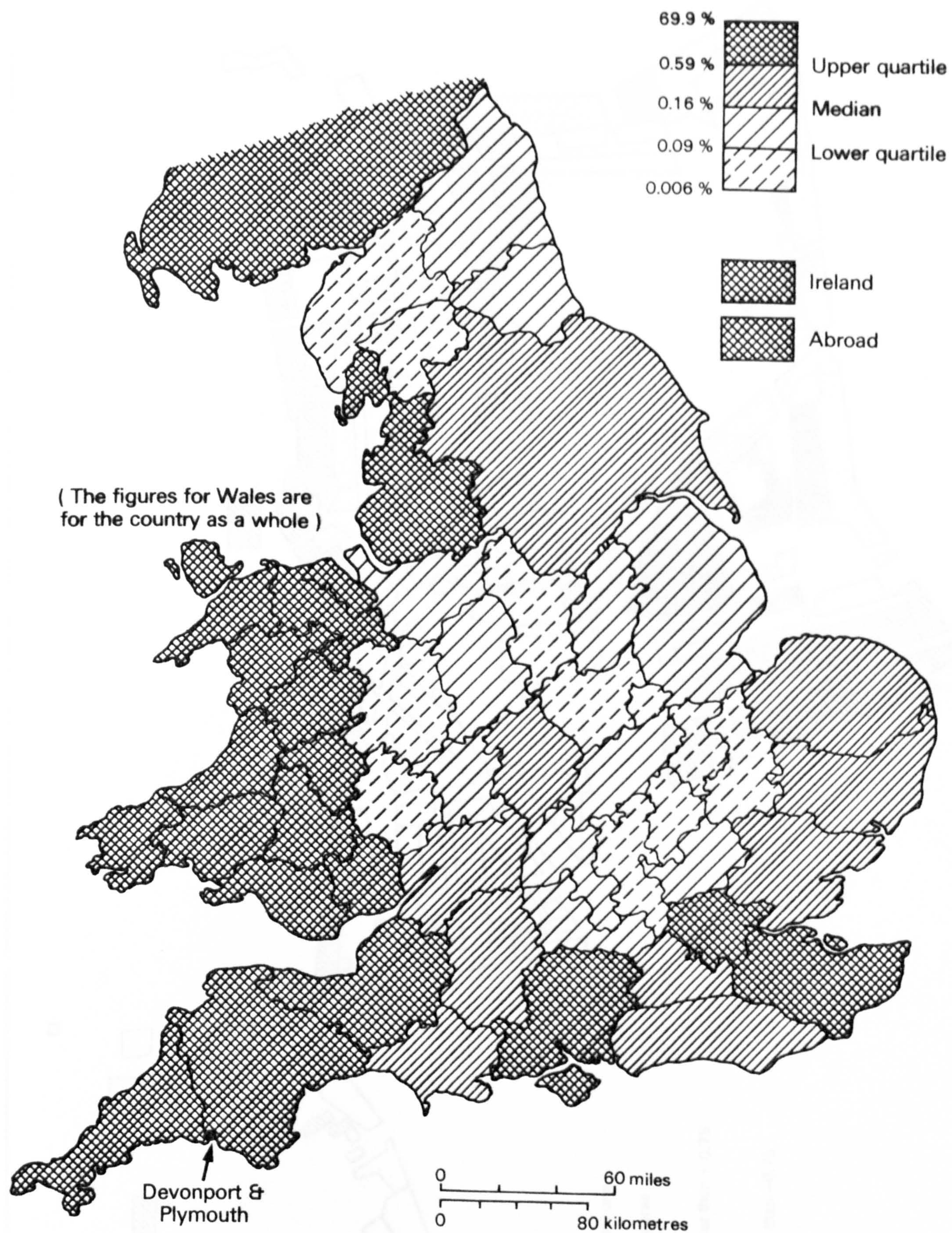


Figure 8.23 Birthfield of Devonport and Plymouth residents, 1871

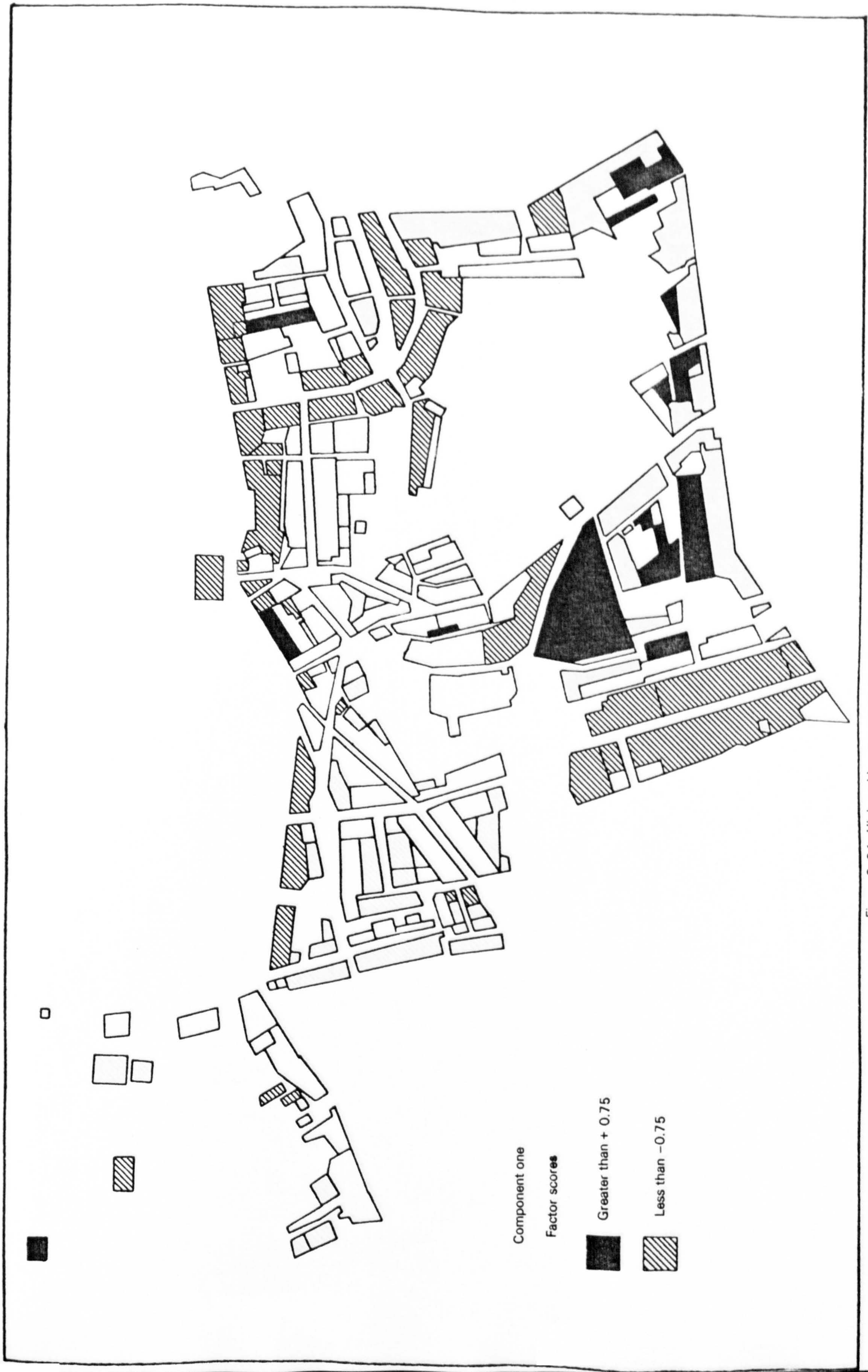


Figure 8.24 High and low scores on component one : Woolwich



Figure 8.25 High and low scores on component two : Woolwich

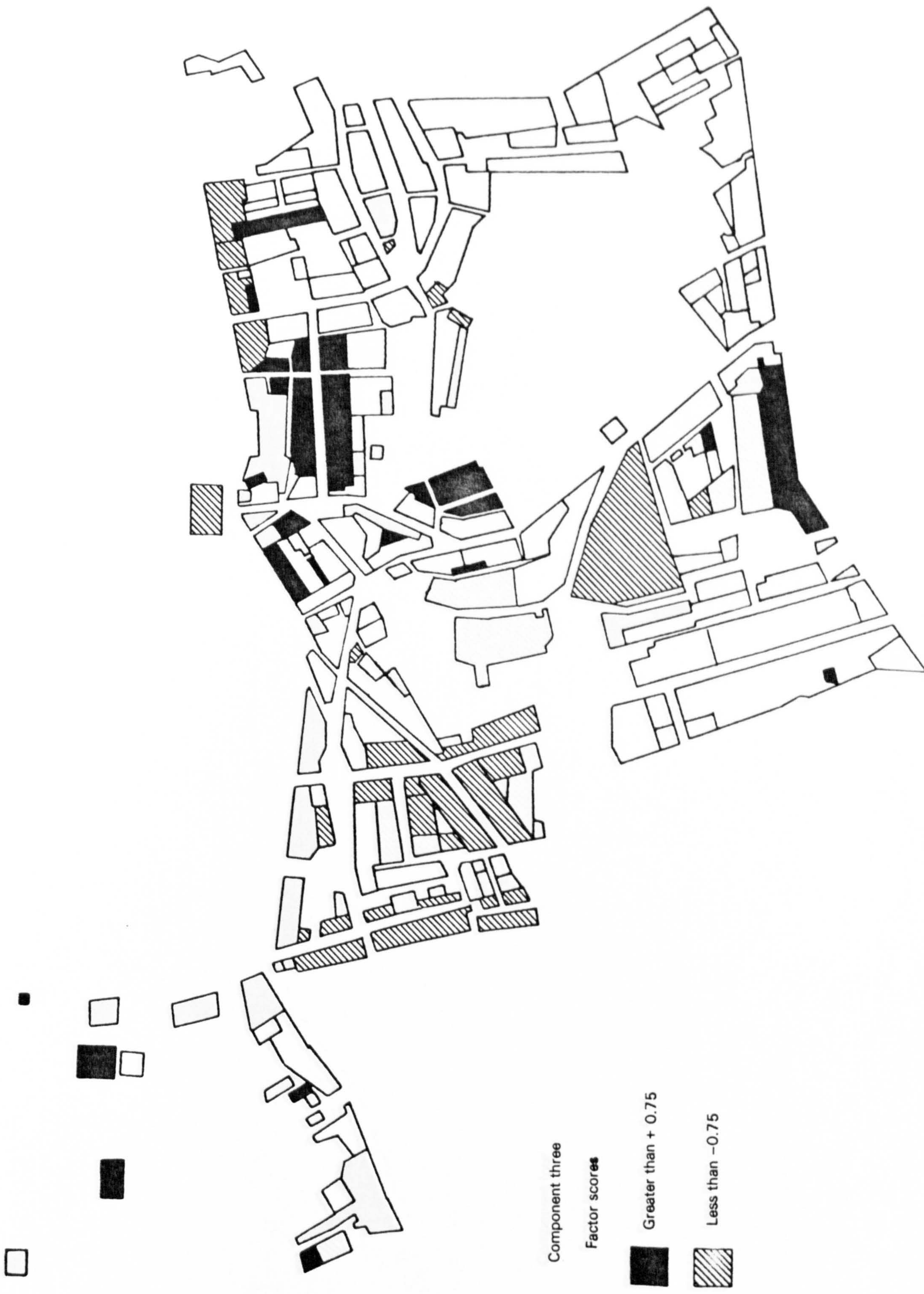


Figure 8.26 High and low scores on component three: Woolwich

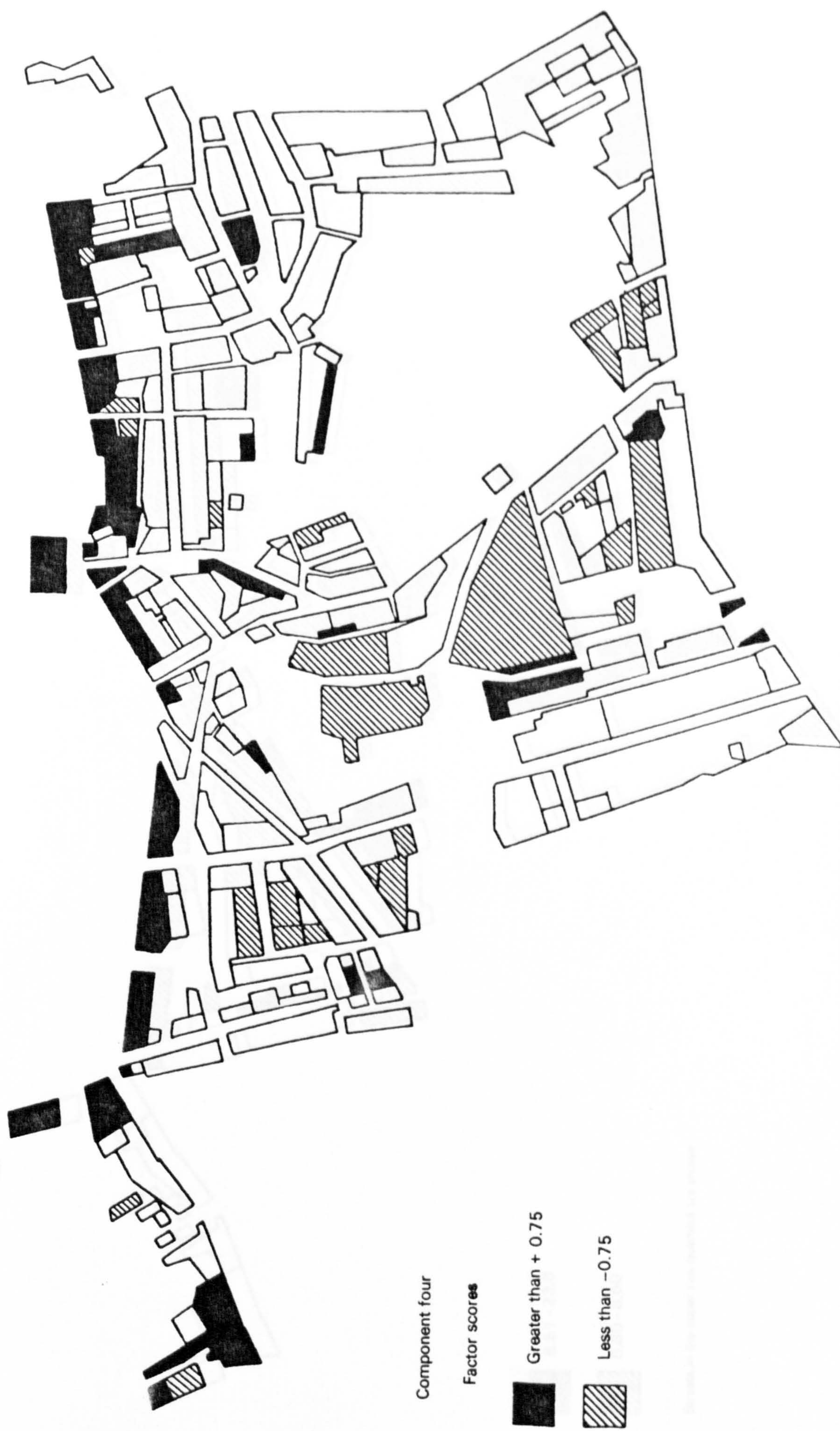


Figure 8.27 High and low scores on component four : Woolwich

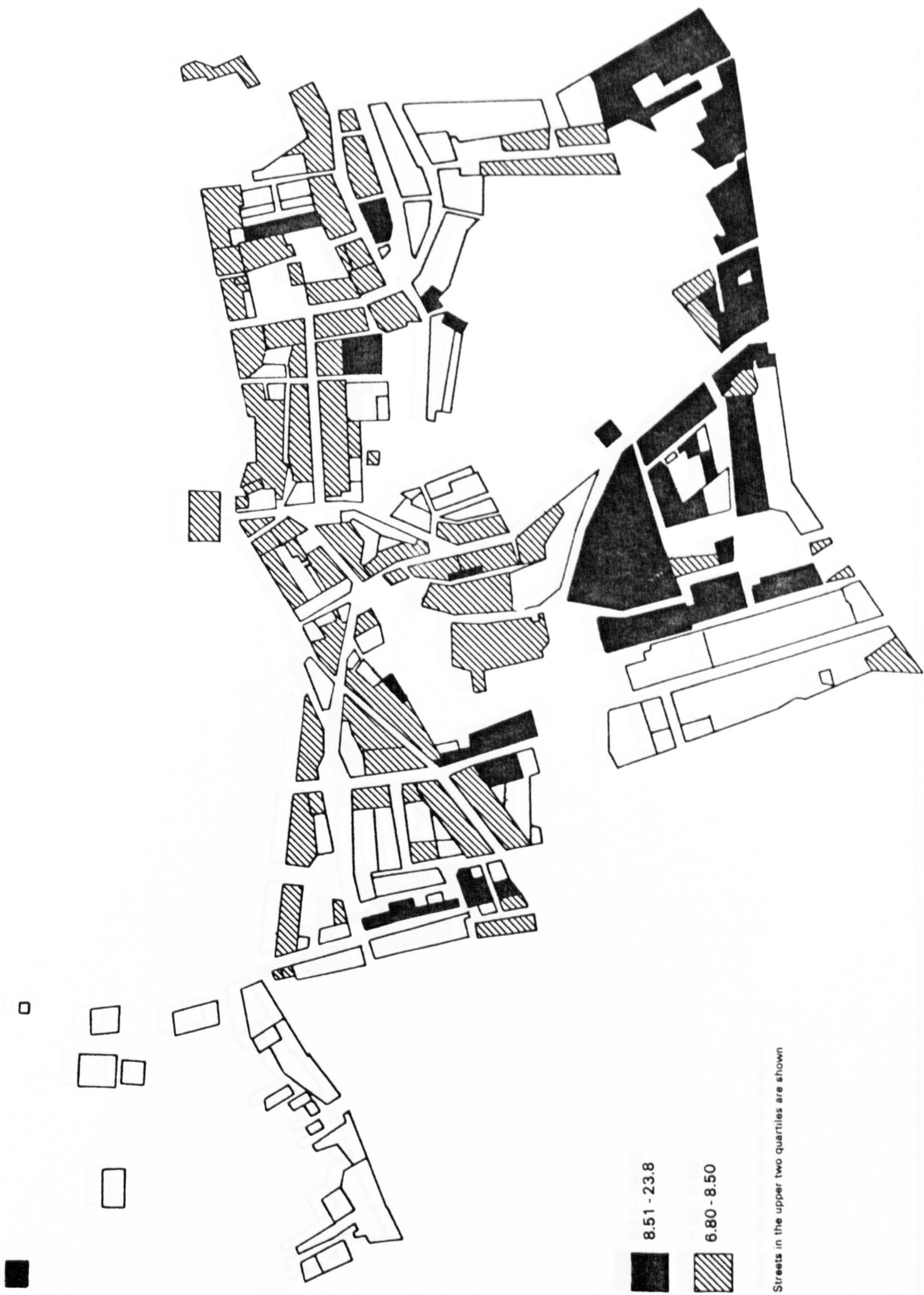


Figure 8.28 Population density in Woolwich, 1861

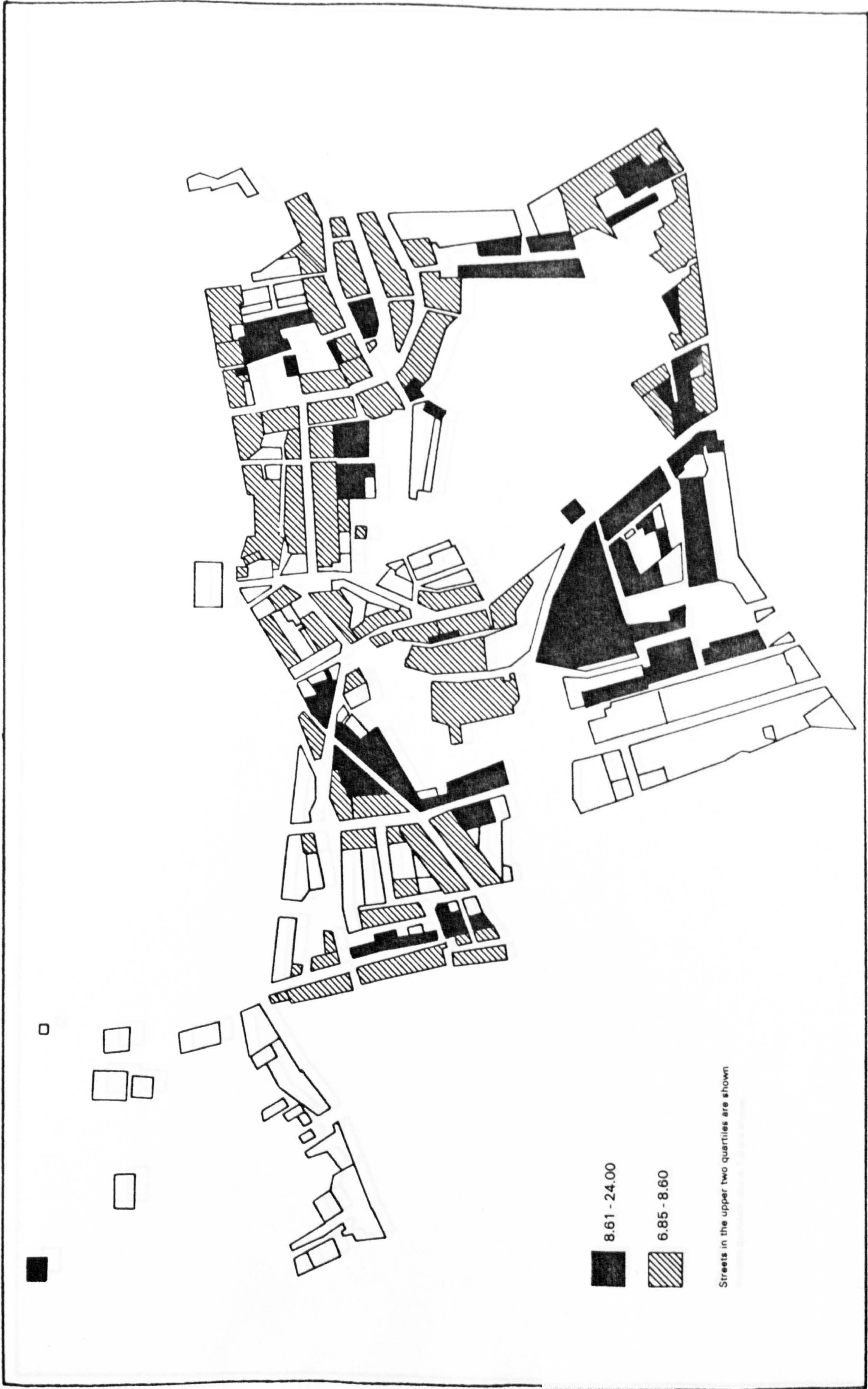


Figure 8.29 Multiple occupation in Woolwich, 1861

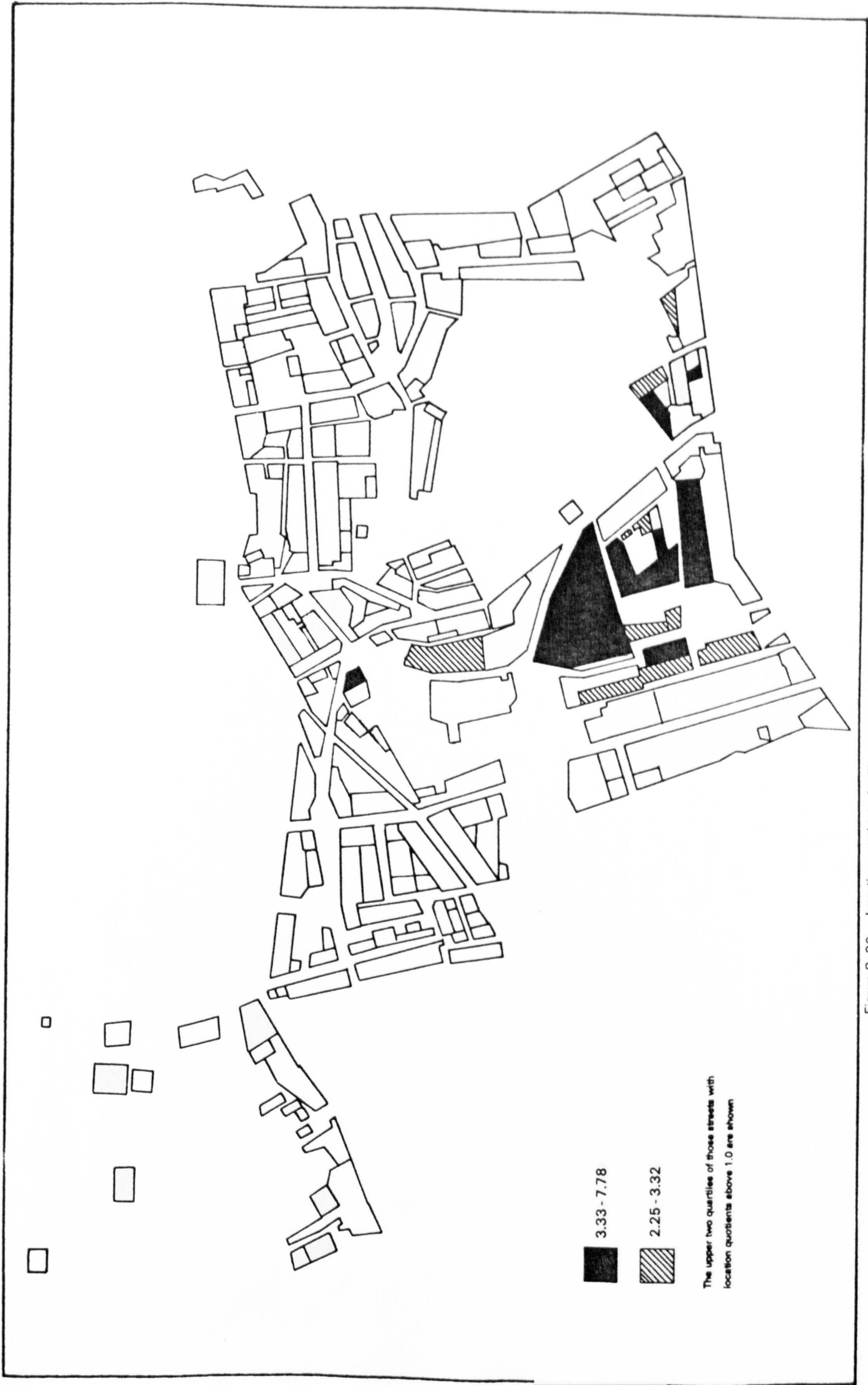


Figure 8.30 Location quotient of military and naval personnel in Woolwich, 1861

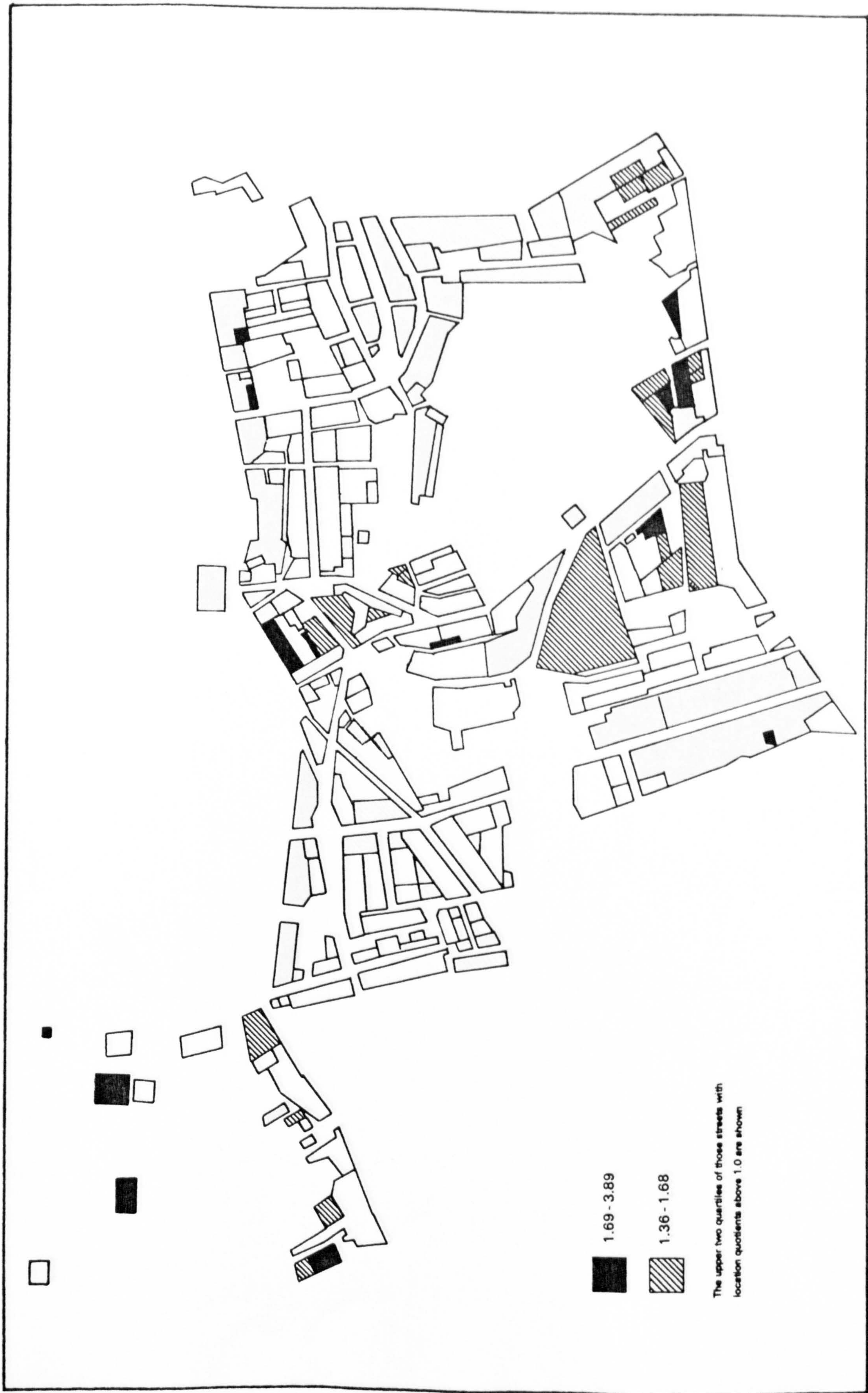


Figure 8.31 Location quotient of social classes IV and V in Woolwich, 1861

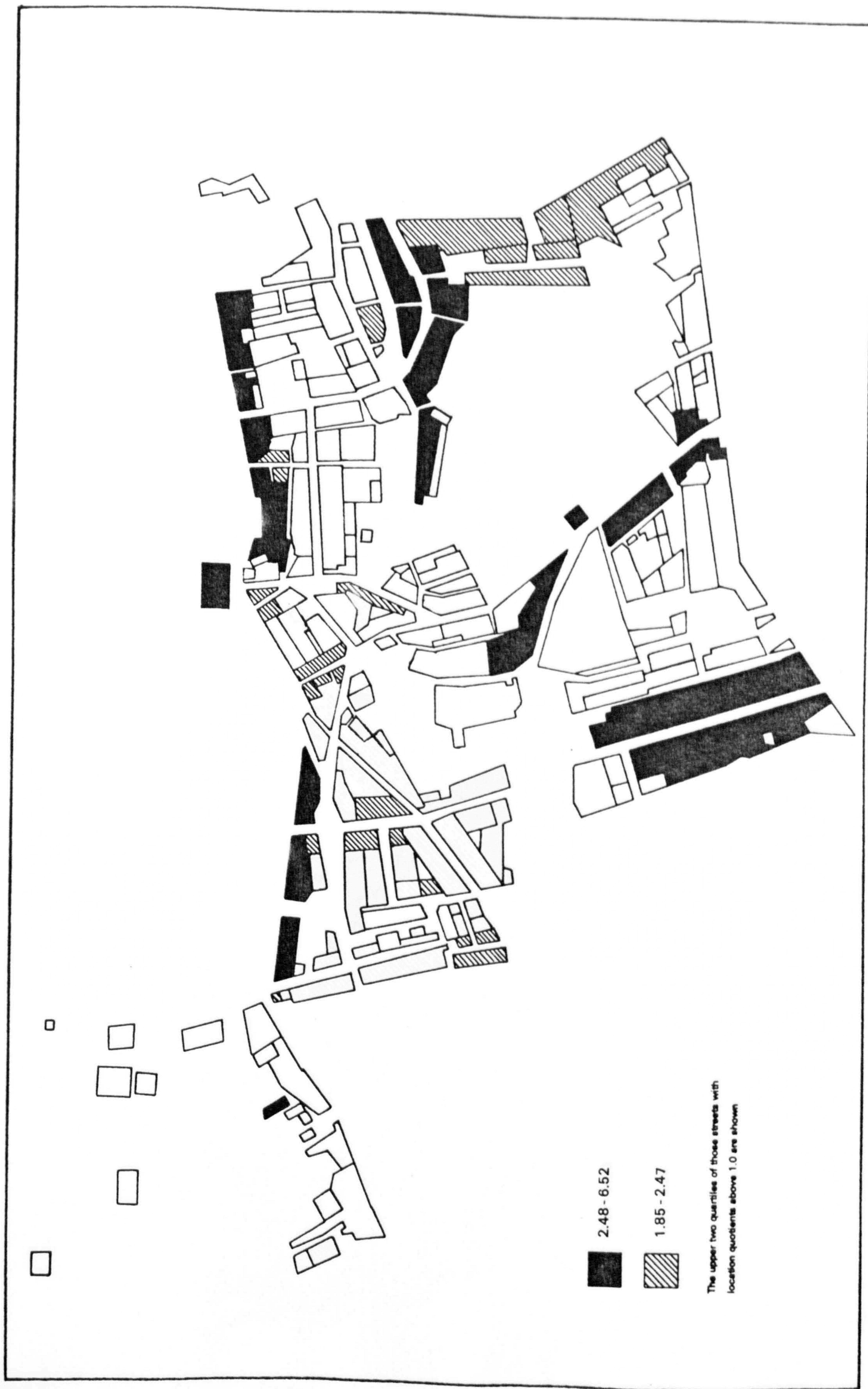


Figure 8.32 Location quotient of social classes I and II in Woolwich, 1861

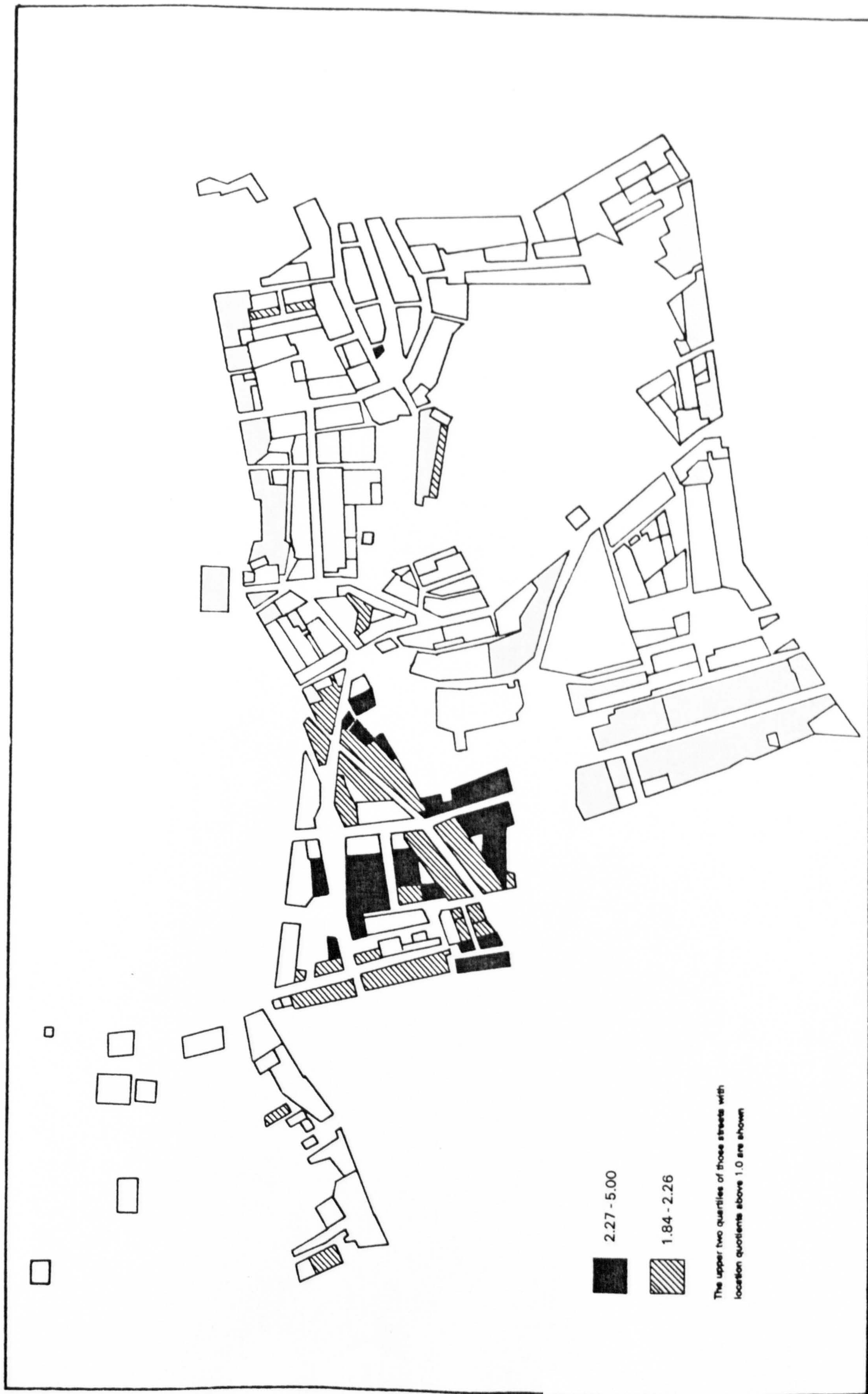


Figure 8.33 Location quotient of dockyard personnel in Woolwich, 1861

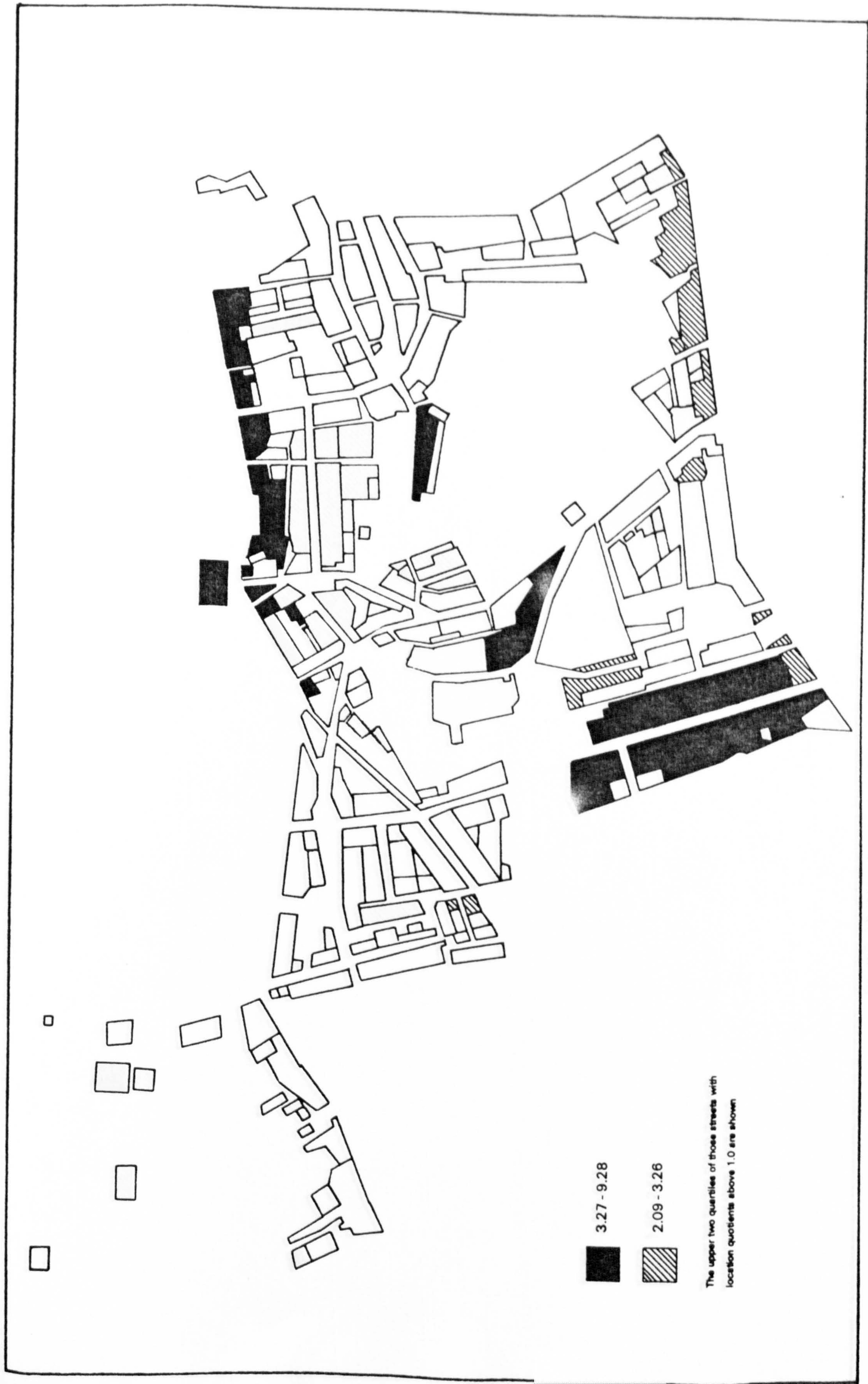
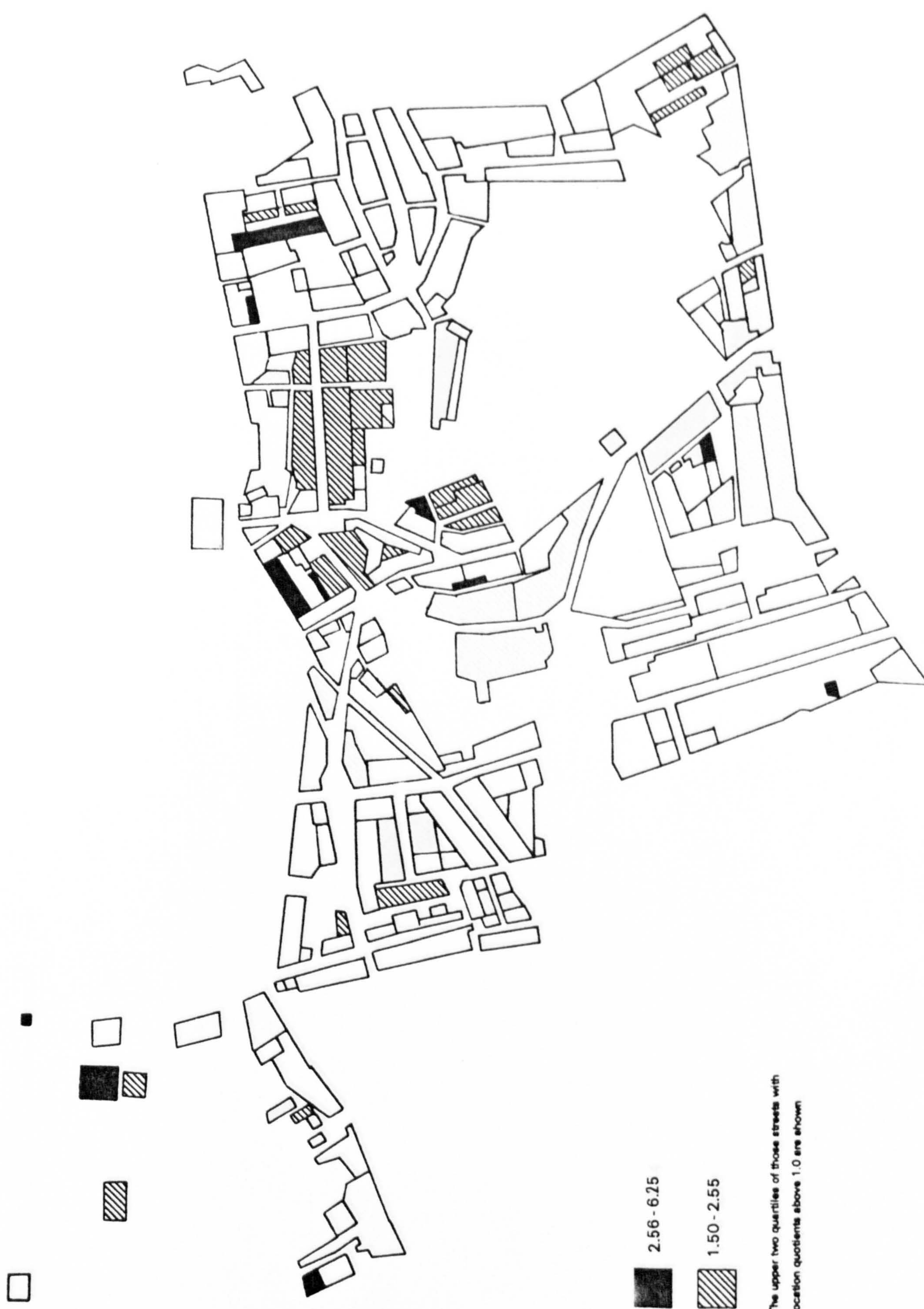


Figure 8.34 Location quotients of servants in Woolwich, 1861



2.56 - 6.25

1.50 - 2.55

The upper two quartiles of those streets with location quotients above 1.0 are shown

Figure 8.35 Location quotient of labourers in Woolwich, 1861

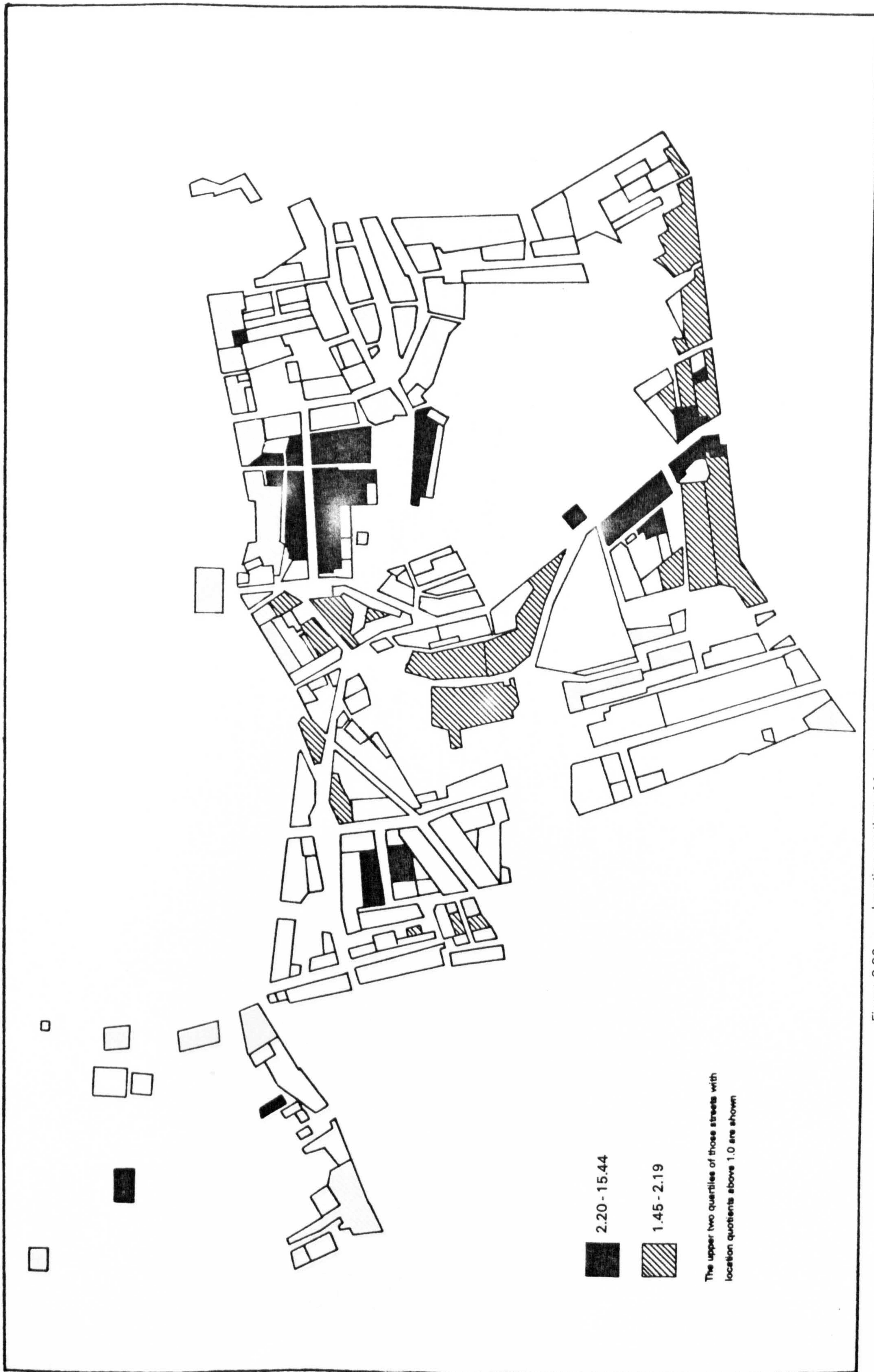


Figure 8.36 Location quotient of female head's of households in Woolwich, 1861

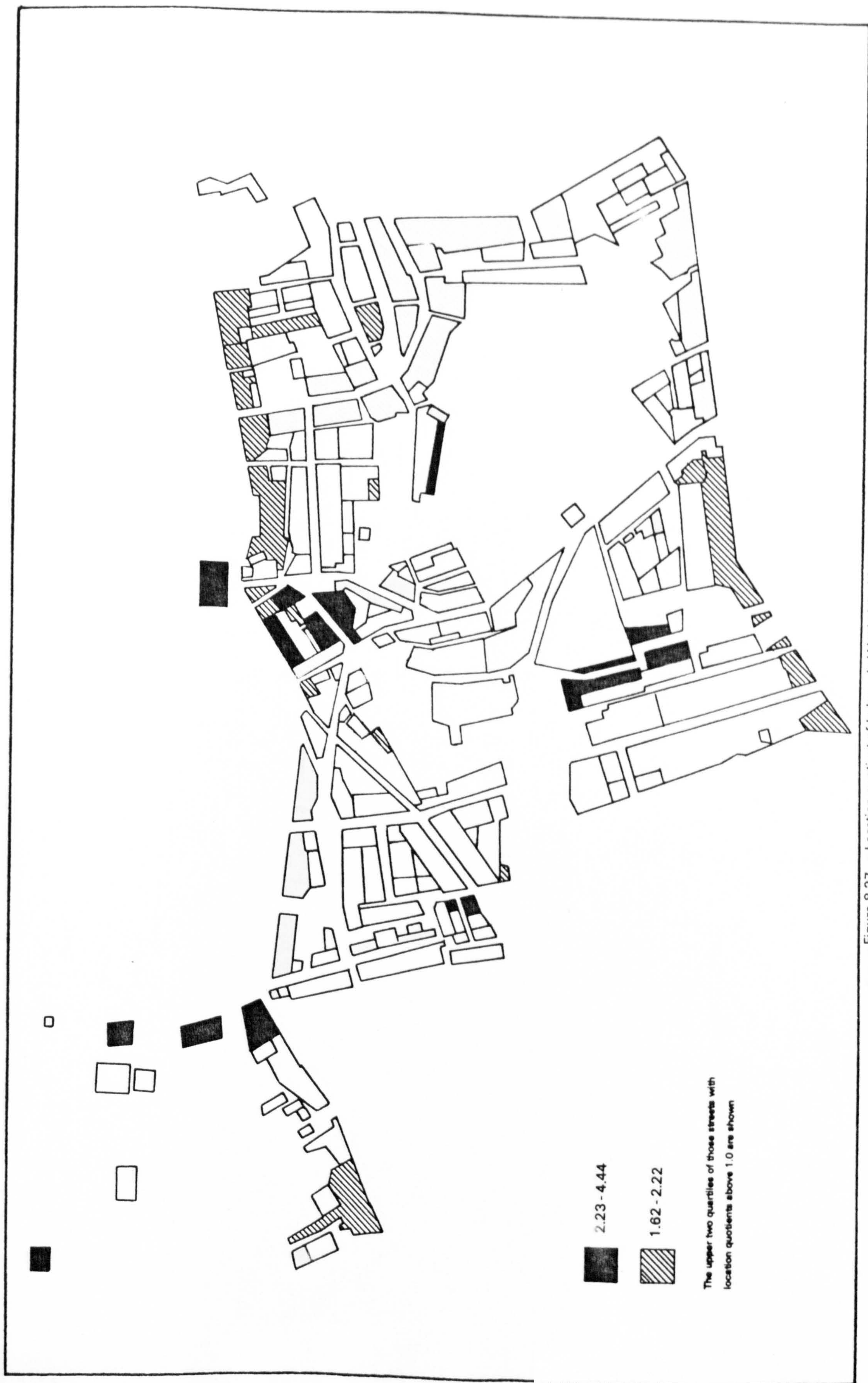


Figure 8.37 Location quotient of lodgers in Woolwich, 1861

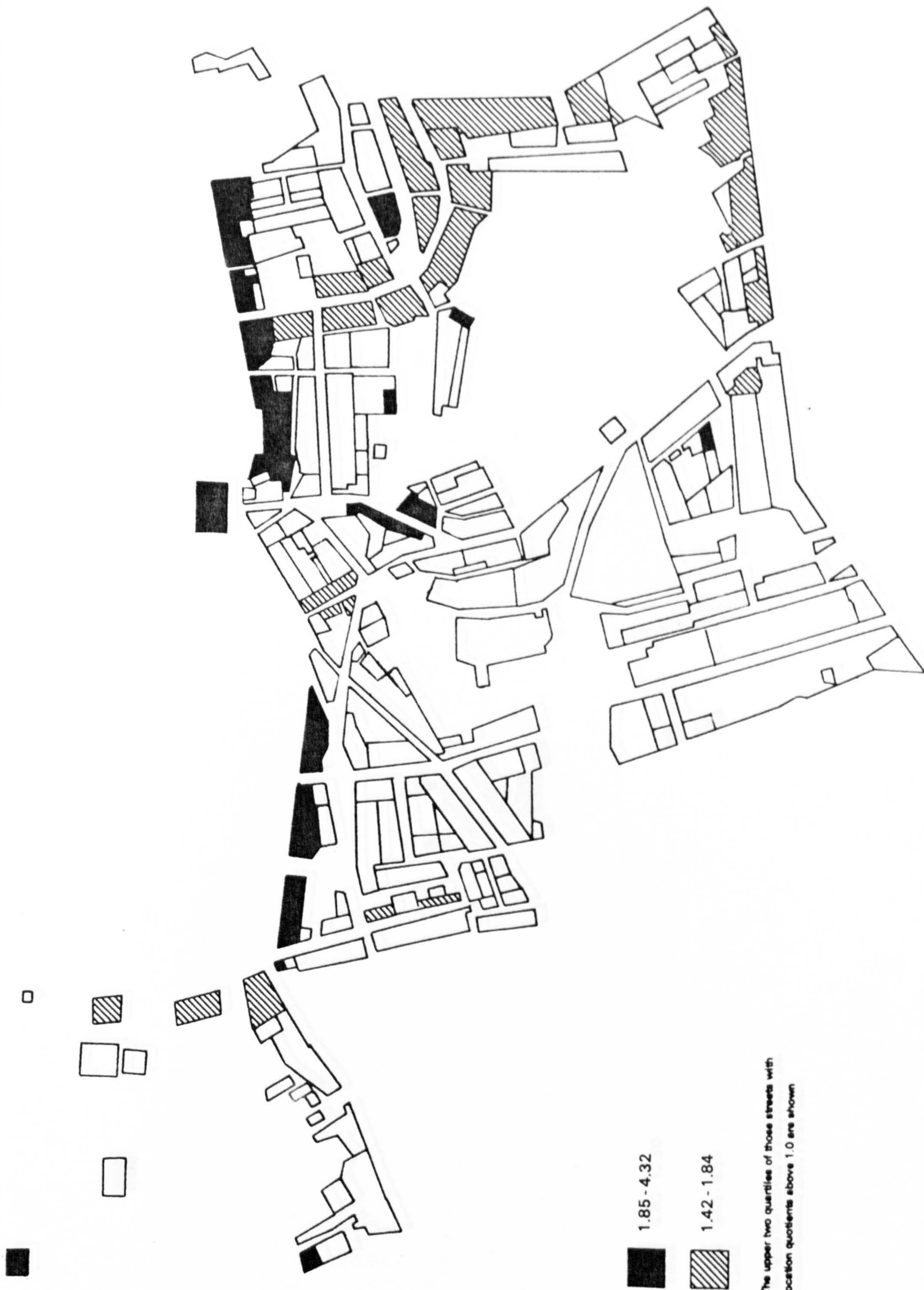


Figure 8.38 Location quotient of tertiary workers in Woolwich, 1861

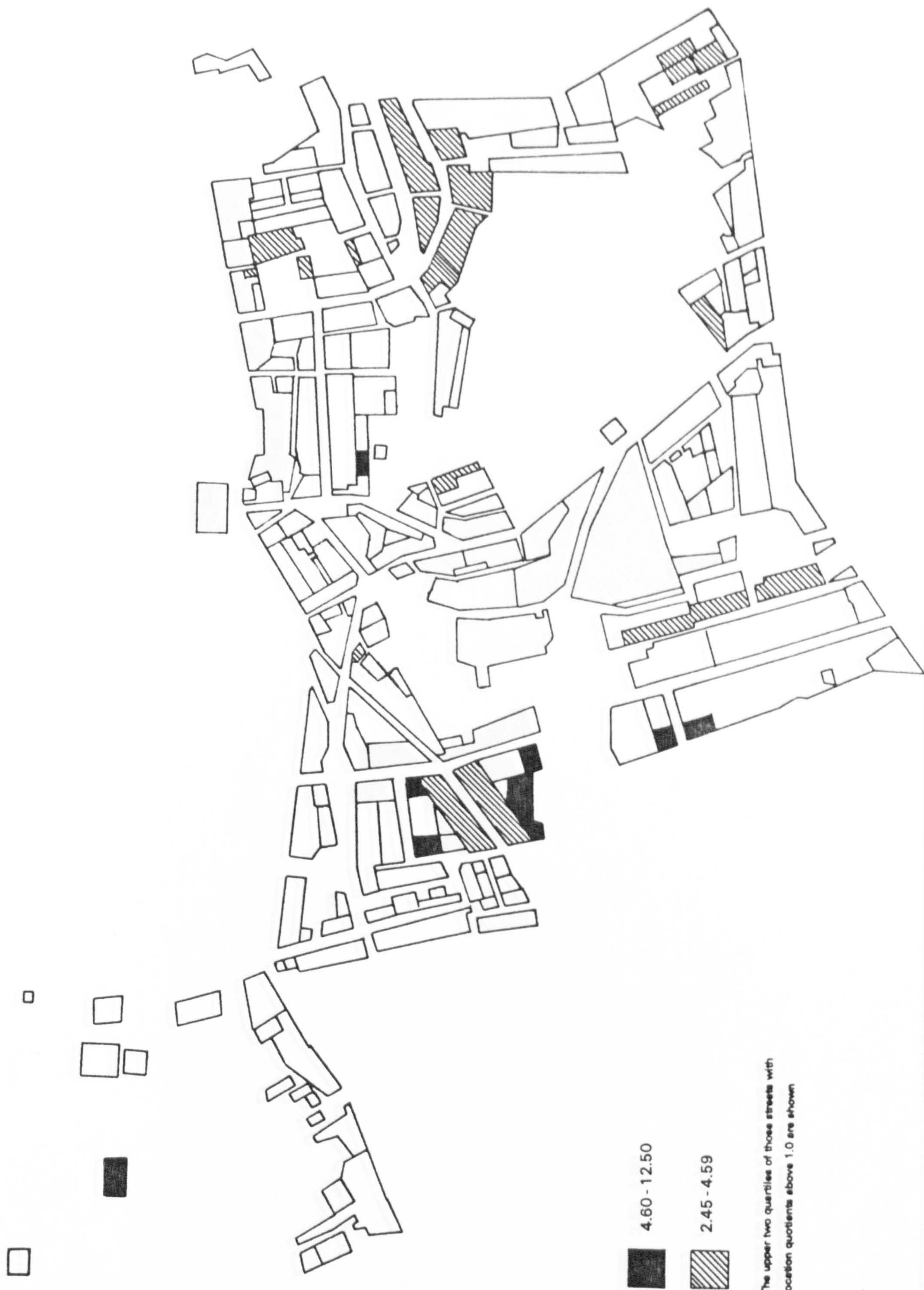


Figure 8.39 Location quotient of Welsh born residents in Woolwich, 1861

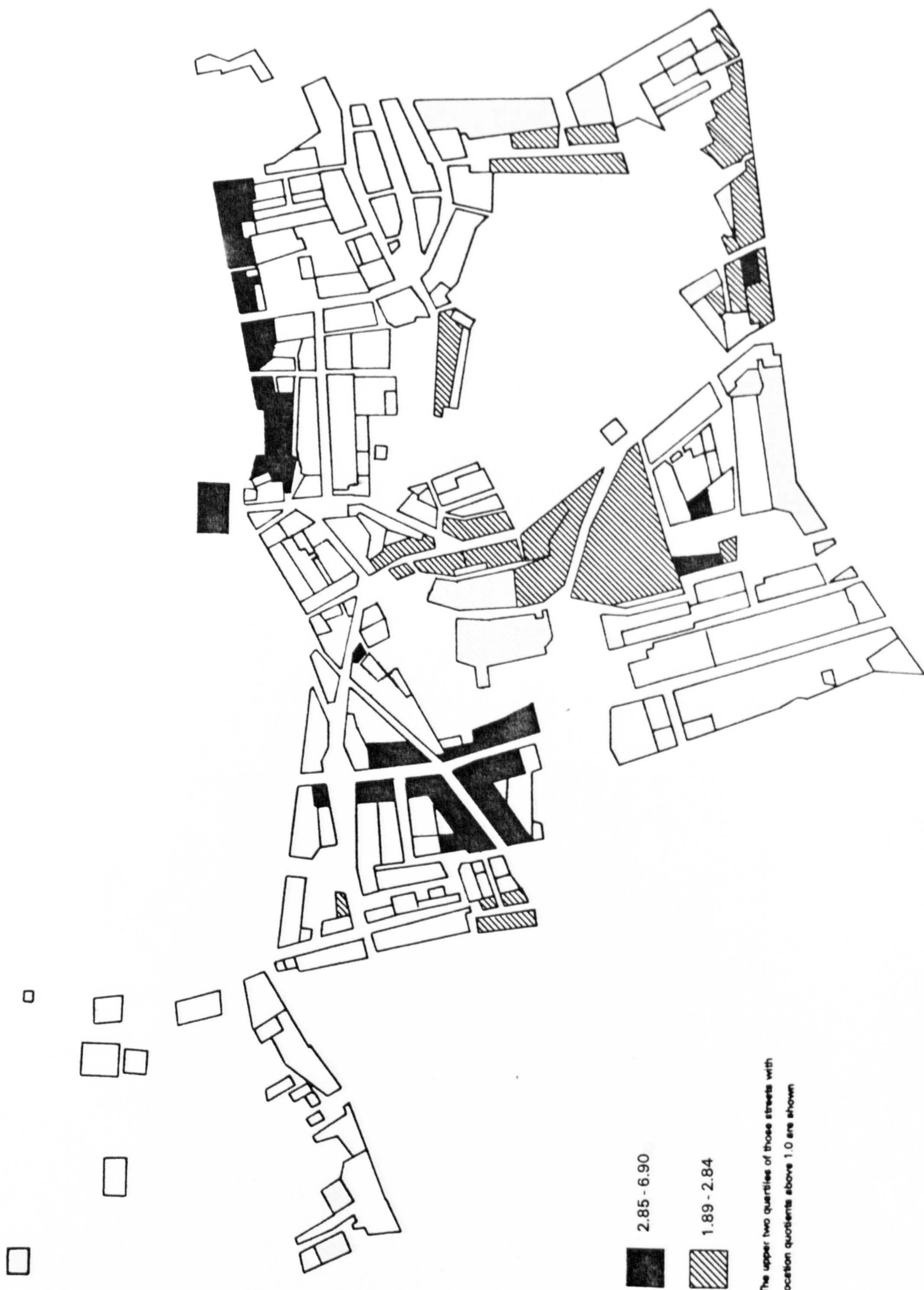


Figure 8.40 Location quotient of Scottish born residents of Woolwich in 1861

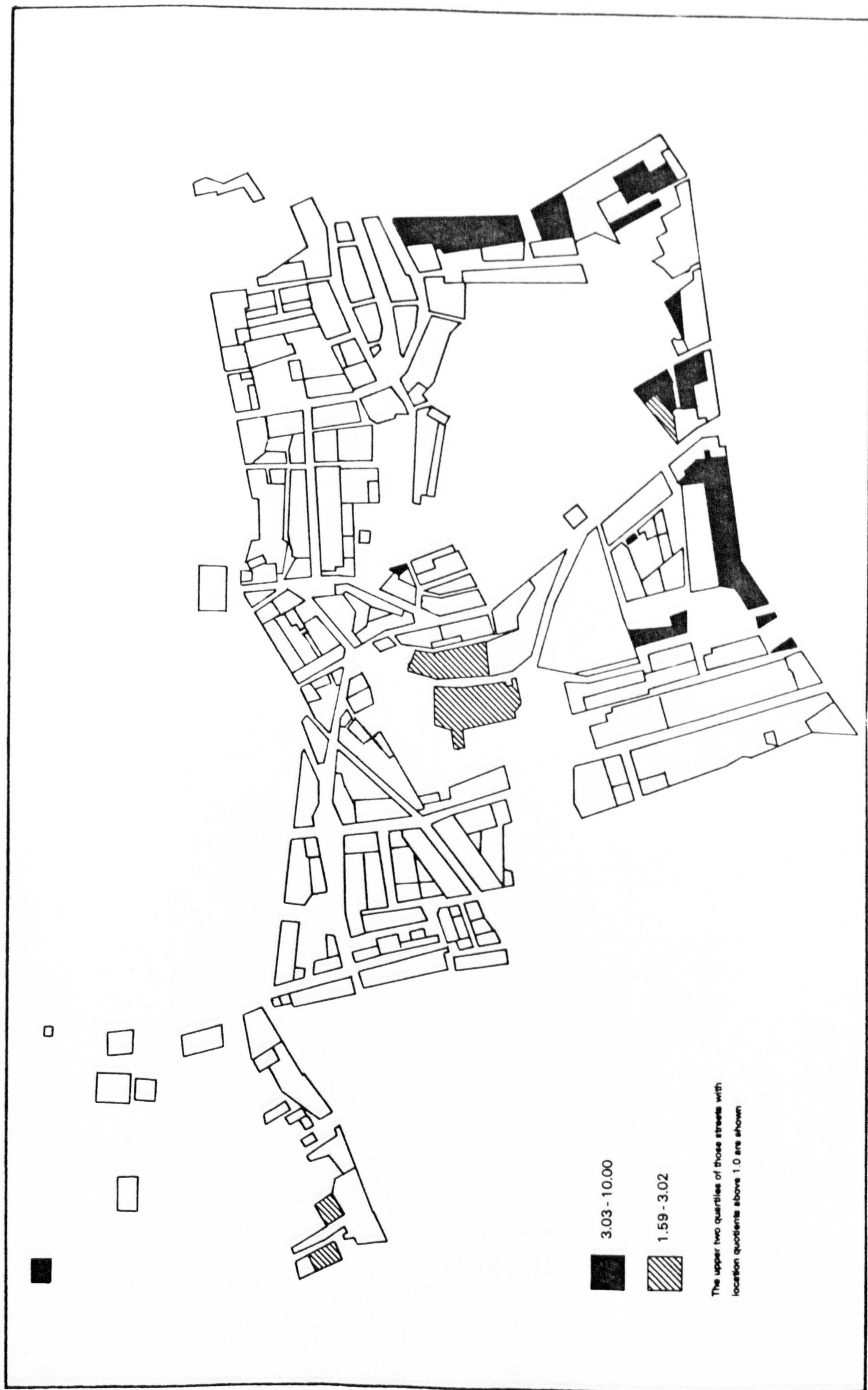


Figure 8.41 Location quotient of foreign born residents in Woolwich, 1861

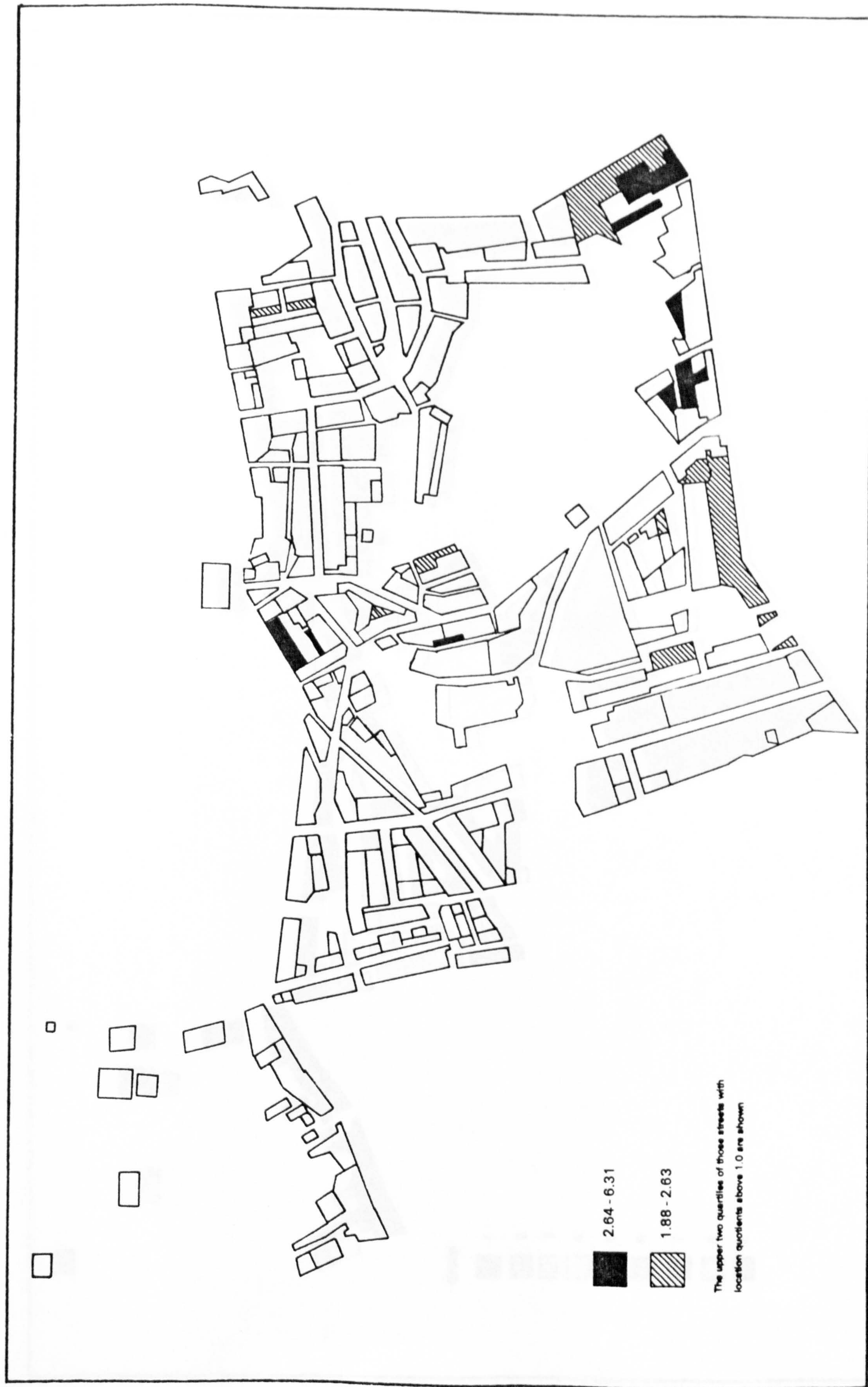


Figure 8.42 Location quotient of Irish born residents of Woolwich in 1861

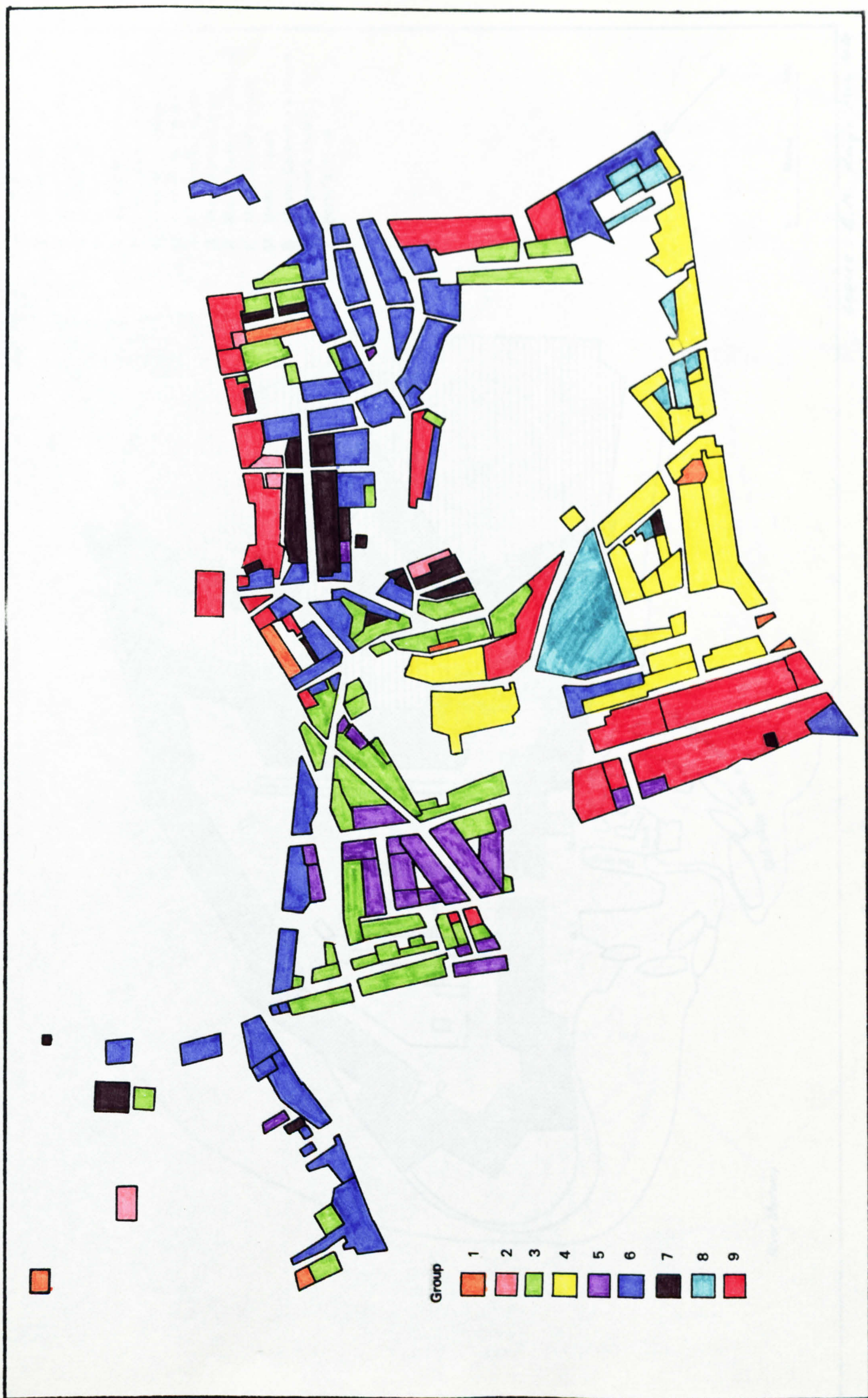
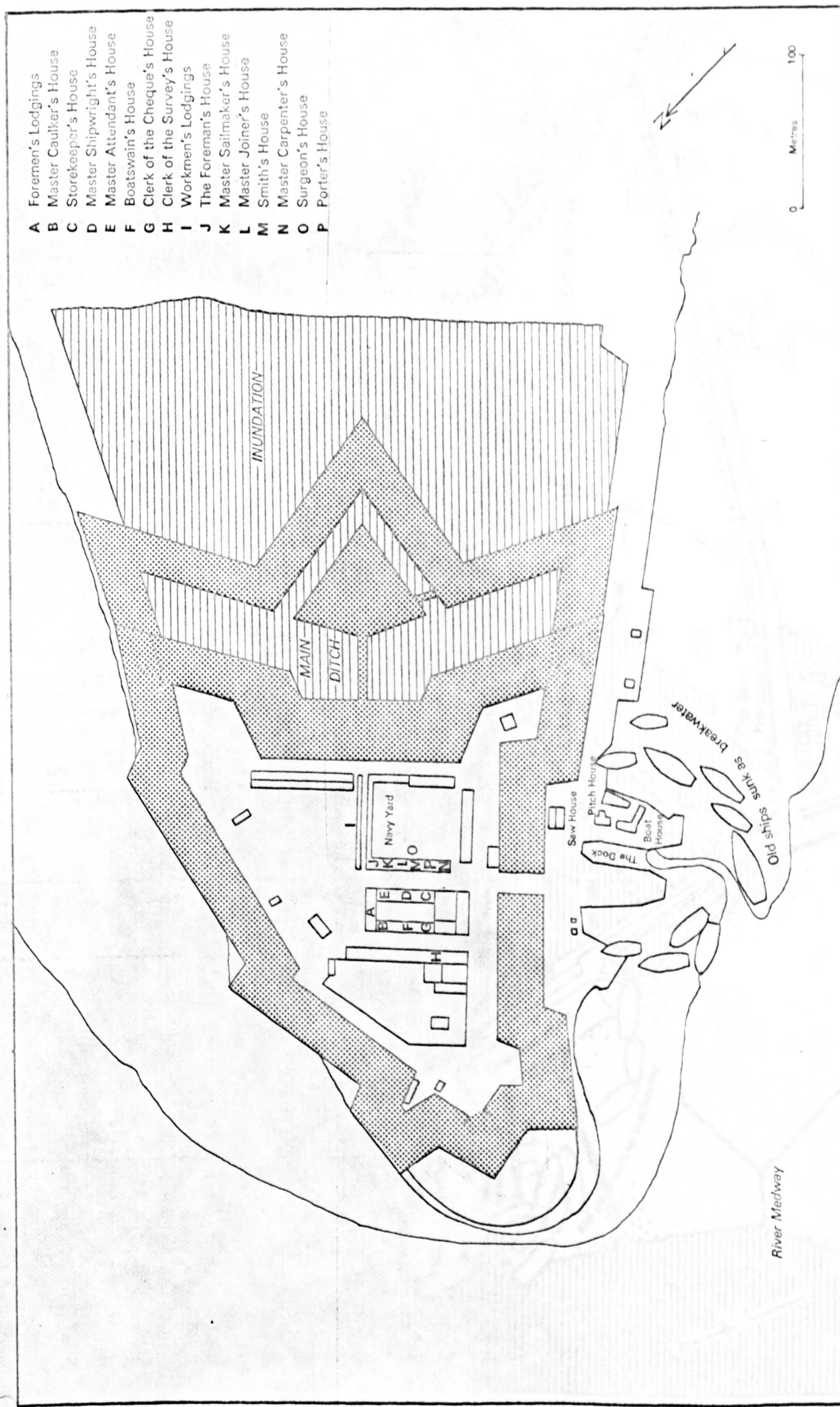


Figure 8-4.3 Woolwich factor scores classified into nine residential groups



source: B.H. King's MSS. 44

Figure 0.1 Sheerness dockyard and fort 1698

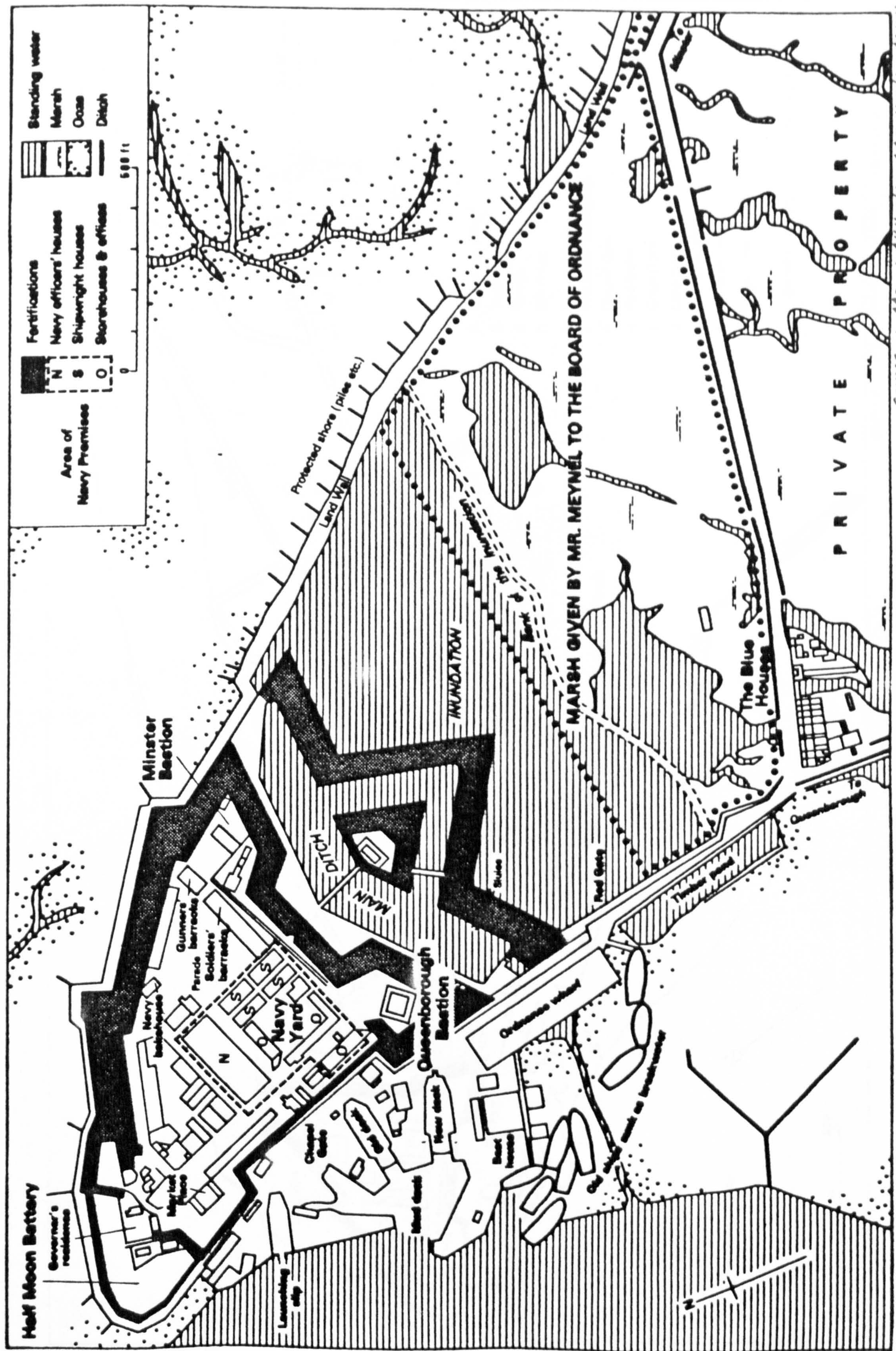
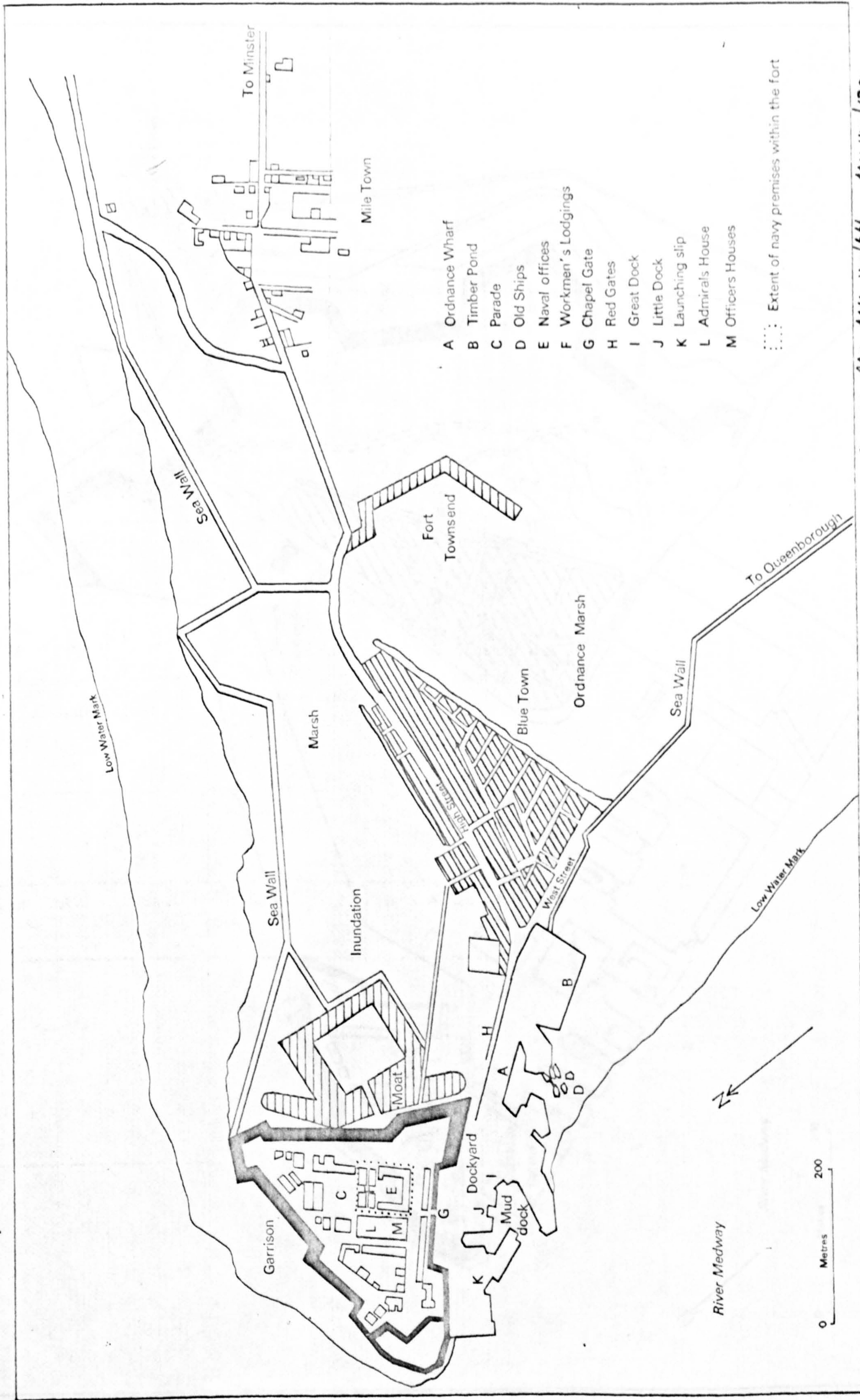


Figure 9.2 Sheerness 1738

Source: PRO MAPH. 2, ADM 140/1, ADM 140/659
ADM 140/662, ADM 140/684



Source: PRO ADM 140/666, ADM 140/670, ADM 293.

Figure 9.3 Sheerness circa 1800

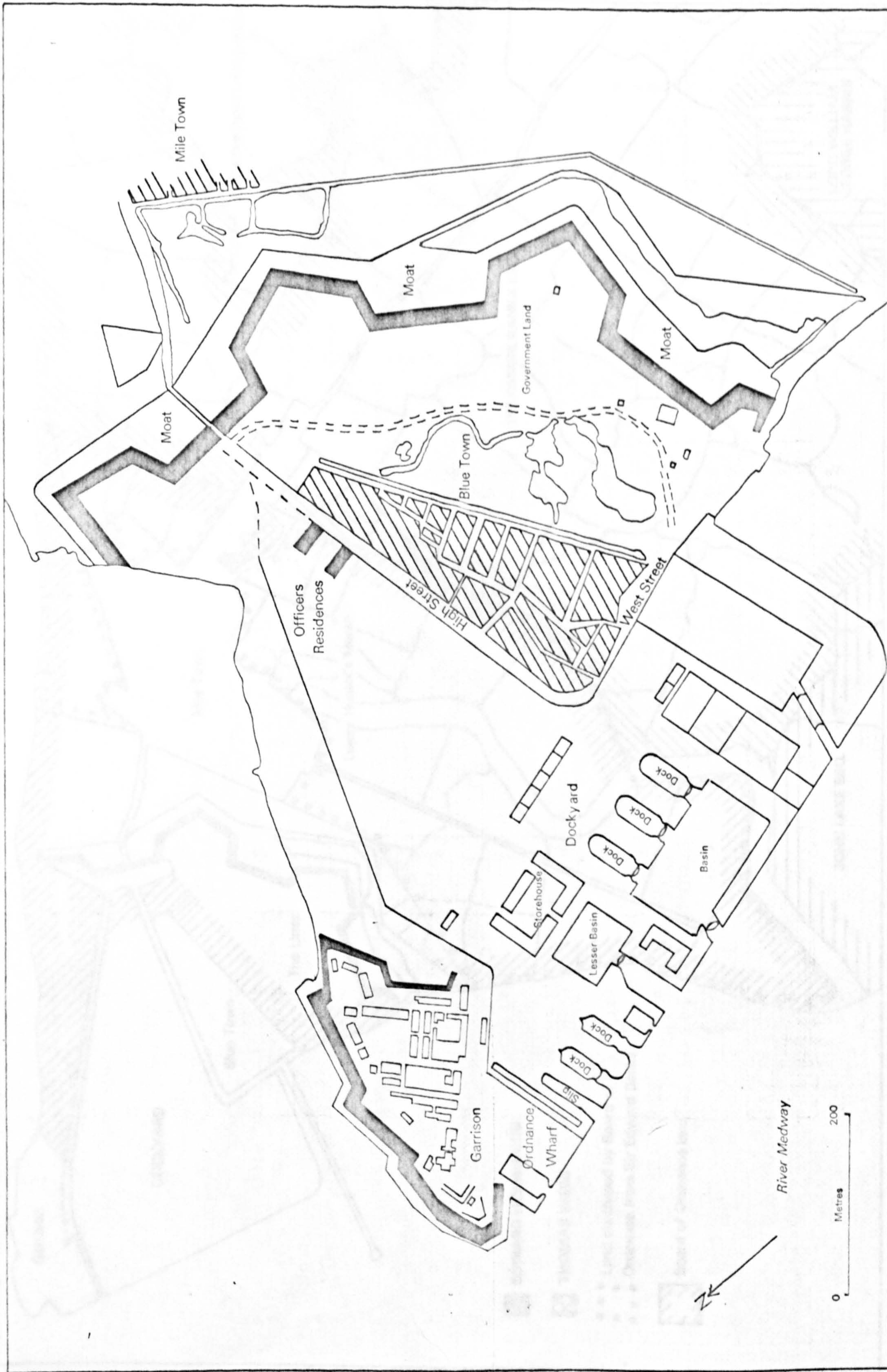


Figure 9.4 Sheerness circa 1820

Source: PRO ADM 140/688, ADM 140/689, ADM 140/692, ADM 697, ADM 140/703 (8)

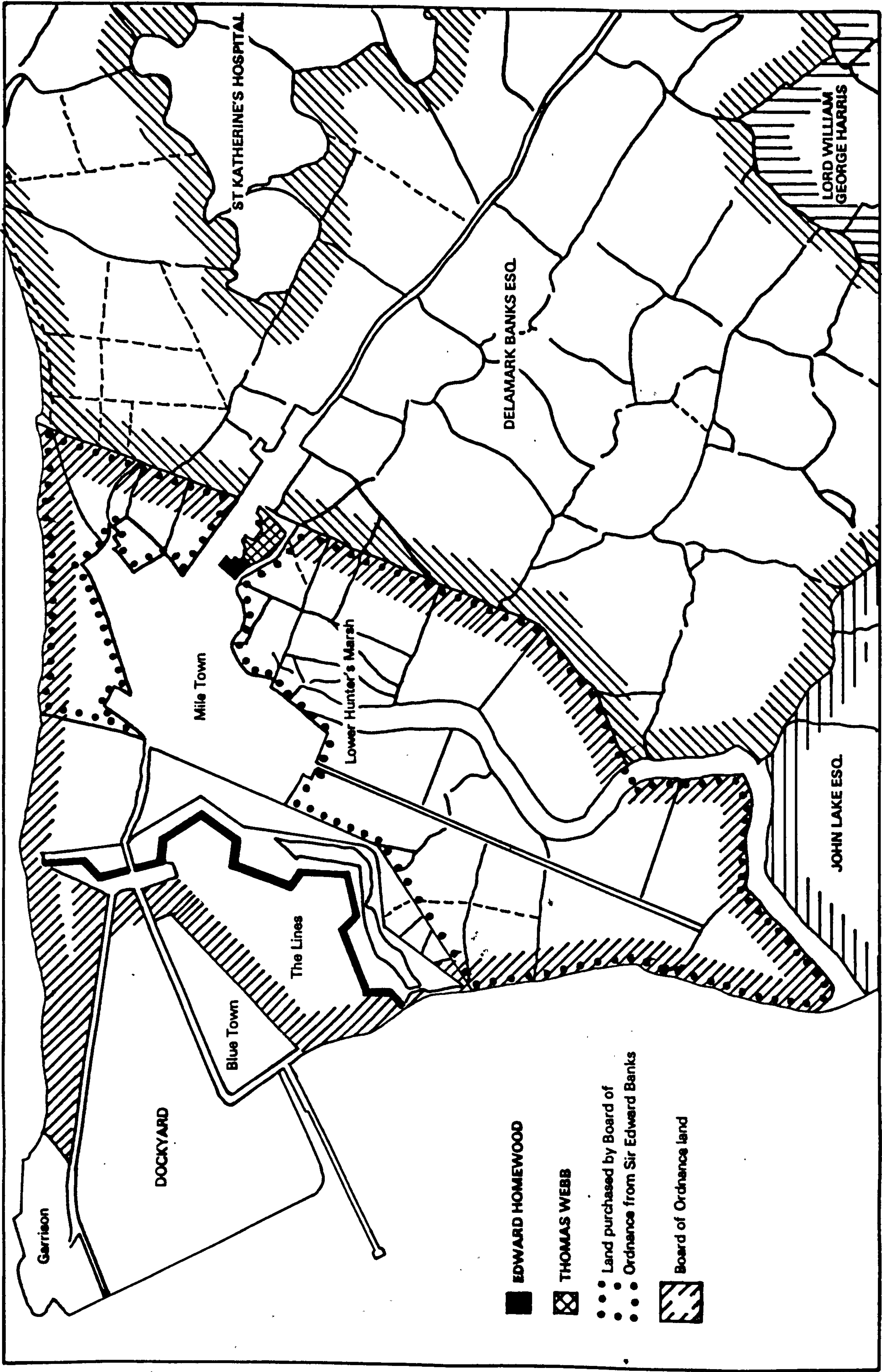
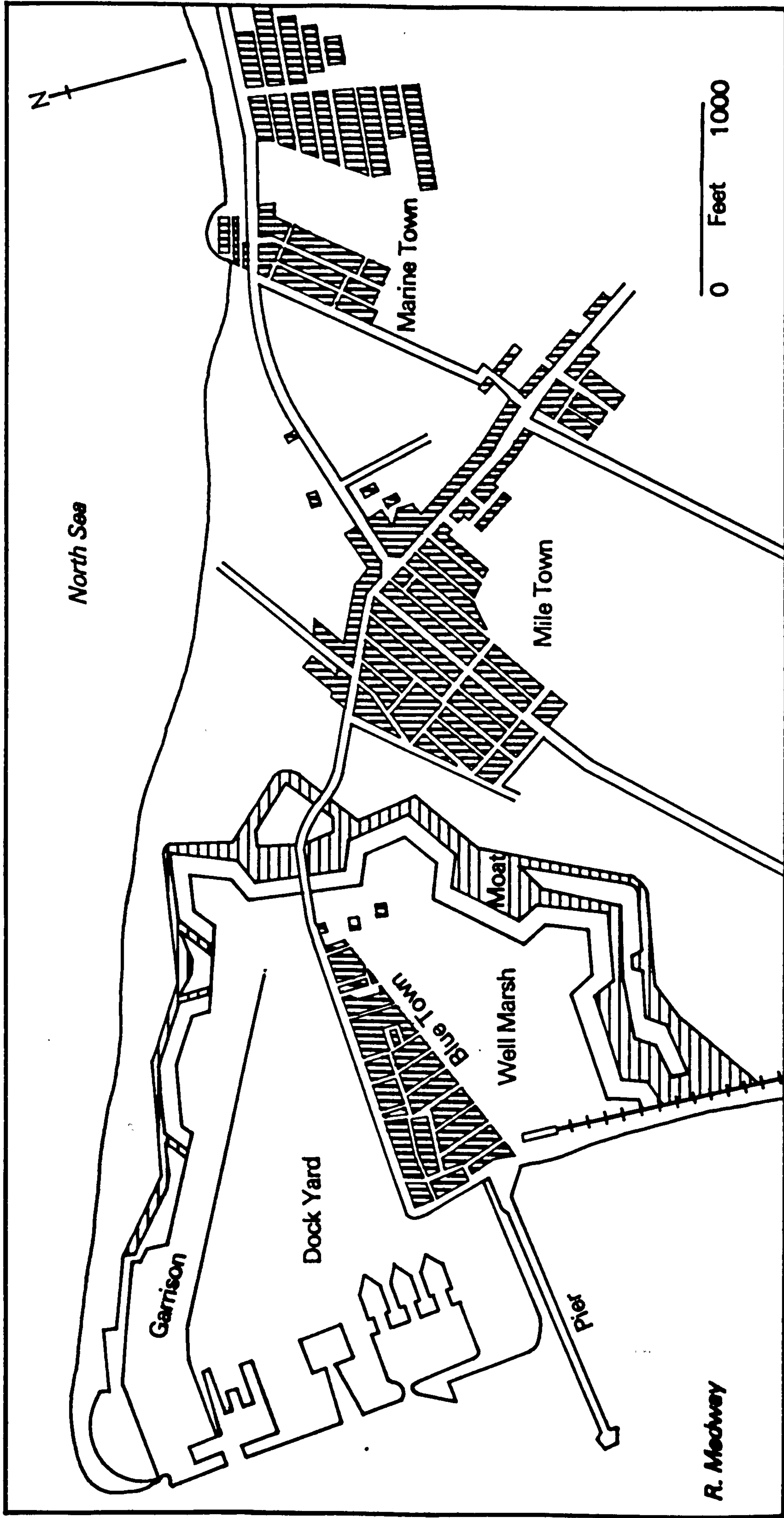


Figure 9.5 Land ownership in Sheerness 1842

source: Tithe Map 1842
PRO IL/29/17/253, IL/30/17/253



Source: 1871 OS 25" OS.

Figure 9.6 Sheerness in 1871

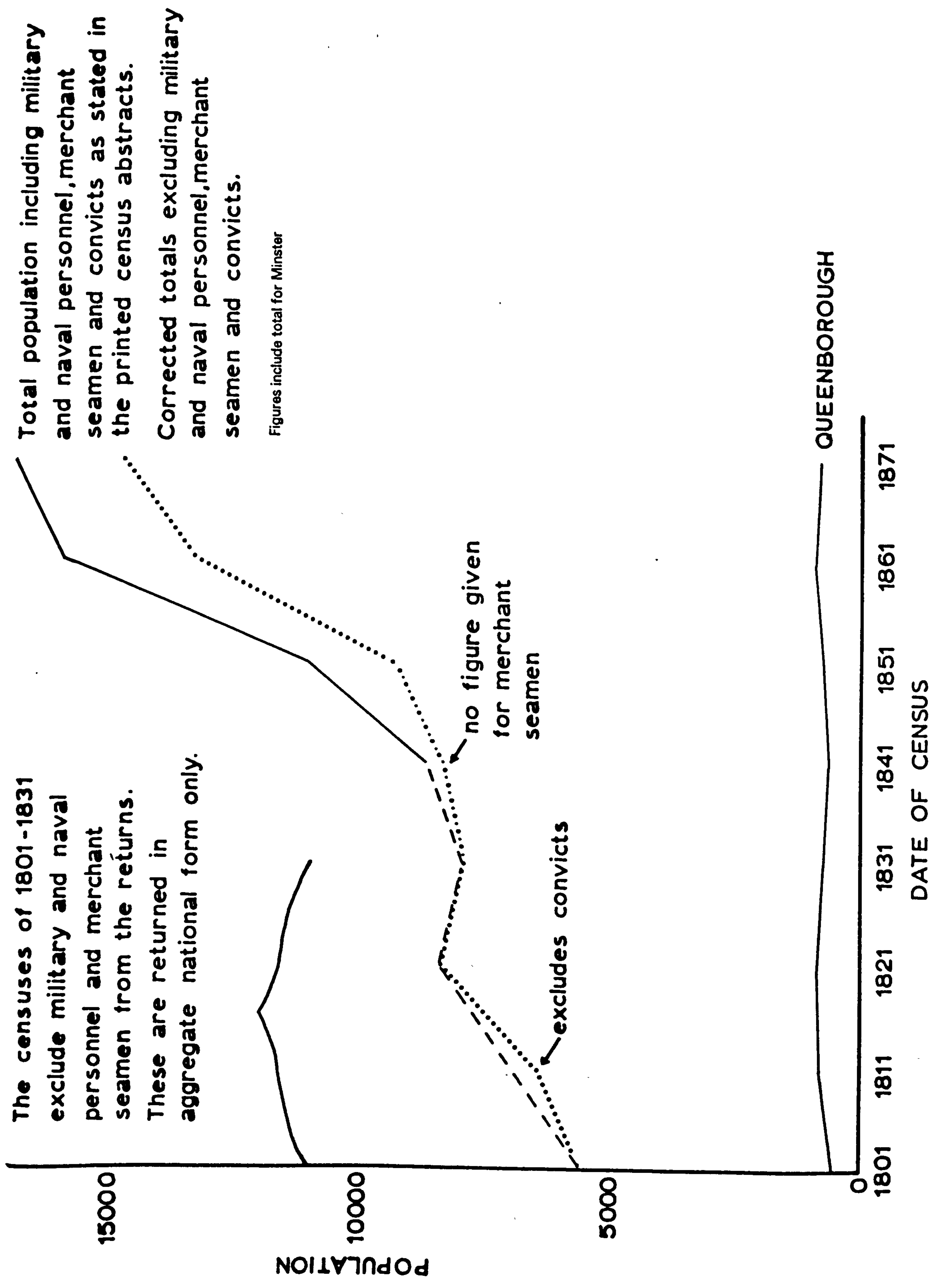


Figure 9.7 Population in Sheerness 1801 - 1871

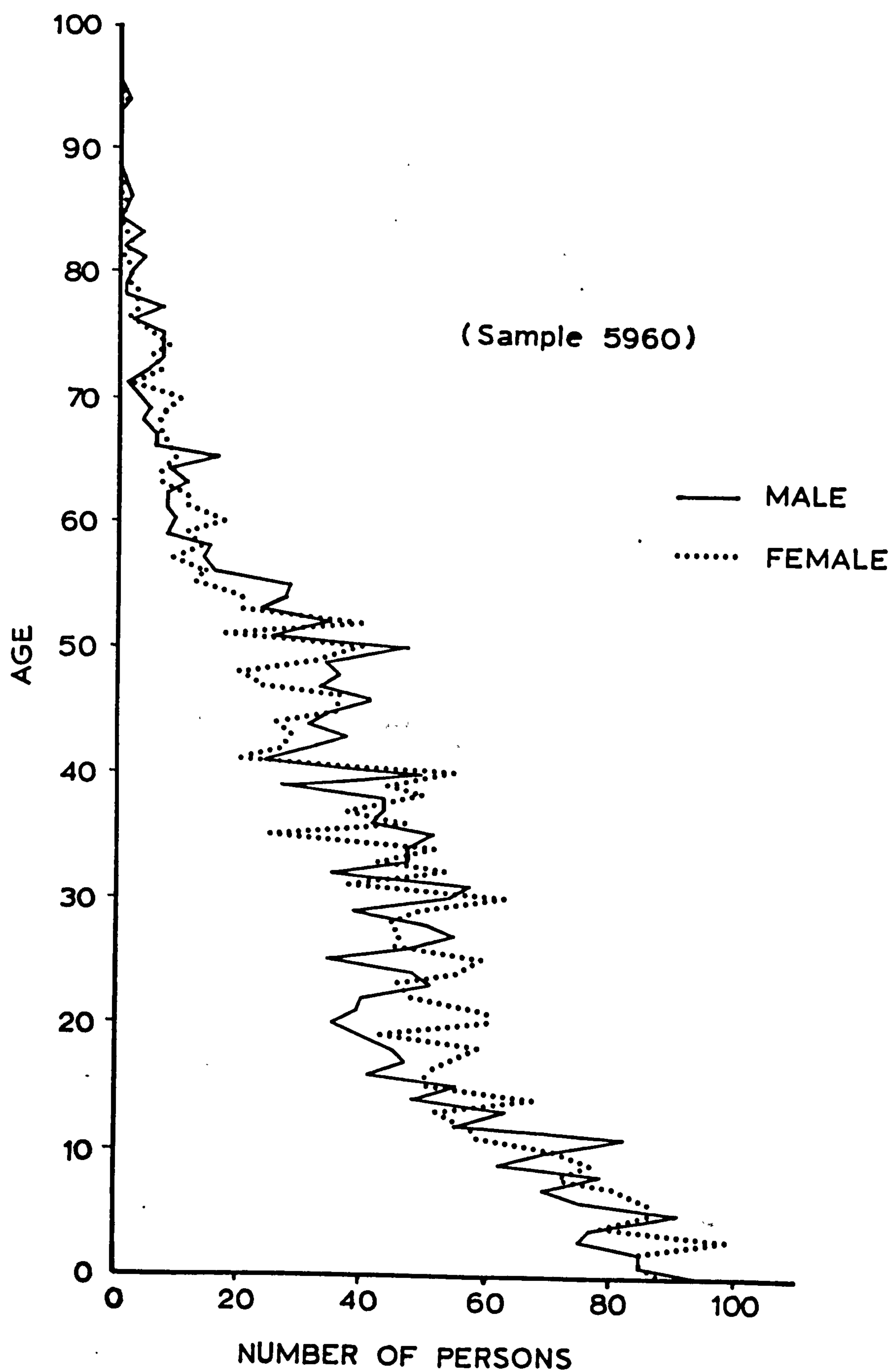


Figure 9.8 Age distribution by sex for Sheerness 1871

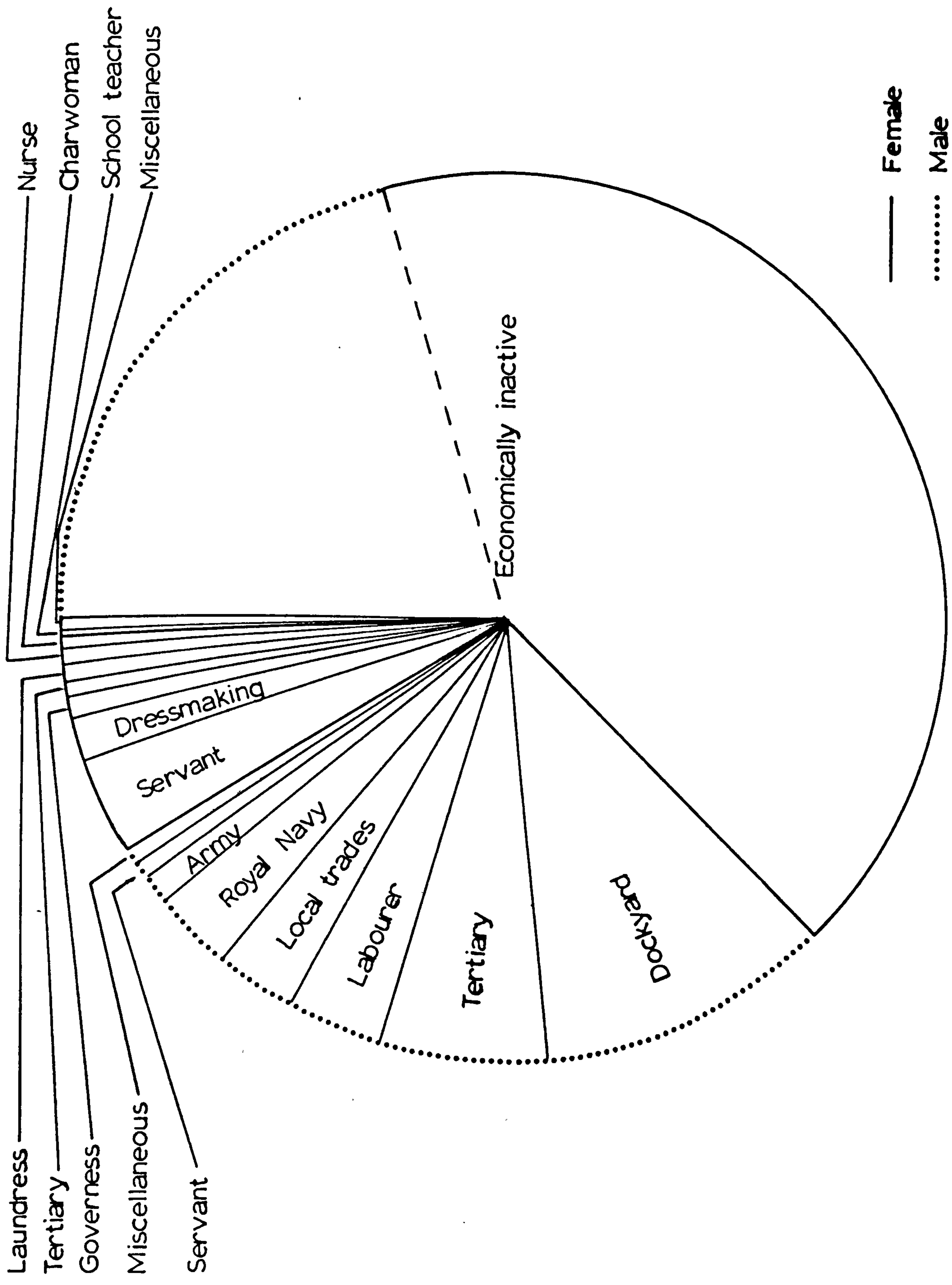


Figure 9.9 Employment structure of Sheerness, 1871

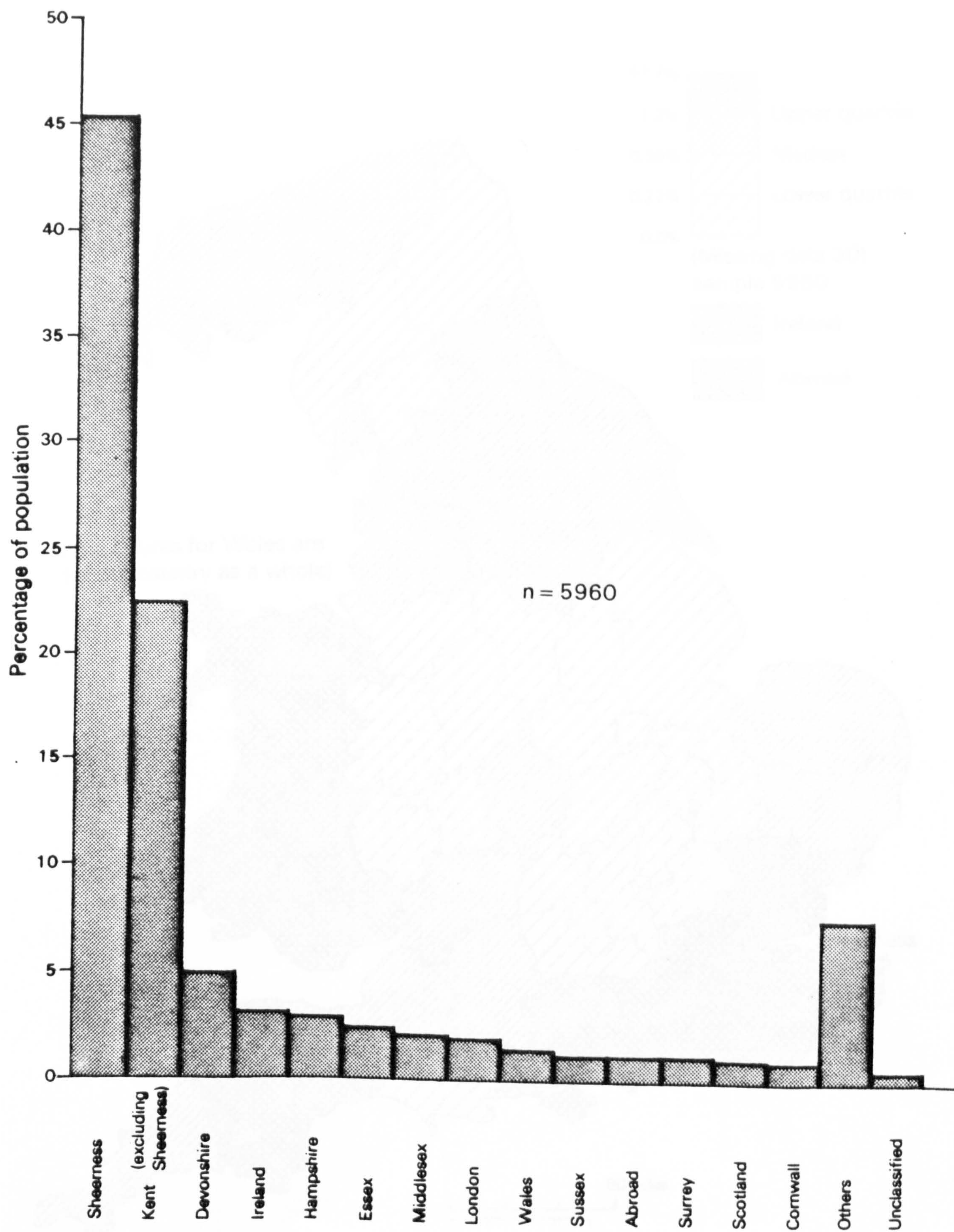


Figure 9.10 Birthplace of Sheerness residents, 1871

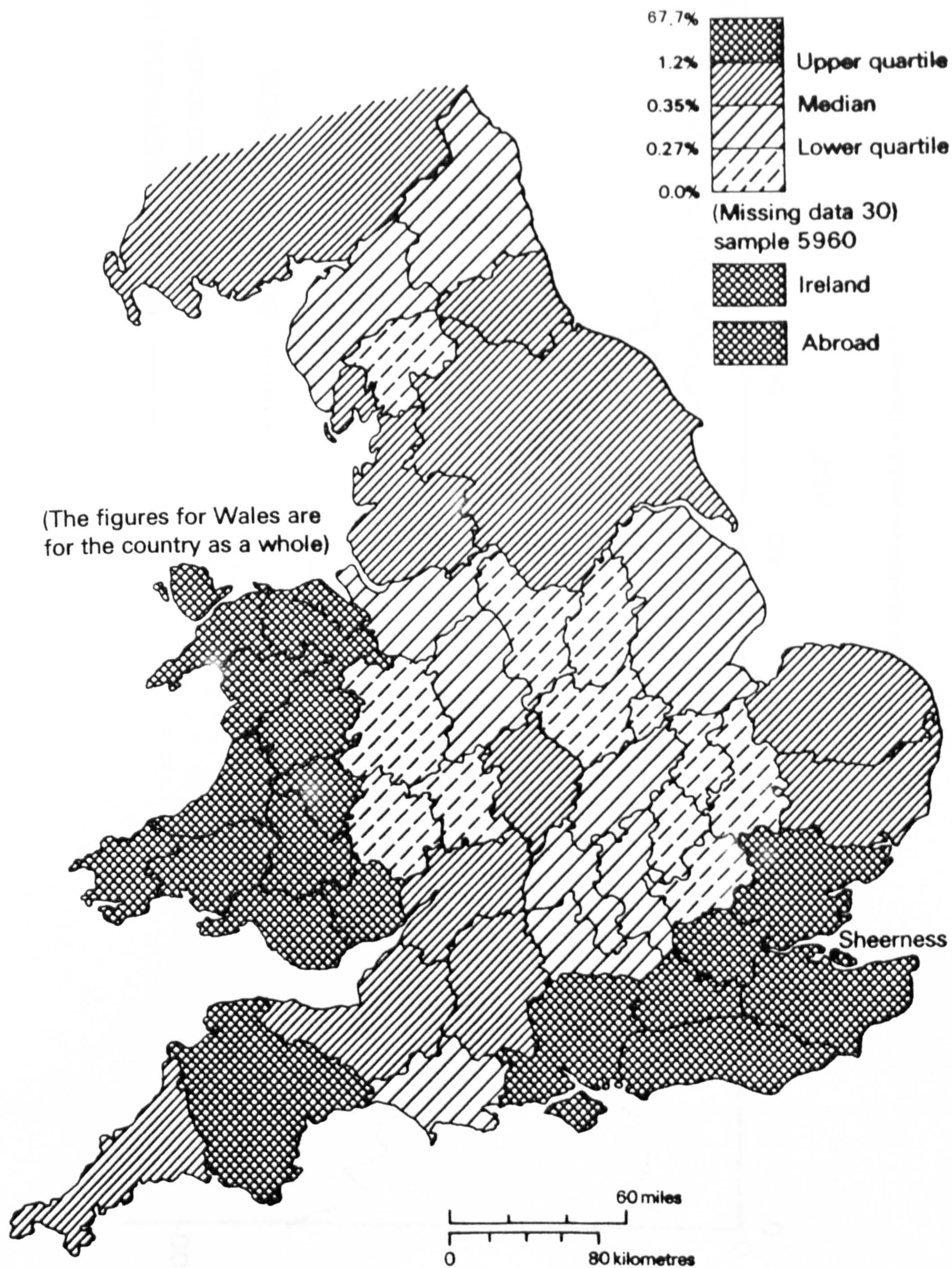


Figure 9.11 Birthfield of Sheerness residents, 1871

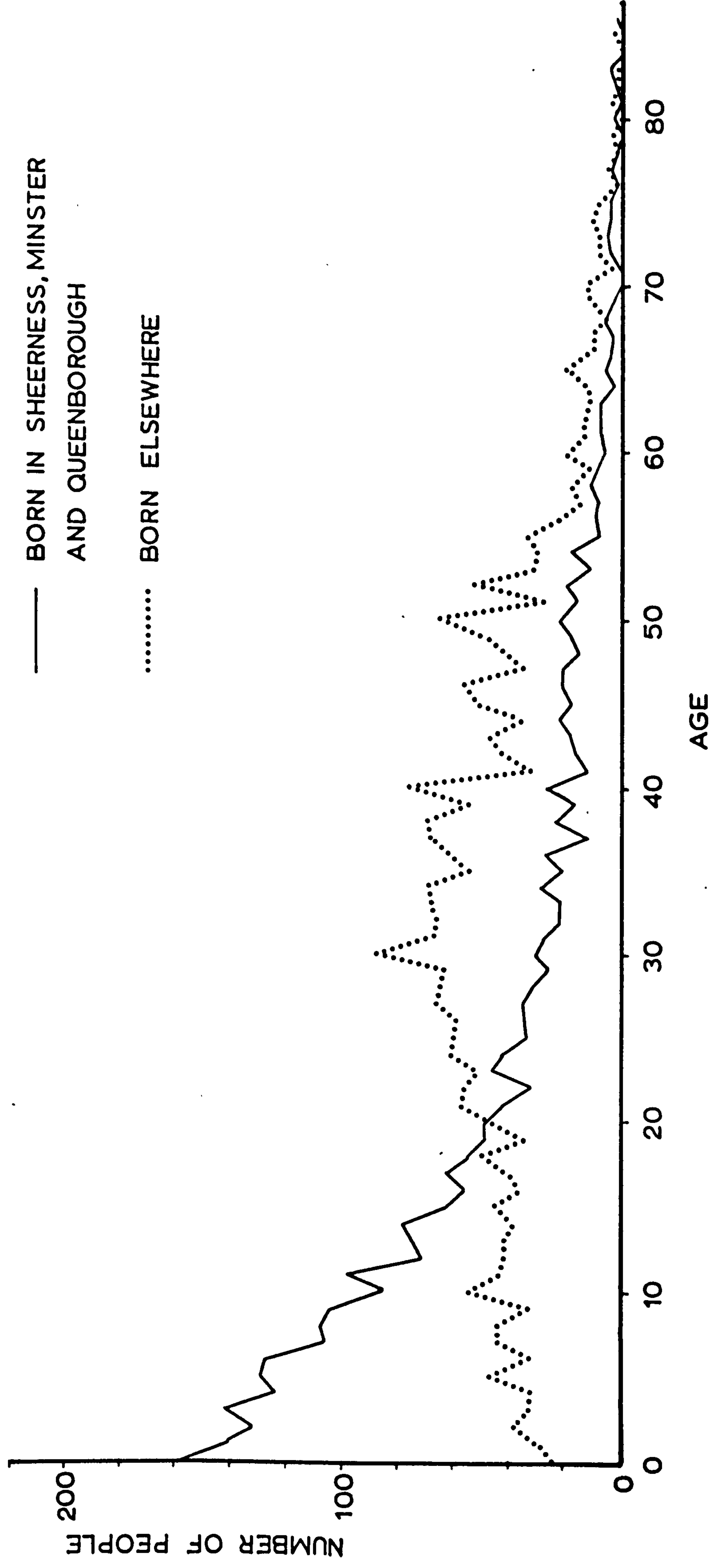


Figure 9.12 Age distribution of native born and migrants in Sheerness 1871

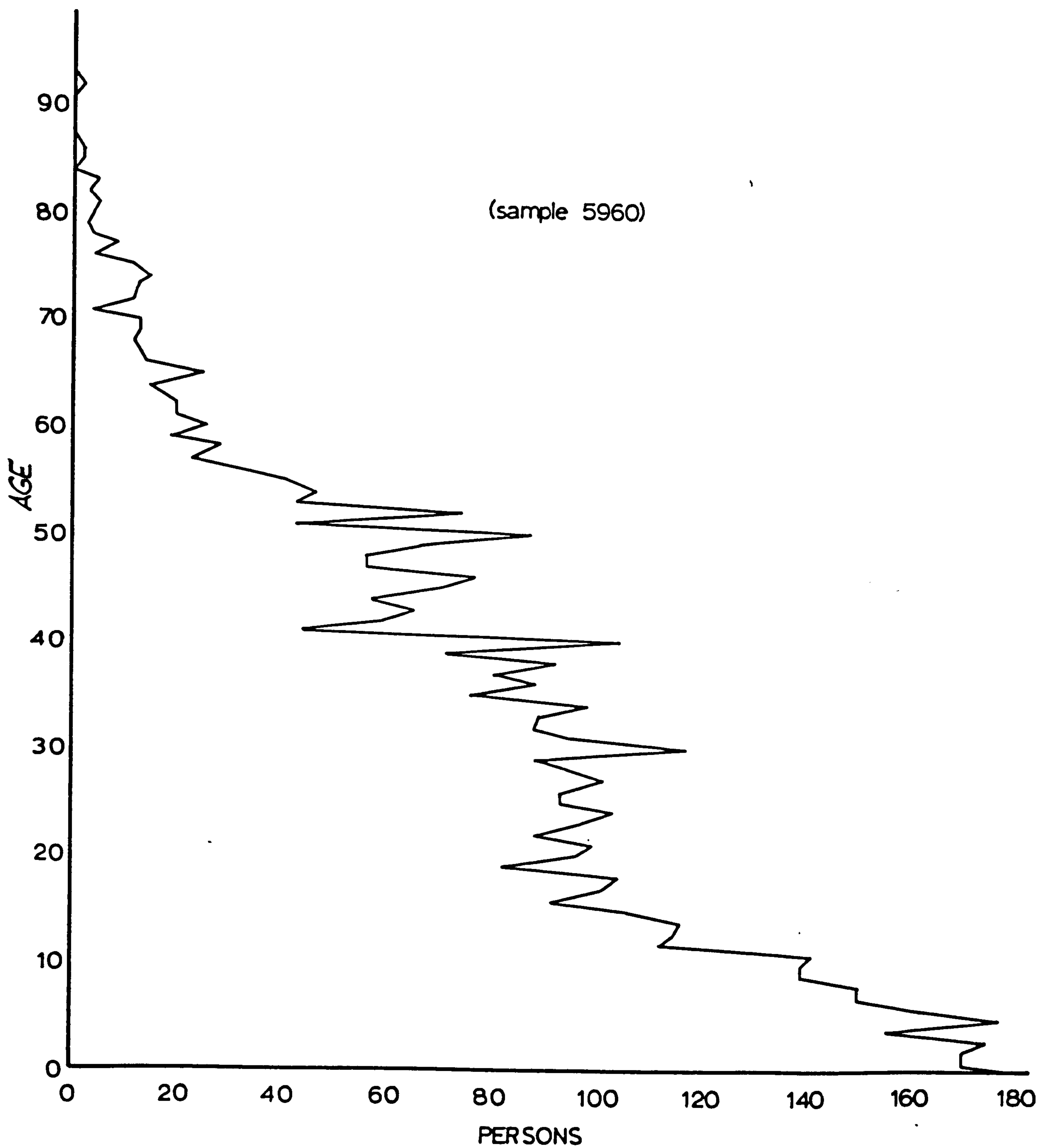


Figure 9.13 Age structure of Sheerness residents 1871

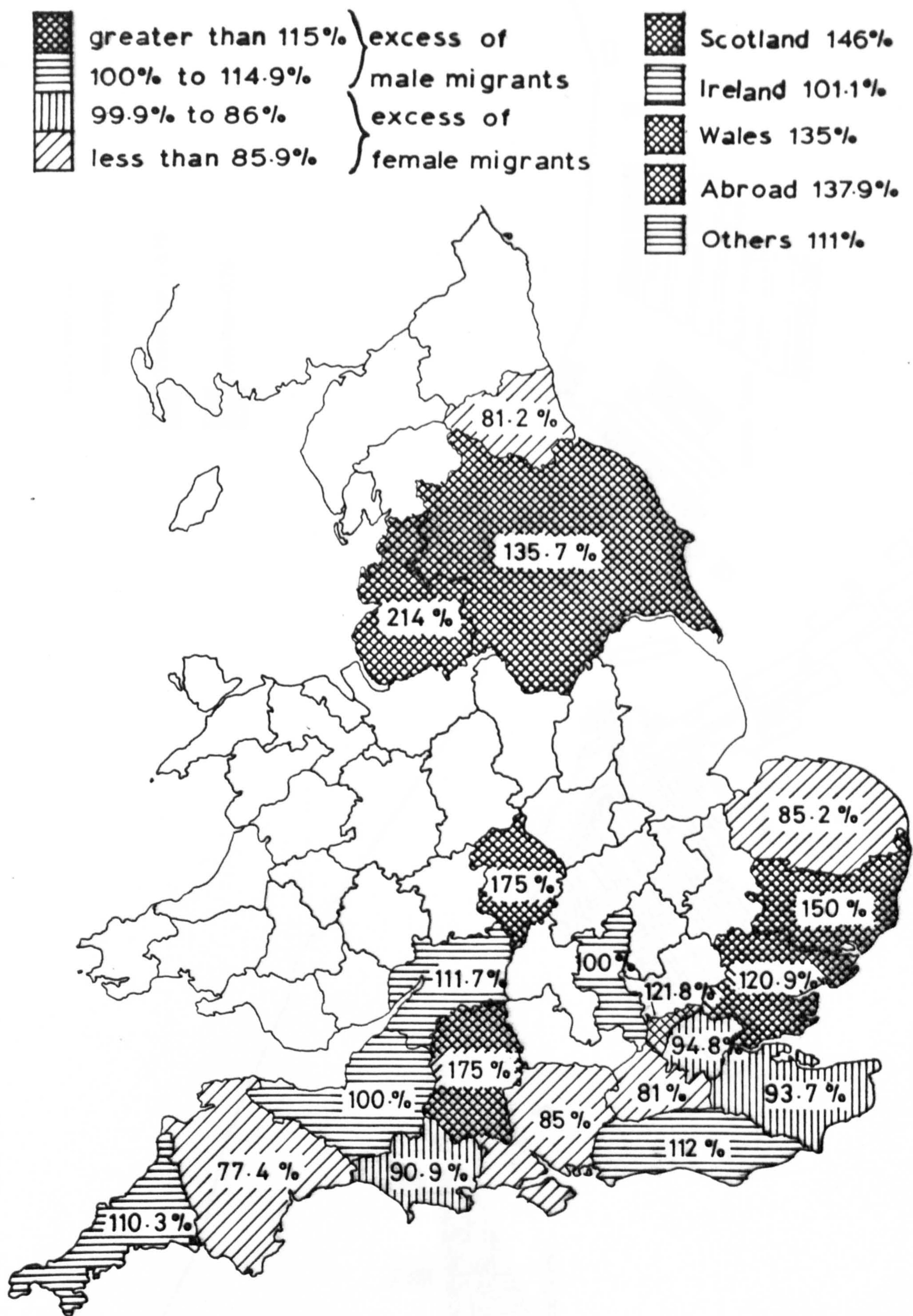


Figure 9.14 Sex ratios of migrants for selected counties contributing over one percent to the total population

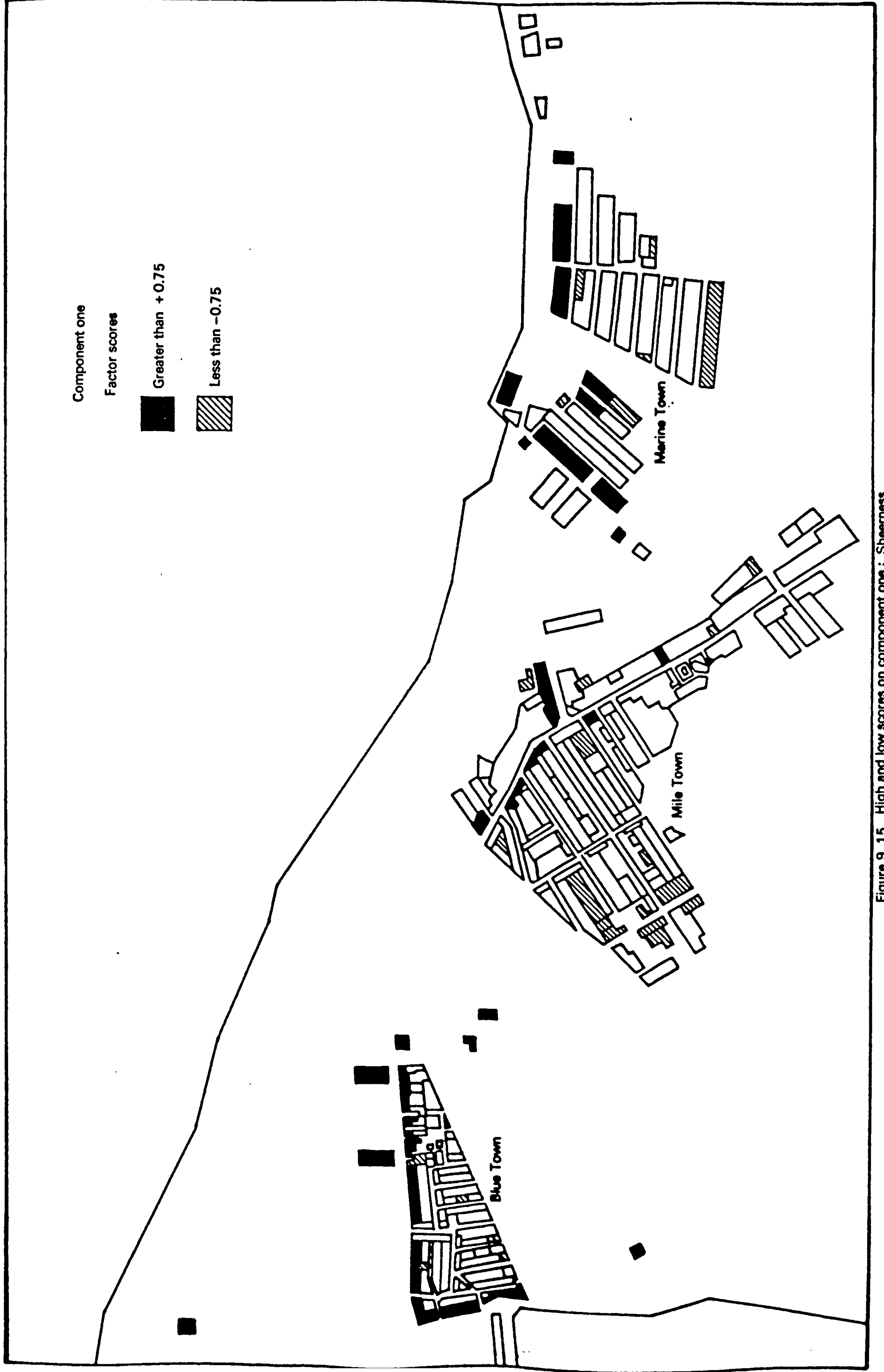


Figure 9.15 High and low scores on component one : Sheerness

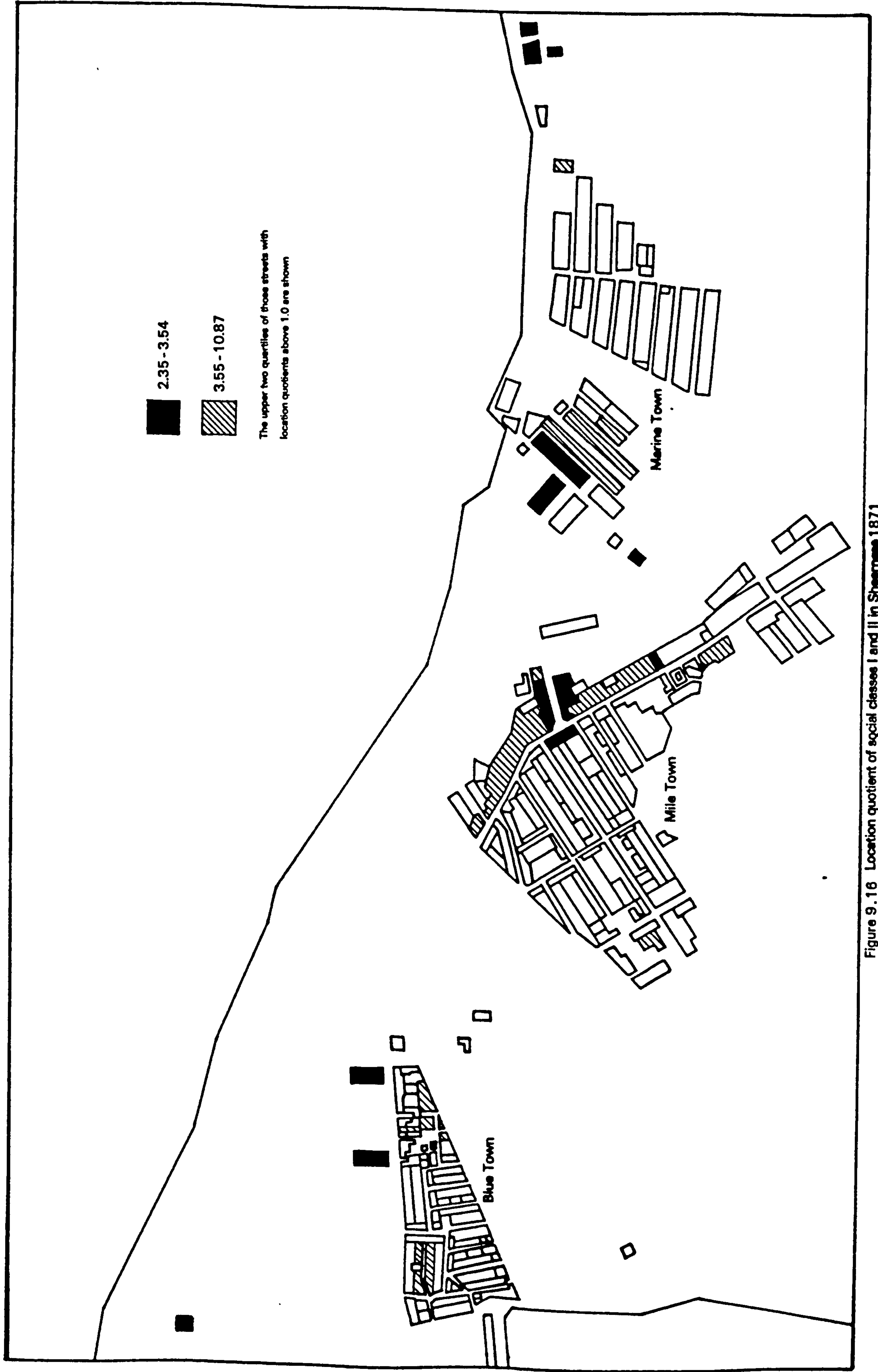


Figure 9.16 Location quotient of social classes I and II in Sheerness 1871

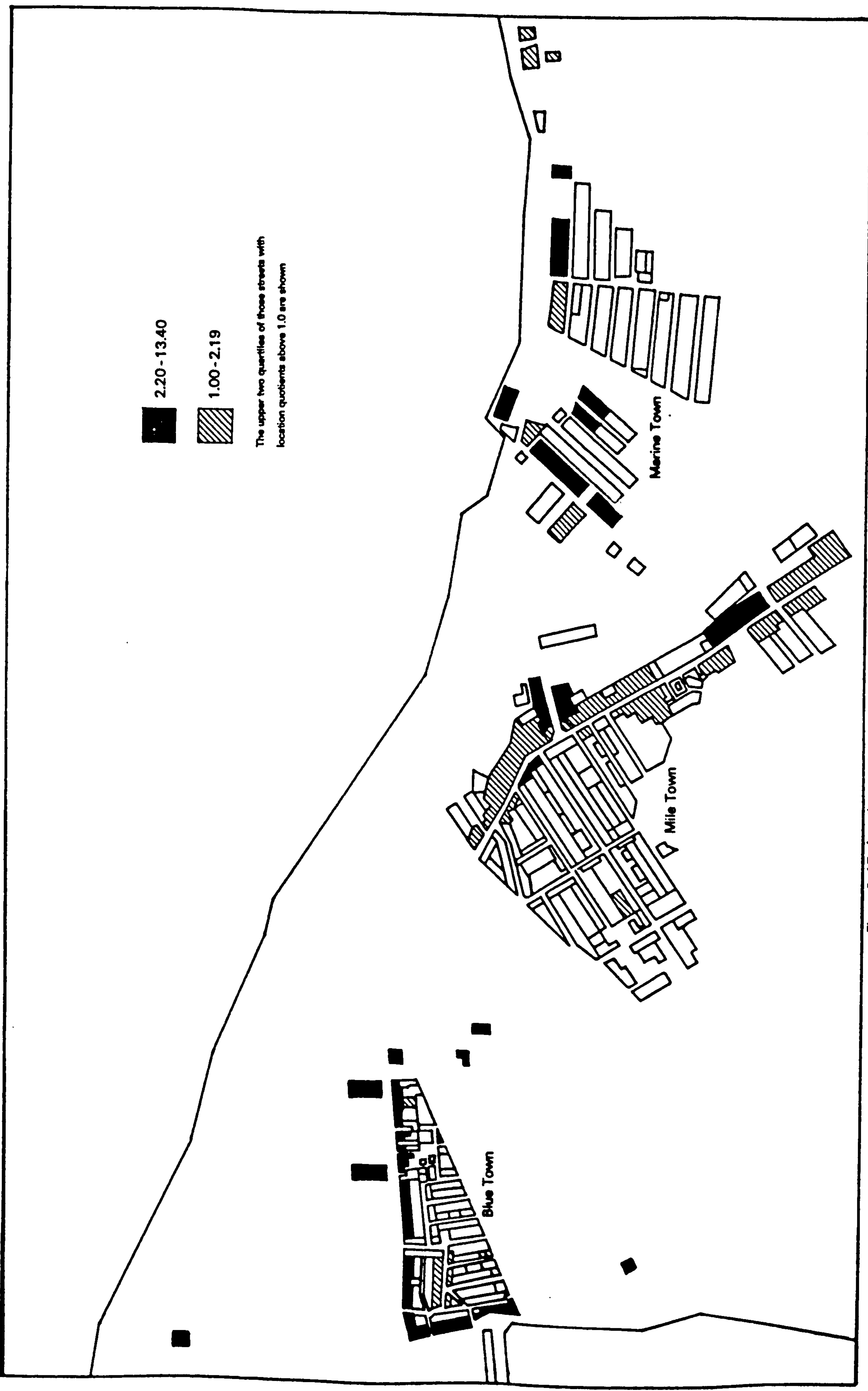


Figure 9.17 Location quotient of servants in Sheerness, 1871

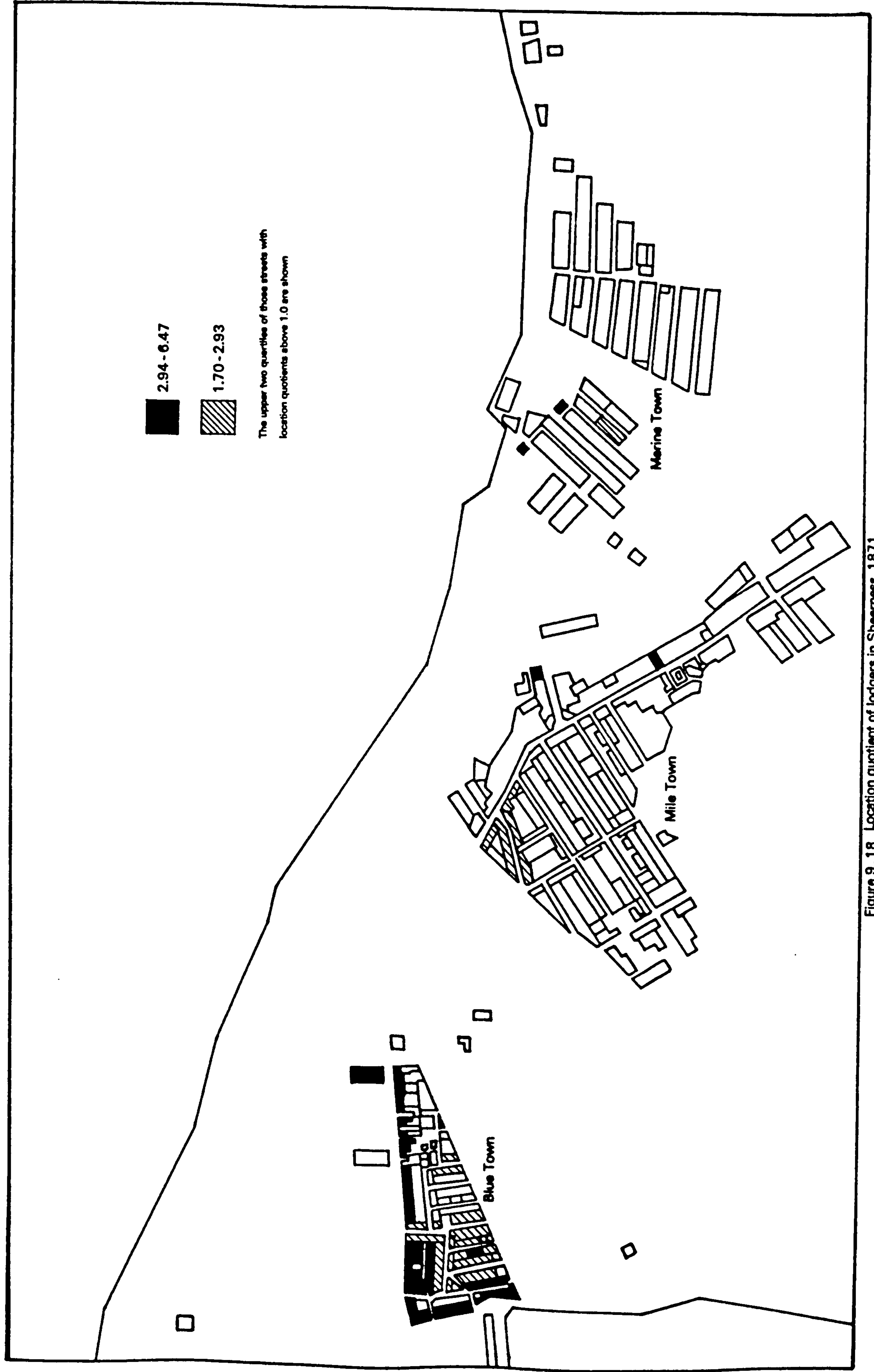


Figure 9.18 Location quotient of lodgers in Sheerness, 1871

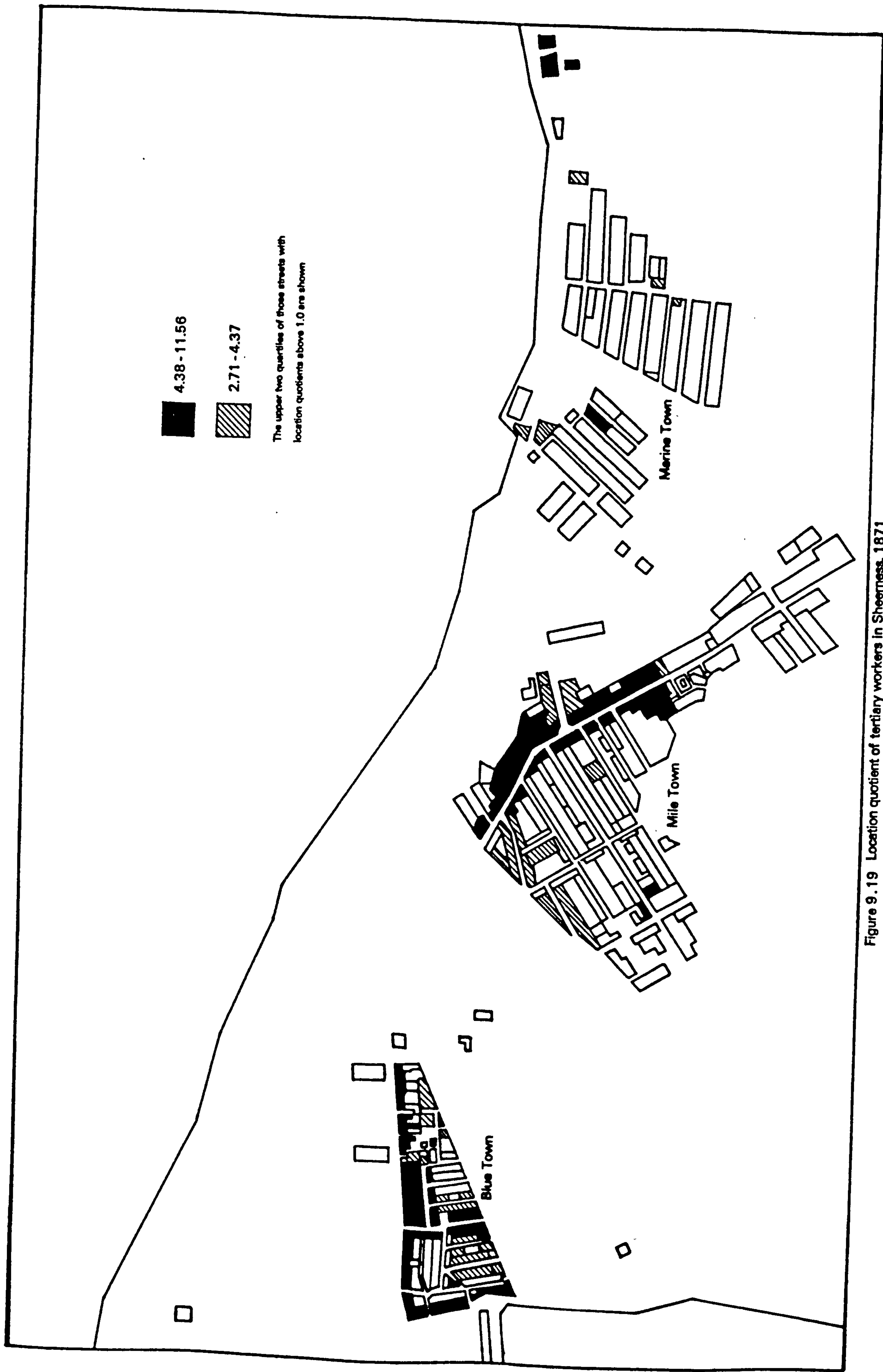


Figure 9.19 Location quotient of tertiary workers in Sheerness, 1871

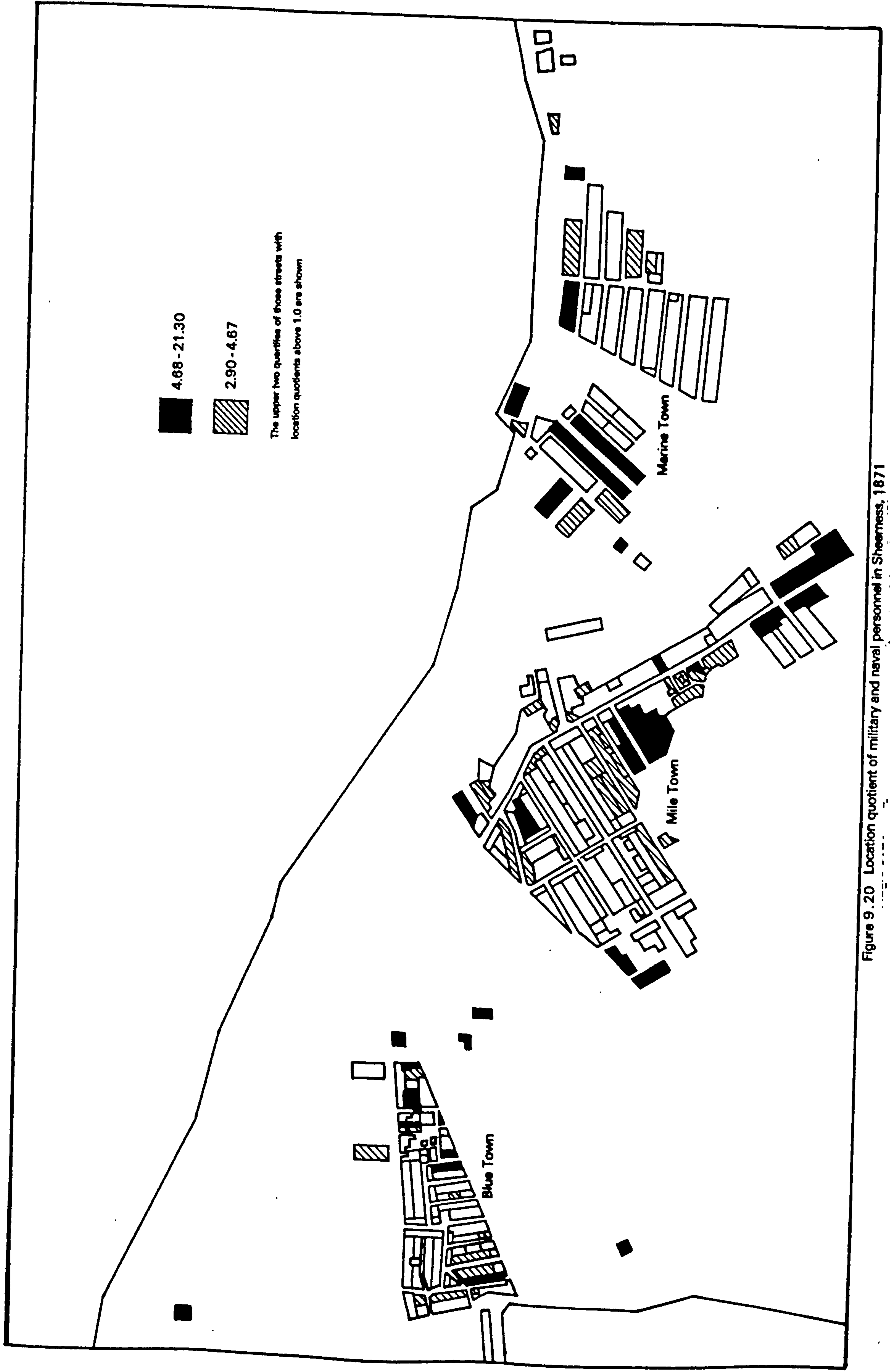


Figure 9.20 Location quotient of military and naval personnel in Sheerness, 1871

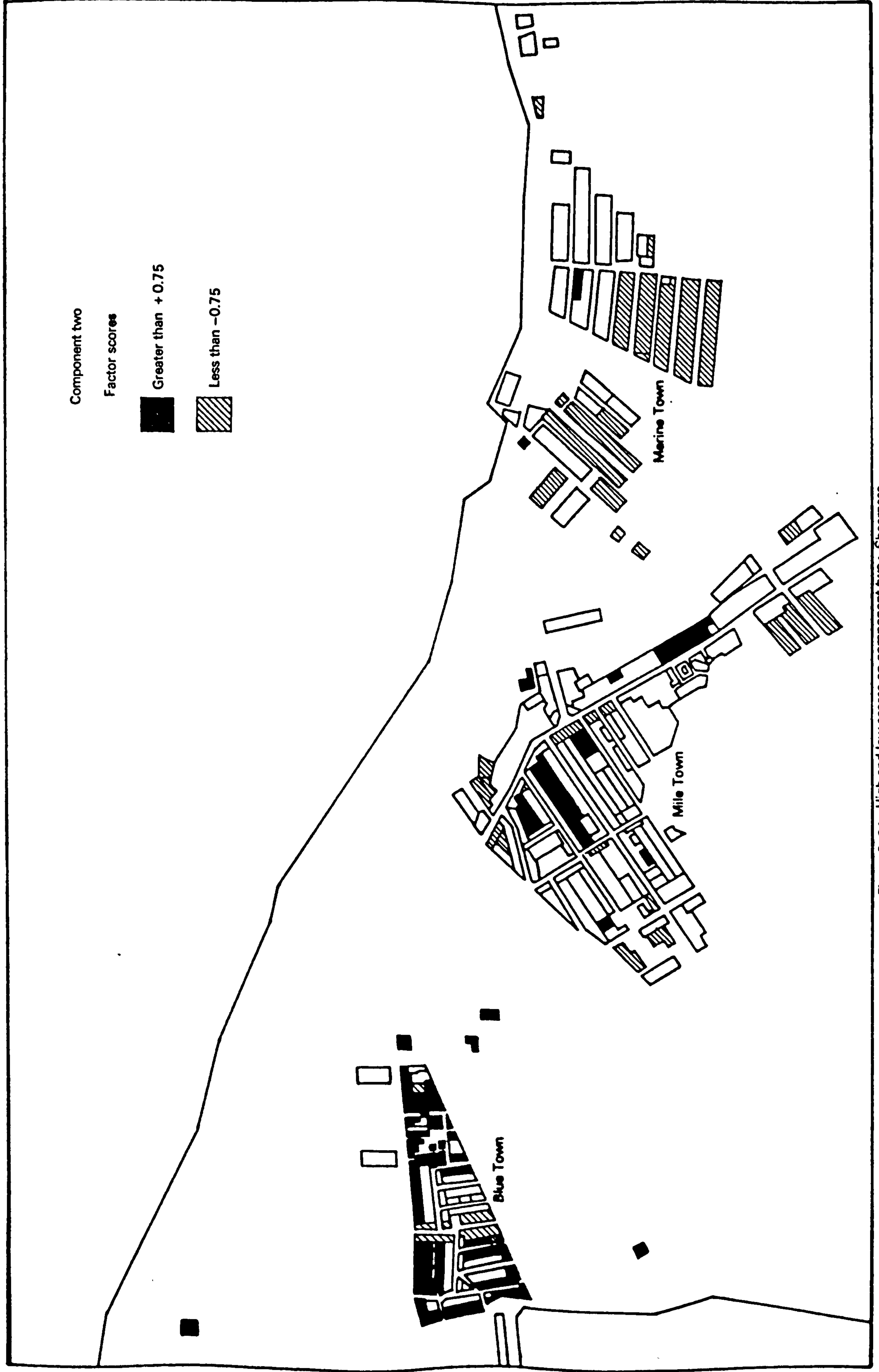


Figure 9.21 High and low scores on component two : Sheerness

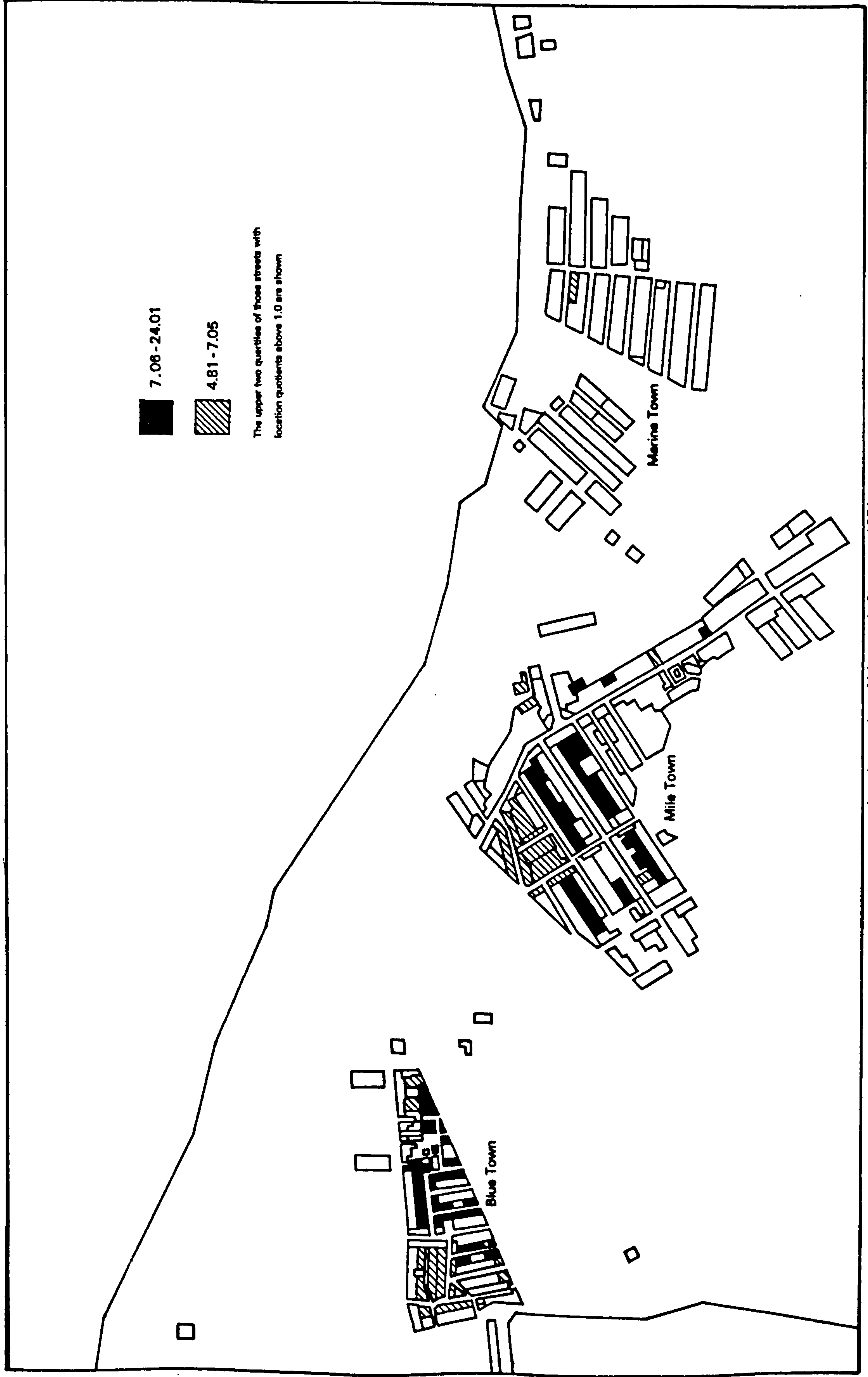


Figure 9.22 Location quotient of labourers in Sheerness, 1871

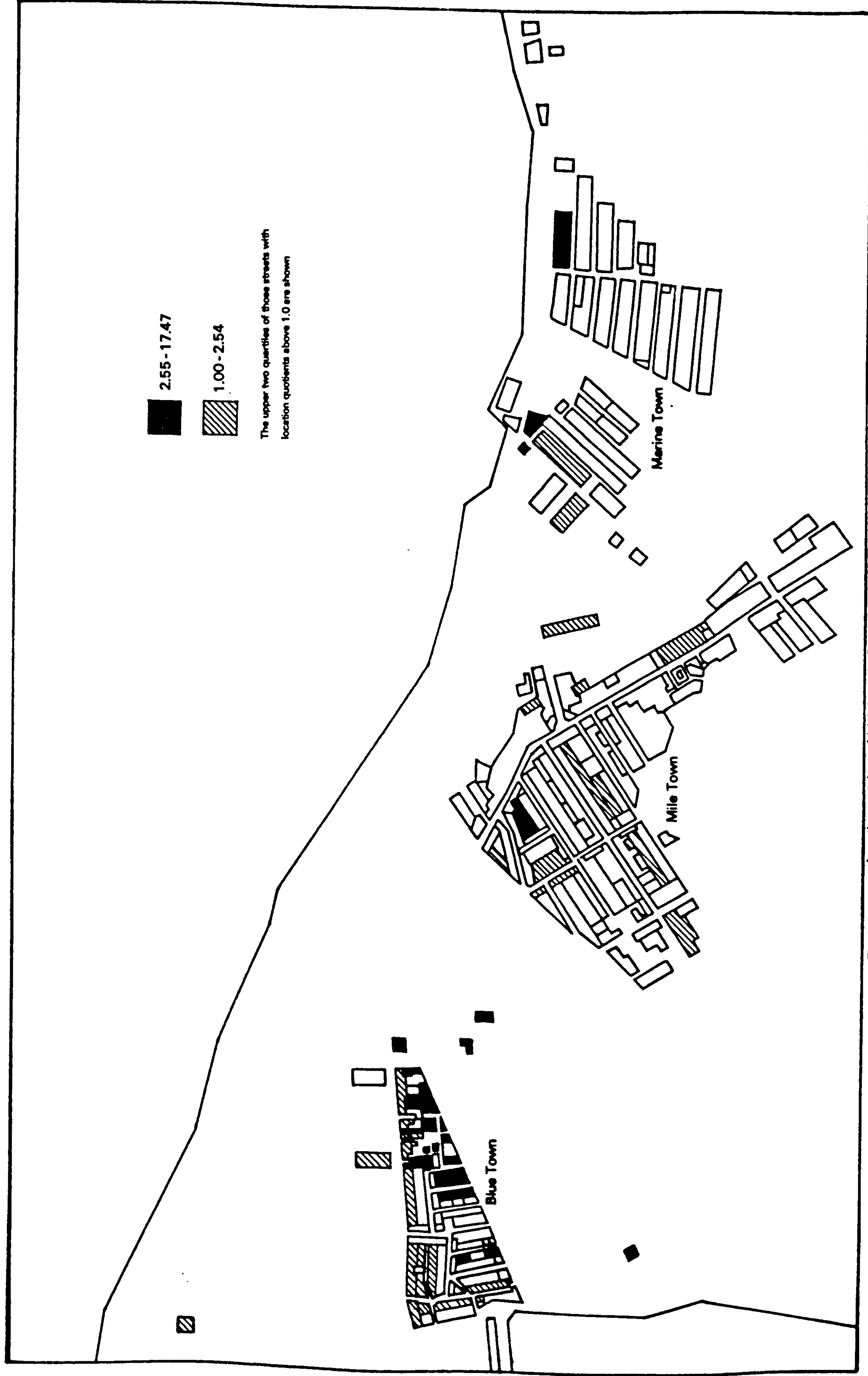


Figure 9.23 Location quotient of Irish born in Sheerness, 1871

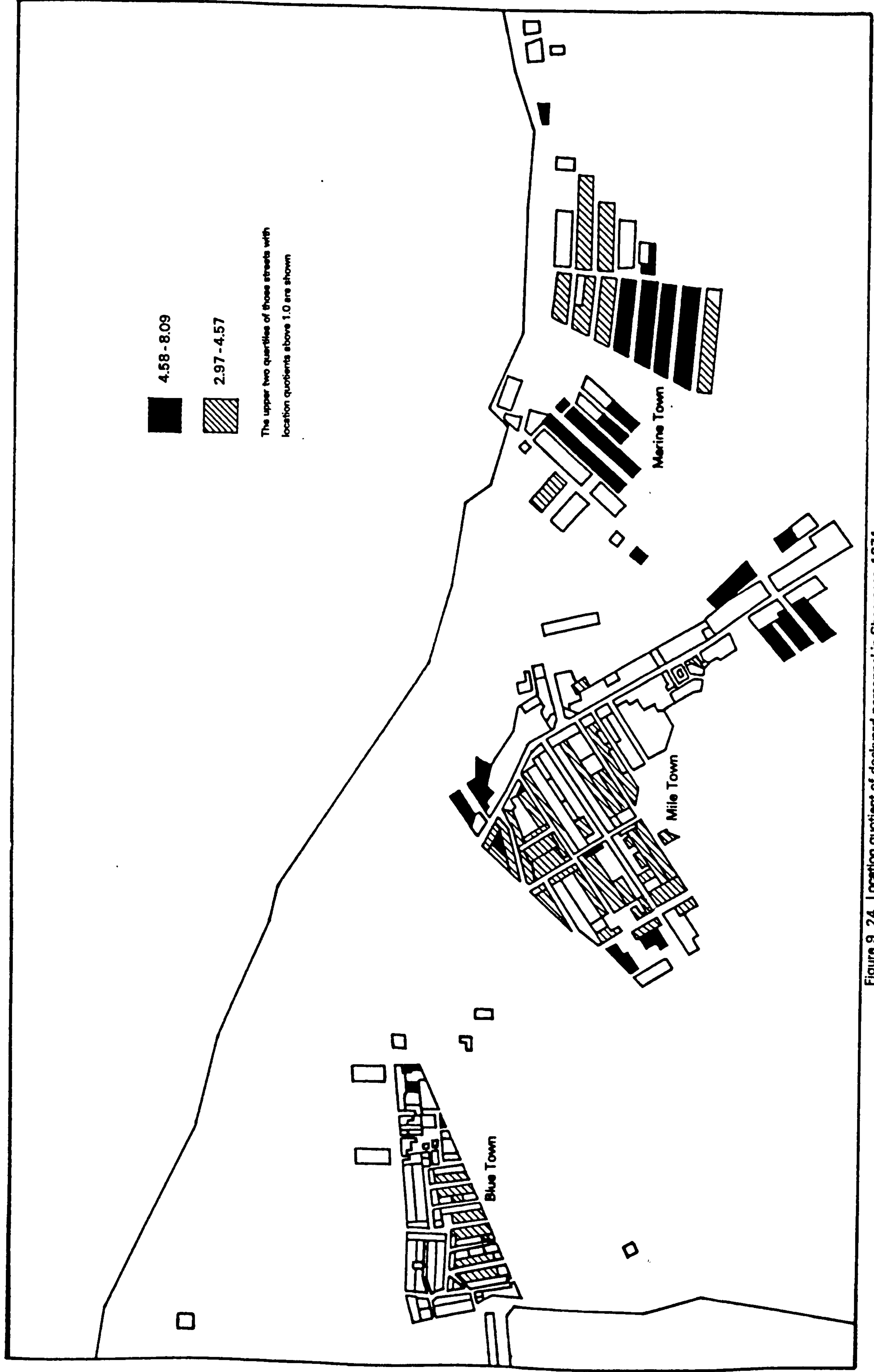


Figure 9.24 Location quotient of dockyard personnel in Sheerness, 1871

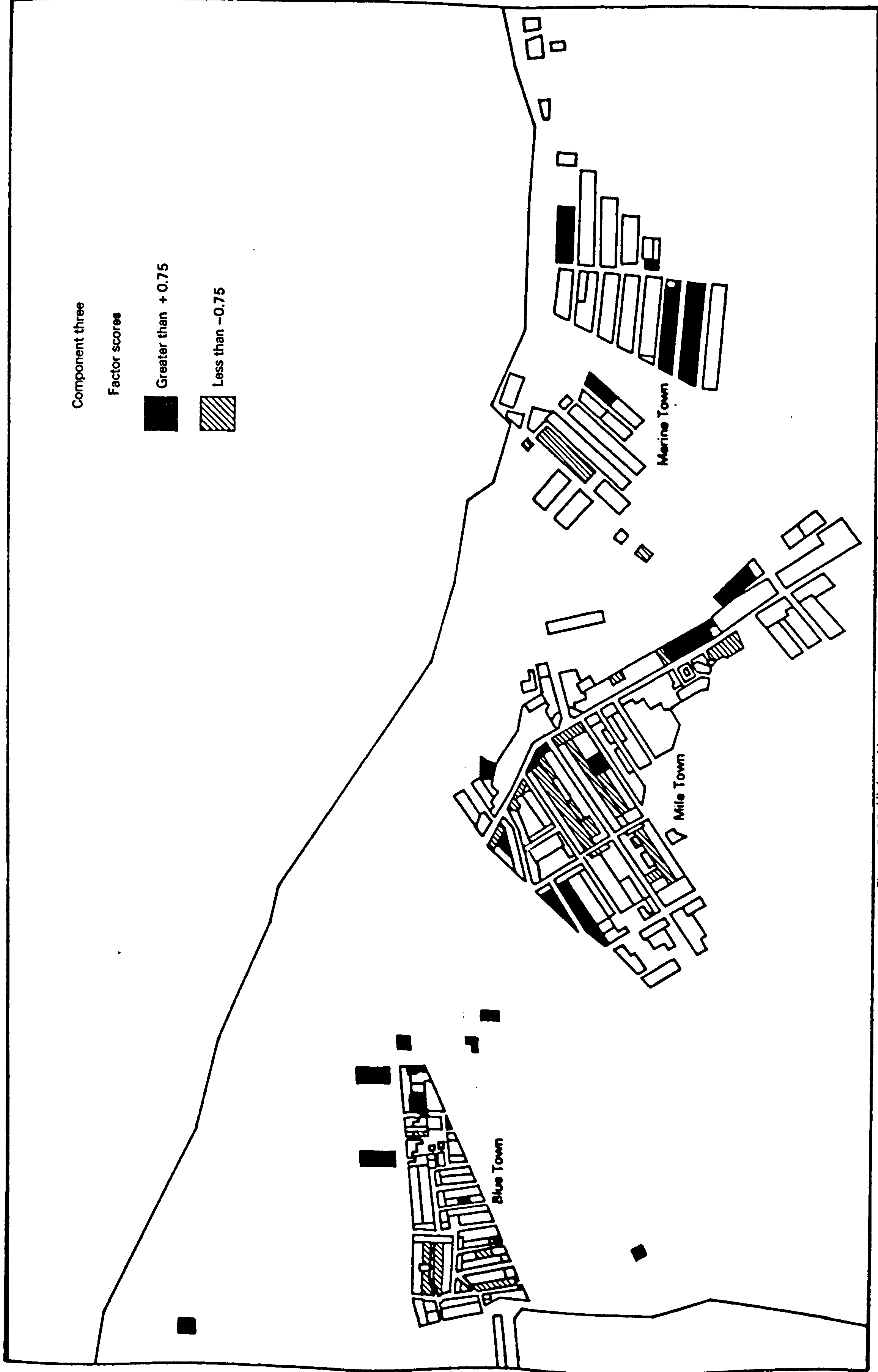


Figure 9.25 High and low scores on component three : Sheerness

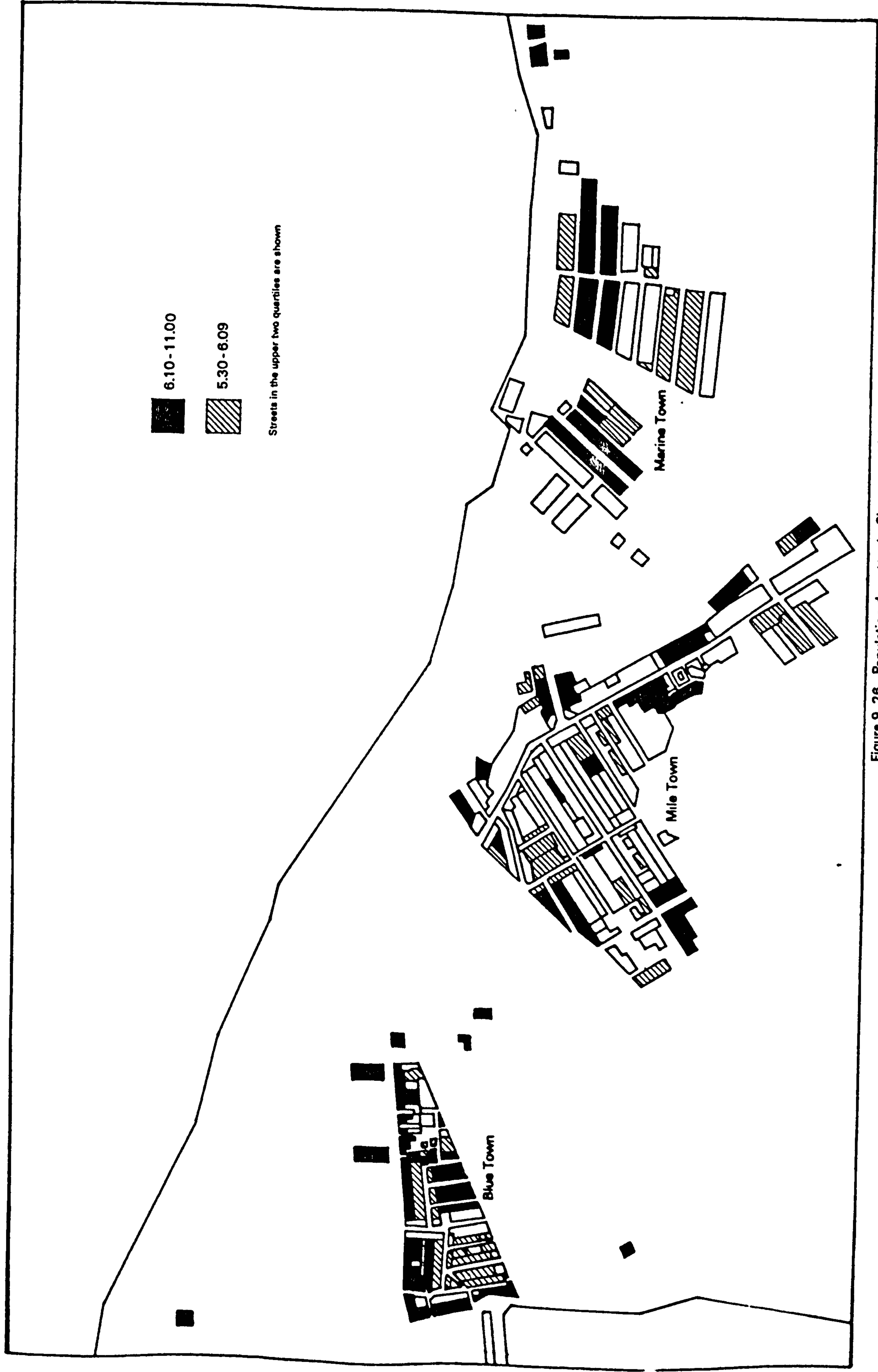


Figure 9.26 Population density in Sheerness, 1871

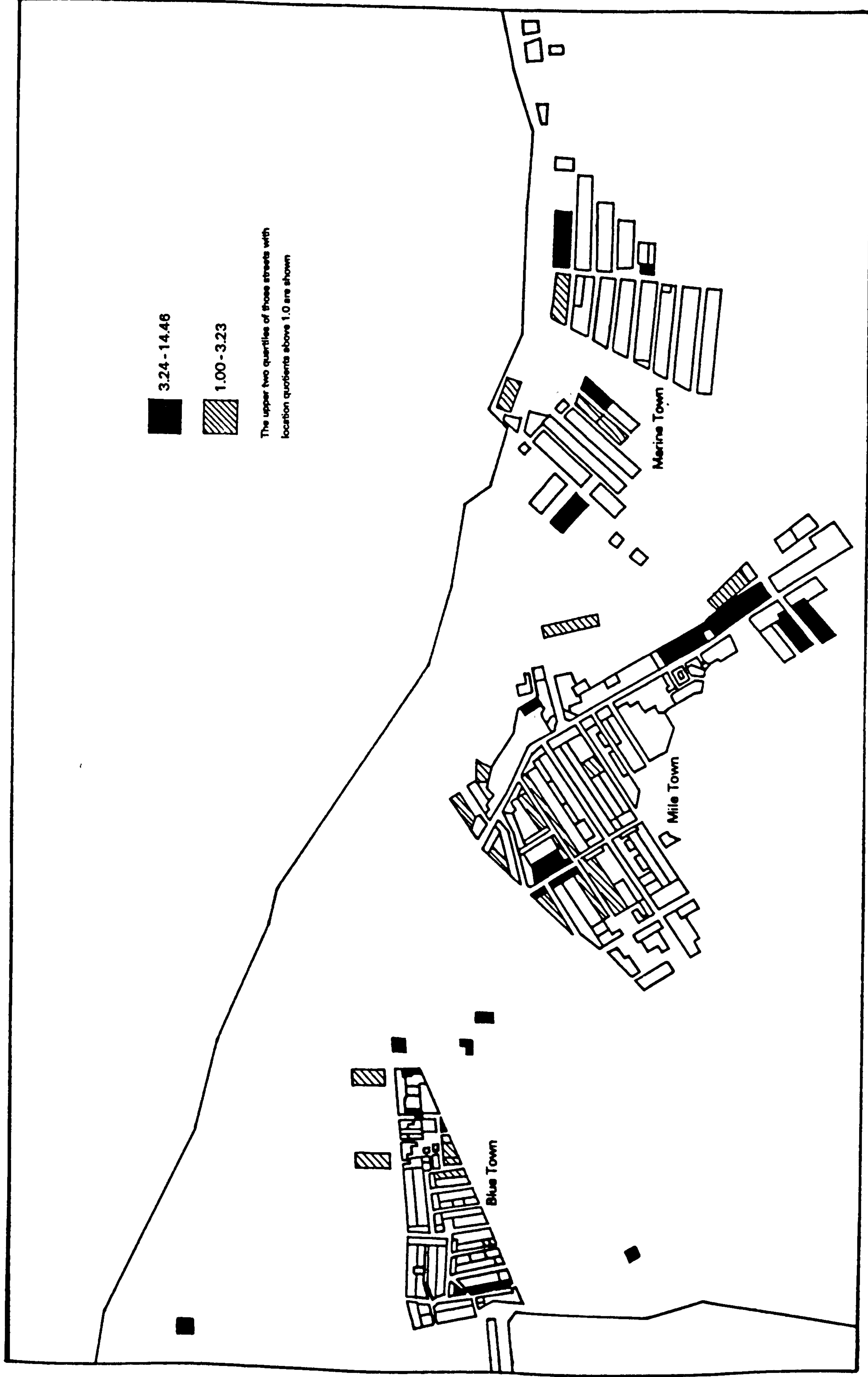


Figure 9.27 Location quotient of Scottish born in Sheerness, 1871

Component four

Factor scores

Greater than +0.75

Less than -0.75

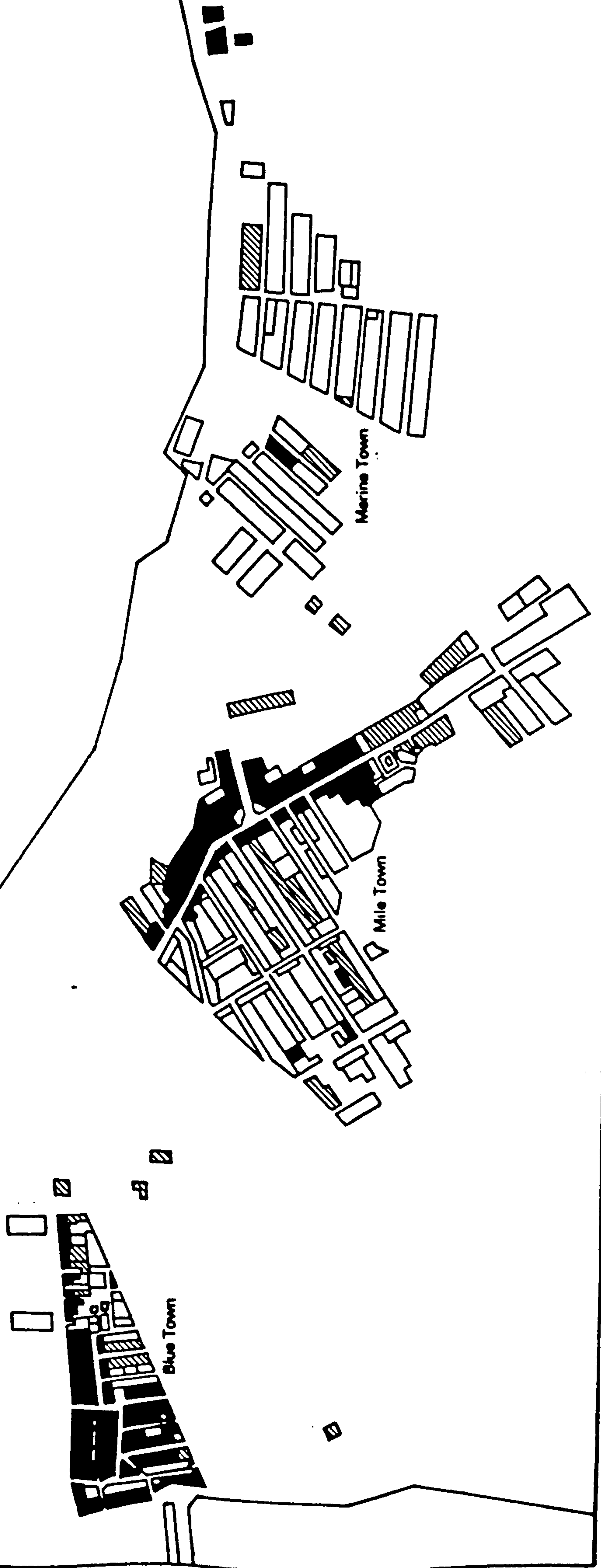


Figure 9.28 High and low scores on component four : Sheerness

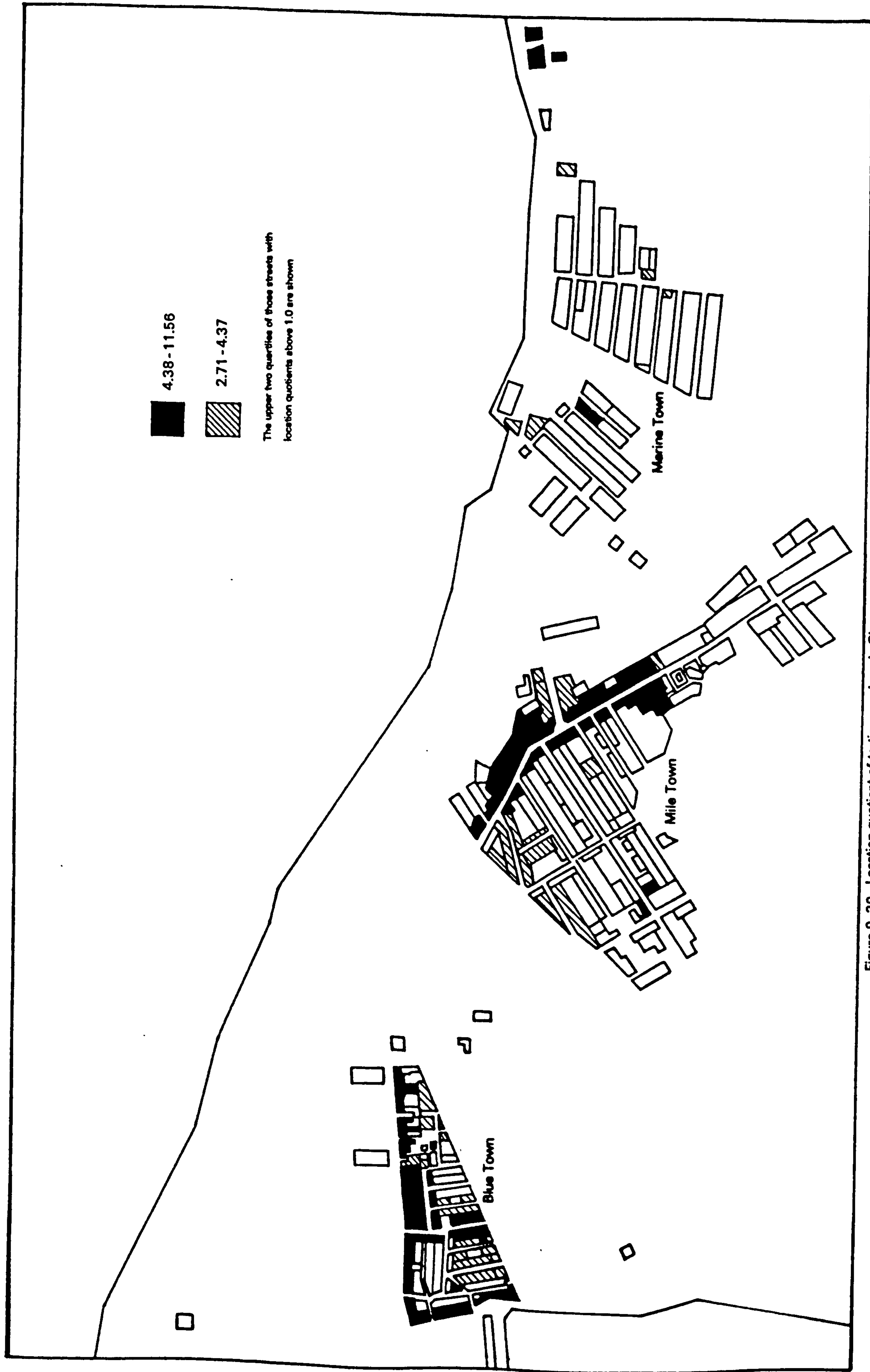


Figure 9.29 Location quotient of tertiary workers in Sheerness, 1871

Component five
Factor scores

Greater than +0.75

Less than -0.75

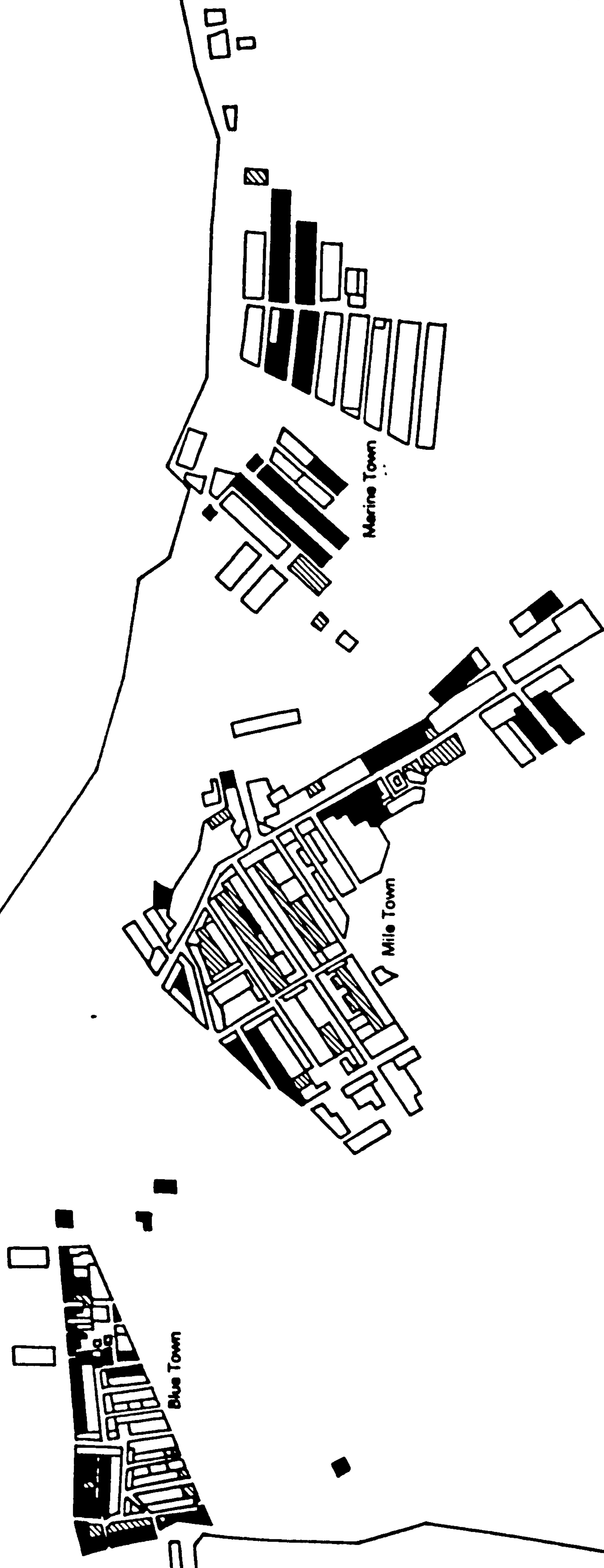


Figure 9.30 High and low scores on component five: Sheariness

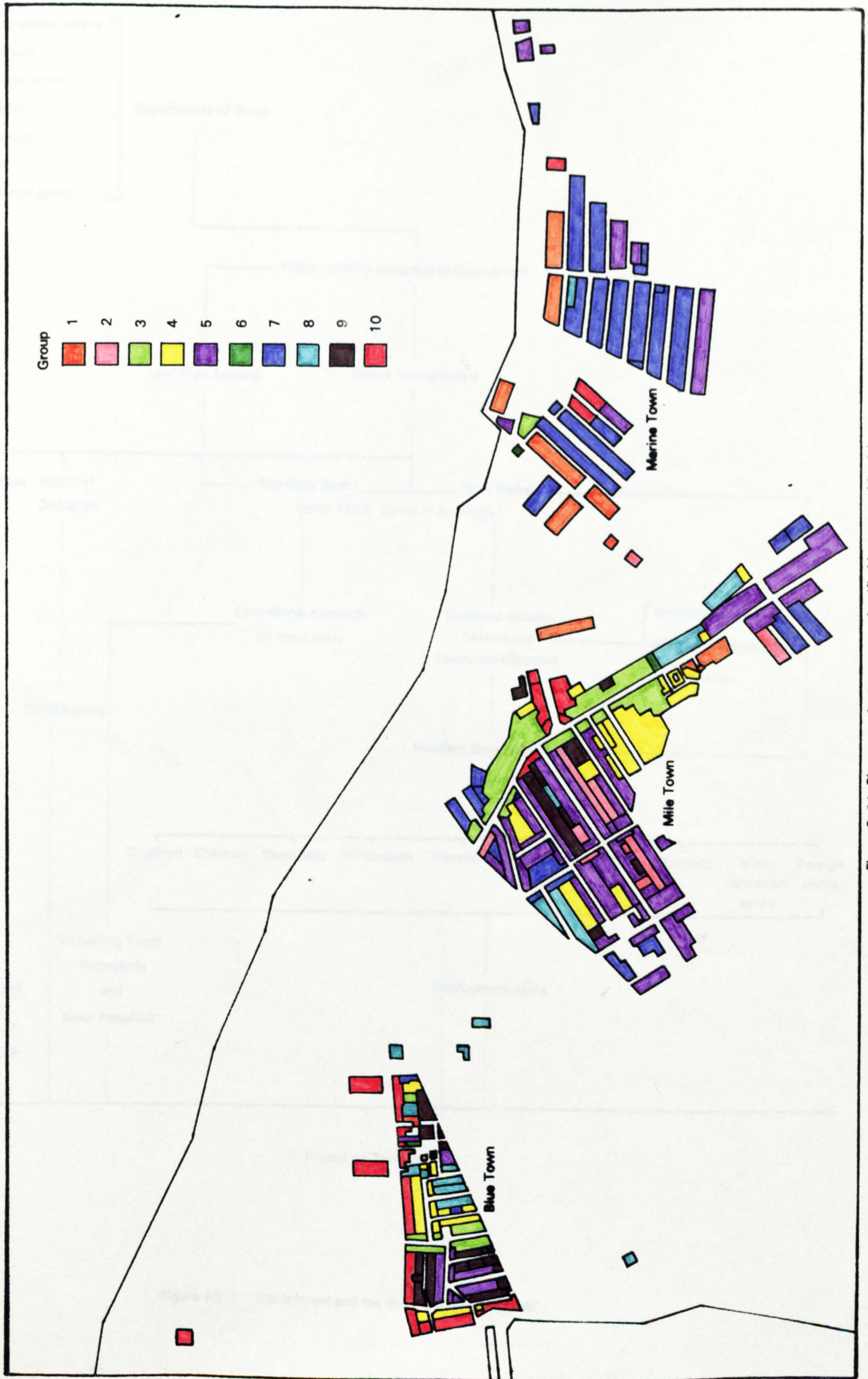


Figure 9.31 Sheerness factor scores classified into ten residential groups

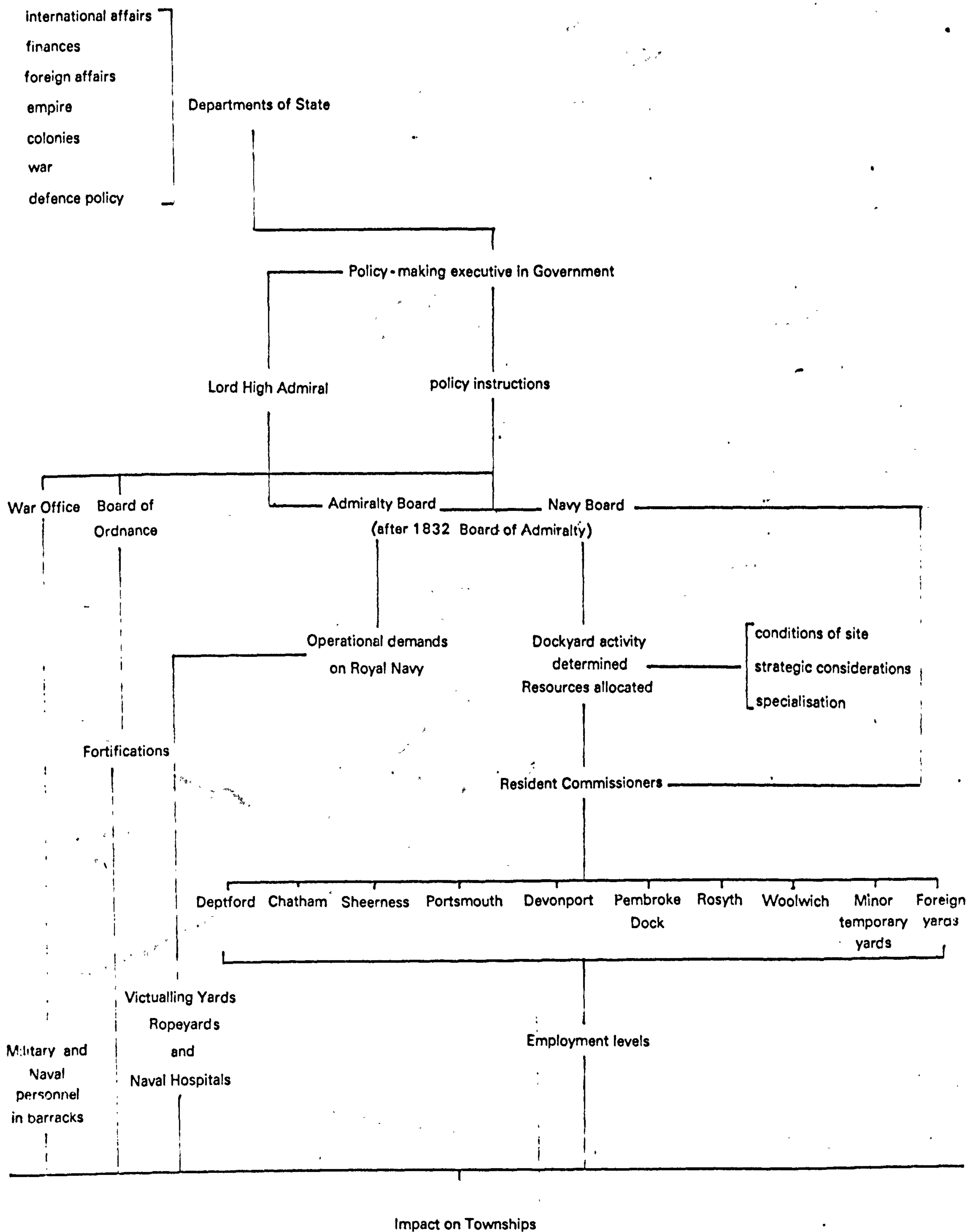


Figure 10.1 Government and the dockyard - urban system



Figure 10.2 Naval strategy and the situation of naval dockyards

Date yard established	Yard	Site	Early river defences	Bastion defences	Ring Fort defences
Sixteenth century	Deptford	=	*		
Sixteenth century	Woolwich	=	*		
Sixteenth century	Chatham	=	*	*	*
Sixteenth century	Portsmouth	+	*	*	*
Seventeenth century	Plymouth Dock	+	*	*	*
Seventeenth century	Sheerness	o	*	*	
Nineteenth century	Pembroke Dock	=	*		
Twentieth century	Rosyth	=			

= Up-river / haven

+ Harbour

o Outport

Figure 10.3 Time, site and the defences of naval dockyards

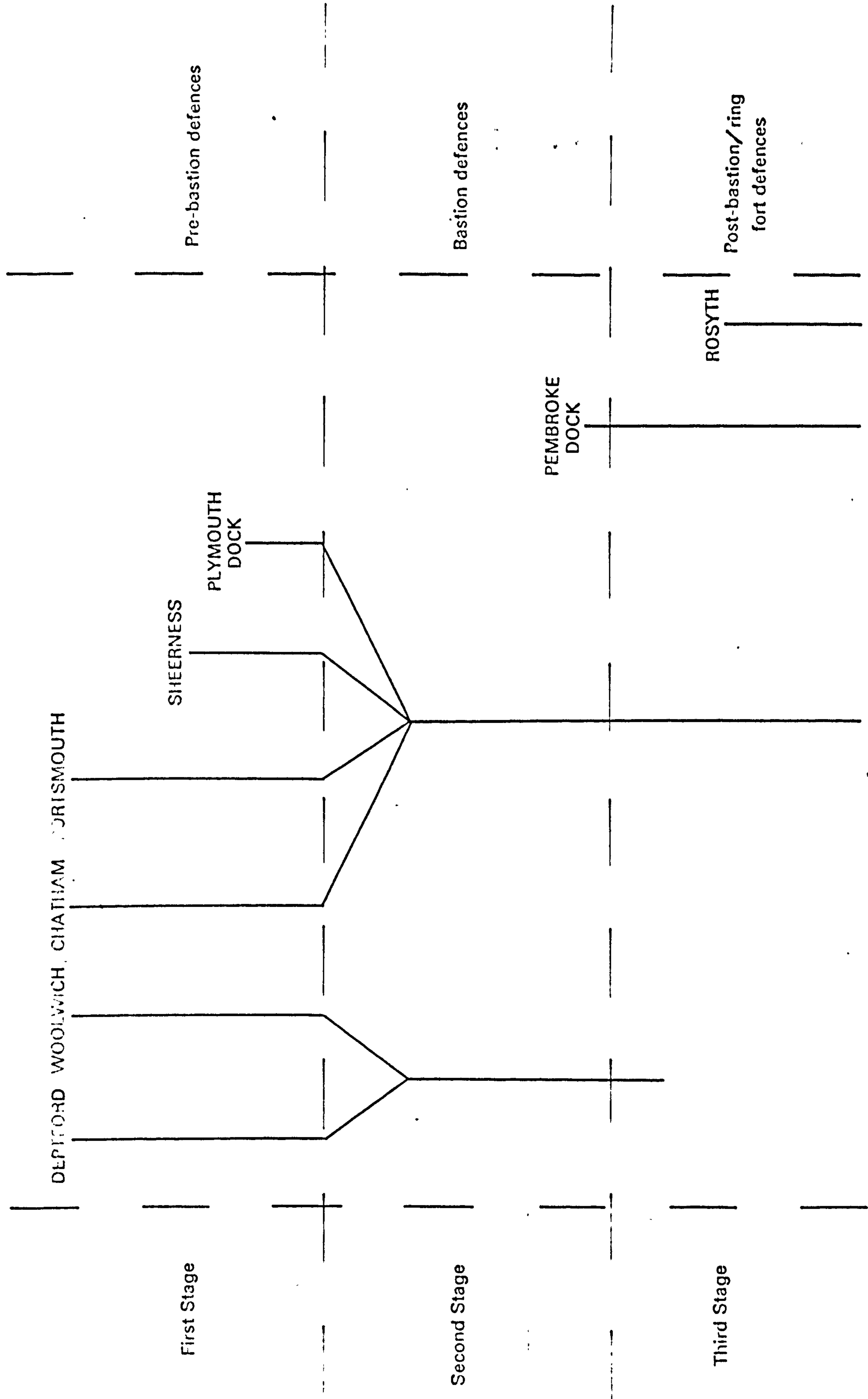


Figure 10.4 Typology of shipyard development

Plate I

**A view of Chatham dockyard and Brompton in 1774,
by Nicholas Pocock**



Plate II

A contemporary model of Chatham dockyard in 1774

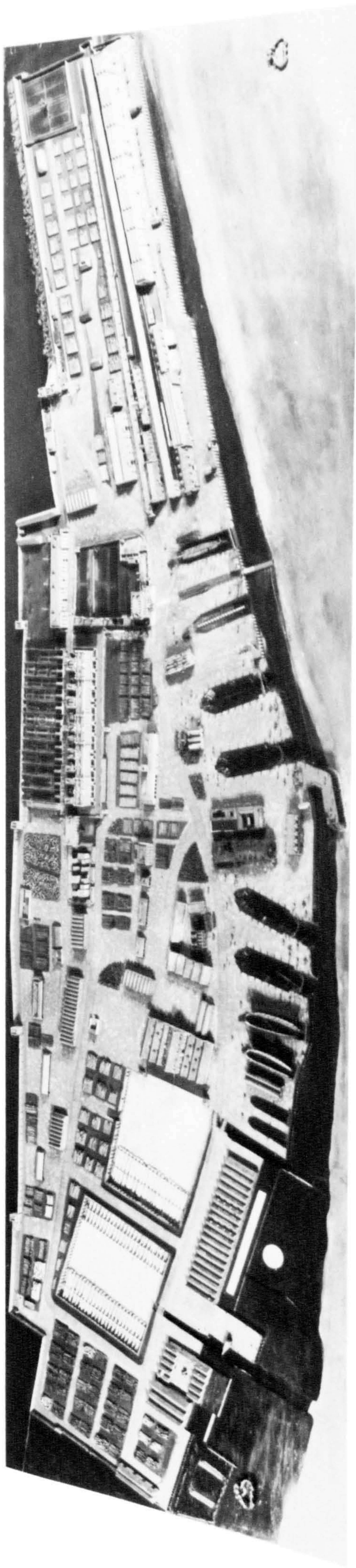


Plate III

**A view of Deptford and the dockyard in 1774,
by Nicholas Pocock**



Plate IV

**A view of Devonport and the dockyard in 1774,
by Nicholas Pocock**



Plate V

The harbour and entrance at Portsmouth

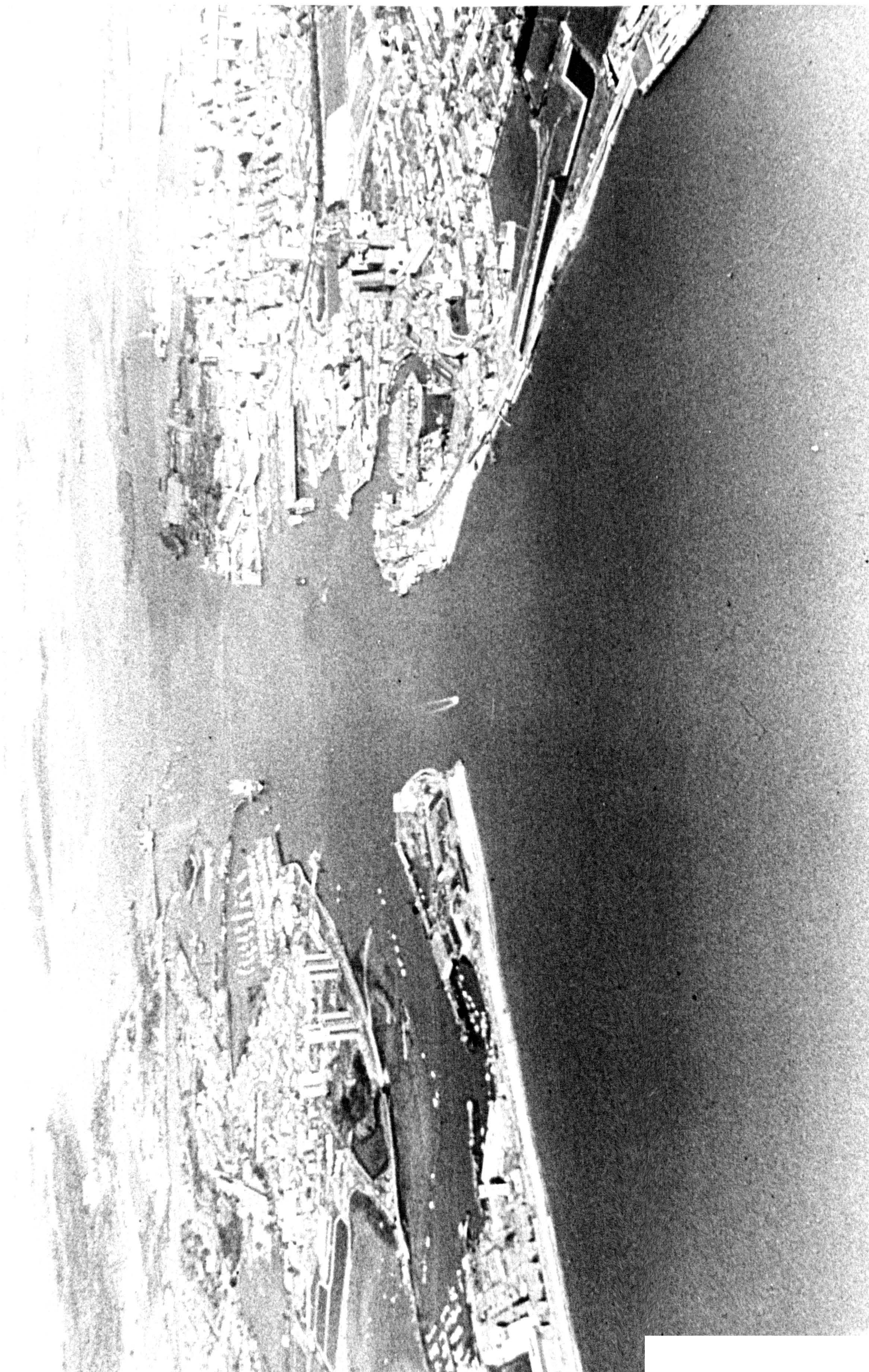


Plate VI

The defences of Portsmouth

In the middle foreground can be seen the sole remains of the bastion defences which once encircled Portsmouth and Portsea during the eighteenth and nineteenth centuries. Further fortifications can be seen along the waterfront defending the approaches to the harbour. The dockyard and Portsea are to the top right of the photograph.

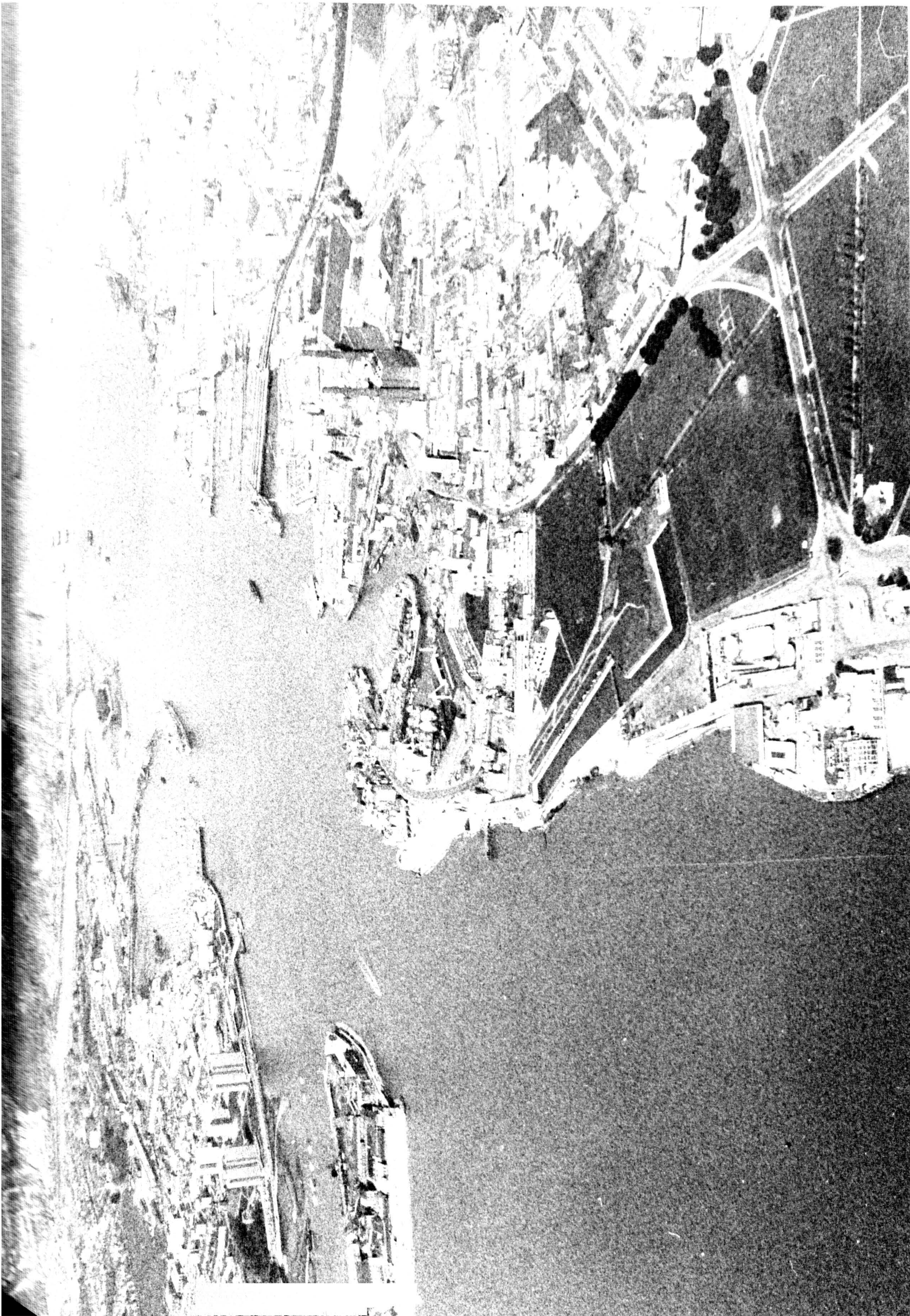


Plate VII

A contemporary model of Sheerness dockyard in 1774

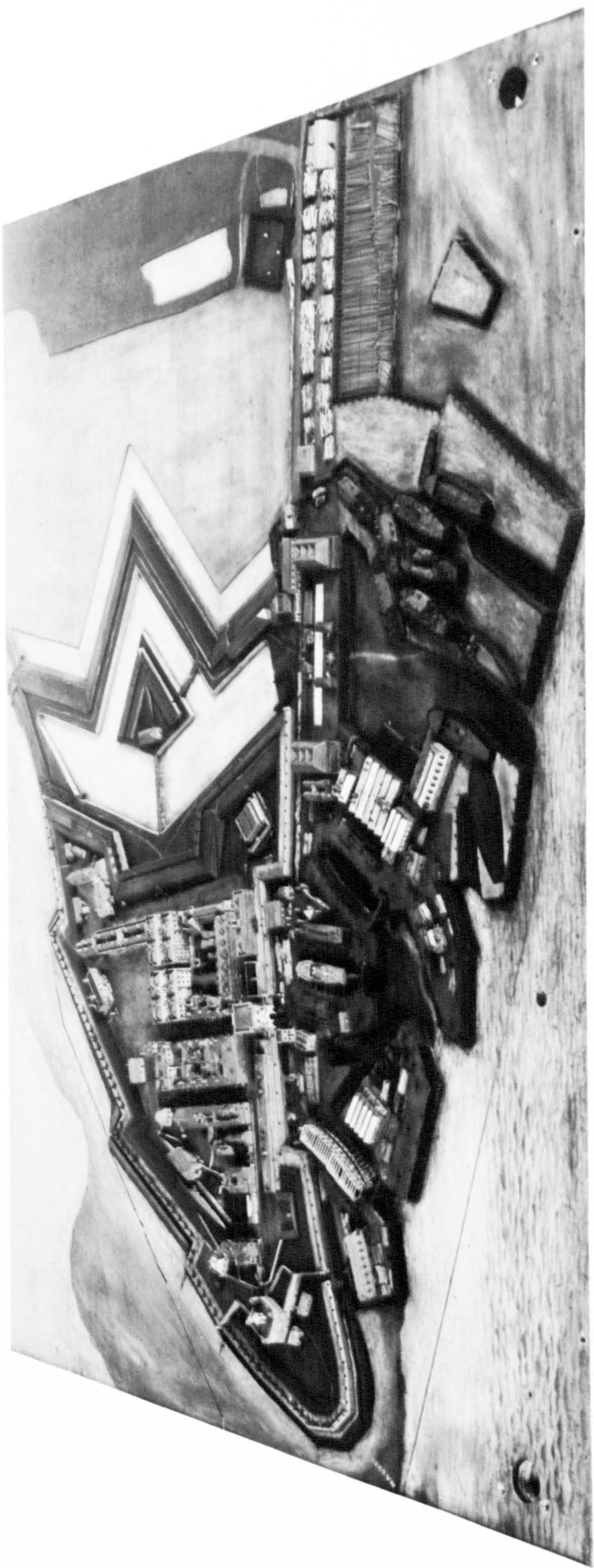


Plate VIII

**A view of Woolwich dockyard in 1774,
by Nicholas Pocock**



Plate IX

The relict bastion defences of Sheerness.

The view is toward Blue Town and the dockyard and was taken from the main road connecting those locations to Mile Town and the remainder of Sheerness beyond the bastion defences.

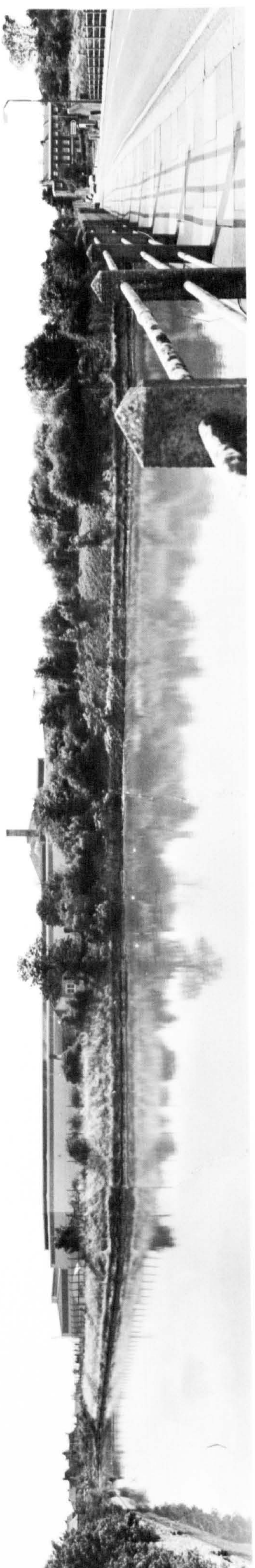


Plate X

The Great Lines at Chatham

The Great Lines formed the glacis in front of the bastion defences. In the distance is the colony settlement of New Brompton, now Gillingham. The previous Military and Naval Hospital, now Medway Accident Centre, is in the middle distance.



Plate XI

A courtyard in Brompton

This is one of a number of such courtyards to be found in those dockyard towns which underwent bastion fortification and is located between High Street and Manor Street in Brompton. This courtyard previously contained houses which were built on land taken from the gardens of existing buildings.



Plate XII

Back-streets and alleys in Blue Town, Sheerness

This is the junction of some of the many back-streets and alleys in what remains of Blue Town, Sheerness. The building in the centre of the photograph is typical of the fortified dockyard town in that it was constructed in what was previously the garden of one of the houses fronting onto West Street in Blue Town.



Plate XIII

High Street, Blue Town Sheerness

The top view was taken looking east toward Mile Town and the lower view westwards towards West Street. The dockyard wall occupies the site of former houses which were incorporated into the dockyard in 1820. The present day derelict appearance of the street bears little resemblance to its previous importance as the centre of activity in the community.

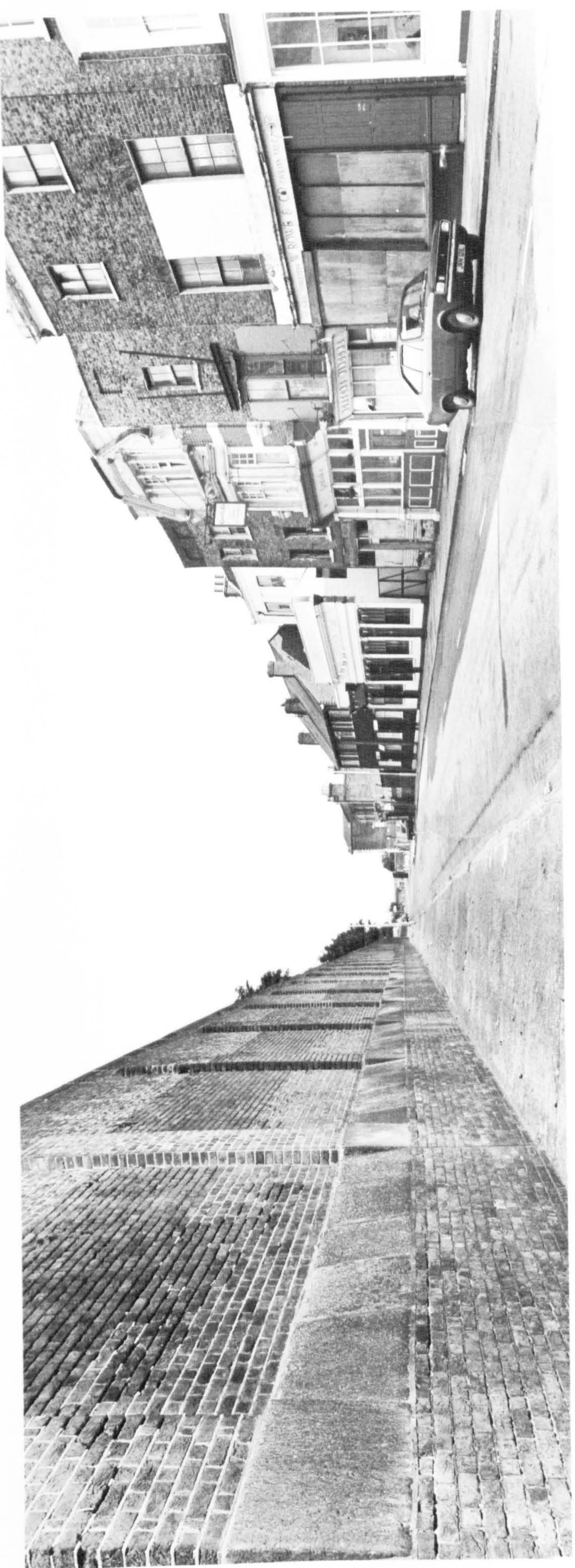


Plate XIV

Queenborough Lines, Sheerness

Queenborough Lines or the 'Cutting' was constructed under the Defence Act of 1860. This man-made moat separated the north west tip of the island containing Sheerness and the dockyard from the remainder of Sheppey. Marine Town can be seen beyond the ramparts to the left of the photograph.

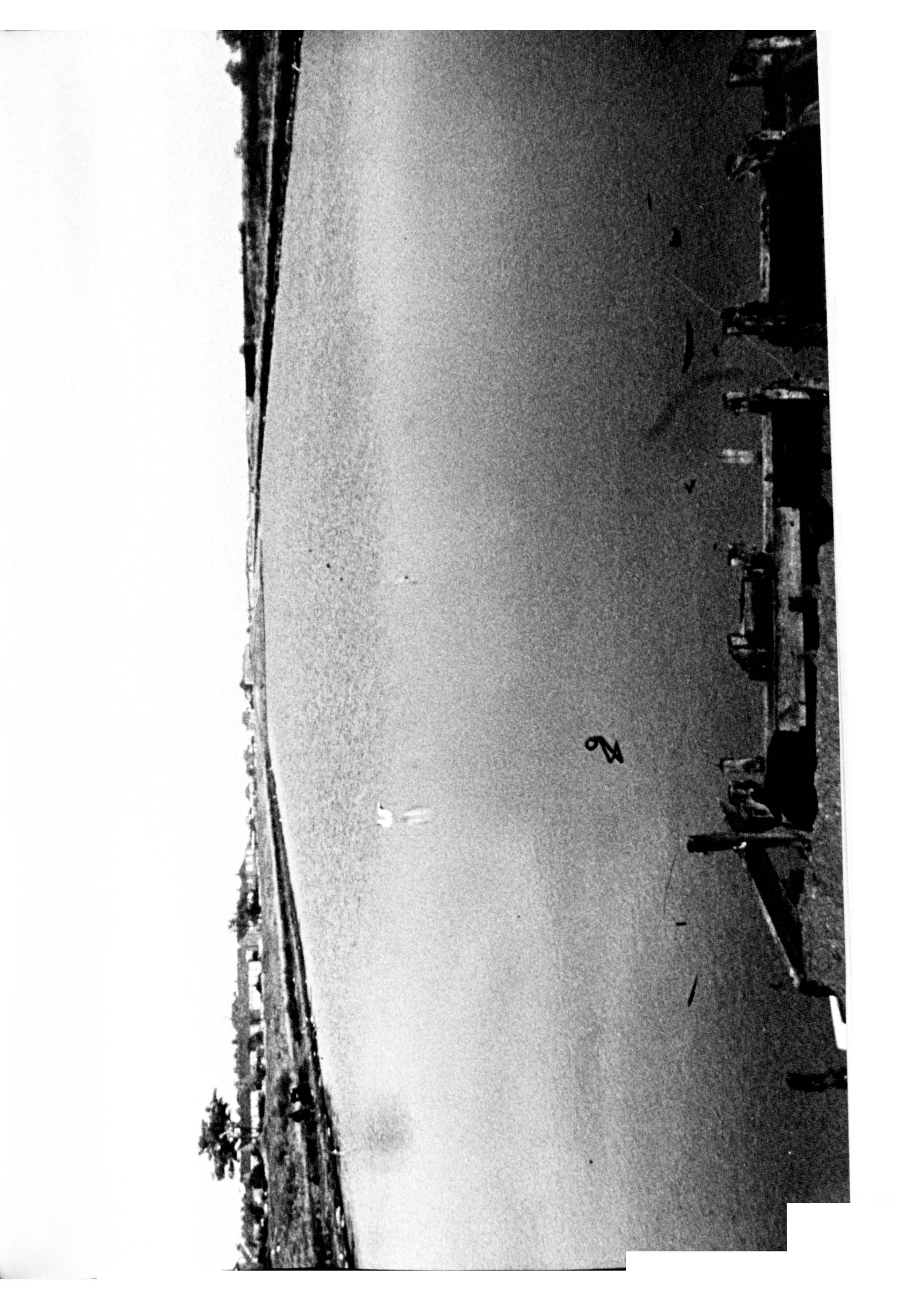


Plate XV

The dockyard wall at Woolwich

This photograph was taken looking west from St Mary's Church. Very little pre-war housing remains in Woolwich today. The former site of the dockyard, which closed in 1869, is currently being developed for offices and housing.



Plate XVI

Naval Terrace, Blue Town Sheerness

These former residences of dockyard and naval officers at Sheerness were constructed adjacent to the Garrison Church by the naval authorities during the period of dockyard reorganisation between 1815 and 1823. They replaced existing residences in the old yard and the provision of such accommodation by the authorities was common to all dockyard locations.

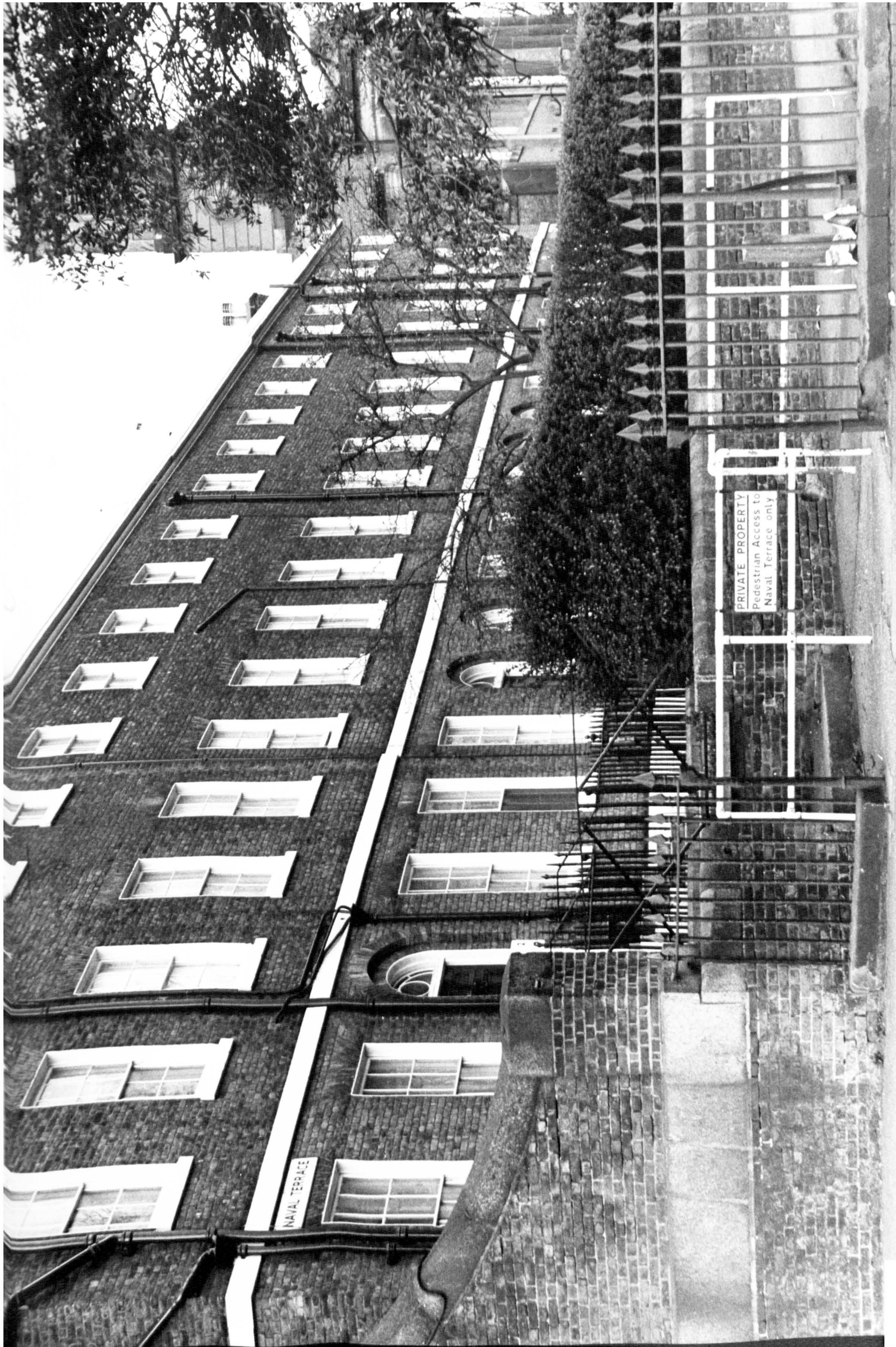


Plate XVII

House styles in Blue Town Sheerness, I

The narrow high house style seen here was typical of housing in Blue Town Sheerness.



Plate XVIII

House styles in Blue Town, Sheerness, II

This house was built on a plot barely three metres in width and reflects the great demand for building space which existed in Blue Town because of the inability of the settlement to expand onto the surrounding Board of Ordnance land. The subsequent development of the colony of Mile Town greatly relieved the pressure on land in the town.



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