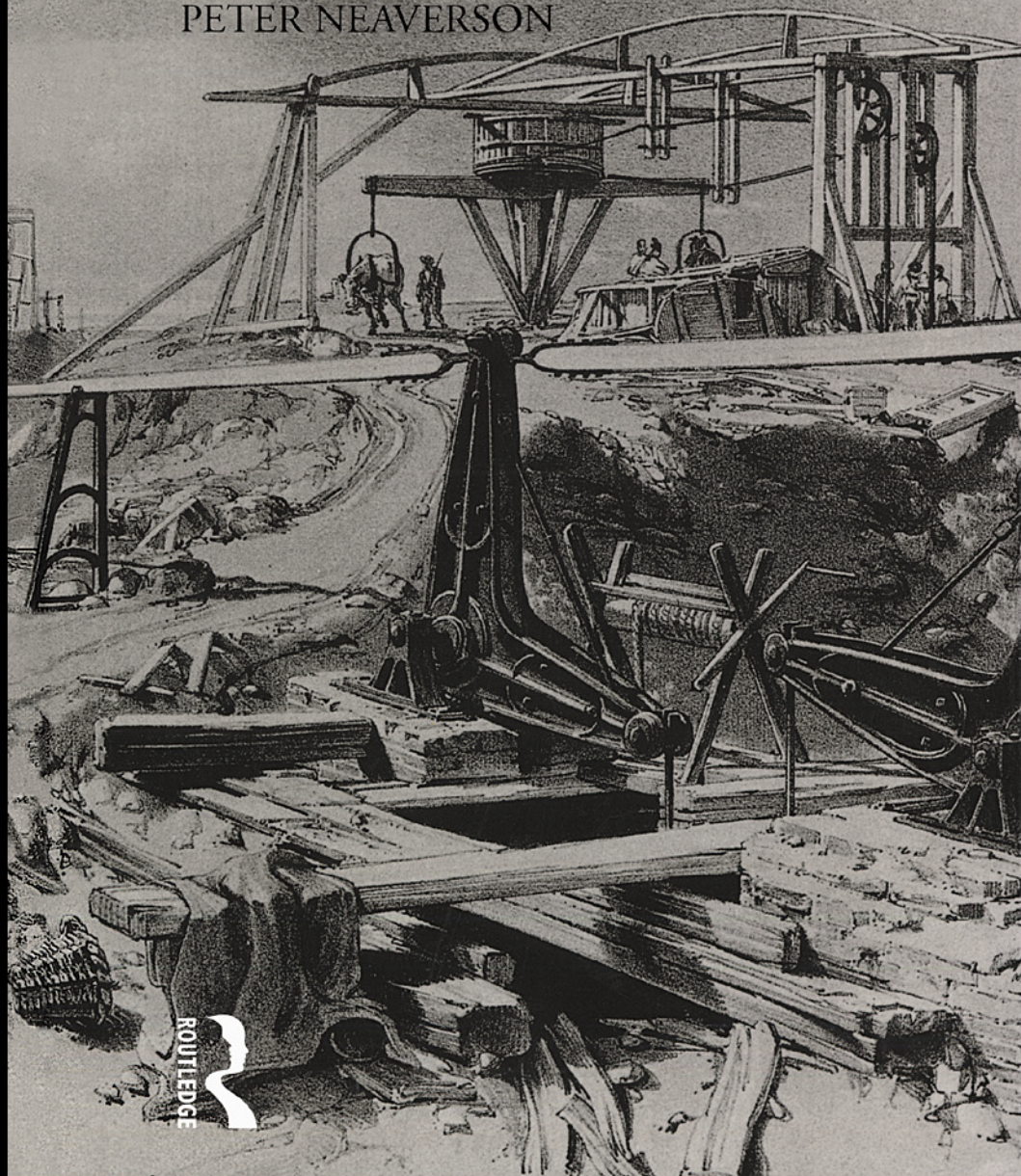


INDUSTRY IN THE LANDSCAPE, 1700-1900

MARILYN PALMER and
PETER NEAVERSON



ROUTLEDGE

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INDUSTRY IN THE LANDSCAPE, 1700–1900

Field to factory, what next?
Is the age of British industry past?

Two hundred years of industry have transformed the British landscape. This book enables the reader to reconstruct the landscape of past industry. The authors are industrial archaeologists of national standing whose concern is to use surviving material evidence and contemporary sources to study the former working conditions of men and women. Comprehensive in coverage, the book examines fuels, metals, clothing, food, building and transport. It makes clear the tangible elements which form the basis for the recreation of past landscapes and demonstrates both their function and the context in which they should be considered.

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INDUSTRY
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LANDSCAPE,
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Marilyn Palmer and Peter Neaverson



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Preface

Industry, by which is meant man's efforts to turn primary products into manufactured articles, is as old as his terrestrial existence, but only in the eighteenth century did the word come to mean the systematic organisation of labour for this purpose. The period from 1700 to 1900 witnessed the transformation of the British landscape on a scale never before experienced, creating scenes of horrifying grandeur and indescribable squalor which equally enthralled and disgusted those who recorded their impressions in verbal or graphic form. We can deplore the visual outcome of past industrial activity, but we cannot ignore it. Industry affected the development of many now seemingly rural areas, and often explains anomalies in the landscape: the traveller through east Leicestershire's hunting country little suspects that the elevation of the road above the surrounding fields was caused by nineteenth-century ironstone quarrying, whose extent can only be determined by studying early editions of large-scale Ordnance Survey maps.

The comparatively late date of this area of landscape history means that its students have a rich store both of visual evidence and of documentary sources to assist them in their efforts to recreate past industrial landscapes. Industrial archaeology is now a familiar term but has tended to be associated with the study and preservation of industrial monuments for their own sake. However, as in mainstream archaeology, artefacts are more and more being regarded as pointers to the past, tangible elements which form the basis for the recreation of past systems and landscapes. They prompt the industrial archaeologist to look around him for traces of sources of raw materials, water supplies, accommodation for the workforce and transport systems which together comprise an industrial landscape. Where he has the advantage over the mainstream archaeologist is that his field evidence can be verified and enhanced from a wide range of documentary and visual sources.

The purpose of this book is to describe various kinds of industrial landscape which have existed over the past two centuries, identifying the features of those landscapes which still exist in today's environment. In this way it is hoped that readers will become sufficiently familiar with these pointers to the past to be able to recognise both their function and the context with which they should be associated. The approach is archaeological and geographical rather than historical, since good accounts of the chronological development of industry in this period already exist. Industry is, however, essentially a human activity and the reason for studying the industrial landscape is to appreciate more fully the circumstances under which our forebears spent the greater part of their working lives.

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The authors' appreciation of industrial landscapes has been greatly enhanced through their position as editors of *Industrial Archaeology Review* which has brought them into contact with contributors from all parts of Britain and beyond. Their membership of the Association for Industrial Archaeology and other societies has been invaluable in introducing them to different parts of Britain through attendance at meetings and conferences. It has also brought them friends who have shared their interests, especially Mary and Tony Yoward from Hampshire and David and Ann Alderton from Suffolk. Their research has been greatly assisted through the services of the Leicester University Library, the Library of the Ironbridge Gorge Museum Trust and many local archive repositories. Help with illustrations has been received from John Crompton, Mike Hodder, G.T.Knight, Pamela Moore, Miles Oglethorpe, John Powell, Paul Sillitoe and the Central Photographic Unit at Leicester University. They would also like to thank their General Editor, Professor Michael Reed, for his encouragement and John Fletcher and Janet Neaverson for their company on field trips.

1

The location of industry in the landscape

Industry and agriculture are today treated as two separate and often opposing entities. In the early eighteenth century this was not the case. These two spheres of activity necessary for human existence interacted for both economic and geographical reasons. The majority of people in Britain were still at least partially dependent on what they could grow for their survival, and industrial activity had to be carried on in association with farming and smallholding, not separated from it. In other words, industry had to go to the people, not the people to industry. Manufacturing and even mining were still usually seen as a by-employment, not as the total means of subsistence. Human muscle was still the major source of power in the early eighteenth century, and the necessary dispersal of the workforce for subsistence purposes meant that industry equally had to be dispersed. Only as agriculture began to change and produce a surplus which could support a population wholly engaged in manufacturing industry could industrial conurbations begin to develop.

Most industrial enterprises still served just a regional, if not a local, demand and their products were sold through markets, fairs and local carriers, few of which drew on so extensive a hinterland as the famous Stourbridge Fair. Daniel Defoe's *Tour Through England and Wales* of 1724 indicates how a national market for manufactured goods was already developing, but it must be remembered that he was particularly interested in what was new, not in what was commonplace. Difficulties of transport hindered the sale of goods much beyond the region, and so the production of basic necessities was replicated throughout the country. The making of boots and shoes was practised in all communities, as was brewing and malting. Agriculture did not often provide a sufficient livelihood and many families resorted to industrial by-employment. Joan Thirsk has drawn attention to the fact that the type of farming practised was important in locating a particular industry. The wood pasture regions of both Suffolk

and Wiltshire, specialising in dairying, had extensive cloth industries: they were also areas populated by small freeholders or customary tenants with security of tenure, which was also true of the Yorkshire Dales. The hosiery industry of the East Midlands developed in areas of pastoral rather than arable farming, often after previously open field areas were enclosed and laid down to grass in the late eighteenth century. The wooded parishes of the West Midlands were early centres of small metalworking. Most metalliferous mining was located in the west and north of Britain where a pastoral economy predominated and there was little demand for agricultural labour, making such dual employment possible.¹

The regional nature of the economy meant that the smallest deposits of raw materials were exploited. Coal was dug wherever it outcropped and deeper mining had already begun on all the major coalfields of Britain. Veins of metalliferous ore in remote, often mountainous, areas had been mined at intervals since prehistoric times. Pottery and bricks were made from local clays, although the quality of the earthenware produced varied considerably from one region to another. Houses were built of local materials, some of which would have been rejected in areas where better stone was available, like the chocolate-brown Greensand, known locally as carstone, which outcrops on the edge of the Fenland, or the clunch found in the chalk areas of Britain. Raw materials were not exploited to the point of exhaustion, as they were to be towards the end of our period, but utilised as and when needed by the local and regional community.

The presence of a particular industry in a given area, then, is the result of the complex interaction of a number of factors. These can be broadly divided into two categories, firstly, natural resources, particularly the extent and position of raw materials and, secondly, human resources providing the initiative and labour for the exploitation and processing of those raw materials. The general significance of these two categories will be explored in the rest of this chapter.

Natural resources

Raw materials for industry are both extracted from the earth and grown on its surface. Their production is widely dispersed across the British Isles: the small county of Leicestershire is not untypical in extracting coal, clay, ironstone, granite, slate and even some lead from within its boundaries, while its rural produce led Daniel Defoe to comment that 'the largest sheep and horses are found here, and hence it comes to pass, too, that they are in consequence a vast magazine of wool for the rest of the nation'.² Most regions of the British Isles have combined extractive and manufacturing industries and so developed mixed industrial landscapes.

The wide extent of mining and quarrying is made possible by the complex geological structure of Britain which means that a considerable variety of rocks and minerals is found within comparatively small geographical areas. The purpose of the industry lay in extracting ores often buried deeply beneath the earth's surface, with miners descending hundreds of feet by the end of the nineteenth century. The deepest was Williams Shaft, Dolcoath, in Cornwall, sunk to 3,600 feet by 1910. The underground aspect of metal-mining is of little interest to the landscape historian, but the nature of mineral veins does affect the surface development and must be briefly explained.

Iron is the most widespread in occurrence of all the metal deposits in Britain. From prehistoric times until the middle of the nineteenth century, most iron was obtained from nodules found in clays in the Weald, the Coal Measures in the Midlands or South Wales and the Carboniferous Limestones of the Lake District. Workings were small-scale, which suited the limited capacity of charcoal-fuelled smelting furnaces. The tremendous increase in demand for iron in the late eighteenth century and for steel by the mid-nineteenth century led first to the more extensive exploitation of the nodular ores, particularly in the Lake District, and then to the extraction of the more widespread but less productive stratified ores of the Jurassic ridge stretching from Oxfordshire up into Yorkshire. The former were generally mined, the latter quarried, and the landscape evidence reflects this difference.

Non-ferrous metals, like lead, copper and zinc, are found in veins contained in fissures resulting from faults or joints in the rock. Some rocks, particularly limestone, are naturally fissured and were filled by mineralising fluids resulting from movements or igneous activity beneath the earth's crust about 200 million years ago, which crystallised to form veins, pipes and flats which were not consistent in either quality or direction. Much of the lead ore in Britain has been derived from the limestone areas of Derbyshire and the Pennines. Earth movements resulting in the folding or faulting of the surface can, however, lead to mineralisation in a variety of rocks: copper, for example, has been worked in the Triassic sandstones of the Shropshire-Cheshire basin and lead in the slates of Wales and the Lake District. In Devon and Cornwall, the mineral veins occur along the edges of the granite masses from Dartmoor westwards to Land's End, a direct result of the igneous activity which formed the granite.

Veins, unlike seams of coal, are usually vertical or near vertical; those in Cornwall incline at about 20 degrees on average. Rake-veins, or lodes in the older literature, are the major veins which may run across country for a mile or more, and are, in essence, a nearly vertical wall of minerals which could be anything from 1 inch to 20 feet wide and of unknown depth, since drainage problems have prevented complete downward exploration. The quantity of actual ore in any vein was always uncertain, since a large part of the vein could, and frequently did, consist of 'gangue' minerals such as

barytes, calcite, quartz and fluorspar. Prospecting for ore was, then, always a chancy business and was referred to as an 'adventure' by early mining companies. The irregular nature of mineralisation goes a long way towards explaining the always fluctuating fortunes of mining companies.

Coal occurs in seams or beds rather than the uncertain veins typical of non-ferrous metal-mining, and consequently one area can be worked for a long period of time, obliterating much of the field evidence for earlier periods of working. The quarrying of building stone, too, destroys evidence of the past, but its products can be seen in local buildings. The surface geology of Britain can change dramatically in just a few miles: granite, for example, is an igneous intrusion into the country rock and so in Cornwall the latter, known as 'killas', is found alongside granite in buildings in the same village. The hardness of granite meant that its use was local until that very property was found invaluable for civil engineering work on bridges and docks in the nineteenth century. It was also quarried in the Lake District, Scotland and in outcrops occurring in central England. Limestone has always been valued as a building material, both for its colour and for the ease with which it can be dressed and carved. It was extensively quarried in the Jurassic ridge stretching from Dorset to Yorkshire and in the Carboniferous Limestones of Derbyshire. Limestone slabs were also used for roofing alongside other local slates until Welsh slate penetrated the market once transport facilities were available: the output of the slate quarries of Caernarvonshire increased from under 20,000 tons in 1786 to over 90,000 tons by 1831.³ Slate was also quarried in the Lake District.

The products of agriculture which provided raw materials for industry were even more widespread in occurrence than mineral resources. The Exe-Tees line, that classic divider of highland from lowland Britain, is significant in that the more fertile south and east boasted a greater variety of output. Yet even in Highland Scotland pure water and barley gave rise to an extensive distilling industry by the end of the eighteenth century and many small mills existed to grind oatmeal for both man and beast (Plate 1). Sheep were universal in both highland and lowland Britain, although the environment dictated which breeds would survive in a particular area and hence the type of wool available for local industry. Generally, the mountain sheep—for example, Cheviots, Herdwicks, Scottish Blackface—produced tough wool suitable for carpets and woollens, while the lowland breeds like Southdown, Romney Marsh and even the Leicester produced long staple wool suitable for worsteds and fine woollens. Cattle are less suited to hilly areas, and so leather processing was more an industry of lowland Britain, although there was an important centre in the Lake District. Flax became pre-eminently the product of Ulster, although it was grown in western Scotland and gave rise to an important linen industry there. Hemp for rope manufacture was grown in southern England, but the location of that industry was more

conditioned by marine and agricultural needs than by local availability of raw materials.

The other raw materials of the textile industries, silk and cotton, introduce a third resource element into the historical location of industry—that is accessibility to ports, coastal shipping or at least navigable rivers. A series of concentric circles drawn outwards from the centre of England might be more important to the understanding of the development of industry than the Exe-Tees line. Yet improvements to rivers for navigation purposes were such that, by 1760, there were more than 1,300 miles of navigable river and much of Britain had access by this means to coastal shipping. Silk was imported from France and Italy into London, where Spitalfields became a centre for silk weaving. Cotton from India also entered London, although when America became a more important source the port of Liverpool became the chief point of entry and stimulated the Lancashire cotton industry. But location was not always the predominant consideration, since the original powered silk throwing factory was set up in Derby in the first two decades of the eighteenth century and cotton spinning was widespread later in the century around Derby and Nottingham. Here, market considerations were more important, with a flourishing hosiery industry, based on locally spun worsteds, which was beginning to diversify into silk and cotton. Only human factors can explain why Macclesfield, not even accessible by canal until 1831, became an important centre for silk throwing and weaving.



Plate 1 The restored Glendale Mill at Duirinish on the Isle of Skye. The thatched rubble-built nineteenth-century water-mill has an all-iron overshot wheel which dates from around 1900. There is a detached drying kiln, also thatched.

Access to water-borne transport was also important for the development of extractive industry. The north-east coalfield, penetrated deeply by rivers like the Tyne, Wear and Tees, had developed far more extensively than land-locked Midland coalfields by the early eighteenth century and captured the London market. The Cornish copper-mining industry benefited from easy access to the coast, although good ports were few, with coal being brought from South Wales to power pumping engines and ore sent by return for smelting. On a more local scale, the Derbyshire lead-miners used water-power and soughs to drain their mines, even on limestone terrain, because of the difficulties of transporting coal to the hills.

The provision of water was equally important for manufacturing industry, whether for transport, power or processing. The same stream might power a corn, cotton or cloth fulling mill together with an iron forge and also be used in dyeing and bleaching works, like the River Leen on its course southwards from Papplewick to Nottingham. The iron industry was centred on the Forest of Dean and the Weald of Kent and Sussex, where furnaces and forges had access to both charcoal and water-power to drive bellows and hammers. The streams flowing off both sides of the Pennines were lined with carding and fulling mills, soon to be joined by spinning mills. But the ingenuity of man bent nature to his command. Artificial ponds and reservoirs were constructed in the most unlikely places to store water for industry and streams were tapped by leats several miles long to ensure that they remained filled. A very high proportion of the smaller areas of water in Britain were man-made, even before the days of great storage reservoirs for drinking-water which began to be built in the late nineteenth century. Artificial waterways, or canals, were also constructed from the mid-eighteenth century onwards and this finally freed industry from the locational constraints of natural rivers and streams, since coal could be taken to where it was needed. Human factors, then, while not displacing natural ones, became increasingly important in determining the location of industry in the period under consideration.

Human resources

Man has helped shape much of the present landscape of Britain and at the same time has imposed patterns of ownership on it. The Diggers may have argued in the seventeenth century that the land was a common treasury from which all should derive equal benefit, but their attempts to break down boundaries invoked no sympathy from Royalist, and Parliamentary gentry alike. Even in the twentieth century, land in public ownership amounts to only 13 per cent and a hard core of titled families still own nearly a third of the countryside. Contrary to popular belief, however, landlords generally promoted rather than hindered industrial activity because

it was in their interests to do so. The earliest example of this is perhaps the 'milling soke', the right of a manorial lord to compel his tenants to use his corn mill. Attempts were made to extend this to fulling mills, but neither was strictly enforceable at law and the right had largely ceased by the nineteenth century. The practice did, however, ensure the continuance of many mills in profitable operation.

Unlike their continental counterparts, the British aristocracy and gentry generally had the power to exploit all the resources of their estates, both above and below ground. The attempts by the Crown to set up companies to work copper and brass in the interests of national defence had broken down by the beginning of the eighteenth century, as had their efforts to prevent private exploitation of ores containing precious metals, which was often the case, for example, with argentiferous lead. These victories, conducted through a Parliament dominated by the landed classes, enabled landowners to derive considerable incomes from industrial activity, from which they were not barred by custom and tradition like many of the European aristocracy. By the end of the eighteenth century, many landlords were involved in both agricultural improvement and the exploitation of mineral resources on their estates. The second Marquis of Rockingham was cited as a paragon of agricultural improvement by Arthur Young and at the same time developed the coal and iron resources of his Wentworth Woodhouse estate to the extent that the income from the mines exceeded the income from farm rents by the nineteenth century. The estate was inherited by the Earls Fitzwilliam, whose income from coal and iron rose from £4,000 in 1801 to £80,000 a hundred years later.⁴ Other aristocratic industrial giants like the Dukes of Devonshire and Bridgewater, the Earls of Dudley and the Lowthers owned land in several counties and so spread their net far and wide. The Lowthers, for example, were responsible for much of the development of the southern part of the Cumberland coalfield in the early eighteenth century but also later exploited coal on estates in Yorkshire.

Many landlords extended the paternal attitudes exercised on their estates to the workforce labouring in their industrial enterprises. However, as the need for capital increased in the nineteenth century, landowners were forced to lease their mineral rights to companies of entrepreneurs and content themselves with the mineral royalties. An early example is Sir Carbery Pryse of Gogerddan in Cardiganshire, who in 1690 discovered argentiferous lead ores on his estate and attempted to work the deposit himself. By 1698 he had leased it to the Company of Mines Adventurers who already worked many of the Cardiganshire lead-mines. Over a century later, the mining entrepreneurs the Taylors, who had become mineral agents to the Duchy of Cornwall, took over the lease of Lord Lisburne's mines in Cardiganshire, developing the famous mine of Frongoch, and then expanded on to the Gogerddan and Nanteos estates, including the mines of Goginan and Cwmystwyth. By 1857 their mines were producing 70 per cent of the lead

output from Cardiganshire and they had been responsible for the total transformation of the landscape by means of leats, reservoirs, mines and dressing plant.⁵ The pioneering iron and tinplate works of the Hanbury family near Pontypool, established in the seventeenth century, were by the 1850s leased to the Ebbw Vale Company who greatly extended them. Capital was vital in the large-scale exploitation necessary by the nineteenth century, and generally landowners withdrew from their direct involvement in industrial expansion in earlier centuries.

Landowners with industrial empires were also keen promoters of new transport systems such as turnpike roads, horse-drawn waggonways, canals and later railways, although they tended to favour mineral lines rather than trunk railways. The Duke of Bridgewater's canal, built in the 1760s to take coal from his mines at Worsley to Manchester, is an obvious example: his brother-in-law, the Marquis of Stafford, helped promote the Trent and Mersey Canal from his estate at Trentham in the Potteries. Earl Fitzwilliam was active in the establishment of the South Yorkshire Railway, while down in Cornwall, Joseph Treffry of Fowey built an entirely new port at Par, promoted a short canal from it to serve the china clay district and built a railway line between 1840 and 1849 from St Blazey to Newquay, right across Cornwall: this was rebuilt in 1874 by Sir Morton Peto as the Cornwall Minerals Railway.⁶ Even men acquiring landed estates for the first time did not neglect the potential of a good transport system. The Scottish merchant, John Christie, whose wealth was derived from the East Indian trade, utilised a horse-drawn waggonway down towards the Swansea Canal as a means of opening up the vast tracts of land on the barren Great Forest of Brecon in the 1820s.

Landowners could, however, use their parliamentary influence to oppose the building of railways and canals. New lines might promote a neighbour's industrial enterprise at the expense of their own: hence Lord Rawdon, later Earl of Moira, opposed the extension of the Soar Navigation from Loughborough to Leicester in the 1780s because it would enable Derbyshire coal to compete with the output of the west Leicestershire collieries in which he had an interest. His opposition was supported by Earl Ferrers and Earl Stamford, both of whom also owned mines and limeworks in the west of the county: Moira subsequently endorsed the proposals in 1793.⁷ In Essex, Lord Petre of Ingatestone Hall received £120,000 compensation for the passage of the Eastern Counties Railway across his estate and used the money to purchase another property. By 1843, this railway company had paid out £600,000 for land purchase and compensation for its 51.2 miles of line from London to Colchester.⁸ Many canals and railways paid dearly for the privilege of routing their lines across landed estates and progress was often delayed by negotiations.

Some landowners also opposed railways and canals on aesthetic grounds, not wishing public lines to traverse their private estates and

spoil carefully planned vistas. Such opposition often helps to explain the otherwise unaccountable eccentricities in the routes taken by canals and railways. Lord Moira, although desperately needing the Ashby Canal in 1792 to open up markets for his new coalmines and ironworks, supported the objections of Penn Assheton Curzon to the line crossing his estate at Gopsall and interfering with springs which fed his ornamental lakes.⁹ Even when the railways came, Leicestershire landowners continued to create local difficulties. Lord Harborough, the owner of Stapleford Park, forced the Syston to Peterborough Railway to be routed around his land, creating a tight curve which later had to be eliminated for safety purposes. The Countess of Bridgewater suggested that the London and Birmingham Railway be routed through her property alongside the Grand Junction Canal between Berkhamsted and Tring rather than breaking new ground between Uxbridge and Aylesbury (Figure 1). She argued that the land was 'already gashed by the canal' and that a railway beside it would make very little difference.¹⁰ Robert Gordon of Kemble House obtained from the Cheltenham and Great Western Union Railway both compensation for damage to his amenities and an undertaking that the line should be tunnelled beneath his property and no public station should be situated on it.¹¹ The Duke of Wellington insisted that no station be built without his consent within 5 miles of his house at Stratfield Saye in Hampshire.¹²

Other landowners embellished their estates with elaborate viaducts or decorated tunnel portals if they did permit a canal or railway to cross their land. The portal at the eastern end of the Sapperton Tunnel on the Thames and Severn Canal faces into Cirencester Park, the home of Earl Bathurst, and is an elaborate classical structure compared with the simpler portal at the western end (Plate 2). Lord Anson added a crenellated tunnel portal to the collection of classical monuments already on his estate at Shugborough in Staffordshire. Specially designed or located railway stations were another privilege which many of them obtained. The Duke of Bedford was placated by a complete series of half-timbered cottage-style stations built to his approved design on the Bedford to Bletchley line. The elaborate station at Redmile incorporated a private waiting room for the Duke of Rutland, since the station served nearby Belvoir Castle, and the ducal arms were displayed on one of the gables. In such ways, then, landowners influenced the form and development of transport systems as well as the industries which they served.

Estate boundaries have played a major role in shaping the industrial landscape. Vigorous seigneurial initiative could lead to the development of one estate while an adjoining one might be neglected by a more lethargic landowner. The division of the countryside using man-made rather than geographical boundaries could also lead to similar industrial enterprises developing independently, whereas, from an economic point of view, they

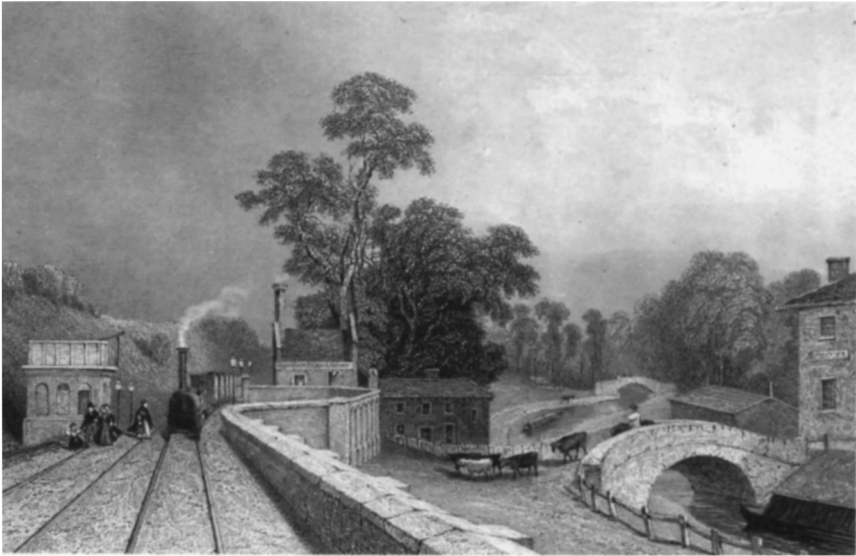


Figure 1 A transport corridor in Hertfordshire. The Grand Junction Canal in Berkhamsted faced new competition when the London to Birmingham Railway passed through in 1838. The station has no platform but is lit by gas and was provided with a private room for the use of the Earls Brownlow (From Thomas Roscoe's illustrations of the London and Birmingham Railway, by courtesy of the Elton Collection: Ironbridge Gorge Museum Trust).

might have flourished better as a combined unit. The distribution of iron furnaces in South Derbyshire in the late eighteenth century bore more relation to estates occupied by the Hastings, Burdetts and Ferrers than to purely geographical considerations. Those three families and the Harpur Crewes of Calke Park each also worked limekilns based on the same two inliers of Carboniferous Limestone. In Dimminsdale, the Crewes and Ferrers operated two sets of kilns separated by only a small stream, which marked their estate boundary.

Personal factors like these have helped to create the rich variety of our industrial landscape, but it is not only the great landowners who have been responsible. People who left villages and hamlets for one reason or another often squatted on common lands and eked out a precarious existence by small-scale mining and quarrying. Such settlement can be detected from estate maps and can still be seen on the ground; it is common in Shropshire and on the edges of the Midlands coalfields, where scattered houses in isolated plots rather than nucleated settlements are still the norm.¹³ Squatter communities provided a mobile source of labour which could play a major role in local industrial development. Equally, landowners themselves could encourage settlement on new ground to bring it into cultivation. The miners who rented cottages from Earl Fitzwilliam at Elsecar