THE DEVELOPMENT OF THE LANDSCAPE ASSOCIATED WITH THE SOUTH STAFFORDSHIRE IRON INDUSTRY, 1500-1800

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Confirmation

I hereby confirm that the work presented here is my own

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Abstract

This thesis examines the landscape development of the river Smestow valley, Staffordshire, associated with iron-making activity between 1500-1750 when the industry flourished. The industry was based on charcoal-fired blast-furnaces driven by water-power in a watermill. Reference is made throughout to a comparison area with a similar history of iron-making in Cannock Chase, Staffordshire.

The thesis investigates whether the presence of iron-making mill sites can be explained by geographic features associated with the location of the study area, or if human factors, such as the actions of iron-makers, the development of the market for iron goods, or technological changes affecting the industry, had a greater impact. It therefore contributes to debates concerning the theory of geographic determinism in the development of industrial landscapes with similar geographic features.

Consideration is given to the impact on the development of the landscape of the specific geographic features of the area including its plateau-edge location, col connecting the drainage basins of the Severn and Trent, underlying geology, soils, hydrographic development, and woodland cover. Special attention is paid to the creation and management of Kinver Forest which covered much of the area for the period 1000-1500AD and to what extent this supply of timber for charcoal influenced the creation of the iron-making industry. The effect of technological change in the iron industry over the period studied is analysed, as well as changes to the market for the product of the iron-making activity (bar iron). Transport links are examined and one chapter focuses on specific families of iron-makers.

The thesis proposes a new paradigm for this specific industrial landscape in that it is the dynamic inter-action of technological change, the activities of individuals and changes in the market that were responsible for the development of its landscape over time, rather than geographical or human factors alone. Secondly, a new typology is proposed for those who exploited the resources of the landscape. Both paradigm and typology have the potential to be applied to other landscapes of industrial exploitation.

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Several factors have contributed to some significant delays and concerns being experienced with the production of this thesis which it is prudent to acknowledge. The principal issue to affect work has the Covid-19 closure of archives (Staffordshire and Dudley) and libraries (notably the Staffordshire local collections, University of Keele) over the period March 2020 through to December 2021 when many restrictions were eased. This period also reduced the ability to engage in fieldwork of any serious nature. Stafford Record Office is now closed for refurbishment Additionally, experiencing a stroke in late 2020 and recovering from it also delayed research and thesis production.

All faults, errors, misinterpretations, and acts of omission remain my responsibility.

CONVENTIONS EMPLOYED

1. Measurements are in British imperial systems. Map scales are presented in both miles and kilometres.
2. All monetary amounts are quoted in the system prevalent at the time and abbreviated to £sd.
3. Counties are referred to with their pre-1974 names and boundaries unless otherwise stated. Geographical areas, such as the east or west midlands are in lower case. The capitalised West Midlands refers to the former metropolitan county of that name.
4. Non-English words and English language place-names not in current use or not in their current form are *italicised*, except when quoted from other authors, where the whole quote is italicised apart from the non-English or not-currently-used place-names.
5. Named rivers and other watercourses are always capitalised, as Rising brook or Smestow brook. This latter stream is traditionally referred to as Smestow brook in its upper section and as the River Smestow in its lower course. For consistency, the stream is referred to as Smestow brook or the Smestow throughout. The principal Smestow tributary stream is referred to as the Wom bourne, and it and the village of Wombourne are given a final 'e'. Holbeche House is also written as here, although the stream is referred to as the Holbeach brook.
6. The Paget family were ennobled in 1549 as Baron Paget de Beaudesert. Regardless of their actual title, the phrase Lord Paget is used. Members of the de Somery, Sutton, Dudley and Ward families who held the Lordship of Dudley are referred to as Lord Dudley.
7. All photographs are taken by the author. All artwork, drawings, charts, diagrams, and figures are appropriately credited and used with permission. Ordnance Survey mapping extracts are either from the Ordnance Survey for current maps or the National Library of Scotland for historical maps and used with permission. North is always at the top. Scales are provided or

noted in the map caption. Map extracts are at actual size unless indicated otherwise. 'Yates' map' refers to the map of Staffordshire created by William Yates in 1775. The extracts from his map used here are from A. D. M. Phillips, 'A map of the county of Staffordshire by William Yates, 1775, with an introduction by A. D. M. Phillips', *CHS,* 4th series, vol. 12, 1984.

8. References are initially given in full and in a shorter form thereafter. References to the Victoria County History (VCH) for Staffordshire are given in the form VCH *Staffs,* vol. XX, p.231, which refers to the volume in Roman numerals and the appropriate page. Documents in The National Archives published by the Staffordshire Record Society are abbreviated to *CHS,* that is, *Collections for a History of Staffordshire*. Most of the papers in each volume have identified authors, named in the appropriate reference. Where no author is apparent, the then *Collections* editor is identified. *CHS* is in four series which (other than the first series) are appropriately identified in each reference.

ABBREVIATIONS USED IN THE TEXT AND BIBLIOGRAPHY

AD	*Anno Domini*
AONB	Area of Outstanding Natural Beauty
CHS	*Collections for a History of Staffordshire*
CUP	Cambridge University Press
DALHC	Dudley Archives and Local History Centre
ed.	Edition
Ed./Eds	Editor/s
EEA	Enville Estate Archives
EPNS	English Place Name Society
GR	Grid reference
HARC	Herefordshire Archives and Record Centre
HMSO	Her Majesty's Stationary Office
JSIAS	*Journal of the Staffordshire Industrial Archaeology Society*
LUP	Leicester University Press
MUP	Manchester University Press
NLS	National Library of Scotland
No./no.	Number
NRO	Northamptonshire Records Office
N.S.	New Series
OD	Ordnance datum, referring to height above sea level as measured by OS at Newlyn, Cornwall
OS	Ordnance Survey
OUP	Oxford University Press
NSJFS	*North Staffordshire Journal of Field Studies*
Pt.	part
RKP	Routledge Keegan Paul

S&W	Staffordshire and Worcestershire (canal)
SRO	Staffordshire Record Office
SSSI	Site of Special Scientific Interest
Staffs	Staffordshire
T&M	Trent and Mersey (canal)
TB	*The Blackcountryman* (magazine)
TLSSAH	*Transactions of the Lichfield and South Staffordshire Archaeological and History Society*
TNA	The National Archives
TNS	*Transactions of the Newcomen Society*
TSAHS	*Transactions of the Staffordshire Archaeological and Historical Society*
TSSAHS	*Transactions of the South Staffordshire Archaeological and Historical Society*
TWAS	*Transactions of the Worcestershire Archaeological Society*
TWHS	*Transactions of the Worcestershire Historical Society*
UHP	University of Hertfordshire Press
Unpld	Unpublished
VCH	*Victoria County History*
Vol.	Volume
WEA	Workers Educational Association
WMS	*West Midlands Studies*
Worcs.	Worcestershire
WSL	William Salt Library, Stafford

CHAPTER 1. INTRODUCTION

1.1. First principles.

Landscapes rarely yield their secrets readily.[1]

A well-known analogy for the development of the varied landscapes that form the English countryside is that of the palimpsest. A palimpsest is a parchment, made from the skin of an animal, that has been written on, that writing partially erased and replaced by more text, and so on, until only jumbled fragments of several layers of text remain. Using this analogy, the present-day English landscape can be seen as incorporating many aspects of those landscapes which preceded it. This idea is usually associated with Professor W. G. Hoskins, the first Professor of English Local History.[2] The palimpsest suggestion is based on the notion that the English landscape is man-made, in effect a result of conscious choices made by people. This idea stands in contrast to the idea that human responses to the landscape are purely governed by the underlying geography and geology – the factors responsible for the creation of landforms, soils, drainage patterns and vegetation.[3] The latter principle, known as geographic or environmental determinism, suggests that human responses to similar landscapes, for example a marshland environment, will be similar wherever that landscape occurs, be it the Somerset Levels, the fens of eastern England or Romney Marsh in Kent.[4]

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[1] F. Pryor, *Paths to the Past*, London, 2018, p.9.

[2] Noted by R. A. Dodgshon, 'Preface' in D. Hooke (ed.) *Landscape, the richest historical record*, Birmingham, 2000, p.v, and by C. Taylor in his introduction to W. G. Hoskins, *The Making of the English Landscape, with an introduction and commentary by C. Taylor*, London, 1988, p.8. See also W.G. Hoskins, *Provincial England*, London, 1965, p.226. The 'palimpsest' idea is not new - the notion is mentioned in F. W. Maitland, *Domesday Book and Beyond*, London, 1897, pp.15-16. More recently, the idea of the palimpsest as an analogy has been questioned: M. Gardiner and S. Rippon, 'Introduction', in M. Gardiner and S. Rippon (eds), *Medieval Landscapes*, Bollington, 2007, p.1.

[3] The interweaving of social, or human factors and the geographic element is summarised in H. S. A. Fox, 'Landscape History: The Countryside', in D. Hey (ed.) *Family and Local History*, Oxford, 2nd edition 2008, pp.120-2.

[4] Observed by Pryor, *Paths,* p.62 who essentially dismisses the idea, preferring to consider the human response to a marshland landscape to be entirely shaped by individual factors rather than determined by the nature of the landscape.

The following thesis will examine these ideas with reference to an investigation of the landscape development of a part of the midlands of England associated with the early development of the iron industry and the beginnings of the industrial revolution, based around the valley of the River Smestow in southwest Staffordshire. This valley, today a mostly rural environment, is a tributary of the River Stour and thus a small part of the wider River Severn drainage basin.

The investigation will have as its focus the development of an industrial landscape in the Smestow valley over the period 1500-1750 when iron-manufacturing in the study area changed from being based on bloomsmithies to utilising much more efficient blast furnaces. This change had enabled the production of bar iron to be substantially increased and the 'industry' expanded into new areas such as the study area. The end date of 1750 has been chosen as it marks an increase in the adoption of 'new technology' in iron-making through the replacement of charcoal in blast furnaces with coal (successfully trialled by Abraham Darby in 1709) thus reducing the dependence on woodlands to produce wood to make charcoal.[5] This change, which took time to adopt, enabled iron production to move to the newly-exploited coalfields in England and can be said to be a 'start point' for the Industrial revolution in England.

The period under investigation is 'bookended' by these two key technological changes in the development of iron-production with a third as its pivot point. The third change, which began in the study area in 1611 is the introduction of the slitting mill, again from the European mainland. This device enabled bar iron, the output of furnaces and then forges, to be slit into rods, thus making it both more transportable and more capable of being shaped

[5] Darby is conventionally credited as being the first iron-maker to successfully produce coke-smelted iron. However, this has recently been questioned, with other individuals based at Coalbrookdale being credited. P. King, 'John Wilkinson (1728-1808) and the Bradley Ironworks' *TSAHS*, vol. LIV, 2023, p.50.

into products in great demand from the end-users of bar iron as nails, a trade which dominated the west midlands during this period.

The Smestow valley has a distinctive local geology, associated landforms, and an equally distinctive landscape history. This distinctiveness arises as a result of, *inter alia*, medieval woodland clearances of the Royal Forest of Kinver and the development of an iron-smelting 'industry' at some of the water-powered mill sites in the valley.[6] Such a combination of factors allows for the testing of these principles of landscape development. The overall purpose of this thesis will therefore be, first, to examine the factors in the landscape that enabled the creation and maintenance of an iron industry. Secondly, the effect of the presence of the iron industry on the later development of the landscape will be investigated. Consequently, this thesis is not a history of the iron manufacturing industry in the Smestow valley, nor in Staffordshire or the west midlands as a whole; their histories are quite widely known, well understood, and where relevant summarised below. Instead, the study is a holistic examination of landscape change over the specific period of the economic dominance of the iron industry within the area. It contributes to the debate on geographic determinism with specific reference to the development of an industrial activity.

The history of the development of the iron industry in the basin, explored below, offers two further elements for consideration - the effect of the market and the impact of technological change alluded to above. In this way, this thesis seeks to widen the discussion and offer original insights by holistically considering the overall effects of geography, individual actions, the impact of the market for iron and the effect of technological changes in the production of iron on the development of the landscape.

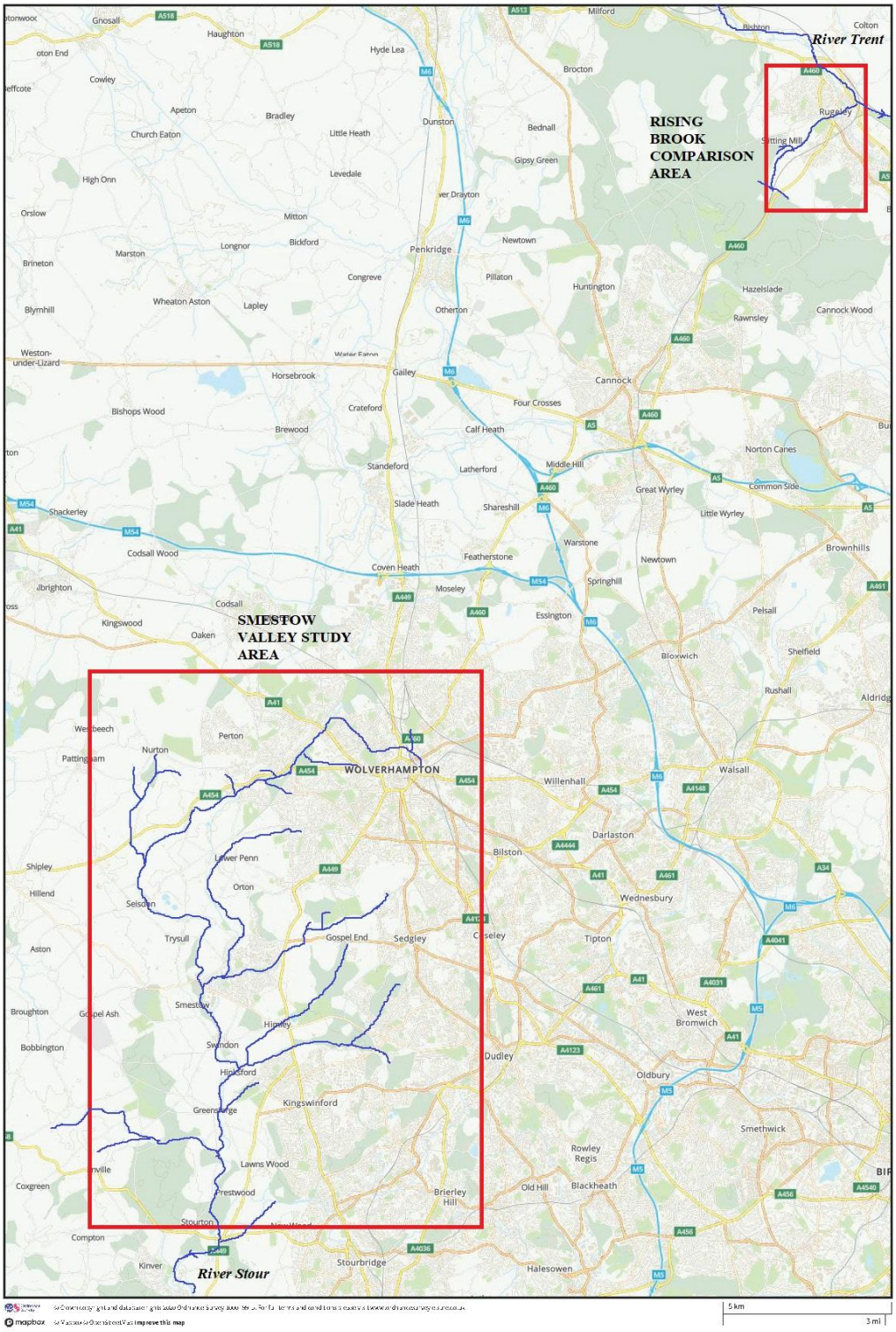
[6] The Royal Forest may have begun in the reign of William I, but could be based on earlier foundations. See chapter 4.

The study area will be contrasted with another Staffordshire drainage basin important in the early development of the iron industry, the valley of the Rising brook, which joins the River Trent at Rugeley. It has many useful points of comparison with study area; considerable woodland derived from the Royally-created Cannock Forest, accessible iron ore, and, similarly reliable streams suitable for the establishment of water-powered mills. Many of those individuals and their families who worked in the sites on the Rising brook also worked in the Smestow basin. Where helpful, contrasts will also be drawn with Weald of Kent and Sussex, a similarly early area of iron-working with considerable reserves of woodland and accessible iron ore. There are also linkages between the individuals and families involved in the study area and the Weald which are examined later.

The following sections in this introductory chapter aim to identify important themes for consideration of the study area's industrial landscape through undertaking a review of the history of its iron-manufacturing and the academic literature associated with it. It will then, using the material derived from the preceding discussion, go on to address the primary questions posed. It will also identify a further set of secondary research questions aimed at exploring detailed aspects of landscape development in an industrial area, which will be outlined in subsequent chapters.

1.2. The study and comparison areas.

Map 1.1. below shows the Smestow basin and tributary stream draining to the River Stour in the south-west with the Rising brook and its tributaries draining to the River Trent in the north-east.



1 of 1

Map 1.1. The study and comparison areas in their Staffordshire locations with drainage emphasised for clarity.[7]

[7] Map derived from Ordnance Survey standard mapping and used with permission.

1.2.1. The Smestow and Rising brook basins.

When the nearly thousand-year-old county map of England altered as a result of boundary changes in 1974, Staffordshire was left with a 'panhandle'-shaped extension on its south-western edge, drained by the small River Smestow, a tributary of the River Stour, in turn a tributary of the River Severn.[8] Most of Staffordshire's drainage is to the east and north-east, into the valley of the Trent through several tributaries. The Smestow, draining ultimately to the Bristol Channel (as opposed to the North Sea) is in marked contrast to the pattern for rest of the county. The Smestow valley today presents a semi-rural aspect, lying just to the west of the previously heavily-industrialised 'Black Country'. The Black Country was one of the early centres of iron manufacturing in England. The contribution of the water-powered iron-making sites in the Smestow valley from the 16th through to the end of the 18th century when coal-based iron smelting moved blast furnace locations onto coalfields, is less well-known, yet is a vital precursor to the Black Country's later industrial development. These iron-making sites were either created *de novo* or converted from water-powered corn or fulling mills in the late 16th and early 17th centuries. The Rising brook basin witnessed a similarly early establishment of iron-making sites using water-powered mills which may have formed the base of the iron manufacturing 'industry' in Staffordshire as a whole. The history of both areas is examined below.

1.2.2 Mill sites in both areas.

Both valleys contain many water-powered mills, not just those associated with iron production. Forty-three have been precisely located within the Smestow basin, with additional sites known that cannot, at present, be firmly located. The Rising brook has fewer

[8] From 1974 most of the southern third of Staffordshire was in the Metropolitan County of the West Midlands, replaced by unitary authorities after 1986. The Smestow basin is predominately in the District of South Staffordshire and partly in the Metropolitan Borough of Dudley. The Rising brook basin is in Staffordshire.

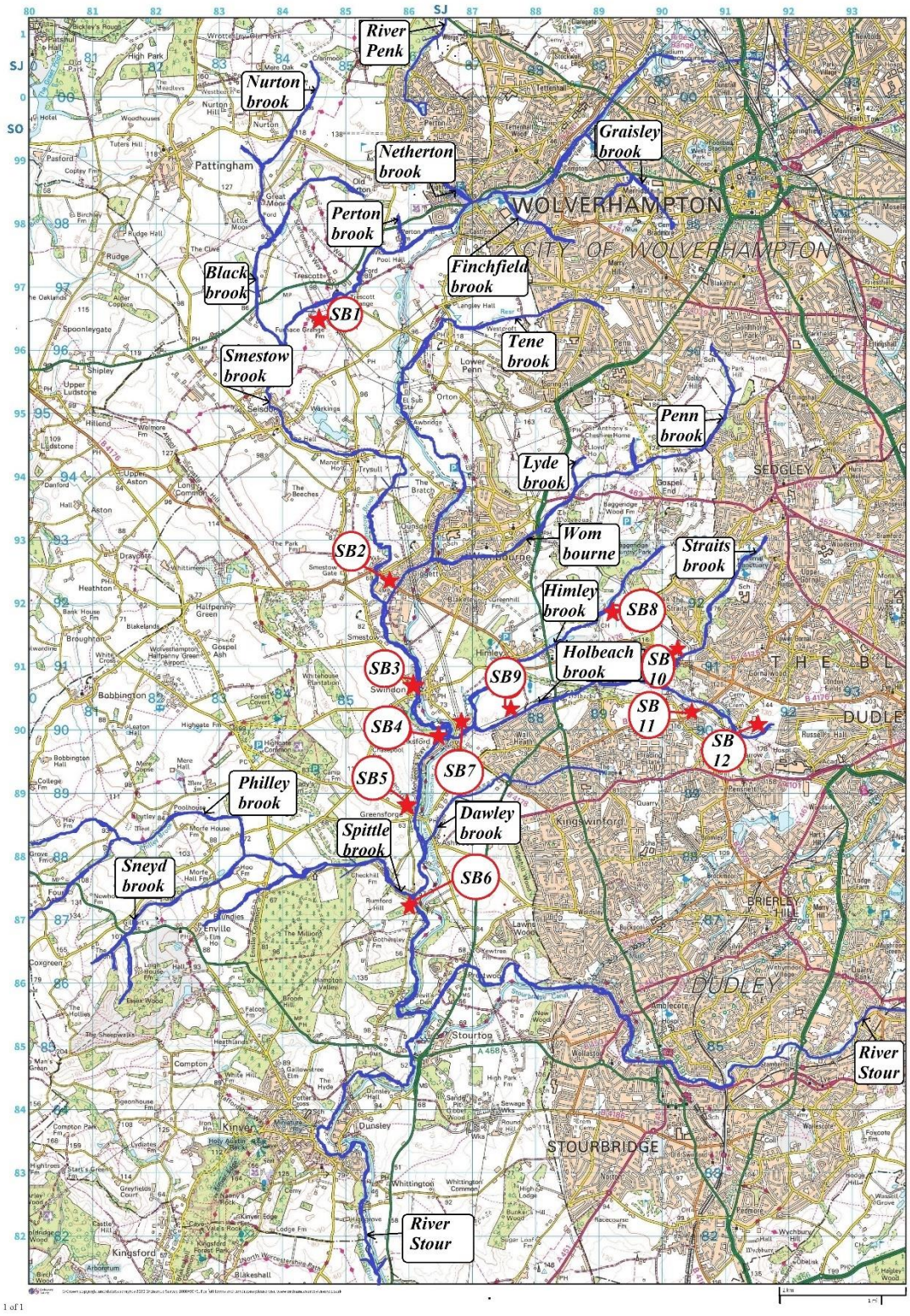
sites, totalling 12. Map 1.2. shows the general location of all known iron-making sites in the Smestow basin study area, and map 1.3. shows all sites in the same basin where grain milling (primarily corn) was the principal activity. Map 1.4 shows the Rising brook sites, all of which produced iron at some point in their working history. The site-numbering references on these maps are used throughout this thesis. They use the prefix SB for sites in the Smestow valley, for example, SB3 for Swindon Forge, and RB1, RB2, and so on for sites in Rising brook.

Key to map 1.2

Site No.	Name
SB1	Furnace Grange
SB2	Heath Forge
SB3	Swindon Forge
SB4	Hollow Forge
SB5	Greensforge
SB6	Gothersley
SB7	Hinksford Forge
SB8	Himley Furnace
SB9	Wall Heath Forge
SB10	Hasco Forge
SB11	Gornal Forge
SB12	Gornal Wood Furnace

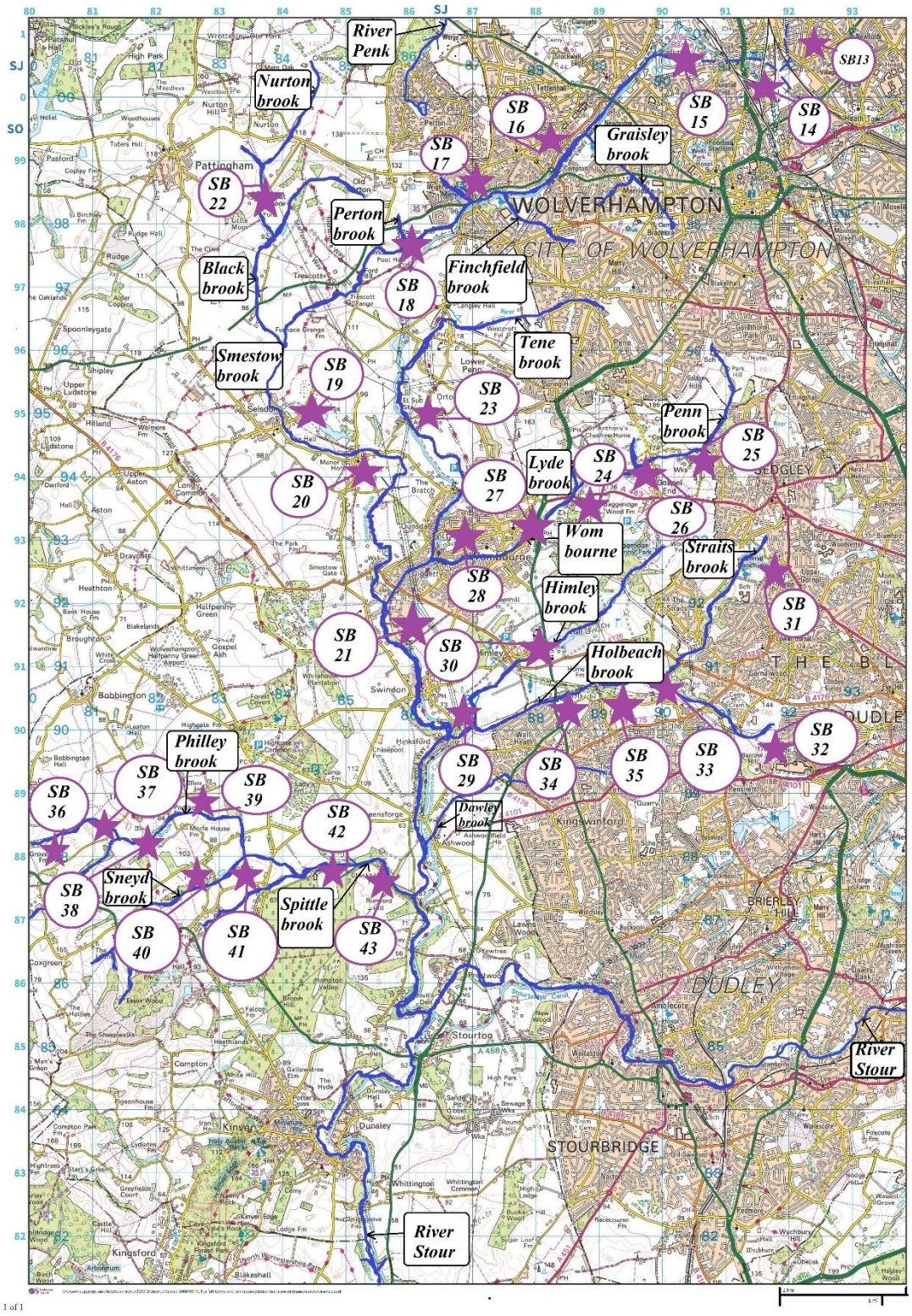
Key to map 1.3

Site No.	Name	Site No.	Name
SB13	Showell Mill	SB28	Ham Mill
SB14	Gorsebrook Mill	SB29	Hinksford Mill
SB15	Dunstall Mill	SB30	Himley Mill
SB16	Compton Mill	SB31	Cotwallend Mill
SB17	Wightwick Mill	SB32	Hunts Mill
SB18	Perton Mill	SB33	Coppice Mill
SB19	Seisdon Mill	SB34	Holbeach Mill
SB20	Trysull Mill	SB35	Oak Mill
SB21	Smestow Mill	SB36	Toys Farm Mill
SB22	Great Moor Mill	SB37	Philley Brook Mill
SB23	Orton Mill	SB38	Lutley Mill
SB24	Woodhouse Mill	SB39	Mere Mill
SB25	Penn Common Mill	SB40	Morfe Hall Farm Mill
SB26	Lyde Mill	SB41	Hoo Farm Mill
SB27	Wombourne Mill	SB42	Spittle Brook Mill
		SB43	Checkhill Mill



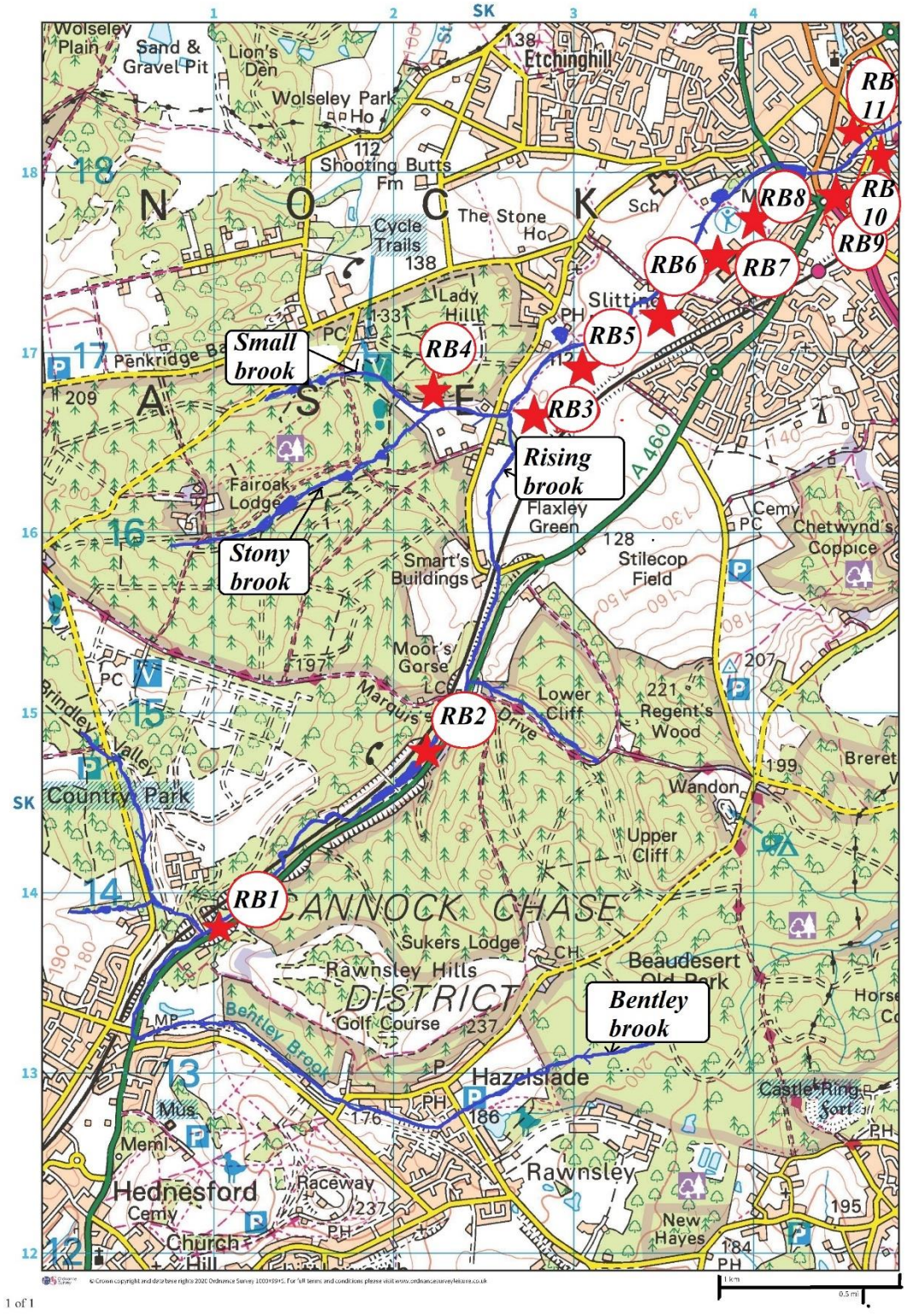
Map 1.2. Known iron-making water-powered sites in the present-day Smestow basin landscape.[9] Drainage system emphasised. See above for the key to the site numbering.

[9] Map based on OS mapping and used with permission.



Map 1.3. All other water-powered mill sites in the present-day Smestow basin. [10] Drainage system emphasised. See above for the key to the site numbering.

[10] Map based on OS mapping and used with permission.



Map 1.4. Known water-powered sites in the present-day Rising brook basin.[11] Drainage system is emphasised. See below for the key to site numbering.

[11] Map extract from OS and used with permission.

Key to map 1.4.

Site No.	Name	Site No.	Name
RB1	The New Furnace or 'newe furnis'	RB7	Slitting Mill
RB2	Old Furnace	RB8	Hagley Park pool
RB3	Cannock Wood Forge	RB9	Hagley Mill
RB4	Old Forge	RB10	Forge Road, Rugeley (1)
RB5	Horns pool		Forge Road, Rugeley (2)
RB6	Devitt's pool	RB11	Tukeyshall Mill

1.3. A brief history of iron-making in Staffordshire.

The identification, description and development of Staffordshire's manufactures has been well-served by the county's historians.[12] The first county survey was by Samson Erdeswick (died 1603) although nothing was published in his lifetime. Dr Robert Plot produced his *Natural History of Staffordshire* in 1686, making extensive reference to the then well-developed manufacturing activities to be found in Staffordshire. Later, the Rev. Stebbing Shaw managed one volume (1798) and part of a second (1801) of his *History and Antiquities of Staffordshire* before madness and death overtook him. William Pitt produced a *Topographical History of Staffordshire* in 1817.[13] Both Shaw and Pitt refer to manufactures, including the influence of families on their development. The Victoria County History of Staffordshire, published from 1908 onward, does similarly.[14] The above sources have all been utilised in the following summary.

The earliest evidence for the exploitation of ironstone in the Smestow basin dates from 1262, in the 'pleas of the forest' where an oblique reference to charcoal burners implies that the charcoal was being produced, and iron-smelting was the most obvious use for it. The

[12] M. W. Greenslade, 'The Staffordshire Historians', *CHS*, 4th series, vol. XI, 1982, pp.1-202.
[13] S. Erdeswick, *A Survey of Staffordshire*, ed. T. Harwood, London, 1844; R. Plot, *The Natural History of Staffordshire*, Oxford, 1686; S. Shaw, *The History and Antiquities of Staffordshire*, vol. 1, London, 1798, vol. 2 part 1, London, 1801; W. Pitt, *Topographical History of Staffordshire,* Newcastle-under-Lyme, 1817.
[14] VCH *Staffs*, vol. I, London, 1908. Other volumes are separately identified as referenced later.

'pleas of the Forest' were legal cases heard and determined by Justices especially assigned to hear these, using officials with specific roles in the management of Royal forests. A record was kept of the relevant decisions. For the study and comparison areas these documents exist and are used below and in subsequent chapters for the light they can throw on the development of the landscape.[15] It can be consequently suggested that locally-based bloomeries exploited ironstone deposits, usually found in association with coal, the most accessible of which in the study area are associated with the 'thirty foot' or 'thick' coal seam in the parish of Sedgley.[16] The first unambiguous reference for ironworking in Kinver Forest (unfortunately not precisely located) is not until 1291. Cannock Forest in the comparison area shows a similar pattern with bloomsmiths reported in Rugeley in 1298.[17] By 1380, 17 iron workers were identified in Cannock forest, again near Rugeley.[18] Both sets of iron-working locations required ready and ongoing access to charcoal in quantity to be effective, which of course both Forests could readily provide.

Clear identification of other developments to the 'industry' in the 14th and 15th centuries remain elusive. In 1546 Cannock Chase had passed by purchase from Henry VIII into the hands of William Paget, Baron Paget of Beaudesert (1506-63).[19] Possessed of a large tract of woodland, Paget clearly considered ways to more intensively utilise this hitherto marginal

[15] TNA E32/187, Plea Roll of Staffordshire Forest Eyre, 1262. Translated with commentary as J. Birrell, 'The Forests of Cannock and Kinver: Select Documents 1235-1372', *CHS*, 4th series, vol. XVIII, 1999, pp.1-276. For the specific reference to 1262 see p.34.

[16] For a glossary of terms used in Iron-making such as bloomsmith, see Appendix A. For ironstone in Sedgley see chapter 2.

[17] VCH *Staffs*, vol. II, p.108 for dates for both Kinver and Cannock Forests, and VCH *Staffs,* vol. V, p.161. See also J. Gould, 'Food, Foresters, Fines and Fellows: A History of Cannock Forest 1086-1300', *TLSSAHS,* vol. VII, June 1965, pp.29-30, where Gould notes that in 1172 the Sheriff of Stafford sent, *inter alia*, 140 spades, 140 pickaxes and 7,000 nails to the King's army in Ireland. This implies the presence of a Staffordshire iron 'industry'. Although iron deposits exist in the Rugeley area, it is not clear where this activity was based.

[18] W. Boyd, 'The Poll Tax of AD 1379-1381 For the Hundreds of Offlow and Cuttlestone Copied From the Original Roll in the Public Record Office', *CHS*, vol. XVII, 1896, pp.186-8.

[19] See chapter 6 for a full discussion of his activities and influence on the development of the industry as well as a family chart to show his relationship to his successors.

asset.[20] His position in the Court of Henry VIII may well have given him an understanding of the iron works of the weald of Kent and Sussex and his occasional military involvement may have made him aware of changes in technology there, especially the introduction of the blast furnace from continental Europe in 1496. That technical change had had the effect of substantially increasing annual output of wrought iron over and above what bloomsmithies could usually provide.[21]

It can be confidently said that the position concerning iron smelting in Staffordshire c.1500 and for a substantial part of the following century was essentially one of a domestic or part-time manufacture, based on the bloomsmithy. The first known 'large-scale' smelting making use of a blast furnace in Staffordshire was, as alluded to above, in Cannock Chase under the aegis of William Paget, who introduced it on his estate (sites RB1, RB2 and perhaps also RB3).[22] Paget provided the capital, presumably from his own resources, to create the first blast furnace in the midlands when his original furnace and perhaps also the '*newe firnes*' was established in the upper Rising brook valley in Cannock Chase.[23] He initially used locally-available ironstone from the Rugeley area, his own wood for charcoal production, and the reliably-flowing Rising brook for motive power for the bellows. His development very quickly became highly successful. Paget added additional furnaces through time, again using the

[20] S. R. Gannon, *Statesman and Schemer*, Newton Abbot, 1973, pp.174, 249. Having said this, marginal land was clearly of value in other ways, as demonstrated by M. Bailey, 'The Concept of the Margin in the Medieval English Economy', *The Economic History Review*, vol. *42*(1),1989, pp.1–17, although soil fertility, one of Bailey's key factors for arable land expansion, cannot have been anything other than extremely low across much of Cannock Forest. See chapter 2 for a discussion of the quality of the area's soils.

[21] B. Awty and C. Whittick (with P. Combes), 'The Lordship of Canterbury, iron-founding at Buxted, and the continental antecedents of cannon-founding in the Weald', *Sussex Archaeological Collections,* vol. 140, 2004 for 2002, pp.71–81.

[22] The sites are discussed further in chapter 3.

[23] The precise date of construction remains obscure. It is clear though that by December 1561 Lord Paget had established at least one blast furnace, as the accounts refer to a new furnace (site RB1) implying the existence of an earlier site (perhaps that at RB2). SRO D(W)1734/3/3/35, A list of accounts for Lord Paget's iron-making activities, does not, regrettably, shed any further light on this vexed question. See also C. M. Welch, 'Elizabethan Ironmaking and the Woodlands of Cannock Chase and the Churnet Valley, Staffordshire', *Staffordshire Studies,* vol.12, 2000, pp.64-5.

Rising brook for power. Ironstone now came from further afield, probably revealing that the source of power to drive the bellows, rather than the sources of iron stone or wood (for charcoal) was the dominant locative determinant for the nascent industry. The importation of ironstone demonstrates the paucity of local supplies in Cannock, as well as a tendency, noteworthy from this early date, whereby blast furnace owners were prepared to move iron ore some distance to their furnaces, indicating that the need for water power kept the furnaces *in situ*.

Johnson provided a thorough, but by now dated, *tour d'horizon* of the industry and related market in Staffordshire from its bloomsmithy-based beginnings through to 1750.[24] He noted that the bloomsmithy 'industry' was centred in the northern part of the county in the 15th century and had spread south to Cannock Chase in the 16th century. He added that bloomsmithy-based practices moved further south again later in the same century into the Tame valley before finally expanding into the study area.

The introduction of blast furnaces seems to have followed a similar, but not identical, trajectory to that of the bloomsmithy. By 1600, iron-making in blast furnaces, using the new indirect method, had become well-established in Staffordshire. In addition to Lord Paget's works in Cannock Chase they had also appeared in the north of the county (around what was later to become the Potteries and the Churnet valley) and in areas further south such as West Bromwich and Perry Barr in the Tame valley.[25] It may be that this initial expansion away from Cannock Chase was driven by the need to exploit woodlands for charcoal

[24] VCH *Staffs*, Vol. II, 'Ironmaking to 1750', 1967, pp.108-20.
[25] H. R. Schubert, *History of the British Iron and Steel Industry from c.450BC to AD1775,* London, 1957, p.180.

elsewhere in the county, as it would seem evident by this period that Cannock had little left to offer.[26]

The Smestow basin came next. Thus, the move of the 'industry' and the blast furnace technology into the Smestow basin meant that it was the fourth area of Staffordshire to be exploited in this way, and the last area to be exploited in this medieval phase of the iron-making industry, where smelting activity was reliant on charcoal.[27] Within the Smestow study area, especially around Dudley, it is apparent that bloomsmithies survived well into the 16th century, including for example, an as-yet-unlocated Funsloe Smithy which may have been just outside the immediate study area in Rowley Regis.[28] The first known blast furnace in the study area was built at Gornal Wood (SB12) and is believed to have been constructed in 1595. The site of the furnace is now lost but was probably in the vicinity of Smithy Lane in Gornal Wood – the southern part of Sedgley parish. From the 17th century the proto-industry began to grow as more sites were established. In the study area examples include Grange Furnace (SB1), Heath Forge (SB2), and Greens Forge (SB5). The period 1650-1750 represents the peak of prosperity for all the iron-working sites in the study area combined with the steady demand for iron goods for both agriculture and domestic use.

The second major technological change after the introduction of the blast furnace was the development of the slitting mill. The mill enabled a method of cutting bar iron (the final stage output of the furnace and forge processes outlined above) into much thinner rods of iron which lent themselves to much easier and quicker production of nails, one of the chief

[26] Welch, 'Elizabethan Ironmaking', p.18.
[27] VCH *Staffs* vol. II p.112.
[28] TNA C 2/Eliz/W15/19, Woode v Lord Dudley, dated 1558-1603. This demonstrates that present day archaeological and historical knowledge of the industrial development of the study area remains one of ongoing discovery of new or hitherto unknown sites.

'domestic' industries of the west midlands and the nascent 'Black Country' in particular.[29] The first slitting mill in England was established in Dartford, Kent; the second was in the comparison area in either 1611 (or perhaps 1619) probably at site RB5.[30] The more well-known Foley family slitting mill at the Hyde, Kinver was built in 1628, and is discussed in chapter 6 in the section on the Foley family.

By 1750, the industry in the study area had changed under the impact of the Foley family and their successors and was facing further upheaval, essentially due to the change in technology brought in by smelting iron with coal rather than charcoal. From around 1750, despite the previously steady growth in the local and regional markets the study area furnaces served, technological change or closure became inevitable. Grange Furnace was about to close in 1750 and only Gothersley and Swindon forges then remained active as iron-making sites. Other iron-making sites such as Hinksford may have been closed (as iron-making venues) as the advent of coal resulted in the creation of newer and more economically-viable furnaces and forges on coalfields for example that found in the adjacent parishes to the east of the study area (the basis of the Black Country) and south Wales. By 1800, this technological and locational transfer was complete, with, as noted, only Swindon Forge and that at Gothersley surviving into this period. Gothersley closed in 1890 and Swindon was the last remaining representative of the industry, finally closing in 1976. The same technological and economic changes affected the iron-making sites in the comparison area. Here, increasingly urgent efforts were made to enable sites to compete although all were eventually doomed to close before the end of the 19th century.

From the discussion above of the history of the Staffordshire industry, several explanations can be advanced for why the blast furnace-based iron industry developed in the way that it

[29] Schubert, *History*, pp.179-81.
[30] See discussion in chapters 2 and 6 under the Paget family.

did in the study and comparison areas. Readily available water-power has been noted. The second reason relates to the availability of woodland to be utilised to produce charcoal. Five tons of wood made one ton of charcoal, and five tons of charcoal made one ton of iron – so the dependency of the industry on access to woodland is clear.[31] The third reason concerns the availability of iron ore close to the woodland and mill locations and the ability to move it across the landscape. Fourthly, the impact of the market and the people and families that worked within it also needs to be considered. These elements are further discussed below.

1.4. The Smestow basin – literature survey.

The Smestow's industrial development, especially its early focus on iron-making has not received a large amount of academic review or discussion. The basin has been treated as a unitary whole just once.[32] Dunphy produced a series of general articles, covering the general social history of most mill sites under discussion, giving some mention of the development of the iron-making activities in the area. He also outlined the histories of some mills on the Smestow's tributary streams. These articles were summarised with additional material as a monograph in 2012.[33] Some mill sites have been described in the Victoria County History, and some iron-making sites have been described elsewhere in small-scale local studies.[34] VCH *Staffs,* vol. XX, has entries for some, but not all, of the parishes in the study area. The histories and development of Sedgley, Penn, Himley and Kingswinford are not covered in any published VCH volume. Penn has been extensively considered by Dunphy in several publications which are referred to below as needed. Other parishes, notably Sedgely, have had histories or studies prepared and these are also noted below as required. Kingswinford,

[31] R. Osborne, *Iron, Steam & Money*, London, 2013, p.232.
[32] F. Brook, 'The Smestow Brook (an Industrial Valley)', *JSIAS*, vol.7, 1977, pp.51–71. This is a gazetteer based on sites reported in J. I. Langford, *The S&W Canal*, Cambridge, 1974.
[33] A. Dunphy, *The Smestow, Wolverhampton's River*, Nottingham, 2012.
[34] For example, P.W. King, 'Grange Furnace', *TB,* vol.41, no. 3, 2008, pp.44–8.

being partially in the Black Country, is mentioned in some local studies and more recently by Baker.[35] Similarly, while reviews of Kinver Forest and its woodland economy have been produced by Cantor and later Birrell, no landscape synthesis has been attempted.[36] The phrase 'the Smestow valley' or Smestow basin, both extensively used here, are not used by any other related work, and there are no reviews of the valley and its settlements, with two exceptions of limited relevance to this study.[37] Furthermore, there are no known relevant archaeological excavations in the valley to assist with understanding elements of landscape change, although work has been undertaken on certain buildings such as Grange Furnace (SB1). That work is referred to as needed in subsequent chapters.

1.5. The Rising brook comparison area literature survey.

As noted above, Schubert first drew attention to the development of the blast furnace in the comparison area and the importance of Lord Paget for the development of the industry in Cannock Chase.[38] Gould later outlined the development of the sites, and Morton afterward added more material to this growing body of knowledge.[39] Further research then focussed on aspects ancillary to iron production.[40] Jones and Harrison concentrated on a late Elizabethan survey describing the negative aspects of the stewardship of Lord Paget's works

[35] https://profchrisbaker.com/historical-studies/kingswinford-manor-and-parish/ (accessed 12 June 2022).
[36] L. M. Cantor, 'The Medieval Forests and Chases of Staffordshire', *NSJFS,* vol.8, 1968, pp.39–53; J. Birrell, 'The Forest and Chase in Medieval Staffordshire', *Staffordshire Studies,* vol. 3, January 1990, pp.23-50. Kinver Forest was discussed by R. M. Grazebrook, *A Short History of Stourton Castle and the Royal Forest of Kinver,* London, 1919.
[37] These are: D. Taylor, *The Impact of WWI on the Smestow Vale Villages*, Oxford, 2017, the only known work to contain Smestow in its title apart from that by Dunphy noted above. The second volume is M. Albutt, *Around the Saxon Hill*, Penkridge, 1990, a pictorial history following the S&W canal.
[38] Schubert, *History*, p.179.
[39] Gould, 'Food, Foresters, Fines and Fellows', pp.21–39; G.R. Morton, 'The Reconstruction of an Industry, the Paget Ironworks, Cannock Chase, 1561', *TSSAHS,* vol. VI, 1966, pp.21–38.
[40] L. M. Cantor, 'The Medieval Forests and Chases, pp.39–53; J. Birrell, 'Peasant Craftsmen in the Medieval Forest', *Agricultural History Review,* vol.17, 1969, pp.91–107.

by Sir Fulke Greville.[41] Welch discussed the iron industry and the management of woodland necessary to support the industry during the Elizabethan era.[42] Francis considered the industrial archaeology of sites in the valley.[43] He was followed by King, who has written extensively on the development of the iron industry, with an especially important paper exploring iron-making sites in the Smestow and referred to the Rising brook sites as part of the phenomenon of pre-industrial revolution economic growth during the Elizabethan period. [44]

More recently, a larger-scale treatment of the Rising brook valley in the 18th and 19th centuries was published in 2013.[45] Thornton examined the social and economic links of Rising brook ironmasters with their counterparts in Blaenavon, south Wales.[46] Later, he produced an overview paper considering all the sites throughout the valley, which he then summarised as a monograph.[47] Archaeological investigation has demonstrated the presence of sites formerly lost. For example, excavations at Horns pool, part of the Slitting Mill site, show that more sites may be found in the future.[48] A recent large-scale LIDAR survey of Cannock Chase focussed on post-medieval archaeology did not note any additional sites.[49] No site is presently extant.[50]

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[41] A. C. Jones and C. J. Harrison, 'The Cannock Chase Ironworks 1590', *English Historical Review,* vol.93, 1978, pp.795–810.
[42] C. M. Welch, 'Cannock Chase: An Industrial Woodland', *West Midlands Archaeology,* vol.38, 1995, pp.7–8; C. M. Welch, 'Elizabethan Ironmaking', pp.17-74.
[43] J.R. Francis, 'The Iron Industry of the Rising Brook Valley', *JSIAS,* vol. 16, 1997, pp.51–71.
[44] P. W. King, 'The Development of the Iron Industry in South Staffordshire in the 17th Century: History and Myth', *TSAHS,* vol. XXXVIII, 1999, pp.59–76.
[45] J. Causer and A. Andrews, 'The Rolling of Iron in Rugeley from 1713 and Other Activities on These Sites to 1890', *JSIAS,* vol. 23, 2013, pp.4–23.
[46] H. Thornton, 'Bygone Ironmasters of Amblecote and Rugeley', *JSIAS*, vol.23, 2013, pp.79-88.
[47] H. Thornton, 'Ironworks of the Rising Brook Valley at Rugeley: Piecing Together the Evidence', *JSIAS,* vol.24, 2015, pp.77–91; H. Thornton, *Ironworks of the Rising Brook Valley*, Rugeley, 2016.
[48] Morton, 'The Reconstruction', and for Slitting Mill, Stoke Museum Archaeology Society, 'Excavations at Horns Pool, Slitting Mill', *JSIAS,* vol. 23, 2013, pp. 67–78.
[49] https://research.historicengland.org.uk/Report.aspx?i=16004. (accessed 10 June 2022).
[50] Thornton, *Ironworks* , p.3.

1.6. The Development of the Staffordshire Landscape.

It is possible to highlight some aspects of the development of the Staffordshire landscape with special reference to the study and comparison areas that require further investigation to assess their impact on the creation and maintenance of the iron-making industry. Palliser identified three general themes: the exploitation of mineral resources, the creation of towns, and thirdly the steady removal of wooded areas (including heaths) in favour of turning the land over to agriculture, incidentally causing an increase in the number of watermills.[51] All three ideas are relevant to the discussion and argument here.

Urbanisation, Palliser's second theme, created a 'rising middle class', with a demand for material objects, often made of iron, as a consequence of growing prosperity. That social development drove demand for iron and created the local market whereby wrought iron was turned into iron goods for retail. Staffordshire's medieval iron-smelting seems to have been 'domestic' in nature whereby iron and iron goods were produced by individuals and their families for small-scale sales only. There is no evidence of anything 'entrepreneurial' until the advent of the blast furnace in the 16th century, as outlined above. The growth of quasi-industrial activities in nearby Birmingham and surrounding villages provided a ready market for iron, but demand was not just confined to Birmingham or the wider midlands, it included the growing market of London. The Smestow mill sites, with links via the riverside *entrepôt* of Bewdley to the carrying trade on the River Severn to Gloucester (for trans-shipment to London) therefore doubly benefitted.[52] These themes are discussed in chapters 5 and 6.

[51] D. M. Palliser, *The Staffordshire Landscape*, London, pp.70-4.

[52] T. S. Willan, *River Navigation in England, 1600-1750*, London, 1936; T. S. Willan, 'The River Navigation and Trade of the Severn valley, 1600-1750,' *Economic History Review*, Vol. 8, part 1, 1937, pp.68-79.

1.6.1. Water power and its impact on the Staffordshire landscape.

The greatest advance in the medieval iron industry…was the adoption of water as a motive power.[53]

The water wheel and its use to mill grain has been known since antiquity.[54] Mills were noted in Domesday (1086) as a source of revenue for the land-owner with over 6,00 recorded in that source.[55] The development of the medieval and later watermill has been extensively considered.[56] Mills needed a regular supply of water (implying a relatively wet climate) with a gradient in the stream course to enable a water-wheel to be placed, and, the water to flow with force. Consequently, if only physical factors were influential, watermill distribution in Britain should be a function of geography and climate. However, grain–growing areas typically are not in high-rainfall places, so streams were modified by the creation of dams to make a pool, thus guaranteeing a steady supply of water and a sufficient drop in gradient to enable a water-wheel to be placed.[57] These modifications included weirs and complex channels (leats) to enable water to move into and out from the watermill. Consequently, many mill sites are marked by long, isosceles-triangle-shaped pools (or relict features) in stream valleys.

The application of water-wheel derived motive-power to inflate the forge bellows was a key technological advance utilising the existing technology of cogs and gears used in driving grain grinding mills. By 1500, the use of mechanically-operated bellows was widespread in

[53] Schubert, *History,* p.133.
[54] M. Watts, *Watermills*, Princes Risborough, 2006, pp.4-5.
[55] R. Hayman, *Ironmaking. The History and Archaeology of the Iron Industry,* Stroud, 2011; H. C. Darby, *Domesday England,* Cambridge, 1977, p.361.
[56] R. Holt, *The Mills of Medieval England*, Oxford, 1988; J. Langdon, *Mills in the Medieval Economy*, Oxford, 2004; M. Watts, *The Archaeology of Mills and Milling*. Stroud, 2002; T. S. Reynolds, *Stronger than a Hundred Men: A History of the Vertical Water Wheel*, Baltimore, 1983.
[57] Adjacent to the Smestow is the River Tame, a Trent tributary. Despite a shallow gradient throughout its course, it powered over 30 mills by the creation of considerable water-retaining and channelling earthworks. See D. Dilworth, *The Tame Mills of Staffordshire,* Chichester, 1976.

the Weald of Kent and Sussex.[58] For a blast furnace to be effective for up to nine months a year, consistency of water supply was essential.[59] Thus blast furnaces, finery forges, and slitting mills had to be sited next to reliable, regular supplies of water. If the power supply to the blast furnace failed, it too would fail and iron would congeal in the furnace, rendering it useless. To avoid this, ironmasters often made complex landscape arrangements to ensure adequate water supplies.[60]

Watermills reflect the technological apogee of the pre-industrial age in terms of the generation and application of power to industrial production. In effect, the relationship means that an important guide to the location of early iron industry is the presence of watermills, or, in their absence, relict features such as the earthworks for controlling and retaining water noted here. These ideas as they apply to the development of the landscape of the study area are developed in chapter 3.

1.6.2. Woodland and its impact on landscape development.

Wood was a vital commodity in the pre-industrial era for fuel, food production and building amongst many other needs. Staffordshire in the medieval era contained considerable amounts of woodland, and at one point five Forests. Forest in the context used here is a legal term meaning 'outside', in that the land so described was subject to Forest law, rather than common law. Areas subject to Forest law were territories set aside or preserved for hunting purposes by the King. Typically, but not always, such areas were often extensively wooded.

[58] Watts, *Watermill*s, p.15.
[59] Blast furnaces were not used during times of low stream flow, especially in the summer.
[60] See chapters 2 and 3.

Ensuring effective management of woodland (through the coppicing system) gave rise to a distinctive local economy and landscape.[61] With Forest Law relaxation, some wooded areas were transferred from royal ownership as private estates or hunting 'chases' to nearby landowners. The attempts made by landowning families to exploit their woodland resources, which were otherwise of little direct monetary value, had a marked influence on the development of the iron industry. Thus, the development of Kinver and Cannock Forests and adjacent areas such as Pensnett Chase will be considered in detail.

1.6.3. Transport links.

The influence of transport routes on the siting of the iron-industry in the landscape of the two study areas was also likely to be significant. Roads as communication routes were necessary to move the considerable quantities of iron ore, limestone (used as a flux) and charcoal that blast furnaces needed, and, to move the finished goods to end-users. The relative ease offered for movement through the valleys may have influenced the location of such roads, and is considered in chapter 5.

A *leitmotif* for this study is the impact of the canal as a landscape feature on the study areas, even though the creation of the canal is strictly outside the 1500-1750 time period under review. It is considered as it was a factor in assisting some of the iron-making sites survive the change to coal and other technological changes at the end of the period. The iron industry sites in Smestow used the S&W canal to import raw materials and export finished goods. The same though cannot be said for the Rising brook sites with the Rugeley T&M canal wharf. The S&W, was influenced, even at the route-planning stage of its creation and

[61] Cantor, 'The Medieval Forests', p.40-2; Welch, 'Cannock Chase: An Industrial Woodland', pp.7–8; D. Hooke, 'Pre-Conquest Woodland: Its Distribution and Usage', *Agricultural History Review,* vol.37, 1989, pp.113–29.

construction, to ensure sufficient volume of water was left in the Smestow and not abstracted or blocked to drive mills.[62]

Rivers and drainage systems are a critical aspect to this study, as it is focussed on two river basins, both of which were part of the drainage basin of much larger rivers – the Severn and the Trent respectively. The River Severn was a key trading artery for large parts of England and Wales.[63] It was used extensively to transport iron ore from the Forest of Dean upstream at least as far as Bewdley to be used in the forges run by the Foley family from the mid-17th century onward. Finished goods were then shipped from Bewdley back down-river to Gloucester and Bristol and then outward to London or overseas.[64] This trade is also examined in chapter 5.

The Rising brook had only one railway, built for coal-mining interests, connecting Rugeley with Cannock. For the Smestow, the nearest line was an afterthought in the local rail system, and closed in 1966. The more minor role of the railways will also be briefly considered.

1.6.4. Ironmasters and their families.

In the Smestow basin land-ownership was in the hands of local gentry and lesser nobility, notably the Lords of Dudley. However, the five main iron-working sites were later owned and managed by the Foley family. The Foleys dominated the 'industry' locally, regionally and at times nationally, from the middle of the 17th century through to the middle of the 18th.

[62] On the S&W canal at Dunstall James Brindley created an aqueduct carrying the Smestow over the canal - an unusual and expensive feature, designed to preserve the flow of water on the Smestow to power downstream mills, indicating the importance of these mills and the pressure the owners could bring on the canal company during the canal construction phase. Brindley was conscious of the need for the water bridge to be properly constructed, see R. Shill, *Silent Highways*, Stroud, 2011, p.33.
[63] R. Hayman, *Severn*, Logaston, 2012, p.4.
[64] M. Rowlands, *Masters and Men*, Manchester, 1975, pp.54-5.

Throughout this period, they bought and sold iron-works, depending on assessments of prosperity, actual and potential of each one.[65] The Foley family relied extensively on managers for their works, and occasionally sold sites to them. Other sites were sold to families or individuals keen to exploit their perceived economic potential. The Foley family was amongst the first to try to operate the iron industry on a national, rather than regional footing. The Foleys have been subject to academic consideration along with their subsequent role in national politics.[66] Schaffer looked at their impact on the industry in a more regional context.[67] Gale considered the family as innovators,[68] while King focused on their buying and selling of iron-producing sites and the managers they employed to establish a financially-sound business.[69] The overall impact of the first four generations of the Foley family has been summarised in a monograph.[70]

Studies concerning Dud(d) Dudley, the illegitimate son of Edward Sutton, Lord Dudley, who claimed to have smelted iron using coal before 1709, also have some relevancy, as one of the sites where Dud Dudley claimed he did this was Himley Forge (SB8) which he apparently built himself.[71]

In the Rising brook, the Paget family, through Sir William Paget (1505/6-63) became the dominant landowners from 1542. Later, the family passed control of their ironworks to the

[65] R. Peacock, *The 17th Century Foleys,* Kingswinford, 2011, has a summary.
[66] H. E. Palfrey, 'Foleys of Stourbridge', *TWAS*, new series, vol. xxi, 1944, pp.1–7; R.L. Downes, 'The Stour Partnership, 1726-36: A Note on Landed Capital in the Iron Industry', *Economic History Review*, vol. II, 3, 1950, pp.90–5; B. L. C. Johnson, 'The Stour Valley Iron Industry in the Late 17th Century', *TWAS*, new series, vol. XXVIII, 1950, pp.35–46; B.L.C. Johnson, 'The Foley Partnerships: The Iron Industry at the End of the Charcoal Era', *Economic History Review*, vol. II, 4, 1952, pp.322–40.
[67] R. G. Schafer, 'Genesis and Structure of the Foley "Ironworks in Partnership" of 1692.', *Business History,* vol. 13, no. 1, 1971, pp.19–38; R.G. Schafer, 'A Selection from the Records of Philip Foley's Stour Valley Iron Works 1668-74 Part I', *TWHS*, new series, vol. 9, 1978, pp.1-128; R.G. Schafer, 'A Selection from the Records of Philip Foley's Stour Valley Iron Works 1668-74 Part II', *TWHS,* vol.13, 1990, pp.1-116.
[68] W. K. V. Gale, 'Richard Foley and the Iron Slitting Mill', *TB,* vol. xxi, no. 3, 1988, p.10.
[69] King, 'S. Staffs', pp.59–76.
[70] Peacock, *The Seventeenth Century Foleys*.
[71] Dud Dudley, *Metallum Martis*, London, 1665.

Chetwynd and Coleman families, who were responsible for the introduction of the first slitting mill to the area.[72] Later control passed briefly to the Foley family. Thus, the iron-making processes and sites in both the study and comparison areas were dominated over a period of more than 200 years by a small group of families who either owned, leased, or operated them. Analysis of the effect of this control is offered in chapter 6.

1.6.5. The influence of the market and technological change.

The output of the forges and furnaces was sought after by locally-based iron manufacturers of finished goods, thus creating a local market. These manufacturers needed specific types of iron for their products, such as scythes, sickles, spades and so on. A considerable proportion of the forge output also went to be shaped into nails, an industrial activity which was already present in the area as it lent itself to the farmer/industrialist method of making a living prevalent in the area from an early date. As such, during the principal period at the centre of this study, a local market was developed for iron to make finished goods. The amount of iron demanded meant that alternative sources of ore had to be sought from the second half of the 17th century which moved a local market into a regional and then a national market. These issues are explored in chapter 6.

The nature of the market began to change after the successful use of coal to smelt iron in 1709. Once the iron industry was freed of the need to be located either near charcoal or water-power, foundries and works opened in the Black Country to be nearer to sources of coal and, secondly, their market.[73] These final-stage iron manufacturers were the market for the study area forges, and remained so, for most of their existence as iron-making sites. A relationship between the study sites and their markets had come into existence by the 17th

[72] Causer and Andrews, *The Rolling of Iron*, pp.8-11.
[73] W. A. Smith, 'John Wilkinson and the Industrial Revolution in South Staffordshire.' *WMS,* vol.5, 1972, pp.24-7.

century, which was maintained, almost as custom and practice, by this local aspect of the market. This longevity of relationship, it will be contended, perhaps counter-intuitively, had a negative impact on the study area sites as it guaranteed a market, so inertia, perhaps enhanced by family connections, inhibited technological and economic adaption and change. Although much technological change was occurring elsewhere, this market stability meant that industrial development, and therefore the future of these sites, may have contributed to their eventual closure as they had no need to innovate or change. These ideas are also discussed in chapter 6.

1.6.6. Summary of the study and comparison areas.

No serious scholarly attempt has been made to explore the connections between the early industrialisation of the Smestow, its access to water power and the probable usage of Kinver Forest and surrounding woodland for charcoal production. The landscape synthesis offered here, with its comparison with the Rising brook valley, enables a provisional overall response to the development of the landscape as mediated through the iron industry, water power and woodland. This thesis is also therefore a contribution to studies of the development of the landscape and economy, especially in the 16th-19th centuries, of the midland part of England.

1.7. Research questions, methodology, and sources.

The academic study of landscapes as an element of historical and/or geographical enquiry in the UK was pioneered by W. G. Hoskins and fully articulated in his *The Making of the English Landscape*, 1955. Since then, the discipline has substantially expanded. One summary of knowledge and direction taken by the discipline was prepared in 2000, edited by Christopher Taylor, reviewing work that had occurred in the 45 years since Hoskins wrote, comparing

progress made under various themes against his 1955 work and noting new areas of academic enquiry such as industrial landscapes, which did not feature strongly in Hoskins' original work.[74] A second wide-ranging review was published in the same year.[75] In the introductory remarks to that study, Dodgson noted that 'landscape archaeology established itself as one of the most productive and vital parts of the contemporary debate'.[76] He indicated that the combination of fieldwork with archival research along with contributions with other disciplines such as, *inter alia*, onomastics and ecology was the probable way forward for effective landscape history studies.

Later work, for example that of Jones and Page, who reported on their extensive project on a south midlands early medieval wooded landscape emphasised this multi-disciplinary approach.[77] Similarly, a slightly later-published chronologically-arranged three volume review of landscape research underlined the combination of approaches led by landscape archaeology, often involving extensive archaeological excavations, either of whole sites or of large areas through test-pit work.[78] Christie and Stamper, although writing specifically on medieval rural settlements presented a number of regional surveys of, in effect, landscape development based on landscape archaeology as well as more thematic overviews to show the continuing usefulness of this approach.[79] Williamson, as a landscape historian also applied such ideas to his review of the development of the landscape over the early medieval era.[80]

[74] W.G. Hoskins, *The Making … with an introduction*.
[75] D. Hooke, (ed)., *Landscape the Richest Historical Record*, Birmingham, 2000.
[76] R. A. Dodgson, 'Preface,' in Hooke (ed) *Landscape the richest historical record*, p.i.
[77] R. Jones and M. Page, *Medieval Villages in an English Landscape*, Macclesfield, 2006.
[78] A. Fleming and R. Hingley (eds.), *Prehistoric and Roman Landscapes*, Macclesfield, 2007; M. Gardiner and S. Rippon (eds.), *Medieval Landscapes*; P. S. Barnwell and M. Palmer (eds.), *Post-medieval Landscapes*, Macclesfield, 2007.
[79] N. Christie and P. Stamper (eds.), *Medieval Rural Settlement*, Oxford, 2011.
[80] T. Williamson, *Environment, Society and Landscape in Early Medieval England*, Woodbridge, 2013.

Onomastics have also heavily influenced the development of landscape development studies. The work of Gelling has been particularly effective, including the later modification of her work by Cole.[81] Work by Carroll and Parsons has also made extensive use of cross-disciplinary approaches to highlight current understanding of the impact of the landscape in terms of the highly specific application of place-name elements attributed to the Viking and early English eras.[82] Further work brought together English place-names and the geography of the era in a review of Trent valley place-names with a fluvial component, notably describing the precise meaning of *wæsse* (washlands).[83]

All the examples above have concentrated on the inter-disciplinary approach of archaeology, onomastics, history, and geography amongst other disciplines. A concentration on 'cultural' aspects of the landscape is also a feature of recent research, where the landscape is considered in terms of the societies that used its resources, placed a value on it, and subjected it to negotiation and change. Again, this approach is of value, albeit at times somewhat theoretical, and where appropriate is referred to below.

The concept of the character of the landscape or the process of historic landscape characterisation (HLC) has also emerged as a significant technique. This approach seeks to investigate the wider aspects of the 'designed' landscape, beyond, for example that of historic houses, their gardens and parklands into the assemblage of the many and varied

[81] M. Gelling, Signposts to the Past, London, 1978; M. Gelling, Place-names in the Landscape, London, 1984; M. Gelling and A. Cole, The Landscape of Place-names, Stamford, 2000, and, more recently, A. Cole, *The place-name evidence for a routeway network in early medieval England*, unpld D. Phil thesis, University of Oxford, 2010.

[82] J. Carroll and N. Parsons (eds.), *Perceptions of Place*, Nottingham, 2013. This volume marked something of a *rapprochement* between archaeologists and place-name studies as relationships have not always been harmonious.

[83] R. Jones, R. Gregory, S. Kilby and B. Pears, 'Living with a trespasser: Riparian names and medieval settlement on the River Trent floodplain', *European Journal of Post-Classical Archaeologies*, vol.7, 2017, pp.33-64.

elements, both temporally and spatially that combine to form a distinctive landscape.[84] The concept began to be applied in England from 2006 and most of the country has now been subject to this approach, including for planning purposes.[85] Historic England has actively supported this method.[86] It is proposed to adopt the framework of the 'wider landscape' in this thesis as it enables a variety of different scales to be adopted, pertinent to a consideration of for example the small-scale effects of local water-course manipulation.[87]

The use of scientific methods of enquiry has been a recent phenomenon in seeking to understand the development of the landscape. Archaeology itself is of course one example – the use of aerial photography another. A more recent example has been ground-penetrating radar, a useful device to aid archaeological excavations. More recently, a version of 3D laser scanning known as laser imaging, detection and ranging (LiDAR) has found applications in landscape development analysis as the technique is particularly effective in removing the masking effects of vegetation or soil accretion to display the underlying landforms or settlement traces. In the comparison area, a survey of Cannock Chase has identified features from the 15th to the early 20th century, including the development of its coal and iron-manufacturing industrial landscape.[88] As LiDAR surveys of much of England have now been made openly available, LiDAR data has been utilised here where relevant.[89]

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[84] S. Rippon, *Historic Landscape Analysis; Deciphering the countryside*, Oxford, 2012, pp.3-4.
[85] https://archaeologydataservice.ac.uk/archives/view/HLC/ (accessed 12 January 2023)
[86] https://historicengland.org.uk/research/methods/characterisation/historic-landscape-characterisation/ (accessed 23 January 2023)
[87] See for example https://historicengland.org.uk/advice/planning/understanding-historic-places/ (accessed 12 January 2023)
[88] http://www.chasethroughtime.info/Historic-research/Historic-Research.aspx (accessed 12 June 2021).
[89] See https://www.data.gov.uk/dataset/f0db0249-f17b-4036-9e65-309148c97ce4/national-lidar-programme Guidance on LiDAR usage has been published by English Heritage, and that is in the main followed here:
https://historicengland.org.uk/research/methods/airborne-remote-sensing/lidar/
relating to 'Using Environment Agency Lidar data. Pdf'. LiDAR extracts are primarily taken from the DEFRA portal: https://environment.data.gov.uk/DefraDataDownload/?Mode=survey (all accessed 5 January 2023).

One specific method of landscape analysis is worth mentioning further. Retrogressive landscape analysis is a method whereby research moves from what is known through to what is not known. An effective summary of the method has been provided by Antonson.[90] In landscape terms, this method can mean using a contemporary map of the area under study and removing modern transport links such as motorways and railways, settlement growth attributable to the post-industrial revolution period, changes in the size and distribution of fields and their boundaries and so on to gain an appreciation of the landscape as it might have existed in the 18th century or earlier.[91] Equally, the changing morphology of earlier settlements, field patterns, woodland clearances, or communication routeways can be discerned through application of this technique.[92]

Although valuable, especially in areas where surviving documentation is sparse, this approach is not in the main used in the following thesis, as it is argued that the combination of sources outlined below does enable an effective chronology of landscape development for both the study and comparison areas to be established. Nevertheless, where applicable, aspects of this technique will be utilised in the analysis in subsequent chapters. This thesis will, given the review of current work in landscape development outlined above, adopt a similar multi-disciplinary approach using a combination of fieldwork and archival material along with the results of LiDAR imaging to bring together the evidence provided by onomastics, geology, topography, archaeological excavations, and hydrology along with earlier academic reviews (as outlined earlier) to provide a holistic landscape analysis. The

[90] H. Antonson, 'Revisiting the "Reading the landscape backwards" Approach: Advantages, Disadvantages, and Use of the retrogressive method.' *Rural Landscapes*, vol. 5(1), 2018, pp.1-15.
[91] For example, Oosthuizen adopts such an approach in her analysis of aspects of the Cambridgeshire landscape in the early medieval period; S. Oosthuizen, *Landscapes decoded. The Origin and Development of Cambridgeshire's Medieval Fields*, Hatfield, 2006.
[92] For example, C. Howell, *Land, family and inheritance in Transition: Kibworth Harcourt, 1280-1700,* Cambridge, 1983, where the technique is utilised to outline the development of a Leicestershire village. A tellingly solitary Staffordshire example is C. Smith, 'The Historical Development of the Landscape in the parishes of Alrewas, Fisherwick and Whittington: A Retrogressive Analysis', *TSSAHS*, vol. XX, 1980, pp.1-15.

approach adopted will be chronological for the reasons outlined in preceding paragraphs, with work presented on specific themes that are relevant to the development of the landscape in the round.

The research ideas presented in this thesis are also influenced in part by the concept of the *long durée* (the long term) derived from the French *annales* school. Such an approach is predicated on the suggestion that the long-term movements (lasting historical or cultural trends, patterns, or behaviours) is of more value in understanding the past than the short-term, such as individual actions or activities. It is based on the principle that although change does happen, it occurs over a long period and may not be noticeable in an individual lifetime.[93] This is particularly relevant in the study area where the influence of geology, soils and climate is long-lasting, as was the technology used in the production of bar iron in the period between the introduction of the blast furnace and the move to smelting iron with coal. Additionally, Chapter 6 will show that effect of families on the development of the landscape lasted across several generations in the period examined – at least five in the case of the Foley family and the owners of the Dudley Estate. Such longevity of family involvement tends to validate the *long durée* method.

Geographic determinism remains a current method of intellectual inquiry. The principles of geographic or environmental determinism were discussed in ancient Greece and China as well as during the renaissance in Europe. In the late 19th century Semple and Huntington developed the theory to explain European colonialism of Africa and other regions.[94] As such, despite a link with geo-political approaches such as those pioneered by Mackinder, the

[93] Eminent proponents include E. Le Roy Ladurie, *The Peasants of Languedoc*, Urbana, 1976, *Montaillou*, London, 1978, and his mentor, F. Braudel, *The Mediterranean and the Mediterranean World in the Age of Philip II*, vol.1, London, 1972.

[94] E. Semple, *Influences of Geographic Environment*, New York, 1911; E. Huntington, *The pulse of Asia, a journey in Central Asia illustrating the geographic basis of history*, Boston, USA, 1907.

theory declined during the 20th century.[95] However, it has been rejuvenated by Diamond (amongst others) who used the nature of the physical environment experienced by peoples in countries to explain the strength of such societies and their institutions.[96] Despite this resurgence, the theory is still subject to criticism.[97] Nevertheless, the impact of geographical factors on human development remains in vogue, and an active method of inquiry, as recent popular studies testify.[98] As a consequence, despite the objections of Pryor noted earlier, this active theory continues to have some validity and will be further examined through this thesis.[99]

Finally, it is important to note that industrial landscapes and their development, as noted above, have only slowly become the subject of intellectual enquiry, and there are many questions and links still left to explore.[100] Although this study is, in essence that of an industrial area, it derives its academic *raison d'être* by exploring the landscape development of two similar but contrasting drainage basins which contained landscapes created and dominated for some 300 years by the iron industry, its workings, and effects. The nature of that development, the people who undertook it, how they were influenced by the growing market for their goods and how they integrated and adapted to technological change in the industry are key elements in the development of the landscape over this period. In particular, it is important to understand how technological change operated in both 'opening up' an area for landscape change, and 'closing down' that change at a later date.

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[95] H. J. Mackinder, 'The Geographical Pivot of History', *The Geographical Journal*, Vol. 23(4) 1904, pp.421–437.
[96] J. Diamond, *Guns, Germs and Steel,* New York, 1997.
[97] D. Acemoglu and J. A. Robinson, *Why Nations Fail*, New York, 2013.
[98] T. Marshall, *Prisoners of Geography*, London, 2016; L. Dartnell, *Origins*, London, 2019; T. Marshall, *The Power of Geography*, London, 2021.
[99] Pryor, *Paths*, p.62.
[100] K. Hudson, *Industrial Archaeology, an Introduction*, London, 1963 was amongst the first books on the topic: The Association for Industrial Archaeology was founded in 1973. B. Trinder, *The Making of the Industrial Landscape*, London, 1982, remains a useful guide.

1.7.1. Questions to be considered.

It is proposed to consider the following principal questions related to the study area (and comparison area) with specific reference to the iron industry:

- Why were these areas the site of early industry? In particular:
    - What factors were behind the choices of these basins to produce iron?
    - What aspects of the landscape enabled these sites to flourish?
    - Is the principle of geographic or environmental determinism associated with the location of minerals, woodland, and stream power the most effective response to the above, or, did other factors associated with land ownership, market preferences, technological change, and social and familial links play significant roles?
    - To what extent can individual factors or people be isolated as key decision-makers in this landscape development?
- What is it about the pattern of landscape development in these two basins that made them sufficiently 'special' to be used for industry from an early date?
    - To what extent is the connection with relatively large areas of surviving early medieval woodland or land under Forest law relevant to the establishment of the iron-making industry?
    - Why was this use continued, despite the attractiveness with the passage of time of new sites outside the region such as south Wales, with which later owners had substantial familial links?
    - Why did some of the Smestow sites 'succeed' whilst all of those in the Rising brook ceased production at an earlier date than those in the Smestow? What was the effect of the landscape, and/or the other uses to which the landscape could be put, on this 'success' or 'failure'?

- To what extent did the presence of locally-available iron ores along with considerable quantities of wood to make charcoal (again locally available) combined with the freely and reliably regular provision of water power, present the opportunity to create blast furnaces and thus start to change the nature of the landscape?
- Was the exploitation of woodland resources initiated by aristocratic/gentry landowners to create charcoal for use in blast furnaces?
    - Did these families 'sponsor' the creation and maintenance of blast furnaces/forges using their resources of capital?
    - How were their family relationships and later family links utilised and exploited?
    - How were 'new men' brought in and bound in (or not) to these family networks? How was the concept of profitability understood by the 'new men' and managers? Why were sites sold off, by, for example by the Foley family in the later 17th century who parted with those sites they believed were not so lucrative? Despite this, why were yet further people interested in raising the capital, or using their own resources to buy these sites? From the above, examples include Greensforge (SB5) and Gothersley (SB6).
    - Once the 'creation' phase ended, how and why was the day-to-day running of furnaces handed over by their owners to site lessees or managers? To what extent did these managers specialise in the operation of blast furnaces?
- What were the reasons for combining the locations of furnaces with forges (and later slitting mills)? Was this simply a reflection of site economic productivity and profitability? To what extent was 'vertical integration' part of the thinking of the owners?
- All these iron-making activities clearly had ready access, through appropriate effective transport links to a local market for their products. How was these routes and markets achieved and maintained?

These areas of research can then be synthesized to produce two further and related higher-level questions:

- What general conclusions about landscape use, development, change and exploitation can be drawn about the study and comparison areas?
- What more wide-ranging conclusions can be derived about the efficacy of historical and topographical methods of enquiry in charting the development of landscape development?

1.7.2. Sources.

We have to remember that it is the landscape that is our prime concern and, often...it is that landscape that contains the answers to the questions it poses.[101]

This thesis will consider both basins as landscapes which, although primarily agricultural, were areas where the exploitation of minerals and other resources gave rise to industrial development at a time before the main period of the 'industrial revolution' happened in Britain thus making them early industrial landscapes.

Many sources are available to respond to the research questions posited here. Some of the existing literature has been mentioned above, and these (as well as others) are used where necessary. Documentary and early cartographic sources held in archives are of critical importance for considering responses to some questions. One example from The National Archive, the 'pleas of the Forest' have already been mentioned, and these can also be used for additional information as to the state of the woodland in Kinver Forest, and how it was used at the times these 'views' were taken. The limitations of such sources need to be

[101] C. C. Taylor, 'The Plus Fours in the Wardrobe: a personal view of Landscape History', in Hooke (ed.), *Landscape*, p.160.

understood, especially as they were not initially intended for the purposes they are used here. Archival material includes for example medieval court cases on mill ownership, although the limitations of such are recognised.

Local archives contain most of the documentation reviewed. Two sets of 'family' papers have been used – those of the Foley family and those of the Lords of Dudley (de Somery, Sutton and Ward families) as these were the principal landowners in the study area during the period under review. Both sets of papers cover several centuries and number in the thousands of separate items, so this thesis is an exercise in selectivity. Those papers used are noted in the bibliography. There are several limitations attached to using these papers, including the recognition that not all relevant material may have survived, and that where contracts or exchanges of land or monies are concerned, only one part of the arrangement has been preserved, so the full meaning of the agreement may not always be evident.

Research has been primarily focussed on the use of the documentary materials outlined above, coupled with an examination of historic OS maps and Enclosure, Tithe and estate maps. The high surveying qualities of OS maps, supplemented by the others noted have been used to enable investigation of iron-making sites, possible mill sites, and related water-course changes.

Non-documentary sources are essentially twofold. Firstly, these are records derived from LiDAR surveys (referred to above) which require careful interpretation. LiDAR images have been used in the potential identification of hitherto lost features such as stream course manipulation and potential sites of mills and woodland boundary banks. Associated with LiDAR images are aerial photographs. The national collection held by Historic England

heritage has been consulted and although of some value, these are not specifically used here. [102]

The second type of non-documentary source is fieldwork, which involved walking stream valleys and investigating industrial sites and recording findings photographically and in notebooks.[103] Fieldwork has therefore followed on from, and been shaped by, documentary evidence and undertaken to verify potential sites, anomalies in stream courses and related issues. Unless access or permission proved impossible to obtain, all sites noted on maps 1.2-1.4 have been visited at least once, some several times. It should be noted that no fieldwork, no matter how extensive, can be as comprehensive and error-free as would be preferred. An element of observer bias is usually likely to be present. [104]

1.8. Thesis structure.

Chapter 2 outlines the factors that have created the geographical landscape of both study areas by illustrating and examining the physical geography, settlements, hydrology, and geology. The chapter will include, where available, historic climate records and more modern material from the Environment Agency to ascertain the nature of the hydrology of the basins in the medieval period. Additionally, the nature of soil types in the area will be examined to consider the effects of agriculture and woodland growth. Once this essential background to the two drainage basins has been established, the chapter will describe the histories of the water-powered sites using research-derived material plus fieldwork

[102] For example, this image across the Tene brook and S&W canal: https://historicengland.org.uk/images-books/archive/collections/aerial-photos/record/EAW030436 (accessed 12 January 2023).
[103] Following W. G. Hoskins, *Fieldwork in Local History*, London, 1967; R. Liddiard, 'Medieval Designed Landscapes: problems and possibilities', in M. Gardiner and S. Rippon, (eds.) *Medieval Landscapes*, Macclesfield, 2007, pp.202-5.
[104] Some of the fieldwork principles outlined by Historic England have been utilised. *Understanding Place*, Historic England, 2017, p.24.

undertaken in the study area to create a gazetteer of all known iron-working sites along with all other mill sites, both known and currently known but not definitely located, that used the water resources of the valley to generate power.

Chapter 3, using the gazetteer from chapter 2, considers the impact of the creation and management of water-powered sites on the overall development of the fluvial landscape at the micro-level through an appropriate examination of sites, surviving buildings and water control features. The material in this chapter is largely derived from a combination of fieldwork and literature reviews.

Chapter 4 discusses the impact the effects of Norman-era Forest Laws on the development of the landscapes of the two study areas. Then follows a review of the importance of woodland in terms of the requirements for mill owners to have access to ready supplies of timber to produce charcoal to provide the main source of combustible material for blast furnaces. Together, chapters 3 and 4 examine to what extent the principles of geographic determinism, applied to climate, landforms, minerals, and water power have affected the development of the landscape.

Chapter 5 considers transportation routes as landscape features, focussing on the road network in the medieval period and how this was adapted to service 'new' locations associated with iron production. Water routes are examined, both the S&W canal and the River Severn with its 'carrying trade'. The impact of the railway, a relatively late arrival, is briefly reviewed.

The decisions made by those that owned the iron-working sites are covered in chapter 6, as is the impact of the developing market for iron in the local and wider regional area in the

period 1500-1750. These decisions had a direct impact on the development of the landscape in both study areas. As no single area in Britain operates entirely independently of its surroundings, family linkages form part of this analysis. Access to markets for iron, whether part-refined or as a finished product, is also discussed here. The lengthy periods over which some families operated, allied to their control of the market makes this perhaps the most important element in landscape development. The study of the market, linked to technological change in the industry, is a novel and original element in analyses of this nature.

The conclusion lays out and discusses the findings from these analyses and responds to the questions outlined above in section 1.7.1 as well as providing an outline of areas for potential further research.

CHAPTER 2. ASPECTS OF THE PHYSICAL AND HUMAN DEVELOPMENT OF THE STUDY AREAS

This though th' industrious muse hath been employ'd so long
yet is she loth to doe our little Smestall wrong
That from her Wulfrune's spring neere Hampton plyes to pour
the wealth shee there receives into her friendly Stour.[1]

2.1. Introduction.

Following on from the introductory chapter, this section examines the general physical geography of the Smestow basin, and sets that geography within a wider context. Secondly, the geology and then pedology of the study area is examined. What is currently known concerning the landscape development of the area is then considered. Finally, there is an extensive examination of the nature of the River Smestow, including its possible medieval configuration derived from an assessment of the local climate and water flows. Where relevant, reference is made to the Rising brook and Cannock Forest.

2.2. The physical geography of the basins.

The pre-1974 county of Staffordshire was 62 miles from north to south and 38 miles east to west at its widest. Geographically, it has three main areas of landscape characterisation, and this tripartite division was noticed by the county's earliest historians. In 1696, Plot stated:

> '*Staffordshire…is divided by the Trent into the north and south, or rather into the north-east and south-west parts, and the north east, as Mr. Erdeswick and some others will have it, subdivided again into the moorelands [sic] and woodlands, which latter lying between the Trent, Tene and Dove, others choose rather to call the middle part',*

thus, giving a three-fold physical division of the county.[2]

[1] M. Drayton. *Poly-Olbion The Complete Works of Michael Drayton,* London, 1876.

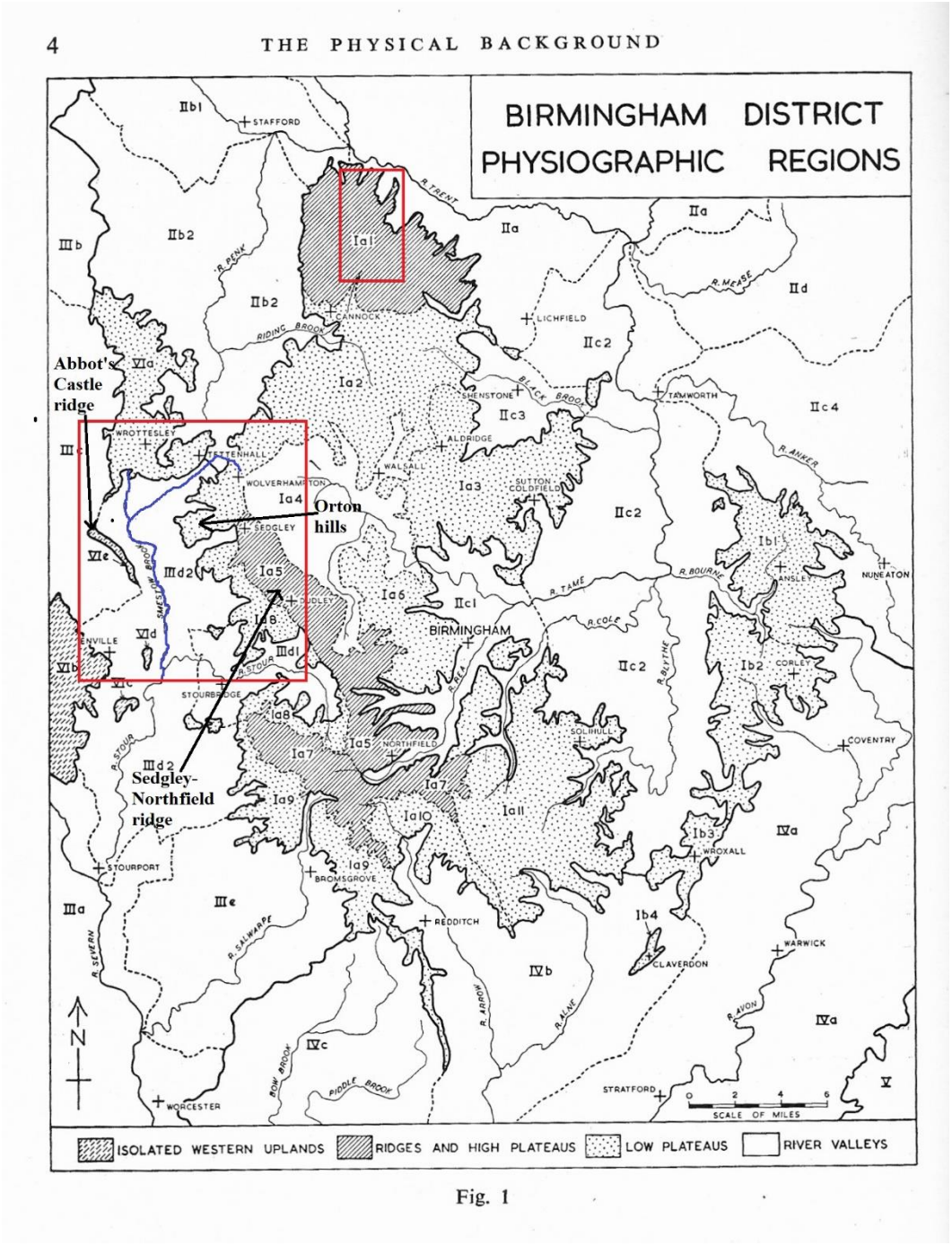
The central third of the county contains the valley of the River Trent and its principal tributaries which drain eastward to the North Sea. North of the Trent valley the land rises and in the north-east of the county becomes part of the Pennine *massif*, with Cheeks Hill at 1710' forming the highest area within the county's boundaries. Drainage of the northernmost part of Staffordshire is northwards, via the River Mersey, to the Irish Sea.

South of the Trent, Cannock Chase forms the northern element of an upland area, the Birmingham plateau, which extends southwards and eastwards into Warwickshire as an upland area - Arden. Th study area is in this southern section, where the Smestow drains into the Bristol Channel through the River Severn. Thus, the county lies athwart two major watersheds –that between the rivers Severn and Trent, and secondly that between the rivers Trent and Mersey.

The Birmingham plateau has an average height of over 400'. On its west, it forms a distinct ridge, almost an escarpment-like feature. This ridge consists of a mix of limestone and sandstone deposits which form a barrier to communication between the plateau and Smestow basin. The highest point is in Sedgley parish at 778'. The ridge forms the watershed between the Smestow basin streams and those of the river Tame. This ridge marks the eastern side of the study area, and is mirrored on the study area's western side by a similar, but shorter, ridge-like structure, the Abbot's Castle ridge, which reaches a height of 425' for most of its length and forms the watershed between the rivers Smestow and Worfe.[3]

[2] Plot, *The Natural History of Staffordshire,* p.107. 'Mr Erdeswick' is Samuel Erdeswick, who wrote the earliest-known history and topography of Staffordshire – unpublished in Plot's lifetime but copies are known to have circulated in manuscript form.

[3] The geomorphology and linkage to geological structure of the wider area is discussed in A. Straw and K. Clayton, *Eastern and Central England*, London, 1979, pp.175-6.



Map 2.1. Physical geography with study and comparison areas identified in red and the course of the Smestow in blue.[4]

An extension of the Birmingham plateau known as the Orton hills forms escarpment-like features on the plateau's western edge in the Penn and Wombourne parishes, which contains the sources of the streams which drain into the Smestow on its eastern side. These

[4] Map taken from G. T. Warwick, 'Relief and Physiographic Regions', in R.H. Kinvig, J.G. Smith and M.J. Wise (eds.), *Birmingham and its Regional Setting*, Birmingham, 1950, p.4.

streams form deeply-incised valleys in their upper sections, giving them considerable reserves of kinetic energy sufficient to power the many mills in the Smestow basin, discussed below. Such down-cutting is associated with sea level changes and drainage adjustment linked to the movement of glacial ice sheets in the area.[5]

The valley of the Smestow is of glacial origin, reflecting the passage of considerable amounts of meltwater and other glacial debris from the Wolston-era ice standstill just north of the study area. The Smestow is a misfit stream where its course has been affected by glacial drainage derangement and subsequent post-glacial isostatic adjustment. Alluvial deposits, glacial sands and poorly-developed river terraces are present in part of the valley. More detail is provided elsewhere in this section.

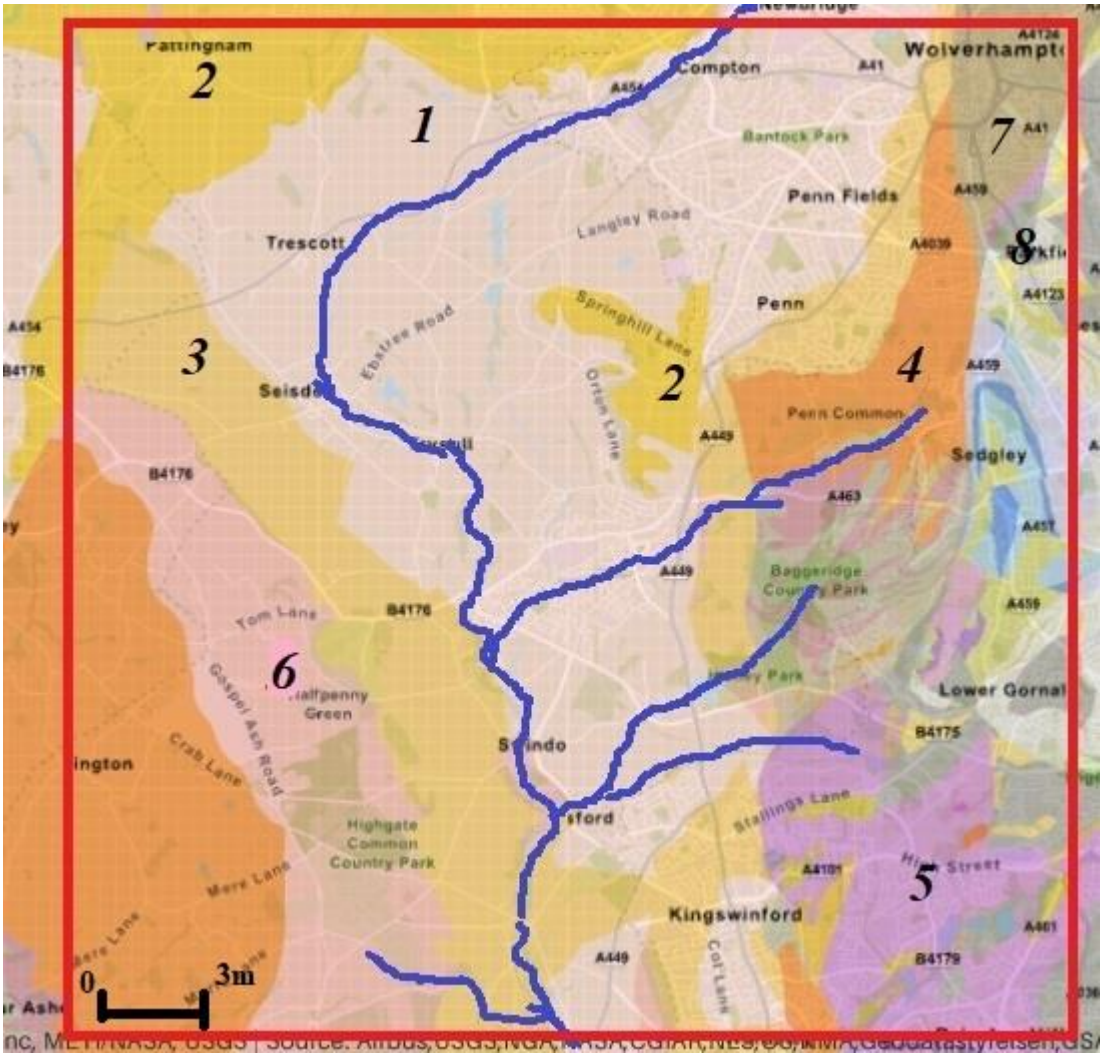
The principal remaining geographical features of the study area that call for comment are at its northern end. Approximately two miles from its sources in the Springfield and Bushbury Hill areas of Wolverhampton the nascent river Smestow, which has until this point flowed in a westerly direction, turns almost through a right angle to the south when it enters a col formed as a result of glacial action on the plateau of high ground today masked by the urban sprawl of Wolverhampton. This high ground marks the western-most extension of the Birmingham plateau and reaches a maximum of 500'. The col was formed in a similar way and at a similar time to the better-known gorge at Ironbridge occupied toward the end of the last major glaciation by the river Severn.[6] The col forms a 'through-route' between the headwaters of the Smestow and the river Penk, which drains north-eastwards into the Trent

[5] These sea-level movements along with related Quaternary developments in the wider Severn basin are discussed in D. Maddy, C. P. Green, S. G. Lewis, and D. Q. Bowen, 'Pleistocene geology of the Lower Severn Valley, U.K.', *Quaternary Science Reviews*, vol. 14, 1995, pp.209-22. Also, A.F. Jones, M. G. Macklin, and P. A. Brewer, 'A Geochemical Record of Flooding on the Upper River Severn, UK, during the Last 3750 Years', *Geomorphology*, 2012, 179, pp.89–105 along with T. H. Whitehead and R. W. Pocock, *The Geology of the Country between Dudley and Bridgnorth*, London, 1947, p.150.
[6] Straw and Clayton, *Eastern and Central England*, pp.219, 226.

and thus to the North Sea. The col makes the basin a distinct environment with an 'outlet' at its northern or 'upstream' end across one of the major watersheds in England. This point is further examined below. Detail on the physical geography and glacial history of the Rising brook, which, as a glacial misfit stream is broadly similar to that of the Smestow, is presented below.

2.3. The geology of the Smestow basin.

As shown on map 2.2, the bedrock geology of the study area is primarily sandstone from the Permian and Triassic periods, with more complex outcrops from the Carboniferous period to the east of the study area and sandstone outcropping in the south of the study area.



Map 2.2. The solid geology of the study area.[7]

Key to map 2.2.[8]

No.	Name	Features
1.	Wildmoor Sandstone	Early Triassic. Sandstones, usually silty or argillaceous, fine- to medium-grained, with subordinate siltstone and mudstone; pebbles rare.
2.	Helsby Sandstone	Fine- to medium-grained, locally micaceous, cross-bedded and flat-bedded sandstones, weathering to sand near surface. Pebbles may be common.
3.	Chester Formation	Conglomerates and pebbly sandstones with subordinate beds of mudstone. The conglomerates consist mainly of pebbles of quartzite, with quartz conglomerate and vein quartz.
4.	Clent Formation	Breccia, sub-angular, in a mudstone matrix, clasts of predominantly 'Precambrian-Uriconian' volcanic rocks and

[7] Map taken from https://geologyviewer.bgs.ac.uk/ (accessed 12/12/22).
[8] Data taken as above.

		subordinate Lower Palaeozoic rocks. Red pebbly mudstone and sandstone in Wolverhampton area.
5.	Etruria formation	Carboniferous period deposit. Mottled mudstone, with lenticular sandstones and conglomerates with rare coal seams. Intrusions of dolerite sills and dykes and extrusion of a small volume of volcaniclastic rocks in south Staffordshire.
6.	Bridgnorth Sandstone	Permian origin fine-grained sandstone.
7.	Clent Formation and Enville Formation	Mudstone and sandstone. Sedimentary bedrock formed 309.5-272.3 million years ago during the Carboniferous and Permian periods
8	Pennine Middle Coal Measures Formation	Mudstone, siltstone and sandstone. Sedimentary bedrock formed 318-309.5 million years ago during the Carboniferous period.

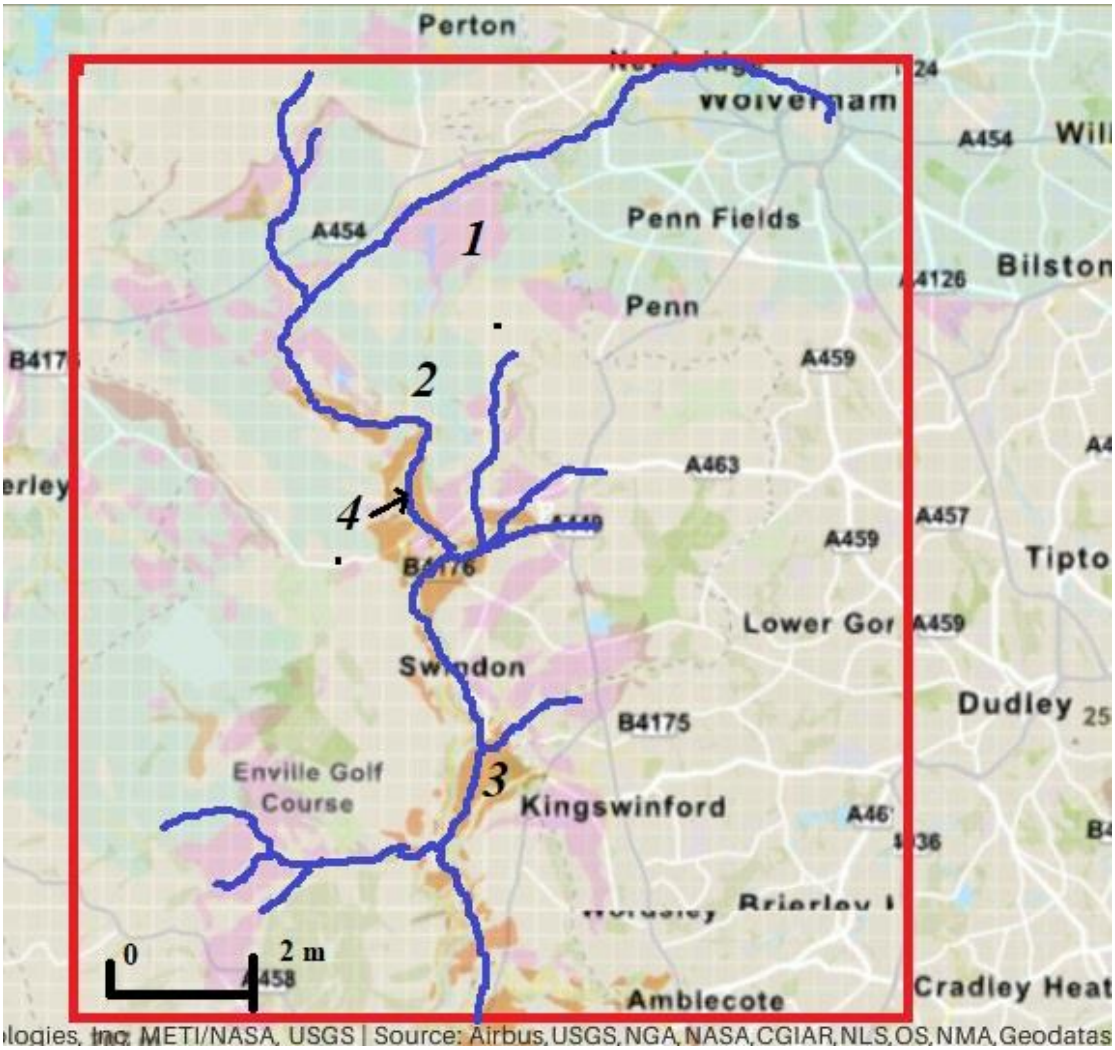
The geology of Staffordshire has been studied in detail.[9] The northern third consists of Carboniferous sediments including Carboniferous limestones and Millstone Grit which form the Staffordshire Moorlands with coal measures to their west. The central third consists of Mercian Mudstones and Sherwood sandstones, as does the southern third, with the outcropping of the coal measures extending north almost as far as the Rising brook. These measures give workable surface outcrops of coal and ironstone, and the ironstone in the Sedgley area is believed to be the basis of the earlier iron-making in the study area.

The boundaries of the coal measures are marked by unconformable edges, or faults. The western boundary fault keeps the deposits of coal, ironstones, and fireclays just on the eastern edge of the study area, outcropping on the edge of the Birmingham plateau. There is an equivalent fault on the western edge of the study area, the Enville fault, although this has a lesser effect on the landscape. The Cannock upland also has its edges marked by similar faults, and, as noted, there is a small intrusion of coal at the surface in the eastern part. This

[9] B. A. Haines and A. Horton, *British Regional Geology: Central England*, London, 3rd ed., 1969 is a general summary. Whitehead and Pocock, *The Geology of the Country between Dudley and Bridgnorth*, provides more local detail.

is also associated with ironstone deposits, themselves used by Lord Paget as the initial basis of his ironworks on the Chase.

The surface geology derived from the effects of glaciation of the study area also needs to be considered as this adds another element to the overall picture. The county was extensively glaciated at the end of the Tertiary era leaving substantial deposits of boulder clay, glacial erratics, and morainic drift, often giving surface deposits of sand, some of which were quarried from the 18th century onward. These are mapped as map 2.3 below.



Map 2.3. The superficial geology of the study area.[10]

[10] Data from https://geologyviewer.bgs.ac.uk/ (accessed 12/12/22).

Key to map 2.3.

No.	Name	Features
1.	Glaciofluvial Fan Deposits, Devensian – Sand.	Sedimentary superficial deposit formed 116-11.8 thousand years ago during the Quaternary period.
2.	Superficial deposits Till, Devensian - Clay, sand and gravel.	Sedimentary superficial deposit formed 116-11.8 thousand years ago during the Quaternary period.
3.	Superficial deposits Holt Heath Sand and Gravel Member- Sand and gravel.	Sedimentary superficial deposit formed 362-126 thousand years ago during the Quaternary period.
4.	Superficial deposits Alluvium - Clay, silt, sand and gravel.	Sedimentary superficial deposit formed between 11.8 thousand years ago and the present during the Quaternary period.

Map 2.3 shows that the effects of glacial activity on the study area have altered the nature of the surface geology to give a highly sandy environment with patches of pebbly soil, mostly derived from glacial meltwater. Other deposits such as glacial erratic material and kames are not uncommon, and small river terraces have also formed in the valley.[11]

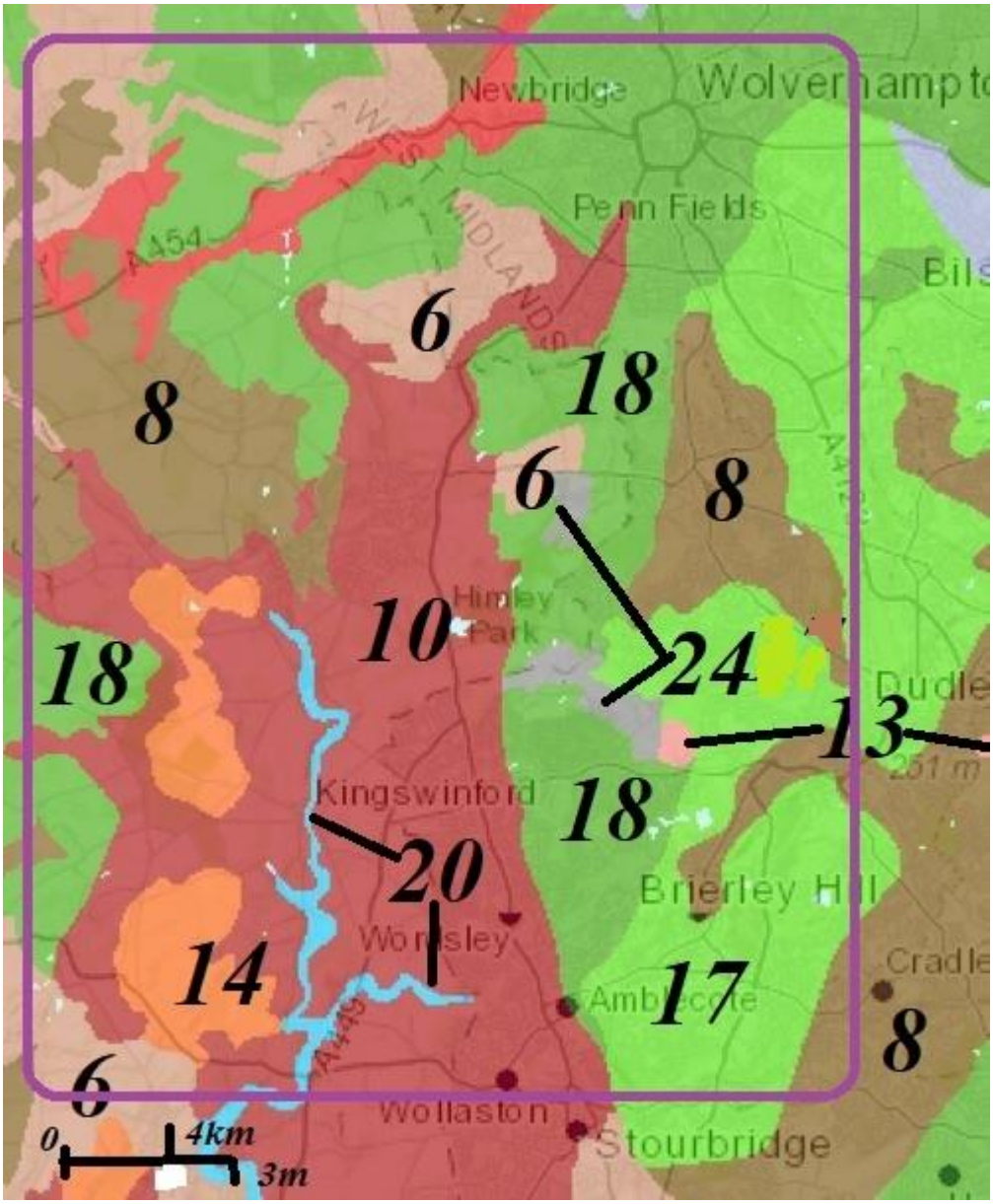
Both the bedrock and superficial geology of the comparison area show considerable similarity to the study area so are not discussed here in any detail.

2.4. Pedology of both basins.

From the discussion of bedrock and superficial geology above it becomes clear that the soils of the study area will have been deeply affected by the nature of the parent rock and superficial deposits. The soils of the wider region have been subject to review, and are described and mapped as map 2.4 below.[12]

[11] Whitehead and Pocock, *The Geology of the country around Dudley and Bridgnorth*, pp.151-3, 155-8, 161, 168 for a detailed discussion of these points.

[12] D. Mackney and C. P. Burnham, *The Soils of the West Midlands,* Harpenden, 1964, and http://www.landis.org.uk/soilscapes/ (accessed 22 January 2018).



Map 2.4. The soils of the Smestow basin.[13]

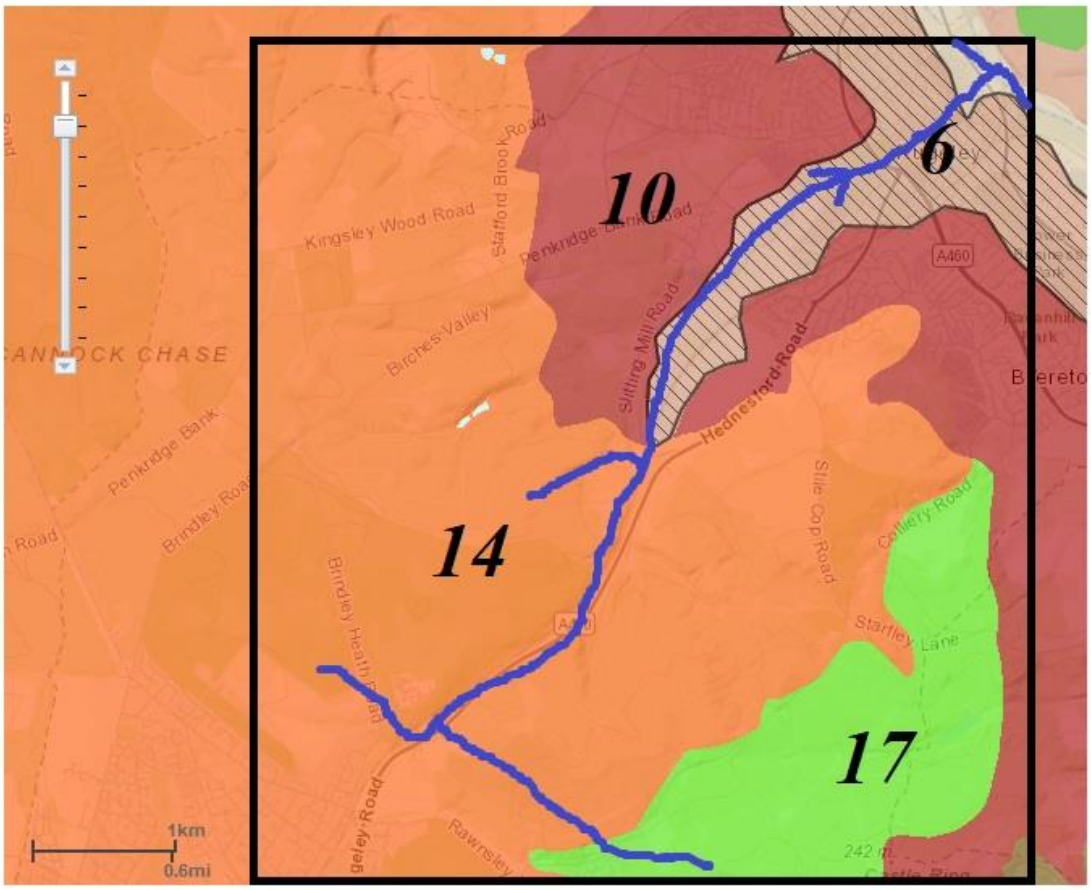
Key to maps 2.4 and 2.5

Soil No.	Description	Farming practises	Impact on drainage systems
6	Freely draining slightly acid loamy soils.	Neutral and acid pastures and deciduous woodlands; bracken and gorse in the uplands.	Drains to local groundwater and rivers. Soil erosion on some of these soils.
8	Slightly acid loamy and clayey soils with impeded drainage.	Suited to autumn-sown crops and grassland.	Land is vulnerable to rapid through-flow to streams.

[13] Map and descriptions in table 2.4 derived from Cranfield Soil and Agrifood Institute: http://www.landis.org.uk/soilscapes/

10	Freely draining slightly acid sandy soils	Dry pastures; deciduous and coniferous woodland; potential for lowland heath due to low fertility.	Drains to groundwater. Highly erodible, and clogging of stream bed with sand can occur.
13	Freely draining acid loamy soils over rock	Steep acid upland pastures dry heath and moor; bracken gorse and oak woodlands' resulting in grassland and rough grazing.	Drains to local groundwater and the river network.
14	Freely draining very acid sandy and loamy soils.	Lowland dry heath communities. Extensive grazing or forestry only possible.	Drains to groundwater.
17	Slowly permeable seasonally wet acid loamy and clayey soils.	Low fertility, supporting seasonally wet pastures and woodlands.	Drains to stream network which can get clogged with sediment.
18	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils.	Seasonally wet pastures and woodlands. Grassland and arable some woodland.	Impeded drainage.
20	Loamy and clayey floodplain soils with naturally high groundwater.	Grassland some arable. Productive grassland provided drainage is maintained.	Naturally wet. Drains to local groundwater feeding into rivers.
24	Restored soils mostly from quarry and opencast spoil.	Appropriate to grass.	Drains to stream network.

The impact on the soils of the comparison area of the solid and drift geology can be mapped as map 2.4, which shows a similar pattern to that of the study area. The table is the key.



Map 2.5. The soils of the comparison area, outlined in black with the Rising brook and Bentley brook added.[14]

This combination of upland plus soil types gives both study areas an environment unsuited to large-scale arable agriculture. From the documentary evidence available (discussed further below) medieval agricultural practices in the Smestow basin were confined principally to woodland pasture, exploiting the woodland and heathy/sandy soils – typically woodland pasture involved keeping pigs, sheep or cattle. Arable crops, where they could be grown, were rye and oats rather than wheat. Equally, the Chase is entirely unsuited to arable agriculture, and it is unsurprising that when the landscape entered recorded history as Cannock Forest it was as a well-wooded upland area used for wood pasture.[15] In summary,

[14] Data in map 2.5 and table 2.4 derived from Cranfield Soil and Agrifood Institute: http://www.landis.org.uk/soilscapes/
[15] Mackney and Burnham, *Soils of the West Midlands,* pp.54, 57.

in agricultural terms, the study areas, and indeed the entire county, were economically poor throughout the main period of study.[16]

2.5. Medieval-era landscape development.

It is important to set the study area in its wider context, recognising that its midland location means that it many cases it is on the edge or margin of areas of landscape classification. For example, the Smestow sits just south of the Tees-Exe highland zone/lowland zone boundary - most of the area lying below 500'.[17] Secondly, following Rackham's analysis, it is part of the area he identified as 'Ancient Countryside', although not far from his 'planned' region.[18] Thirdly, it is on the edge of the general division between nucleated and dispersed settlements, and seems to contain elements of both in the morphology of its principal settlements.[19] For example, Sedgely parish on the eastern edge of the basin contained nine separate settlements; Wombourne had a similar number, as did Kingswinford. On the other hand, settlements at Bobbington and Pattingham take the form of nucleated villages more familiar from the eastern midlands.

Both study and comparison areas are within the Northern and Western province as defined by Roberts and Wrathmell.[20] The more recent classification system used by Natural England classifies the Smestow as part of the larger Mid-Severn sandstone plateau and the comparison area as part of the Cannock Chase and Cank Wood area.[21]

[16] J. Thirsk (ed.), *The Agrarian History of England & Wales*, vol. 3, Cambridge, 1991, pp.228.
[17] This line was first described in H. Mackinder, *Britain and the British Seas*, London, 1902, p.83. See also S. R. J. Woodell (ed.), *The English Landscape*, Oxford, 1985, p.18 for a map.
[18] O. Rackham, *Trees and Woodland in the British Landscape*, London, 1976, pp.2-3.
[19] See for example B. K. Roberts, *The Making of the English Village*, Harlow, 1987, p.3.
[20] B. K. Roberts and S. Wrathmell, *Region and Place*, London, 2002, fig. 1.4.
[21] http://publications.naturalengland.org.uk/publication/5001578805198848 (accessed 12 January 2023).

Aspects of the study area's historical development reflect this liminality. The Smestow likely formed part of the Roman-era tribal area of the *Cornovii*, but was on its southern edge and the basin may have formed part of the boundary zone with the *Dobunni* to the south. In the Early English period the area may have been part of a 'folk group' known as the *Pencersætan*, which sat on the boundary between Mercia and the kingdom of the *Hwicce* to the south. Later still the area is on the southern edge of the medieval diocese of Lichfield and the southernmost point of the county of Stafford. The county boundary in the study area was complicated. The parish of Dudley was an exclave of Worcestershire in Staffordshire. The date of this arrangement is not known and precedes the Domesday Book which lists Dudley in Worcestershire. Amblecote, a sparsely population township, later parish, was during this period a detached part of (Old) Swinford parish, Worcestershire, being administratively in Staffordshire. Until 1844, there was a detached part of Staffordshire in Worcestershire, the parishes of Broome and Clent, when they transferred to Worcestershire. Halesowen, just to the east of Clent, was a detached part of Shropshire in Worcestershire, which transferred to Worcestershire at the same date.

The post-Norman conquest landscape history of the basin was dominated by the creation and management of the Royal Forests of Kinver in the south and Cannock Forest at the northern edge. Kinver was perambulated in 1300, and the later landscape history of the basin related to its disafforestation.[22] Early medieval landscape history was therefore, *inter alia*, one of piecemeal assarting. Industry, initially at a domestic or 'dual economy' level and carried on alongside agriculture, has been a marked feature of this area. Once the coal measures to the east of the basin began to be fully exploited from the 18th century, steady industrial and urban development led to the creation of the Black Country just to the east of the study area.

[22] J. Birrell, 'The Forests of Cannock and Kinver; VCH *Staffs*, vol. XX, pp.208-9; Chapter 4 below.

The history of Cannock Forest is discussed in several sources.[23] Attempts at disafforestation began soon after its creation with initial Royal resistance dissipating in the reigns of Henry II and Richard I in the face of their needs for money. By 1540, the Antiquary John Leland noted:

> *"whereas of ancient time al the quarters of the country about Lichfield were as forest and wild ground, the woods bee in many places so cut down that no token is that ever any were there."*[24]

This implies steady assarting had occurred in the two hundred years or so before Leland wrote. The landscape development of Cannock Forest is dominated by woodland from an early period, with the woodland managed through coppicing. Only one area of 'natural' wildwood has survived from the medieval period, discussed in chapter 4. By the 18th century, the landscape was relatively bare of trees. The other (aside from iron-production) early industry in the comparison area was coal mining, evidence of which in the form of bell pits is visible where the Coal Measures form minor but significant surface outcrops.[25]

It is proposed here that the unusual complexity of boundaries in the study area as noted above, and therefore indicating distant administrative centres, meant that the 'political' control of the study area and population, including any burgeoning middle class or nascent industrial activities, was more difficult to control or manage by a county community or county families, apart from the Lords of Dudley, for most of the medieval period. These different levels of political, county or gentry authority, centred some distance away, may have led to a lax level of oversight on medieval settlement, mineral extraction, and land ownership boundaries at the micro-level. The pattern may have enabled the exploitation of

[23] For example, VCH *Staffs,* vol. V, pp.58-60, 158-9.
[24] Quoted in D. Palliser*, The Staffordshire Landscape*, p.67, taken from J. Leland, *Itinerary*, vol. 4(2), f.189a.
[25] For example, in Red brook, the drainage basin to the south of the Rising brook. See C. M. Welch, 'Early Coal and ironstone mining on Cannock Chase', *TSAHS*, vol. LII, 2021, pp.75-132.

minerals and creation of farmer-industrialist ('dual economy') working patterns which are evident from the 16th century in these areas.

2.6. The hydrology of the Smestow basin; water and its uses in the study area.

Human societies have always made use of water in the landscape for a variety of functions. The most essential was life-sustaining fluids for himself, and, his livestock. But water, especially moving water, was used for other purposes, notably, veneration, boundaries, naming of settlements or territories, communications or transport, agriculture, a source of kinetic energy, industrial use such as turning a millwheel or more general ornament in parkland.[26]

The Smestow illustrates many of these uses. For some of its length it is a boundary between parishes with parts of its watershed having a similar boundary function. It was also the location of meadowland, a source of power generation, and used in early 'industrial' activities. To date, there is no archaeological evidence of votive offerings in the basin, although one spring, Sugar Well (see below for more detail) may have had, from the evidence of its name, either a medicinal or perhaps, an earlier devotional use. A second spring, one of the sources of the Tene brook, is known as Ladywell, and dedicated to St Mary. Dunphy noted that it 'has never failed', although it was dry when located in August 2020. It was known locally as having curative properties.[27] The dedication to St Mary, 'our lady', may disguise an earlier, pre-Christian, name, perhaps 'the well of the maidens'. There is a similar name in the study area - the bridge across Holbeche brook near Wall Heath Forge

[26] See, for example, J. Barrow, 'Demonstrative behaviour and political communication in later Anglo-Saxon England', *Anglo Saxon England*, vol. 36, 2007, pp.140-1 and A. Everitt, 'River and Wold: reflections on the historical origins of regions and pays', *Journal of Historical Geography*, vol. 3, 1977, pp.1-19.
[27] A. Dunphy, *Out and About in Penn*, Dinas Powys, 1990, p.9.

(SB9) is known as Maidens' bridge. These three names suggest that there may be remnants of an older, pre-Norman Conquest, 'religious' landscape partly discernible underneath later accretions.

The Smestow is approximately 15 miles in length from source to confluence with the Stour. It drains an area of an average of four and a half miles in width by seven miles in length, roughly 31 square miles. Most of the drainage basin is over 250' in height, with the Smestow crossing this contour roughly half-way down its valley. It is a rapidly-flowing stream for most of its length, prone to flooding at times of heavy rain. In the 1980s drainage works deepened, straightened, and narrowed the Smestow. Abstraction of water by the South Staffordshire Waterworks Company has also reduced the overall water volume.[28]

There was only one hydrological station in the Smestow basin at Swindon near SB3. Evidence held by the Centre for Ecology and hydrology (CEH) holding the National Rivers flow archive showed a mean flow of 0.58m^3/sec over the period 1974-8, the years when the station was in operation. By comparison, the River Stour at Prestwood near its confluence with the Smestow is 0.98m^3/sec.[29] It is likely that these flow rates would have been higher in the past, perhaps indicating that the river may have anastomosed to accommodate this flow. Evidence of such paleo-channels remains elusive at present.

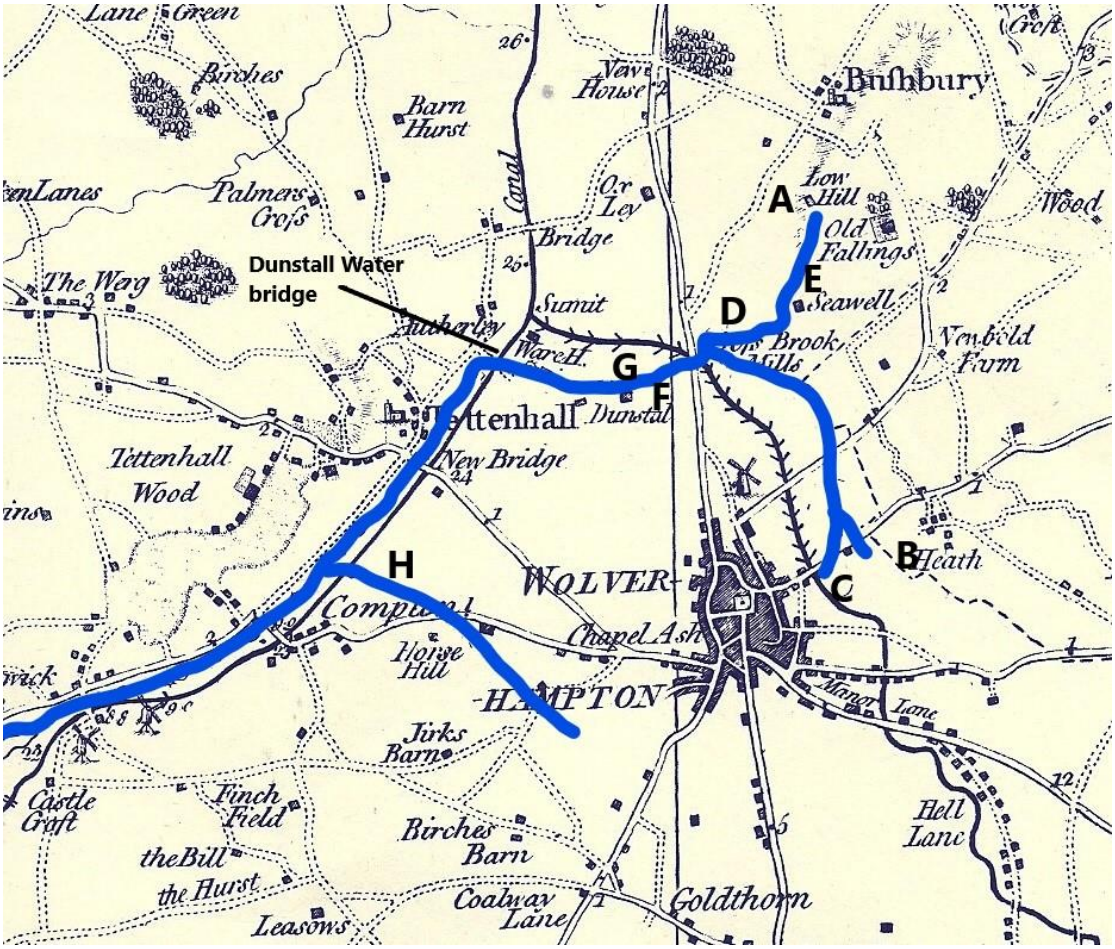
The Smestow has its *fons et origo* north of Wolverhampton centre (GR SJ 931995) at approximately 411' OD. With one short exception at Fowler's Fields Park, It is underground

[28] https://environment.data.gov.uk/catchment-planning/WaterBody/GB109054044781 (accessed 12 January 2023) indicates that the upper section of the Smestow has a hydromorphological designation as 'not … artificial or heavily modified'. For the South Staffordshire water Company works, see: https://southstaffswaterarchives.org.uk/Potted%20History.htm (accessed18 June 2021).
[29] https://nrfa.ceh.ac.uk/data/search (accessed 22 January 2023)

for its first three miles before ‘emerging into daylight’ after its last culvert at Wolverhampton racecourse.

Figure 2.1. The Smestow emerging at Wolverhampton racecourse - SJ 898006.

Current and former place-names such as *Wulfruna’s* well*,* Showell, Gorsebrook and Culwell in the area indicate the likely origin of a series of springs that feed the brook. The 1880 1:1,250 OS map shows a source of the Smestow close to the Springfield Brewery, named as the Culwell, and another at Showell, a place-name which may be derived from the early English *Seofan Wyllan,* meaning seven wells or springs. Culwell and may mean ‘well of the cows’. These wells and putative sources are shown on map 2.6 an annotated version of Yates’ map (1776) and listed in the key table, both below.



Map 2.6 Yates' map annotated to show the sources of the Smestow. Reproduced at double actual size; scale is 2" to the mile.

Key to map 2.6.

Site	Identification	Notes
A	Showell spring	Today on Showell Road.
B	Springfield road source	Between locations 'B' and 'D' the Smestow forms the pre-20th century Wolverhampton boundary.
C	Culwell	Spring giving its name to nearby Culwell Road.
D	Gorsebrook	Site of mill (SB14) and Gorsebrook Road. Between here and the Dunstall water bridge the Smestow is entirely underground.
E	Showell	Seawall Farm just south of 'A' marks the presumed site of Showell Mill (SB13).
F	St Wulfruna's well	Not marked on Yates' map, but visible on the OS 1880 1:10560 map.
G	Dunstall Mill	Marked on this map (SB15).
H	Graisley brook	Not named but shown on this map.

Once the Smestow reaches the glacial spillway in the Tettenhall area, it turns south.[30] It is possible, examining the current landscape, that the canal builders moved the course of the Smestow slightly to the south as they carried it across the S&W canal at Dunstall, but other than a piece of marshy ground, just to the north of the Dunstall water bridge, no other physical or documentary evidence has been found to confirm this suggestion. Wolverhampton's 19th century parish boundary did not follow the stream but was marked by other means to the north of its then course. This is consistent with theories concerning the use of watercourses as parish boundary markers, their longevity as boundaries, and the motives behind the creation of the Dunstall Water Bridge by the S&W Canal Company. There is also an odd right-angled bend in the course just after the stream leaves Dunstall Mill (SB15) which currently defies explanation - possibly the canal builders used the mill race to take the full amount of the stream flow and blocked off the northern (original) course. [31]

Figure 2.2. The Smestow brook crossing the Dunstall water bridge, Aldersley.

The first section of the Smestow's now southerly course is marked by artificial changes as the railway arrived in 1913, and affected the stream's course as the railway is carried on

[30] L.J. Wills, 'Geology' in Kinvig *et al*, *Birmingham and its Regional Setting*, pp.32, 36.
[31] G. Mander*, A History of Wolverhampton,* Wolverhampton, p.9.

brick piers placed in and alongside the stream bed.[32] The Smestow travels over a mile through the ice-made gap before emerging, at Wightwick, into a wide, gently-sloping valley (also ice-formed) used by the Smestow to describe a wide arc to the south-west through Trescott, Trysull and Seisdon before turning south at Wombourne to ultimately join the River Stour. The Smestow has not created this feature – as at Tettenhall, the stream is flowing through the remnants of extensive ice age depositional activity, mixed 'glacial drift' deposits of sand and gravel. The sand supported the nascent iron industry by providing a suitable medium for the creation of castings and mouldings. Sand extraction continued until the mid-20th century adding, in the shape of quarries, another element in the development of the landscape.[33] The combination of free-draining soil, with, for example eskers in the Wombourne area, led to gravel extraction. The Bunter Pebble beds, part of the basin's underlying solid geology, were used from the 19th century as an aquifer for water supplies. These activities all demonstrate alterations to what continues even today to appear to be a post-ice age 'natural' landscape – although the landscape is marked by stream diversion, water abstraction and multiple examples of mineral extraction.

[32] This is the Wombourne railway, not the Great Western railway, which crosses the Smestow at the Aldersley gap on a series of monumental brick viaducts. See chapter 5.
[33] Noted for example in Langford*, The S&W Canal*, p.128.

Figure 2.3. Trescott ford, GR SO 852973, June 2019. The Smestow flows from left to right – the car is pinned against the footbridge by the force of the flow, even though the stream depth is shallow and the water is not rapidly moving.

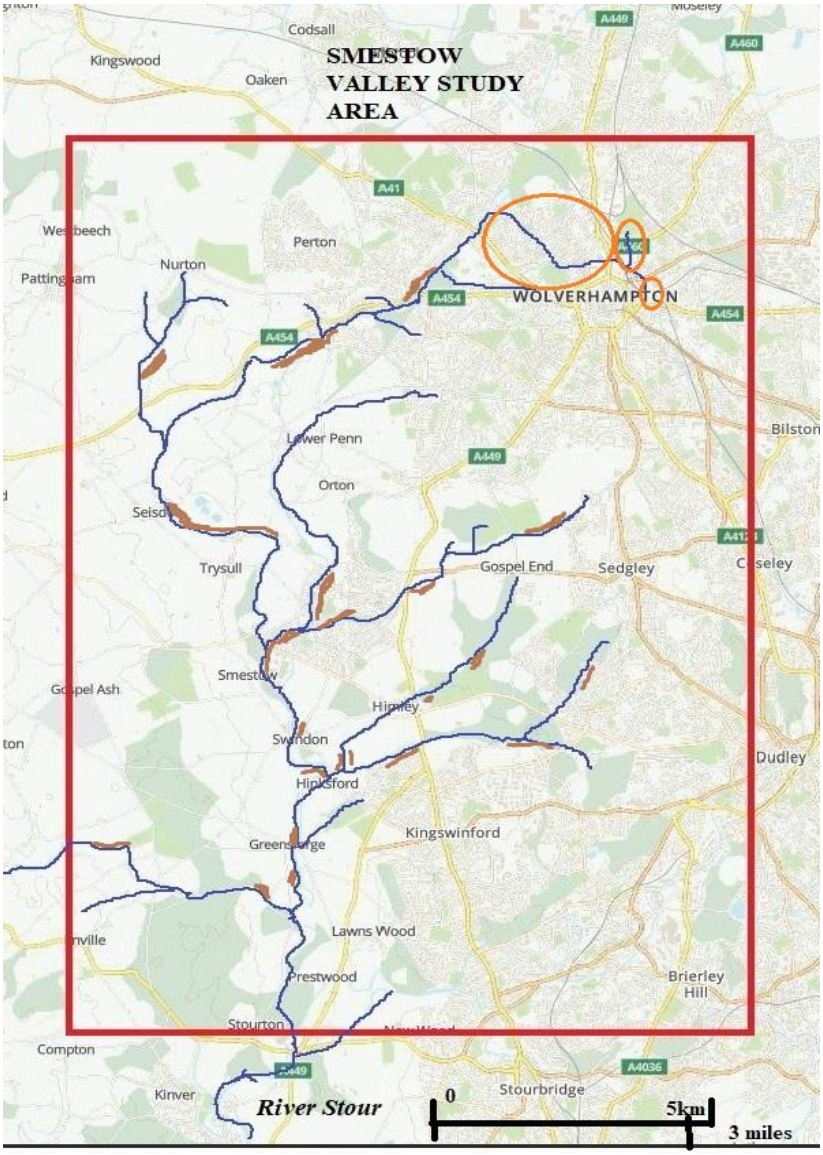
The Smestow is joined along its course by tributary streams that originate on the Birmingham plateau edge. A smaller number of streams join the Smestow from sources in the west of the drainage basin. The largest of these latter streams, the Philley brook and its feeder streams, originate at around 500' in the Enville area. The 'Birmingham plateau' edge streams descend from a similar height, in part in markedly incised valleys, to join the Smestow.[34] Most of these 'east bank' streams, certainly the more important ones in terms of utilisation of water resources for power, fall between 150' and 200' to their confluences with the Smestow in the space of one or two miles, giving them considerable kinetic energy reserves. These valley profiles are graphed below and show the extent of the descent, indicating why these streams were so heavily populated with mills.

[34] The incision is due to the relative uplift that affected the basin of the Severn after the last glaciation due to isostatic readjustment. See Maddy *et al.*, 'Pleistocene geology' pp.209-20.

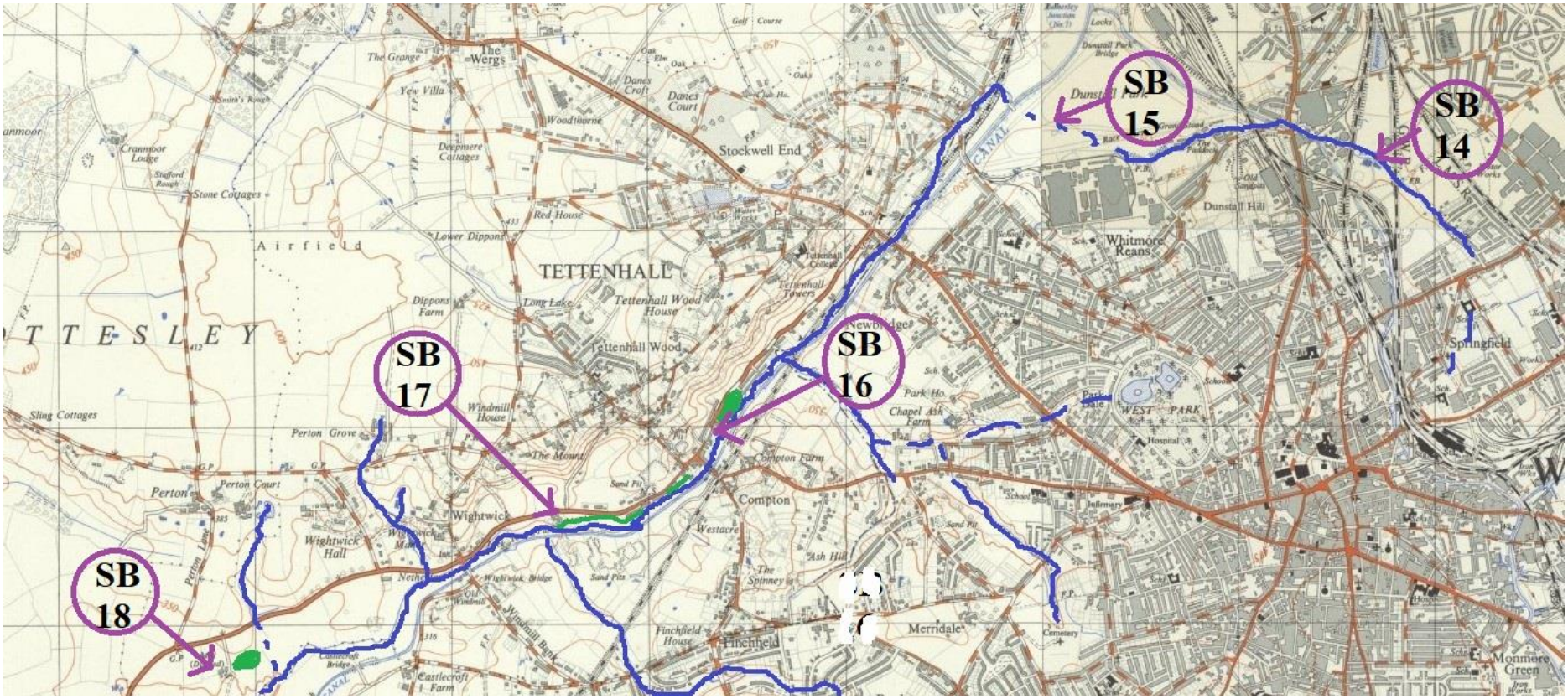
Map 2.7 illustrates the areas of modifications made to the natural drainage pattern to create mills by showing those areas where the headwaters of the Smestow have been culverted as well as locations of mill pools and leats. The mills are mapped in more detail below and discussed in chapter 3.

The extent of the manipulation of the valley and its use for water resources are presented as maps 2.9-2.13 using 1937 OS 1:25,000 maps as base with the maps shown at this scale. These five maps show the current watercourses of the drainage basin as a blue line and areas of manipulation as green lines or green shaded areas, for example where millponds or ornamental features have been established in the landscape. Dashed blue lines represent areas where the drainage system has been culverted, and the line of the stream is inferred from earlier maps and LiDAR data. Data sources for these maps and annotations have been derived from fieldwork supplemented by use of OS 1:10,000 mapping from the 1880s, earlier maps of the study area (such as Yates' map from 1776, tithe and enclosure maps) and LiDAR data. More detailed maps, where relevant, are offered in the following chapter.

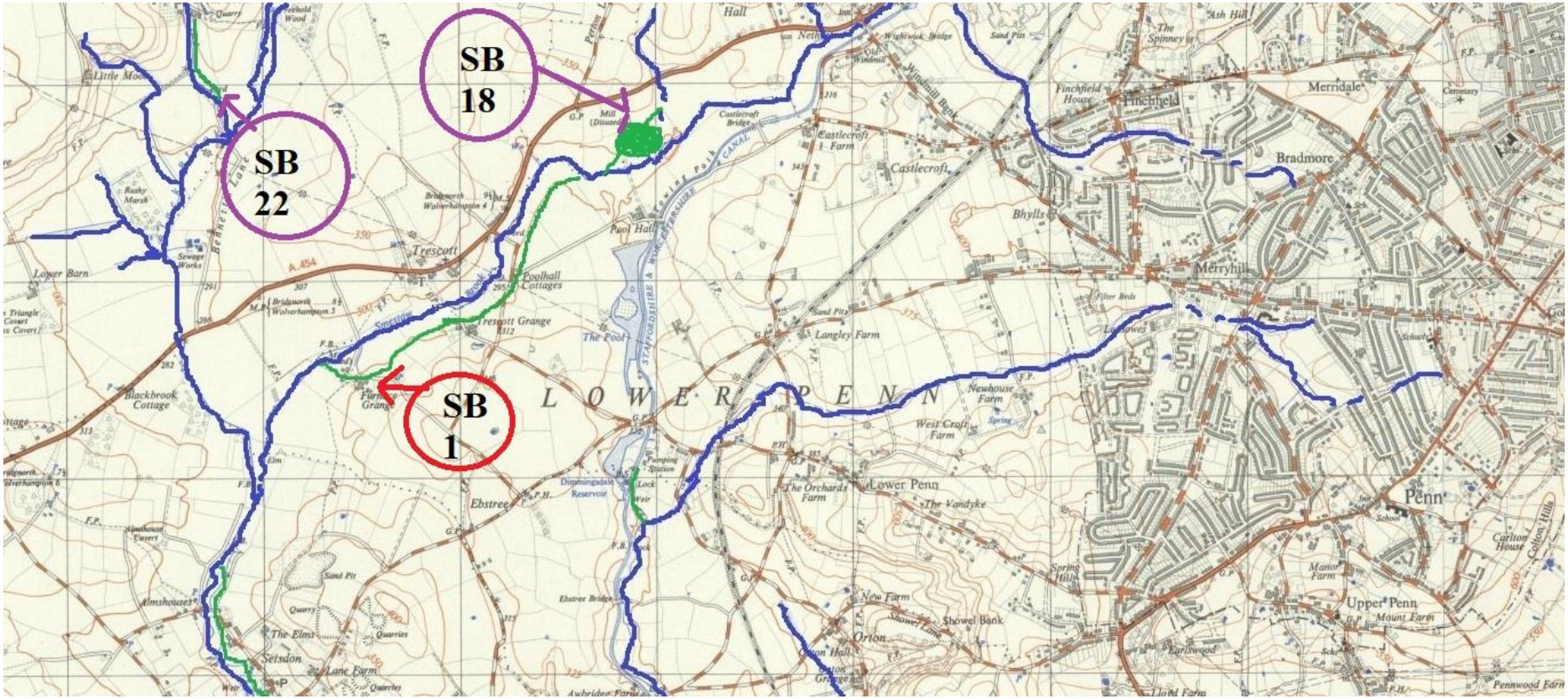
The valley profiles (thalwegs) for the nine principal streams in the basin are presented in the following figures 2.4-2.12 below, as an examination of such profiles of the streams in the drainage basin can throw some light on their nature as well as their differences. These valley profiles are instructive for the degree of fall of the individual streams. Data points have been derived from Ordnance Survey material giving an element of confidence in the profile established.



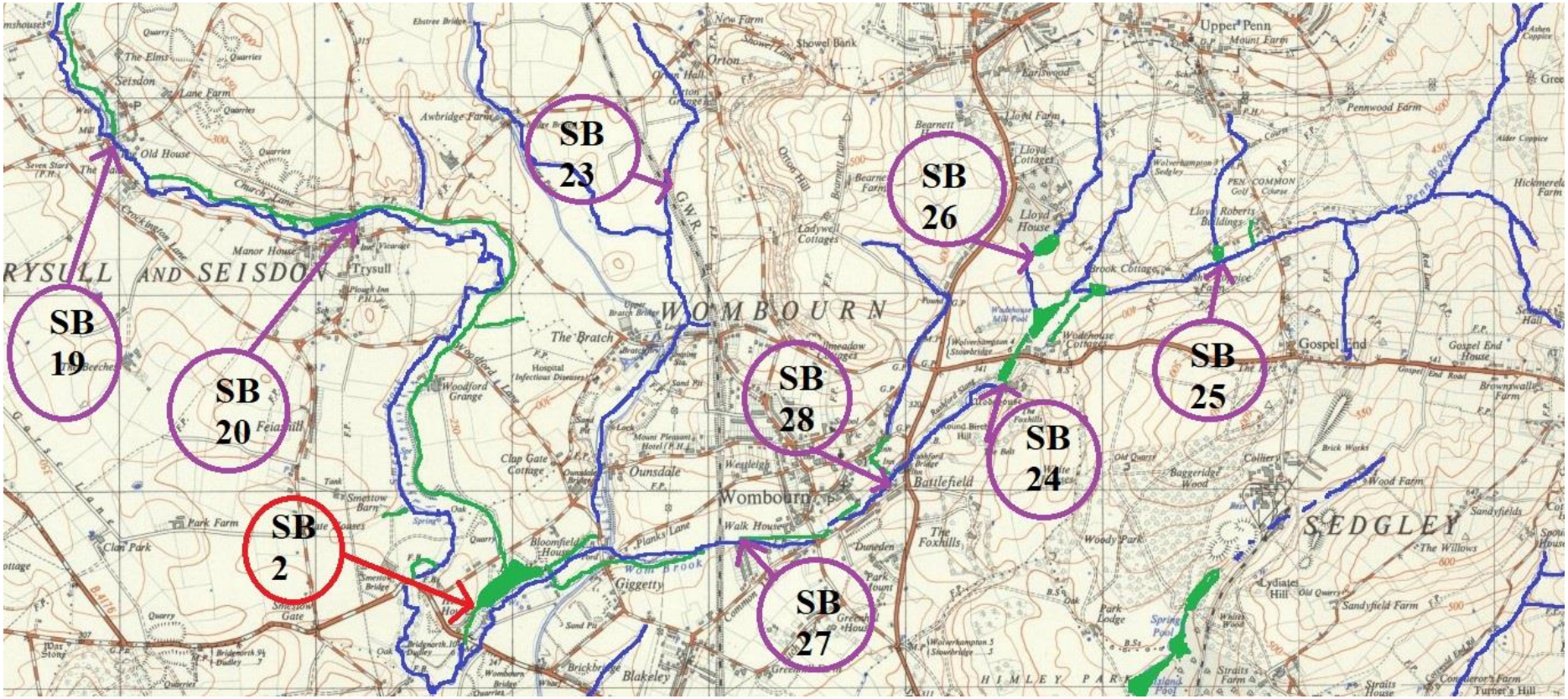
Map 2.7. Smestow drainage basin showing principal areas of leats and mill pools (brown lines) and sites where the drainage system has been extensively culverted (orange circles).



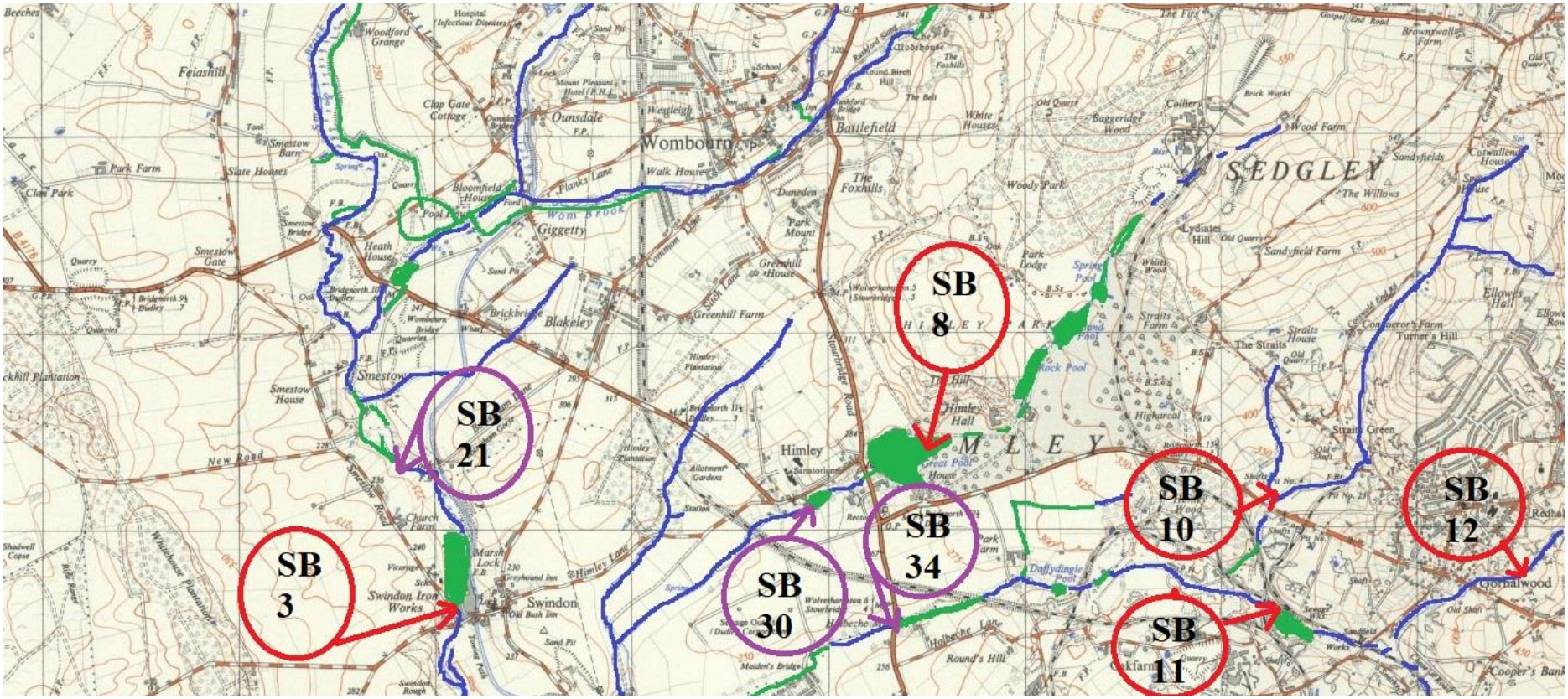
Map 2.8. The northern part of the Smestow basin. The manipulation of the water-course is notable, along with the presence of linear mill ponds at Compton (SB16) and Whitwick (SB17). Perton mill (SB18) is also visible. Note also the culverted areas (shown as blue dotted lines). Scale is 2.5" to the mile, as are maps 2.9-2.13.



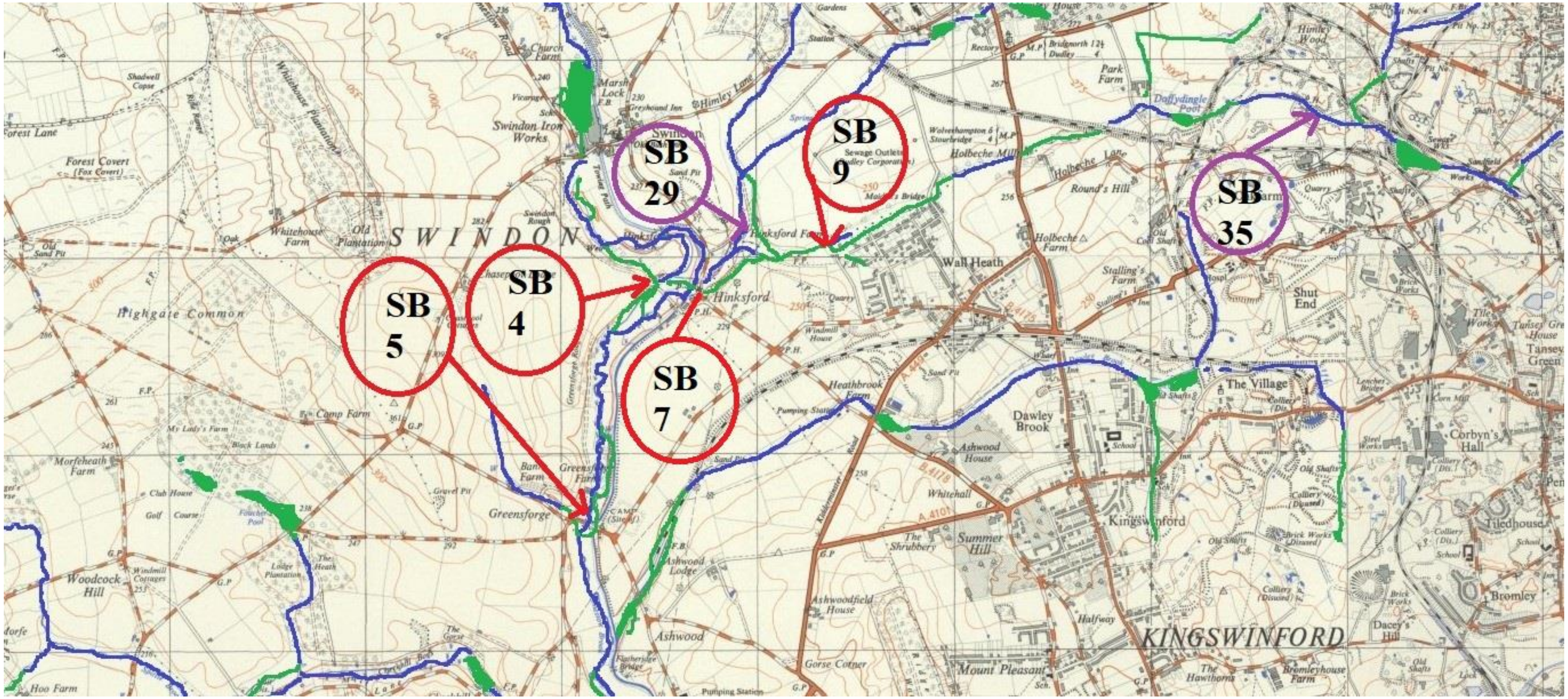
Map 2.9. Middle reaches of the Smestow brook with Black brook and the upper course of Tene brook. Perton mill (SB18) is visible along with the significant lengthy leat holding the 300' contour that fed Furnace Grange (SB1). The beginning of the leat for Seisdon mill (SB19) is also visible along with the stream modifications associated with Great Moor mill (SB22) on Black brook.



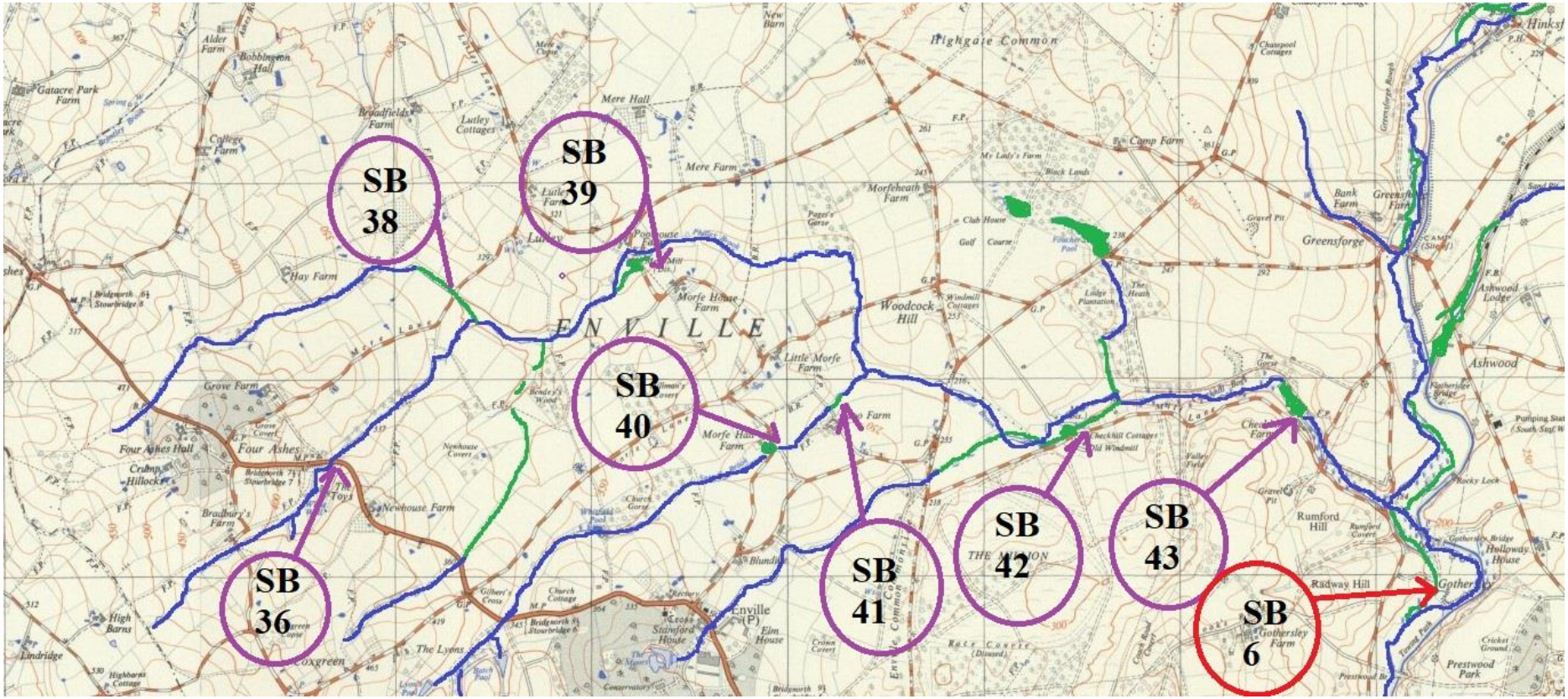
Map 2.10. Smestow brook central middle reaches along with the Wom bourne/Penn brook and their tributaries. Leats for Seisdon (SB19) and Trysull (SB20) are shown, along with complex of leats for Heath Mill (SB2) and mills in Wombourne (including SB27 and SB28) Wodehouse mill (SB 24).



Map 2.11. Southern central Smestow including Holbeach brook and its tributaries. Visible areas of modifications to the landscape include the large pools at Swindon (SB3) along with more ornamental pools in Himley park (which covers SB8). The substantial changes brought by 19th century industrial excavations to the area around the Holbeach brook are also evident.



Map 2.12. Southern Smestow brook. A variety of artificial hydrological modifications are visible on this extract including the extensive leats and pools associated with the iron making sites at Hinksford (SB4 and SB7) and Greensforge (SB5). The substantial adjustment to the course of Holbeach brook to create Wall Heath forge (SB9) is also marked.



Map 2.13. The Philley brook and tributaries. This tributary of the Smestow had its kinetic energy reserves extensively exploited with 8 mills being sited here. Unlike the Smestow, extensive leats were not a feature of these sites.

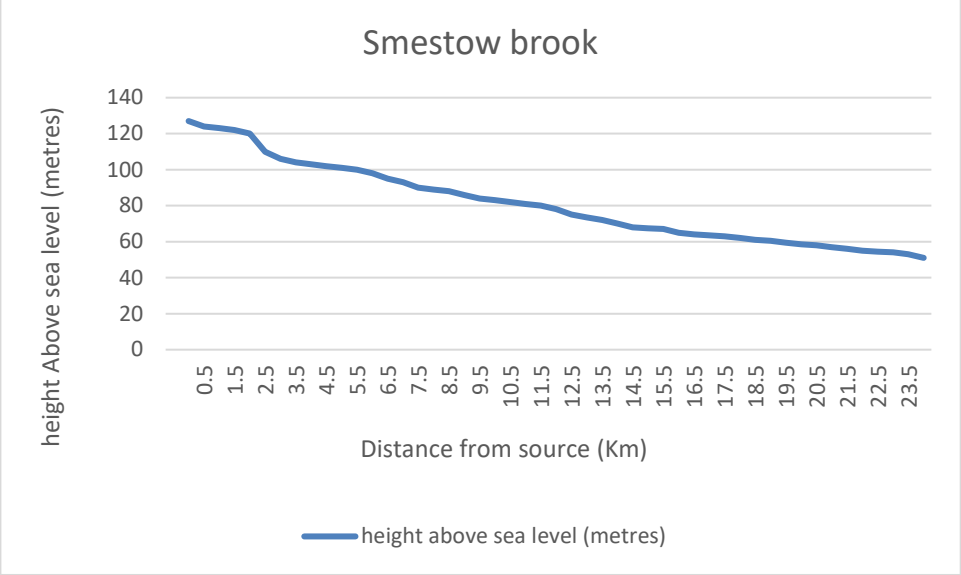


Figure 2.4. Smestow brook valley profile. Note the sharp drop in height associated with the stream's southerly turn into the Aldersley gap at 120m

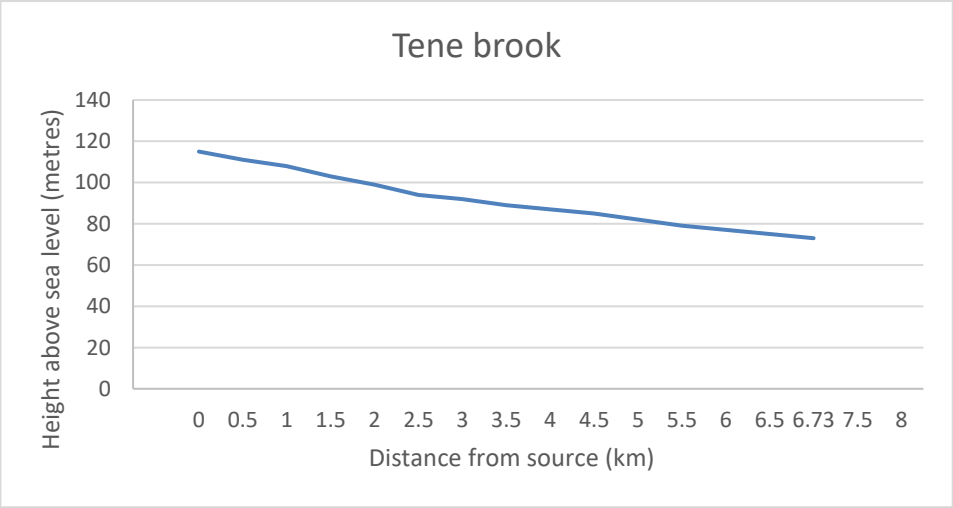


Figure 2.5. Tene brook valley profile. Note the generally even nature of the profile.

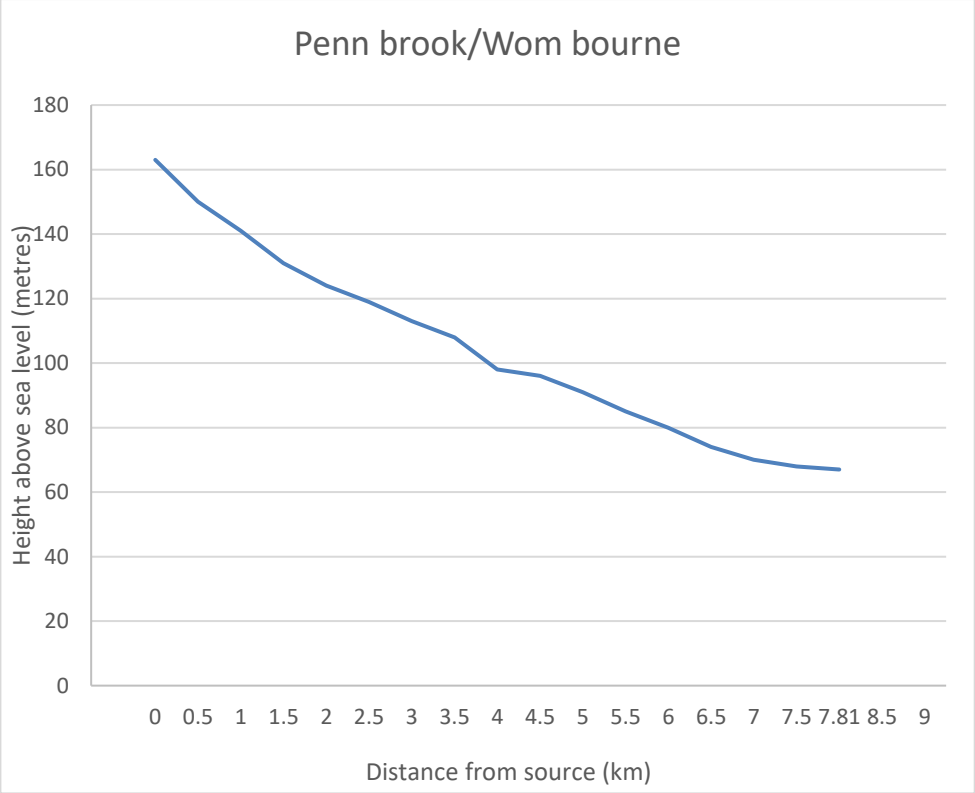


Figure 2.6. Penn brook/Wom bourne stream profile. Note the high source and steep fall throughout.

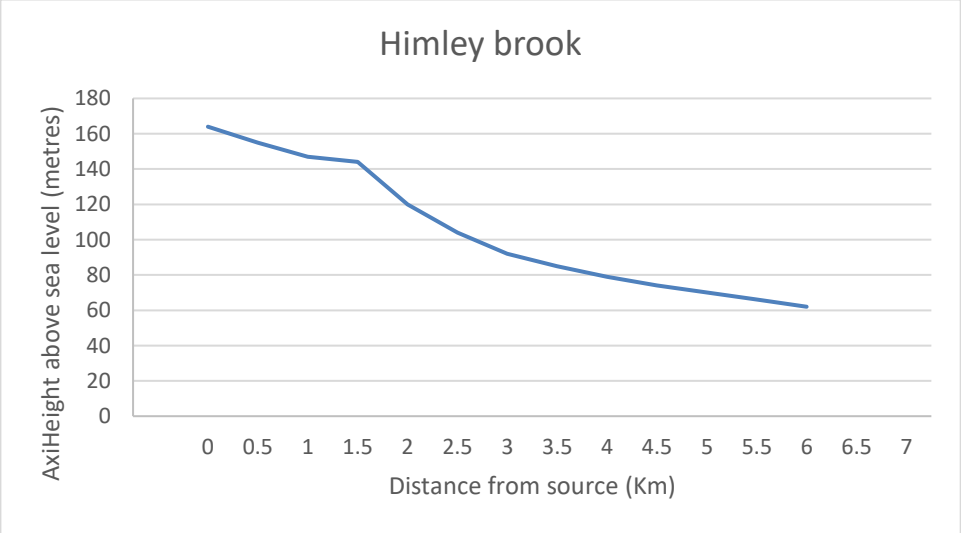


Figure 2.7. Himley brook stream profile. Note again the high source and overall steepness of descent.

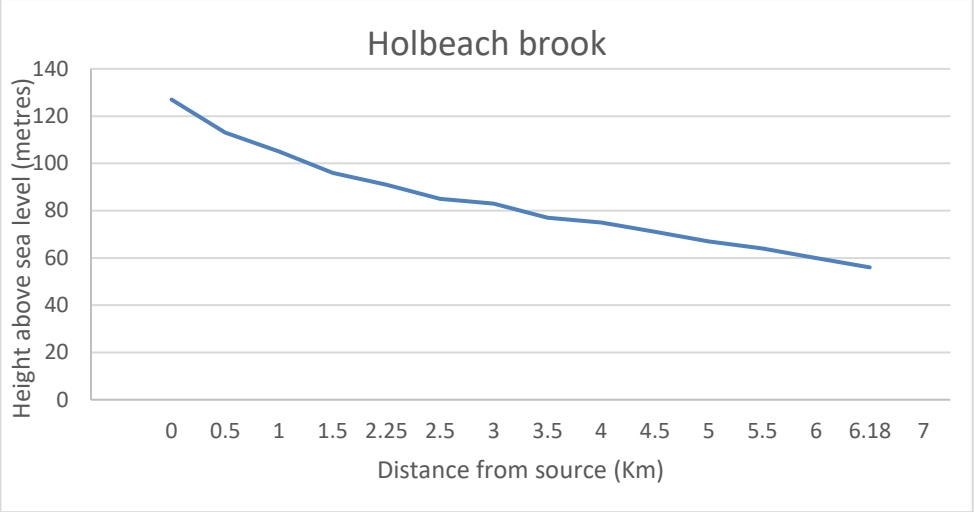


Figure 2.8. Holbeach brook stream profile. Note the even descent, although source area data is affected by 19th century excavations and stream culverting.

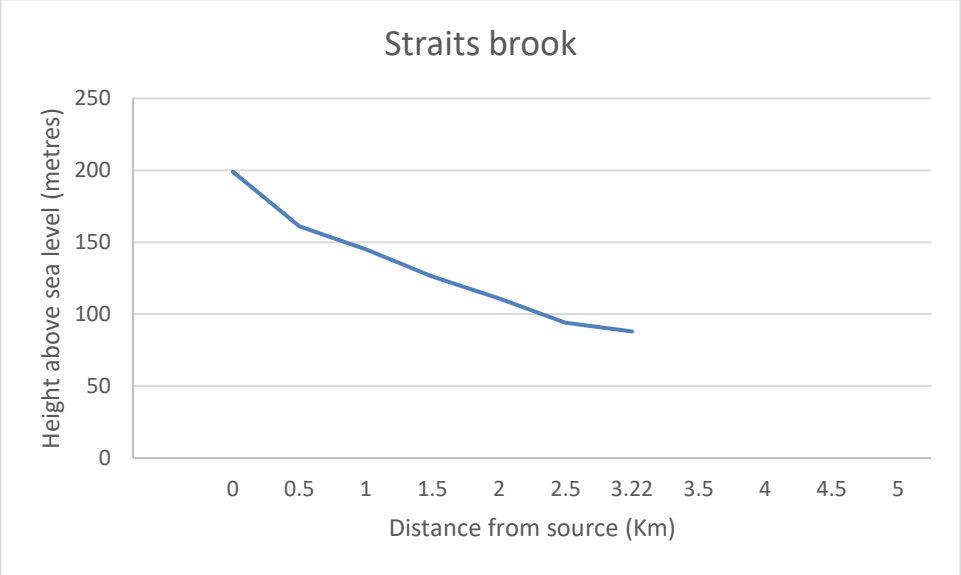


Figure 2.9. Straits brook stream profile. Again, note the high source and rapid descent.

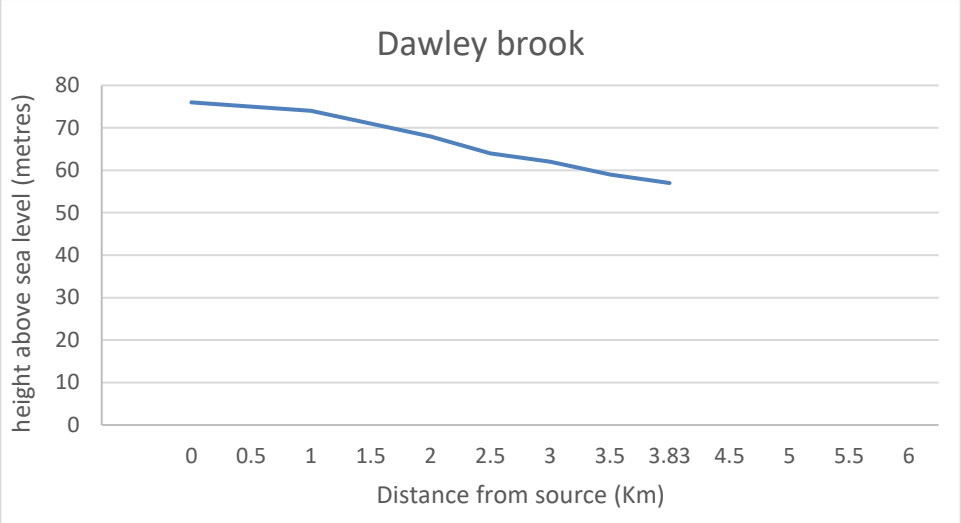


Figure 2.10. Dawley brook stream profile. Here the stream source is at a much lower level and the profile shows a relatively 'flattish' nature which may indicate the reason why no mills are known from this area.

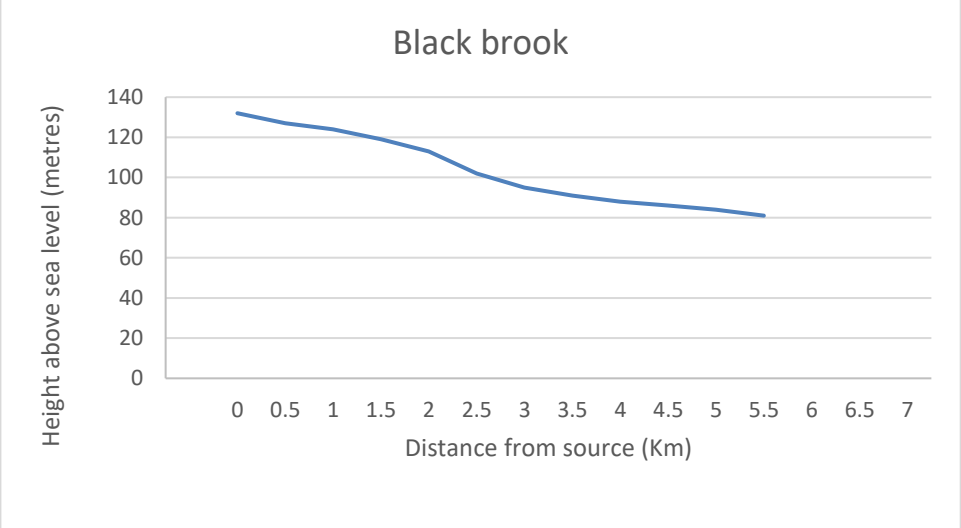


Figure 2.11. Black brook is a 'west bank' tributary of the Smestow. The marked change in profile at 110m indicates the location of Great Moor mill.

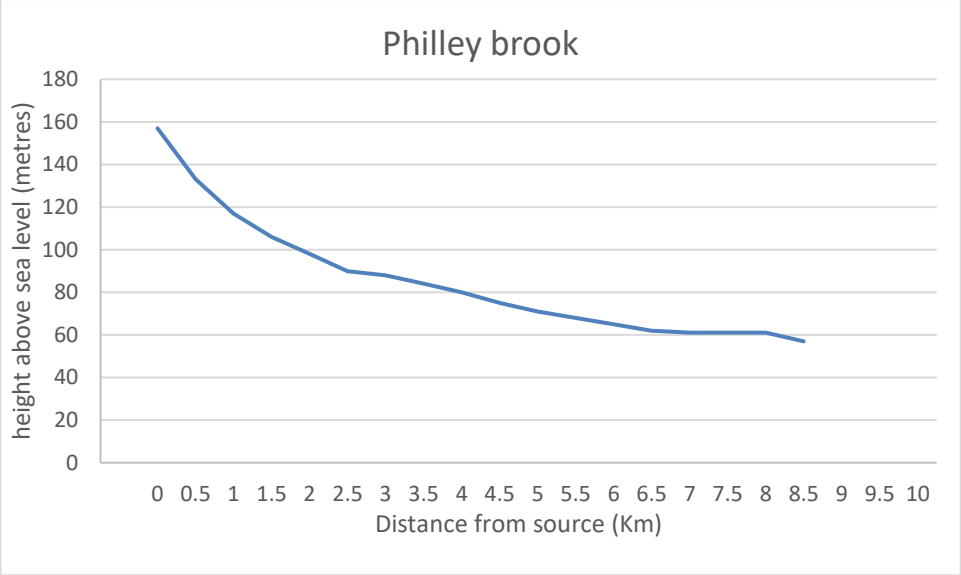


Figure 2.12. The Philley brook stream profile. A west bank tributary with a steep initial fall.

Examining these profiles, it is evident that many of the east bank tributaries of the Smestow do show a marked steepness of slope, especially in the uppermost sections, largely due to the underlying geology, except for Dawley brook. This may explain why, to date, no mill sites have been located on this tributary stream. The second point to emerge suggests that the earliest corn-milling sites are located where there is a change in the steepness of the valley profile which may have enabled a mill site to be built and safely used without fear of periodic inundation. This also applies to the west bank tributary streams, even though the steepness of fall is not so marked in them. These points are examined further in chapter 3 below and elsewhere in this thesis where relevant.

2.7. Hydrological changes

This section will examine how the hydrological regime of the Smestow basin may have altered through time. An examination of the probable meaning of the earliest known examples of the stream names is presented to consider what light this throws on landscape development in table 2.1 below along with a description of the nature of the stream and the

number and location of mills it supported. This is followed by an investigation of potential climate-related changes.

'"Must a name mean something?", Alice asked doubtfully. "Of course it must," Humpty Dumpty said'.[1]

Place-name studies in Staffordshire are hampered by the lack of English Place Name Survey volumes – only one has been published.[2] However, Horovitz attempted a comprehensive analysis using a similar approach, which is utilised below. The earliest spellings of many of the stream names are medieval or late-medieval, so it is possible that these names may represent re-naming from earlier names, now lost. Nevertheless, Horovitz's interpretations are followed here.[3]

The meaning of the river-name Smestow is unclear. Ekwall noted that the word Smestow can be defined as 'the place of the smiths' which offers an indication that the area's industrial development may have begun in the early medieval period.[4] Ekwall offered an alternative definition as 'a smooth place or pool', which he suggested may have originated as a name for part of the stream. He noted that the Smestow originally was called *Tresel,* a name from which the nearby settlements of Trysull and Trescott are derived. His discussion of *Tresel* suggests that its origin is 'obscure', perhaps cognate with a Celtic word (*tres*) meaning toil or labour, which may imply a scene of industry, or, a steadily-downcutting stream creating currents and eddies.[5] Both Anglo-Saxon charters which refer this area

[1] L. Carrol, *Alice Through the Looking Glass*, London, 1872, p.103.
[2] P. Oakden, *The Place Names of Staffordshire*, vol. LV, Cambridge, 1984.
[3] D. Horovitz, *The Place-Names of Staffordshire*, Brewood, 2005.
[4] E. Ekwall, *The Concise Oxford Dictionary of English Place-Names,* Oxford, 4th ed., 1960, p.437.
[5] Ekwall, *Dictionary,* p.481.

named the stream as *Tresel,* supporting the suggestion that it was the original name.[6] Horovitz concurred, noting that *Smethestall* may be the name for a pool in the stream, or possibly, an earlier name for either the Wom bourne or the Penn brook.[7] Stour, the name of the river which the Smestow joins, is early English in origin and means 'loud, vigorous, forceful'.[8]

Table 2.1. Smestow basin watercourses.[9]

Stream name	**Name meaning**	**Course description, including source**	**Number of mills**
Smestow brook	The meaning and origin are discussed above. *Tresel* as a name survived in regular use until at least the 14th Century. *Tresel* is a naming element in both the settlements of Trysull and Trescott. The uppermost part of the Smestow was also known as the Goose brook (later Gorse brook) giving the mill and road of the same name (SB14).	The original spring may be near the site of the former Springfield brewery on Springfield Road in central Wolverhampton. The Smestow now first appears above ground near the appropriately-named Smestow Street and Water Street. The course is discussed above.	Three mills were in the uppermost reaches, with Showell (SB13) and Gorsebrook (SB14) sites lost. The third, Dunstall Mill (SB15) was built over. Further mills at Compton (SB16) Wightwick (SB17) Furnace Grange (SB1) Seisdon (SB19) Trysull (SB20) Smestow hamlet (SB21) Swindon (SB3) Hollow Mill (SB4) Greensforge (SB5) and Gothersley (SB6).

[6] D. Hooke, *The Landscape of Anglo-Saxon Staffordshire: The Charter Evidence,* Keele, 1983, p.64 in charter S860 dated to 985AD and p.70 for the bounds of Ashwood. Charter number references are from P. H. Sawyer, *Anglo-Saxon Charters. An Annotated List and Bibliography,* London, 1968.
[7] Horovitz, *Place-Names*, pp.498, 545 (under Trysull). Horovitz' explanation is accepted here.
[8] R. Coates, 'Stour and Blyth as English river-names', *English Language and Linguistics*, vol. 10, 2005, pp.23-9.
[9] Place-name definitions from Horovitz, *Place-names*, unless indicated otherwise.

Graisley brook [10]	Named from the hill on which is starts.	A four-mile-long tributary joining the Smestow at Compton Mill (SB16). It starts on Graisley hill, where its two sources are initially culverted.[11] It takes in excess water from West Park lake, Wolverhampton. The confluence with the Smestow was probably altered by the S&W canal construction.[12]	No known mills. Compton Mill (SB16) is below the Smestow confluence.
Finchfield brook	The name may be derived from Finchfield Farm, located half-way along the stream's course, meaning 'the open land where the finches are'.	Two-mile-long tributary joining below Wightwick Mill (SB17). Source is Goldthorn Hill, Penn. The brook falls from 600' to 330' OD.	No mill sites known. Wightwick Mill (SB17) is sited after the Smestow confluence.
Perton brook	Presumably named from the village.	Under a mile in length.	
Wom bourne or Wom brook [13]	The meaning may be 'the clear stream in the hollow.' This is one of the northern-most uses in England of the place-name element bourne (as opposed to burn) as a stream-name.	A 5-mile tributary formed by the confluence of Penn and Lloyd brooks at Wodehouse Mill (SB24). It joins the Smestow above the hamlet of Smestow.[14]	Four known sites; Wodehouse Mill (SB24) Wombourne Mill (SB27) Ham Mill (SB28) and Heath Forge (or Heath Mill) (SB2).
Small brook or Withy-more brook	Self-explanatory. The 'withy' element may refer to withies – that is, willows.	A mile long, with two sources to the west of the A449 road at Bearnett Lane, 550' OD. The stream feeds the Wom bourne.	No mills known. Wombourne Mill (SB27) made use of its waters.
Penn brook	Presumably named from the village of Penn.	Four sources on the Sedgley ridge (Colton Hills) at 600' OD. Deep cutting on Penn Common made by extensive post-glacial down-cutting. Other springs in the area of Penn Common give a moor-like	One known mill – Penn Common Mill (SB25). Now demolished. A mill is recorded in Domesday Book at Upper Penn, site

[10] A possible 'ghost stream', the Puddle brook, appears on Taylor's map of Wolverhampton (1750) draining the southern part of the town. It may have drained into the area now occupied by the lakes in West Park and therefore into Graisley brook. No part of Puddle brook remains above ground. The map is in Shaw, *The History and Antiquities of Staffordshire*, vol. II pt.1, p.viii.

[11] Graisley may mean 'the *lēah* where the wolves are'. If so, the area must have been heavily wooded to provide sufficient cover for a pack of wolves. Horovitz, *Place-names,* p.282.

[12] Langford, *S&W Canal*, p.105.

[13] Occasionally, the stream is called Wombourne brook.

[14] The stream gives its name to the bridge, that is, Smestow Bridge. The subsequent small settlement at the bridge became known, rather confusingly, as Smestow.

		landscape feature.	lost. It may have been in the Penn Common area. A mill is shown in this area in 1797 on a map created to consider using water from the brook as an additional source for the S&W canal.[15]
Lloyd brook, Lyde brook, Lyd brook	Probably derived from the early English word *hlud*, meaning loud. The name may refer to its aural contribution to the landscape. There is a slight overlap in meaning with *Tresel*, which also suggests an audible element.	Half-mile long. Source is Chamberlains Lane, Penn Common, then through Light Wood, Lloyd Wood (a variant of *hlud*) before joining Penn brook.	Ludes Mill (SB26) was at the confluence with Penn brook.
St. Anthony's brook	Currently there is no known explanation for the name, but it flows close to St Anthony's Cheshire Home Penn, indicating a 'new' name replacing an older one. [16]	A tributary stream to Penn brook, running roughly parallel with Lyde brook. Source is on Hannoke's Moor. Flows for half a mile, dropping 200'.	No known sites, although there remains a large fish pond which could have been used for other purposes.
Tene brook	Meaning unknown and early spellings are lacking. Dunphy suggests it means 'gathering grounds of the waters' without offering an explanation.[17] It may be cognate with Tean.[18] Also known as Merry Hill brook as the stream has its source in this part of Penn. The usually reliable Langford describes it as an un-named stream and	7-mile tributary of the Wom bourne. Two sources at Goldthorn Hill and east of the A449 in Lower Penn. Also fed by overflow water from the S&W canal below Dimmingsdale lock.	One mill - Orton Mill (SB23). The general area is known, but not the precise spot. [21] A lengthy leat from this stream feeds Heath Mill (SB2).

[15] SRO D3186/1/1/1 - Minute Books of the S&W Canal Company, 1766-1845. This may be Penn Common Mill (SB25) or alternatively an additional hitherto unrecorded mill site.

[16] https://www.openstreetmap.org/#map=15/52.5509/-2.1664 accessed 28 January 2020.

[17] Dunphy, *Smestow*, p.67; Plot, *The Natural History of Staffordshire*, p.64 refers to a Tene brook in Wightwick which may be this stream, although it is not in that parish. Frustratingly, Horovitz does not mention this stream.

[18] Tean is the name of a river in Staffordshire (amongst others). Ekwall, *Dictionary*, p.462, suggested Tean is cognate with the river-name Teign, meaning 'scattering or sprinkling' from a Welsh form.

	later confuses it with Penn brook.[19] VCH *Staffs* leaves it un-named.[20]		
Showell brook	Meaning is likely to be from the Anglo-Saxon for seven wells, as in Showell, Wolverhampton (see above). Presumably it had seven sources or springs.	A mile-long tributary of Tene brook, descending over 100' in this short distance. Several springs in the area, but not seven, and all feed the stream.	
Holbeach brook[22]	Probably derived from the Anglo-Saxon *Holbeche* meaning stream in a rounded hollow. Known locally as Mad brook.[23] Fowler's map of Kingswinford shows the brook carrying the Kingswinford parish boundary.[24] The middle reaches have been heavily affected by 19th century extractive industries.	Approximately 6 miles long, joining the Smestow at Hollow Mill, Hinksford (SB7). Substantial down-cutting just west of Wall Heath Forge (SB9) giving a 150' deep ravine. Leats link the lower part of the stream with Himley brook.	Eight mills known: Gornal Wood Furnace (SB12), Hunts Mill, (SB32) Gornal Forge (SB11) Coppice Mill (SB33), Oak Mill, (SB35) Holbeach Mill (SB34), Wall Heath Forge (SB9) and Hinksford Forge (SB7). Gornalwood Furnace (SB12) is the oldest known iron-making site dating to 1595.[25] Millponds exist at Daffydingle pool, the header pool for Holbeach Mill (SB34). Fillwell pool is marked on Fowlers map.[26] The Coppice Mill (SB33) header pool has also survived.
Himley brook	Name probably derived from the settlement of Himley, meaning the *lēah* with hops growing.	Six-mile-long tributary of Holbeach brook. Two sources; one at Beggars Bush, Wombourne. Second in an area subsumed into	Three mills known. Dud Dudley's Himley Forge (SB8), either on the site of the later Himley

[21] See chapter 3 for a possible site at Orton Grange farm.
[19] Langford, *S&W Canal*, pp.126-7.
[20] VCH *Staffs,* vol. XX, p.212.
[22] For the Holbeach/Holbeche convention adopted here see the introductory notes on 'conventions used'.
[23] Dunphy, *Smestow*, p.113.
[24] DAHLC: PR/24/14/4. Fowler's map of Kingswinford, 1822.
[25] Schubert, *History*, p.180.
[26] DAHLC: PR/24/14/4. Fowler's map.

		Baggeridge colliery. The southern arm forms pools in and below Himley Park. The northern arm is known to have contained pools, purpose unknown.[27] A third pool is above Hinksford Farm Mill (SB29) and it may have been a back-up pool for that. Extensive use of leats, some now lost.	Mill (SB30) in the village, or now lost underneath one of the pools in the Park. Hinksford Forge (SB7) was the third, above confluence with Holbeach brook.
Straits brook	Meaning unknown, although it may be derived from the nearby settlement with the same name.[28] Also known as Bob's brook.[29] The origin of this name may be relatively recent, referring to 'bob holes' dug by miners for coal, found just below the surface hereabouts.	A tributary of Holbeach brook. Main source is near Sedgley Beacon (736' OD) at The Whitewell, one of the Sedgley village wells. Another source is at Cotwall End (Spout Farm). The stream flows in a steep narrow channel implying substantial down-cutting. Several nameless very short streams, all under a mile long, join here.	Three mills known. Cotwallend Mill (SB31); the site may be in the nature reserve of the same name; Hasco Forge (SB10) at Askew bridge and Coppice Mill (SB33) at the confluence of Straits brook with Holbeche brook.
The Dingle	Dingle, in west midland place names, means a steep narrow valley, usually wooded – an accurate description of the stream and valley profile today.[30] The Straits brook valley is also known by this name.	Short stream joining Straits brook.	No known mill sites. This may be too steep a profile to be suitable for a mill or wheel and surrounding buildings to be established or maintained.
Dawley brook	No known settlement of Dawley. It is possible that it is composed of the elements dell and *lēah*, meaning wooded hollow.	Tributary of the Smestow. The lower section sometimes known as Heath brook. The stream has been adjusted at its lower end to turn into the S&W canal basin at Ashwood.	No mills identified.[31]

[27] SRO B/A/15/529 – Himley Tithe Award and Map, 1839.

[28] Although the reverse could be the case. Horovitz, *Place-Names*, p.518 suggests that the name Strait means 'narrow passage'. This may refer to the gorge-like valley of the stream rather than anything specific about the settlement of the same name.

[29] Dunphy, *Smestow*, p.107.

[30] Ekwall, *English Place-names*, p.144

[31] Given the large of number of mills on the Smestow tributaries, no mills at all on what seems to be a suitable stream is rather odd. However, examination of the stream profile above does suggest that appropriate mill sites may not have been available.

Black brook	Perhaps named from its habitual colour, indicating transportation of mud or silt.	A 'west bank' Smestow tributary, approximately four miles long. Its course is partly straightened by Great Moor Mill.	Great Moor Mill (SB22).
Nurton brook	Presumably named from the hamlet of the same name.[32]	Two-mile tributary of Black brook. May have been straightened.	None known.
Philley brook	Meaning is 'the filthy brook', indicating a high amount of sedimentary material under transportation.	Two main sources at 500' OD near Four Ashes. After Sneyd brook confluence it becomes Spittlebrook. Under two miles in length. Steeply down-cut initially before levelling out.	Four mills within a mile and half at Mere Mill (SB39) Lutley Mill (SB38) Philleybrook Mill (SB37) and Toys Farm Mill (SB36).
Spittle brook	Meaning is 'brook by the hospital or religious house'. A site was given to the Knights Hospitallers in Kinver Forest by Richard I in 1189.[33]	Tributary of the Smestow joining at Gothersley (SB6). Formed by the confluence of Sneyd brook and Philleybrook. Two miles long with only a small drop in height giving a marshy valley floor.	Two sites, Checkhill Mill (SB43) and Spittlebrook Mill (SB42). Checkhill Mill buildings remain.
Sneyd brook (N)	Sneyd is an Anglo-Saxon term meaning 'A cut off piece of land'.	Under two miles in length. Joins the Philleybrook.	Hoo Farm Mill (SB41) and Morfe Hall farm Mill (SB40). No traces of any water features from either mill.

The appearance of all these streams today, notably their width, position in their valley and volume of water carried at different seasons in the year was certainly not the same in the past. Historic climatic variations experienced across England in for example the Roman era, medieval period and later may well have had a significant impact on the nature of these streams due to changing rainfall levels, and this must be borne in mind when considering the landscape impact of artificial water features and stream course modifications. Such changes to the climate experienced by the British Isles through time have been extensively

[32] Horovitz, *Place-Names*, p.414, suggests it is derived from the place-name elements for ridge and settlement, and the stream is named from it.
[33] VCH *Staffs,* vol. XX, p.137.

discussed.[34] The broad chronology of northern hemisphere and north-west European climatic events including, for example, a Medieval Warm Period (MWP) from approximately 900-1300AD and a Little Ice Age (LIA) expressed by Lamb and other researchers is followed here. Kington defined the LIA as from 1540 to the 1890s, noting that three periods of colder weather were separated by more variable periods.[35]

The Smestow was therefore likely to have experienced periods of higher and more intensive rainfall during the late Roman era and perhaps beyond, which may have had the effect of a raising of the water table in the basin and increasing the flow of the streams by current standards, making the opportunity to utilise them for watermills potentially difficult, given the steepness of the profiles noted in figures 2.4-2.12. It is perhaps no surprise therefore that the Domesday book record of mills in Staffordshire shows a relatively low number, and where sites can be definitively located, that they are away from the steepest parts of the valley profiles and on relatively flatter land. The change from a warm and wet climate after 1300 to one after 1540 that was characterised by increased periods of coldness may have resulted in periods of lower stream flow, making the construction of mills and their associated water features an easier prospect, and the opportunity to finally make use of the steeper sections of the streams for mills. A chronology of mill site construction is presented in chapter 3 below.

Although detailed studies of the alluvial depositional history of the Smestow are unavailable, it is possible to extrapolate probable changes to the local hydrology by considering such changes across the Severn basin, of which the Smestow is a small part. Examination of

[34] This scientific discipline owes much to the work of H. H. Lamb, notably 'The early medieval warm epoch and its sequel', *Palaeogeography, Palaeoclimatology, Palaeoecology*, 1965, vol. 1, pp.13–37, and a research summary in H. H. Lamb, *Climate History and the Modern World*, London, 1995. A synopsis of 2000 years of climatic change in the British Isles is discussed by J. Kington, *Climate and Weather*, London, 2010, pp.191-450, also used here.
[35] Kington, *Climate*, p.149.

alluvial deposits at Broadwas on the River Severn has been undertaken.[36] This analysis showed that flooding was more serious in the period 350-700AD than in the following 400 years, and that each river investigated by Pears *et al* had an increasingly different flooding regime through time, perhaps indicative of anthropogenic factors associated with woodland clearance and agricultural practice coming into play. Such a set of events is also likely to have affected the Smestow drainage basin as well, suggesting that the remarks above about the specific hydrological regime and the nature of the valley profiles examined above may have some validity.[37]

Rainfall levels have been recorded for the study area. The average amount has varied slightly by location in the study area. On the Sedgley-Northfield ridge the figure averaged 28" (711mm) falling away to 24" (609mm) in the Severn valley (and perhaps by analogy a not dissimilar figure in the Smestow) in the period 1945-50.[38] More recent figures (2022) still show the wider Birmingham area as receiving an annual average of approximately 700mm rainfall.[39] Slightly further afield, data from the Climate Research Centre has established rainfall levels from 1847 to 1995 for Shifnal, some 5 miles to the northwest of the study area. This data shows that annual averages slightly exceed 700mm.[40] This is well below the

[36] B. Pears, A. G. Brown, J. Carroll, P. Toms, J. Wood, and R. Jones, 'Early Medieval Place-Names and Riverine Flood Histories: A New Approach and New Chronostratigraphic Records for Three English Rivers', *Journal of European Archaeology*, vol.23.3, 2020, pp.381-405.

[37] The River Trent, which drains the comparison area has also been investigated. It moved from being a single meandering channel in the 6th century to an unstable multi-channel system during the 10th. In the following 200 years it was characterised as a stable multi-channelled anastomosed environment, before resuming a stable single channel course in the 15th century, probably due to human management. L. Elliott, H. Jones and A.J. Howard, 'The Medieval Landscape', in D. Knight and A.J. Howard, *Trent Valley Landscapes*, Kings Lynn, 2004, p.156. Similar changes may have been present in the Smestow, but no evidence is currently available.

[38] B. Saward, 'Climate', in Kinvig *et al Birmingham and its Regional Setting*, p.49. Confirmed by data at Swindon from CEH: https://nrfa.ceh.ac.uk/data/station/spatial/54067 (accessed 22 January 2023).

[39] https://www.worldweatheronline.com/birmingham-weather-history/west-midlands/gb.aspx (accessed 23 January 2023)

[40] https://crudata.uea.ac.uk/cru/data/UK_IR_rainfall_data/UK_precip_subset_long_sites.dat accessed 2 May 2023.

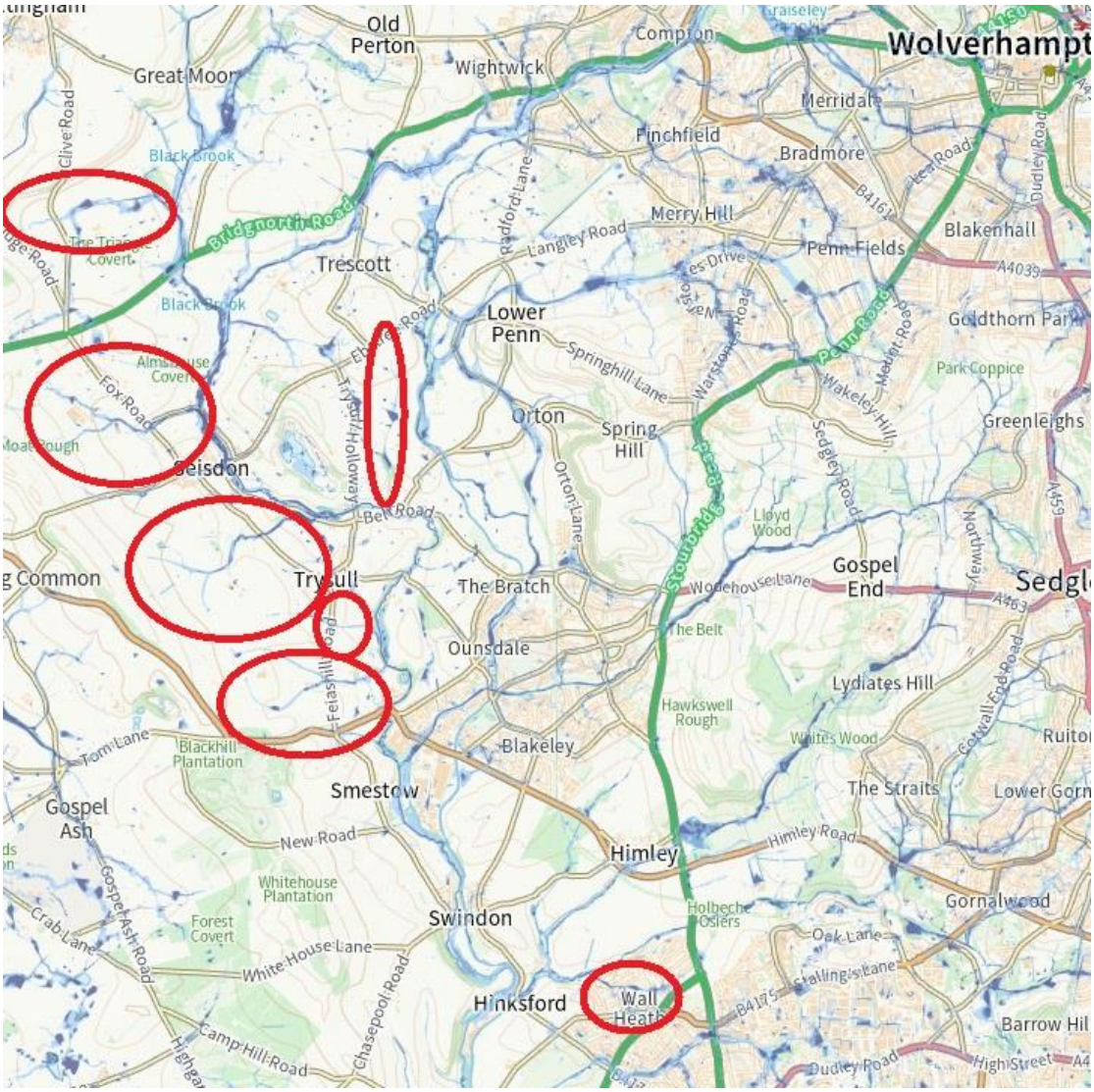
UK average precipitation now, and it is likely that this has also been the case in the past given the basic southwestern orientation of most UK weather events.[41]

Taken together, it is possible to conclude that the hydrology of the basin today, as shown in maps 2.9-2.13, may not represent the drainage pattern at its maximum in the past, as it is known that extensive water abstraction from the underlying geology, thus lowering the water table, has occurred since the 19th century. Estimating periods and volumes of peak flow remains challenging, but it is likely, based on the evidence presented here that flow levels in the study period were higher than those experienced in today's environment making control of streams through dams and mill-gear a potentially hazardous enterprise, especially so for those where sudden water volume increase could pose a serious problem. This is likely to have been exacerbated by the impact of the LIA which may have been at its coldest in this period. The water table would therefore have been at a high level so it is likely that the effect of storms would be marked, as when, for example, Dud Dudley, discussed in chapter 6, noted the ruin of the mill sites he created in the period 1620-3 due to a storm in May 1623.[42]

Potential flood risk maps may indicate areas where earlier stream courses have been 'lost', by field drainage, culverting or groundwater changes through time. Map 2.14 below shows several areas defined as 'flood-risk' but no longer marked by stream courses. These may represent 'lost' streams reflecting, as discussed above when considering climatic variation, a higher water table and more rainfall than in the present era. There is a notable concentration of 'lost streams' on the Smestow west bank near Trysull in the centre of the extract presented here and shown on the LiDAR image (figure 2.17, below). At least six such

[41] UK average derived from: https://climateknowledgeportal.worldbank.org/country/united-kingdom/climate-data-historical (accessed 2 May 2023)
[42] D. Dudley, *Metallum Martis*, p.10.

'streams' are shown south of the Smestow: Black brook confluence where no streams are found today. Headwater loss, perhaps as a result of culverting of the east bank streams, Tene brook, Penn brook, Himley brook and Holbeach brook is also evident.



Map 2.14. Potential flood risks in the central Smestow valley (marked in blue) showing some likely 'lost' water-courses marked with red circles.[43] Scale 2cm = 1km.

[43] Map taken from DEFRA at https://check-long-term-flood-risk.service.gov.uk/map?easting=379081&northing=340248&map=SurfaceWater (accessed 23 January 2023).

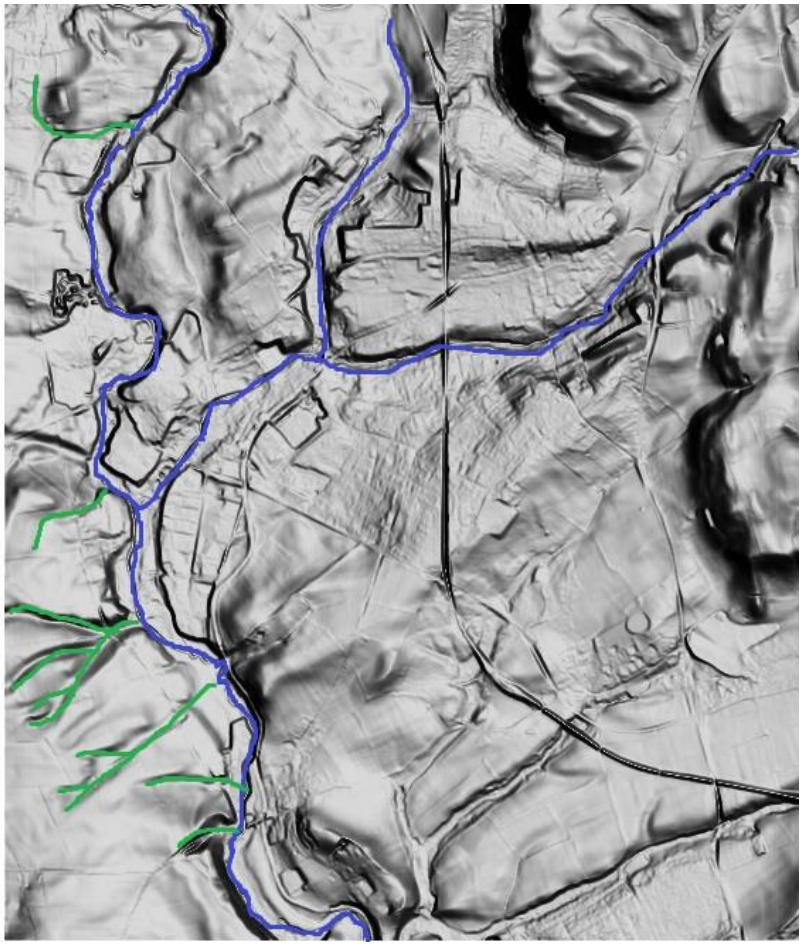


Figure 2.13. Annotated LiDAR image of the Smestow: Wom bourne confluence area (streams in blue) to highlight some of the possible lost stream courses (marked in green) shown on map 2.14.[44]

It is useful at this point to consider the comparison area. The Rising brook starts on Cannock Chase (GR SJ 994157) at 601' OD and heads south. The brook's course has been affected by mine workings, and downstream from the Brindley pools it is culverted for 400 yards to the Chase railway bridge. It is then joined by the Bentley brook, at what may be an elbow of capture. Bentley brook holds the parish boundary between Rugeley and Cannock for most of its course.

[44] Data from: https://environment.data.gov.uk/DefraDataDownload/?Mode=survey (accessed 23 January 2023) and manipulated in QGIS. Scale 1:25,000.

Figure 2.14. Source of the Rising brook (front centre).

Figure 2.15. The Rising brook half a mile south of its source.

Figure 2.16. Rising brook emerging from the culvert below the lower Brindley pool, heading south, some two miles below the previous figure.

Figure 2.17. View looking south showing the Rising brook crossed by the Chase railway, 600 yards from the previous figure.

After the Bentley brook confluence, the Rising brook heads north-east, into a glacial meltwater overspill feature as a misfit stream for five miles. The stream runs through Hagley Park, joining the River Trent at Brook's Mouth just east of Rugeley.

As with the Smestow, place names add to the general picture of landscape development. Rugeley means 'the wooded glade on a ridge',[45] and the Rising brook name, shared with another stream near Stafford, means 'stream growing with brushwood'.[46] However, the stream's propensity even today to quickly overtop its banks after heavy rain may offer an alternative explanation for its name.

Table 2.2. Rising brook watercourses.

Stream name	Name meaning[47]	Course description including source	Number of mills
Rising brook	Discussed above.	Over twelve miles long from its source to its confluence with the River Trent at Rugeley. Makes use of a glacial spillway across Cannock Chase AONB where it has substantially cut into the surface geology creating a narrow ravine in places. Its course has been straightened and adjusted from the 16th century onward.	10 (11 if a joint mill is considered as two separate sites).
Bentley brook	Probably derived from the early English '*leah* overgrown with bent-grass'. Bent-grass grows on thin acidic soils which fits the environment of the stream.	Tributary of Rising brook. Four miles long from its 600' OD source in Beaudesert Park to its confluence near Hednesford. The lower course appears straightened presumably due to nearby railway and colliery construction.	None known.
Stoney brook	Most likely to mean stream with a stony bed – which it still has.	Two miles long. Shortly after confluence with Small brook it joins Rising brook.	Probable site of first iron blast furnace (RB2) at its confluence with the Small brook.
Small brook	Self-explanatory.	Two miles long. Joins Stoney brook.	None.
Fallow brook	Not known	A mile long. Joins Stoney brook.	None.

[45] Ekwall, *Dictionary*, p.396, although this is not consistent with its topography today.
[46] Horovitz, *Place-Names*, p.461.
[47] Derivations are from Horovitz, *Place-Names*.

2.8. Summary of physical factors.

This chapter has considered a variety of physical factors (topography, geology, pedology, and hydrology) that have combined to create the specific landscape of the study area. Consideration has also been given to the effect of climatic change through time on the nature of the hydrological response to both climate and geology. It is evident that the hydrological regime in the valley has changed through time giving reduced flow rates, stream loss and a lowered water table, partly due to these climatic factors, but also due to human activities associated with agriculture in draining areas and 19th century (and onward) water abstraction.

Overall, this analysis has presented a valley landscape on sandstone rocks heavily modified by glacial action creating a col at the northern end and leaving acid soils capable of supporting heath and woodland, especially given rainfall levels, and except in specific areas, not suitable for intensive agriculture, especially cereals. Because of these factors and the 'marginal' element of its location, the type of pastoral agriculture practiced during the medieval era is unsurprising.

Climatic factors combined with aspects of the topography have resulted in streams fed by regular, reliable rainfall, and a steep profile more than suitable for damming to create water-powered mills. The relatively poor agricultural regime, combined with iron deposits intermingled with coal in the coal measures found both near and at the surface in the very east of the study area near Sedgley combined to make the 'dual economy' an attractive proposition. Therefore, it is proposed the iron-making industry that did develop in the valley is a function of geology in the form of the presence of iron deposits and pedology (itself derived from geology and glacial deposition) giving poor quality soils unsuited for anything

other than grassland or woodland. The woodland could therefore generate charcoal in sufficient quantity for the creation of charcoal to smelt the iron ore and to continue to smelt that ore for many years provided the woodland resource was suitably managed. This proposition is tested further in the following chapters.

CHAPTER 3: WATER POWER IN THE LANDSCAPE – THE WATER MILLS

3.1 Introduction.

The objective of this chapter is to provide a discussion of the development of all the mill sites in the Smestow basin listed in tables 1.1 and 1.2 in chapter 1. These sites are set out in more detail as table 3.1, below, which includes those sites known from medieval and later documentation which cannot currently be traced on the ground.

It will review the effect on landscape development in the Smestow at the micro- and macro-level of watermill sites, their associated water channels, and other water features, whether they produced iron or not. The analysis includes some evidence derived from fieldwork and contributes a response in part to the research questions posed in chapter 1. The value placed on mill buildings, as well as the water supply to them, is investigated through the medium of medieval legal records to determine how essential (and lucrative) a landscape component mill buildings were for the local economy.

3.2. The origin of the water mill and its development and usage in England.

Water wheels, and their associated buildings, generally known as a mill or watermill, are believed to have been invented in Mesopotamia, China and perhaps also Greece around the same time. The earliest references to watermills in Greece are from the 5th century BC.[1] Watermills were probably introduced to Britain by the Romans, and appear in the archaeological and historical record during the post-Roman period. A noted example, beyond but close to both study areas was excavated at a Mercian 'princely residence' in

[1] L. Syson, *The Watermills of Britain*, Newton Abbot, 1980, pp.17-19.

Tamworth.[2] To date, no such early archaeological traces have been found in either study area.

Late pre-Norman Conquest era mills are documented in Domesday Book, with approximately 6,000 mills in England.[3] The listing may be a partial record, as those mills noted may only be those which paid tax, implying the presence of others, which may have been tax-exempt. In the Smestow valet, mills are recorded at Kingswinford, Kinver (two), Patsull, Upper Penn, Trysull and Wombourne, again with two mills. In the Rising brook only one mill is noted at Rugeley – which could have been on the River Trent or Rising brook. The paucity of mill sites listed in Staffordshire by comparison with other counties is noteworthy, suggesting that the area was somewhat under-developed.[4]

It is not clear whether individual Domesday Book mills are human- or animal-powered or water-powered. It is assumed that most mills described in the documentation under review below were water-powered, and, in most cases, the water wheel was a vertical one. Water wheel types and their technology have been discussed by Reynolds.[5] He noted the development of the horizontal waterwheel, the vertical undershot and the vertical overshot waterwheel, and the diffusion of these inventions through the world of antiquity.[6]

Initially, mills were only used for grinding grain. Later, there is evidence of the application of mill technology to the production of cloth - the mill was called a fulling or walk mill. Mills

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[2] P. Rahtz and R. Meeson, *An Anglo-Saxon Watermill at Tamworth: Excavations in the Bolebridge Street area of Tamworth, Staffordshire in 1971 and 1978*. CBA Research Report 83, 1982.

[3] D. Hey (ed), *Family and Local History*, p.496, Syson, *Watermills*, p.22 suggests the startlingly precise figure of 5,624. The 'true' figure is probably greater than this as undoubtedly not all mills were recorded.

[4] Reynolds, *Stronger* p.53, figure 2.2., which shows their geographic distribution in England.

[5] Reynolds, *Stronger*, pp.14-46, which has influenced the discussion here. It is not proposed to outline the development of mill technologies which is amply covered elsewhere, for example, Langdon, *Mills in the Medieval Economy*, and Holt, *The Mills of Medieval England*.

[6] Reynolds, *Stronger*, p.27.

were also used for tanning and, later still, paper production. The techniques of rotational gearing involved in the production of power were applied to the movement of hammers, and later bellows, enabling both the initial smelting of iron and its later refining/forging to occur in close proximity through the development of the water-powered iron mill.[7] This principle accounts for the co-location of blast furnaces, chafery and fining forges and slitting mills, as they all require a reliable source of power and to be close to each other to minimise the transportation costs of iron between the sites.

Over time, the understanding of the need for a constant supply of water to the mill was developed and implemented, culminating in the 'standard' arrangement of a weir directly in the bed of the main stream to pond back water supplies with flowing water diverted into a parallel, artificially-constructed channel on which the waterwheel of the mill was sited. Often the water-course would be formed into a millpool and allowed out, over the wheel, through a sluice, which enabled the water supply to be controlled effectively. The channel from the mill returning the water to the main course of the stream was called the mill- or tail-race – the leat bringing the water to the pond was the head-race. Sometimes the original course of the stream, deprived of much of its water, became shallow and silted, known as a 'back stream', used for excess water-flow in times of flood.

In Britain, mill ownership was typically associated with manorial lordship, as they turned the local grain harvest into flour. Mills were therefore usually part of the medieval lord of the manor's money-raising enterprises from his land. Increasing ecclesiastical ownership of land meant that monasteries had a need to create and maintain their own mills. Competition between landowners, and, later, independent millers, for the use of water in fast-flowing streams to generate power was a feature of the 12th-14th centuries. Such competition led

[7] Syson, *Watermills*, p.33.

to the development of slow streams with a low flow as mill sites, such as the shallow valley of the River Tame which drains the eastern Birmingham plateau.[8] Until the development of fossil fuels for steam power associated with the industrial revolution, water (and wind) power remained the main source of power in the landscape and economy.

Figure 3.1. Rowarth Little Mill.[9] An example of waterwheel technology from outside the study area demonstrating the peak development of mills. Floods in the 1970s destroyed the mill but left the 24' diameter wheel intact, in its original location. The wheel is mid-shot, fed by a trough. The mill building was where the photographer is standing.

3.3 Water Mills in the Smestow basin

Chapter 1 (tables 1.1 and 1.2) lists the 43 water-powered sites in the study area that can be clearly located through fieldwork, physical remains, LiDAR evidence or documentary

[8] Dilworth, *The Tame Mills* , p.9.
[9] Rowarth, Derbyshire.

material. Many of these mills were a significant, long-lasting element in the landscape, along with their associated water channels, dams, weirs, and other features. Three known mills cannot be precisely identified on the ground, suggesting a minimum of 46 mill sites in the basin. Fieldwork identification of possible additional sites has increased this number slightly. Thus, this basin, small though it is, may have contained up to 50 sites altogether, at a density of over two per square mile, albeit not all in operation at the same time.[10] Table 3.1. (below) starts with known iron-making sites, and then considers those sites that have been associated with iron production on a more short-term basis. Other sites in the study area, mostly corn-grinding mills, follow. Taken together, all these sites demonstrate an extensive use of water power in the study area, making that a characteristic landscape feature. The key sites, along with their associated water features, are described, illustrated, and compared through discussion below. Data for the Smestow sites is primarily drawn from published research supplemented by fieldwork review over the period 2017-21 along with evidence from historic maps and LiDAR.[11]

A similar table (table 3.2) is presented showing sites in the Rising brook comparison area. These are as mapped in chapter 1 with the same numbering system. Data is drawn from published research over the same period quoted above.[12]

[10] This contrasts with the 12 known sites from the Rising brook basin, although the basin's area is smaller.

[11] Principal published sources are: Schubert, *History*; Brook, 'The Smestow Brook'; S. M. Cooksey and M. V. Cooksey, 'Watermills and water-powered works on the River Stour, Worcestershire and Staffordshire. Part 5, Smestow Brook', *Wind and Water Mills*, No.7, 1986, pp.11-23; King, 'S Staffs'; Peacock, *The Foleys*; Dunphy, *The Smestow*; VCH *Staffs,* vol. XX, 1981, under individual parishes.

[12] Morton, 'The Reconstruction of an Industry; Jones and Harrison, 'Cannock Chase Ironworks 1590'; Welch, 'Cannock Chase: An Industrial Woodland'; Francis, 'The Iron Industry of the Rising Brook Valley'; Welch, 'Elizabethan Ironmaking'; Causer and Andrews, 'The Rolling of Iron in Rugeley'; Thornton, 'Bygone Ironmasters'; Thornton, 'Ironworks of the Rising Brook Valley'; Thornton, *Ironworks of the Rising Brook Valley*.

Finally, the Sites and Monuments Record for Staffordshire has been utilised for both basins. For example, the data for Furnace Grange, (SB1) was accessed at

https://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MST12350&resourceID=1010

Further information is provided in the relevant table entry, including additional site-specific references where necessary.

Table 3.1. Water-powered sites in the Smestow Basin.

No.	Name, stream, location, & GR	History, owners, and subsequent development.	Extant infrastructure
		Known iron-working sites	
SB1	Grange Furnace.[13] Smestow brook. Trescott hamlet, Penn parish. SO844965	A charcoal-fired furnace throughout its life. Known variously as Furnace Grange or Furnace Grange Farm. The location could have been two adjacent milling sites. Also called Trescott Forge, giving confusion with Trescott Mill, which may have been a flour mill only, at SO 850967. Land owned by Coombe Abbey (Warwickshire) by gift from the owner of Lower Penn. Mill bought by William Wollaston in 1557 who may have subsequently turned the site over to iron production. Owned by the Wollaston family until c.1630, then leased to Richard Parkes, ironmaster. Later bought by Foley family – first reference is 1636.[14] In 1681 Messrs Wheeler, Avenant and Downing leased it from the Foleys. Always a productive site, it made 886 tons of pig iron in the 1693-4 'campaign'. In 1698 used by Richard Wheeler, although he was bankrupt by 1703. Phillip Foley sold it in 1708, but it continued to produce iron for another 50 years. Rebuilt in 1814 as a corn mill, working to 1920. The Wrottesley family sold Grange farm in 1950 and Trescott Farm in 1963.	Leat and outflow both filled in. No mill pond visible. One building intact. No visible external traces of former use or water wheel.

[13] A full discussion of the site is in King, 'Grange Furnace'. Also, HER as noted above.
[14] Both families are discussed in chapter 6.

		Likely export/import route is via Dimmingsdale wharf, S&W canal. The 'Coalway Road' may have been used before the canal was built.[15]	
SB2	Heath Forge or Heath Mill.[16] SO858923 On Wom bourne where Bridgnorth Road crosses S&W canal, Wombourne parish.	The long-term importance of iron-working here is shown by the creation of a specific wharf for it by bridge 43 on the S&W canal.[17] Originally, the site included a Y-shaped mill pond fed by a lengthy, carefully graded leat from the Smestow at Trysull. A second feeder came from the Wom bourne and a third via an iron aqueduct from the Tene brook. The mill was sold by John Grey (Lord of Orton manor township in Wombourne) to William Wollaston in 1584, then Hugh Wrottesley in 1601. It may have been an iron forge (hammer mill) started at the same time under the same ownership as Grange Furnace, and intended to refine the output of Grange Furnace, although quite why, given that the sites are more than five miles apart is not clear, as the distance must have been a hindrance. From 1628 finished bar iron went to the slitting mill at The Hyde, Kinver. Site may have been used by Dud Dudley in the 1620s as part of his experiments in using pit coal to smelt iron. Under Foley control 1650-1681. In the period 1690s-1700 occupied by Ralph Powell. From an unknown date in the 18th century occupied by the Jordan family who also rented Furnace Grange (SB1). Used for iron production until at least 1820 for export to Boulton and Watt's works in Soho, Birmingham. Converted to corn in 1827 for Sir John Wrottesley and let to the Jones family. A substantial 4 storey building. The mill ceased in 1937.	Both mill ponds (Old pool and New pool) and almost all leats are lost – fieldwork has shown slight traces of one leat, which needs confirmatory work. The Old pool was drained in the 19th century (date unknown) and the Y-shaped New pool drained during the 1940s. The aqueduct was demolished. Wom bourne has been subsequently straightened. Mill building was demolished during the 1970s. No traces.

[15] See chapter 5.

[16] It is listed as a Smestow site (even though it is next to, and partially fed from, the Wom bourne) as its millpond is fed from the Smestow through a lengthy leat.

[17] Langford, *S&W Canal*, p.124.

SB3	Swindon Forge, (also known as Swin or Swyn Forge). Smestow brook. Swindon township, Wombourne parish. SO862906	Earliest reference is mid-13th century as a fulling mill.[18] Passed to Halesowen Abbey which in the 16th century converted it to mill flour. Owned by the Dudley estate in late 16th century.[19] Operated by Dud Dudley in 1620s in conjunction with other sites. Then controlled by Foley family from 1645, owned outright from 1668 by purchase from Edward Jordan.[20] Then run in tandem with Furnace Grange, Heath Forge and Greensforge. Leased by Wheeler and Avenant from 1681. Production was 120 tons/year. Became a plating forge then a finery forge by the 1730s and owned by the Homfray family.[21] Leased by the Baldwin Group in 1866, then bought outright in 1899. In 1873 there were 12 puddling furnaces making wrought iron, using coke, not charcoal. Changed to be a rolling steel strip and bar mill when Baldwins merged with the Richard Thomas group. Doubled in size in WWI to meet demand.[22] After WWII became part of British Steel Corporation, closing in 1976. Swindon Forge was the longest-lasting iron-making site in the basin and the only one to survive into the 20th century as it modernised, expanded and changed its power source from water to coal.[23]	Mill pond is mostly lost; only slight traces of the leat. The mill pond outflow is also lost. The Smestow's course is straightened. The change of towpath side for 500 yards to avoid towpath use in front of the forge wharf remains a problem, as the 'new' towpath is not stable in parts and needs regular maintenance to ensure it does not slip into the canal. Site now under a housing estate. Street names include Forge Way and Baldwin Way. Former site canteen is a community centre. Wharf incorporated into domestic gardens on canal edge.
SB4	Hollow Mill or Hollow Forge. Smestow brook. Hinksford (part of Wombourne).	At confluence of Smestow and Holbeach brooks, using water from the Smestow. Hollow Mill (sometimes called Swindon Lower Forge) was used for a variety of purposes including iron production. Site's origin unclear. May have been the	The hollow which contained the mill pond is covered with mature trees. The mill race channel and part of the weir used to create the back brook,

[18] VCH *Staffs*, vol. XX, p.214.
[19] DALHC DE/1/9/4. Feoffment of 28 October 1592, referring to a mill (use unspecified) in Swindon.
[20] HRAC E12/VI/KAC/1 dated 1644 concerning Swyn Forge.
[21] See chapter 6.
[22] Langford, *S&W Canal*, p.128.
[23] One hammer remained powered by water until closure in 1976.

	SO865899	blade mill at Greensforge (a mile away) mentioned in 1657.[24] In 1678 the leat to it was leased (or re-leased) suggesting that the impressive sandstone bluff-cut channel for the mill may have been dug out mid-17th century.[25] In the 18th century it ground timber. Sold in 1720 and may have become a scythe mill again.[26] By the 1770s it was a forge, perhaps used by Francis Homfray.[27] Offered for sale along with Heath Forge in 1793. Still a forge in 1816. By 1834 a corn mill. All milling functions stopped in the early 20th century; exact date unclear.	now the Smestow main channel, remain. Earthworks for the mill pond dam are visible, but overgrown. The farm is extant, all other mill features and buildings lost. The bridge to the site over the Smestow from Hinksford remains *in situ*, but in imminent danger of collapse.
SB5	Greensforge. Smestow brook. Wombourne parish. SO861887	A finery mill (used for refining iron bar) was probably built here in 1599, perhaps based on an adjacent corn mill.[28] The iron-working site may have been held by Edward Green (hence the name). From the 1620s used by Dud Dudley to smelt iron with coal, perhaps through to 1625. Later in the 17th century under Foley family control, run in tandem with Heath Forge, Furnace Grange and the nearby slitting mill at The Hyde, Kinver. In 1681 leased by Wheeler and Avenant jointly with Swindon Forge (SB3). Although production regularly exceeded 100 tons/year it closed in 1686.[29] Later used as a blade mill. Then a corn mill, use having transferred at some point in the 19th century perhaps linked to Gothersley's (SB6) closure, although one of the blade mills was corn milling as early as 1733.[30] Closed in 1921.[31]	Back stream and mill ponds are both silted-up. Both temporarily visible after periods of heavy rain. Entire area is recently heavily wooded. The 1890s buildings survive, converted to flats and offices. The mill wheel pit is still visible.

[24] P. W. King, 'The North Worcestershire Scythe Industry', *Historical Metallurgy,* vol. 41 pt.2, 2007, p.145.

[25] DAHLC DE/4/23/2. A deed of covenant for Hollow Mill dated 3 March 1678. Lord Dudley reserved the fishing rights in the pool for himself, indicating an interest in traditional land usage activities whilst seeking to maximise the opportunities presented by early industrial development.

[26] M. W. Flinn, *Men of Iron*, Edinburgh, 1962, p.26.

[27] Another member of the Homfray family – see chapter 6.

[28] King, 'North Worcestershire Scythe Industry', p.145.

[29] Schafer, 'A Selection…Part I', p.70.

[30] Langford, *S&W Canal*, p.130.

[31] F. Brook, *Industrial Archaeology of the West Midlands*, London, 1977, p.146.

SB6	Gothersley iron Works.[32] Smestow brook. Kinver parish. SO863869	On the Smestow, adjacent to S&W canal, south of bridge 35 with its own canal wharf. No known predecessor corn milling site. May have opened from 1670, built by Philip Foley who leased it to a scythe maker (James Raybould) and later to another scythe maker, indicating its principal usage.[33] By 1730 a slitting mill. Continued in Homfray family ownership for the remainder of the 18th Century. By 1798 owned by John Hodgetts (a Foley family relative) and ran by the family until at least 1830 when it was let to tenants. By 1871 despite the massive changes in technology available to the industry it continued to employ 15 men and 9 boys.[34] Closed in 1890, when it was still only using water–power. Sold in 1891. Likely to have been the last site in the Smestow basin to rely entirely on water for power-generation.	'Back stream' and both mill ponds silted up and overgrown with wetland woodland. The mill ponds were just evident in 1976.[35] The area began to be substantially wooded from then. No buildings remain except for the site of the now- demolished Round House. Uniquely, the site was fed by a leat from the Philleybrook, culverted underneath the Smestow just above its confluence with the Philleybrook. No traces remain of this, or, despite extensive fieldwork, the roads created for the site.
SB7	Hinksford Forge. Holbeach brook. Kinver parish. SO868898	Below the Himley and Holbeach brook confluence. Possible other sites in the immediate area. [36] The first building on the site originated in the early 15th century, but nothing is mentioned until 1637 when it was described as a blade mill, leased by Edward Lyddyat (of the same family that later held nearby Swindon) and occupied by one Griffis Eavans (sic). Sold to Philip Foley in 1683. The tenant at this point (Francis Patchett) is later associated with Greensforge, indicating that the site probably did more than just put an edge on iron tools made elsewhere. Continued in use in the 18th	Some leats remain, as does evidence of the former mill pond site. Now a private house.

[32] Mostly taken from R. Davies, 'Gothersley Mill', *TB*, vol.24, part 2, 1991, pp.39-43. He notes that when examined in the 1970s, 'there was little to see', as the site had been bulldozed and returned to agricultural use, p.43.

[33] Raybould is a distinctive 'Black Country' surname and members of this family were involved at various times with many of the mills in the study area.

[34] TNA PRO RG/2928. 1871 Census return, Kinfare district.

[35] Langford, *S&W Canal*, p.133.

[36] King, 'North Worcestershire Scythe Industry', p.145.

		century as a forge and appears in 1806 as a forge used to plate scythes. Later owned by the owners of nearby Wall Heath Forge (SB9). Probably ceased operations before Gothersley in the 1880s.	
SB8	Himley Furnace. Himley brook. Himley parish. SO890916	Believed to be between upper and lower pools in Himley Park. Noted in 1625 as 'at or unto the Church, Hall and Park of Himley', indicating it could have been close to Himley Mill (SB30). Dud Dudley claimed to have built this furnace himself and smelted iron using pit coal here.[37] Site later leased by Richard Foley from Edward Sutton in 1625. Not mentioned after 1638 as it presumably ceased operations. Nothing else known.[38]	No traces remain.
SB9	Wall Heath Forge.[39] Holbeach brook. Sedgley parish. SO875901	On Holbeach brook between Hinksford Forge (SB7) and Holbeach Mill (SB34). Shown on Yates' map, implying a pre-1775 construction-no date known.[40] In 1783 a scythe grinding site. By 1822 known as Wall Heath Forge. The Raybould family possibly leased it. By 1858 sold to Isaac Nash of Belbroughton, Worcestershire, a scythe grinder, who produced edged tools. Sold in 1909. The local road name Forge Lane refers to it.	The leat has gone. There was a waterfall, also lost. The millpond is dried-up. The mill building remains, now a private house. The stream falls dramatically through a heavily-wooded gorge after leaving the site.
SB10	Hasco Forge, Askew Forge or Furnace. Straits brook. Himley parish. SO902909	Origin unknown. Recorded in 1626 when Edward Sutton demised it. Allegedly created by Dud Dudley to smelt iron using coal. Location lost – perhaps on the lower section of Straits brook above its confluence with Holbeach brook. The marshy area on both sides of Askew bridge may be a result of the stream realignment Dud Dudley may have arranged to ensure that his bellows had a permanent water-powered supply. No record after 1636, possibly linked to the similarly-timed apparent closure of Dudley's forge at Himley (SB8). Dudley describes	No identifiable water features or buildings remain.

[37] See chapter 6.

[38] There may have been a whitesmith's forge at Himley in 1686, perhaps at SB8 or SB30 or somewhere else. Plot, A *Natural History*, p.375.

[39] King, 'North Worcestershire Scythe Industry', p.146.

[40] DAHLC DE/4/17/4/14. Lease of 5 December 1690 of Wall Heath field to John Haden, a steelmaker, indicates that industrial activity may have been occurring in the area.

		it as 27' square, large for the time. Dudley claimed the forge equipment was destroyed by 'riotous persons' during his period of use.[41]	
		Probable iron-working sites	
SB11	Gornal Forge. Holbeach brook. Sedgley parish. SO910901	On the upper section of the fast-flowing, steeply-downcutting Holbeach brook just above its confluence with Straits brook. Survived until at least 1840 and noted on Fowler's 1822 map of Kingswinford.[42] The forge is of an early (but elusive) date. The site included a forge pond directly above the forge. Smithy Lane marks the site.	All features and buildings lost.
SB12	Gornal Wood Furnace. Location lost. Holbeach brook. Sedgley parish.	Possibly the oldest iron production site in the study area - first recorded in 1595, leased by Lord Dudley.[43] Let again in 1607 and 1648. Location unclear, believed on upper reaches of Holbeach brook. May overlap with Hunts Mill (SB32), or part of Gornal Forge (SB11). The Fillwell pool in the Holbeach valley may mark or even be the site of the forge pool. An alternative is that this pool was another pool for Gornal Forge (SB11). Recent fieldwork has not provided a conclusive answer.	Site lost.
		Other mill sites	
SB13	Showell Mill. Smestow brook. Bushbury parish. SJ925009	On headwaters of the Smestow (the section known as the Showell stream) probably only used for flour. Uppermost mill site in the Smestow system – under half a mile from this source of the Smestow. Nothing else known.	The Smestow is largely culverted here and its course is difficult to identify. Site lost underneath 19th century expansion of Wolverhampton.
SB14	Gorsebrook Mill.[44] Smestow brook. Bushbury parish.	Possibly located near Wulfruna's Well, now part of central Wolverhampton. Used for flour milling only. As with Showell, the name may reflect a possible earlier name of this part of the Smestow. Shown on a small map of potential canal-building options in the	This section of the Smestow is also largely culverted, appearing above ground only in the Fowler's Park area. Built over by 1889.

[41] G.R. Morton and M. D. G. Wanklyn, 'Dud Dudley: A New Appraisal', *West Midlands Studies,* vol. 1, no. 1, 1967, pp.48–65 for discussion. Also, chapter 6.
[42] DA PR24/14/4 Fowler's map of Kingswinford, 1822.
[43] Schubert, *History*, p.181.
[44] Cooksey and Cooksey, *Watermills*, p.23, call this Goss Brook Mill, possibly a transcription error.

	SJ914005	area prior to the creation of the S&W, but not on Yates' map.[45] Nothing else known.	
SB15	Dunstall Mill. Smestow brook. Wolverhampton. SJ902003	Survived to 1925 when demolished to make way for Wolverhampton racecourse. Described as a blade mill in 1836, but no known history of iron production at the site. The Smestow was culverted here as part of the racecourse construction.	No remains survive. It may have led to the creation of the Water Bridge on the S&W canal and the change of course of the Smestow there.
SB16	Compton Mill. Smestow brook. Compton. SO883990	Below the confluence with Graisley brook. Unlikely to have produced iron. Probably used to produce edged tools using iron forged elsewhere. First mentioned in 1249 and possibly linked to Wightwick mill as one of the two royal mills within the manor of Tettenhall. May be the site referred to as *Rodesford* mill in 1300.[46] A corn mill throughout this period. In 1743 used as both a corn and blade mill. Out of use sometime after 1900 (perhaps 1903). No longer standing by 1980.[47]	No features visible.
SB17	Wightwick Mill. Smestow brook. Wightwick. SO875983	On Smestow, above confluence with Finchfield brook, adjacent to bridge 58 on the S&W canal. A corn mill throughout. First mentioned in 1290. Acquired by the Wrottesley family in 1316. Survived to the beginning of the 20th century, final date unclear.[48] Stopped using water power in approximately 1888 in favour of steam.	Marshy remains of a millpool visible. Leats no longer visible. The surviving 19th century buildings are incorporated into Wightwick Mill Farm.[49]
SB18	Perton Mill. Smestow and Perton brooks. Perton, Tettenhall. SO858977	Probably newly-built in the 1190s for Ranulph, lord of Perton. Used water from Smestow and Perton brooks to form the header pond. Worked into the 1920s - always milled corn – no evidence of any other activity. Not clear when production ceased - machinery removed in 1965/6.	Mill pond gone. No traces of leats from either stream. Mill house demolished. Site is part of a farm.

[45] WSL 327/292/81 - Plans of canal routes between Birmingham and Aldersley and between rivers Trent and Severn.

[46] G. Wrottesley, 'The Pleas of the Forest, Staffordshire, Temp Henry III and Edward I Translated From the Originals in the Public Record Office With an Introduction and Notes', *CHS*, vol. V pt. i, 1884, p.180. *Rodesford* is a lost place name.

[47] VCH *Staffs*, vol. XX, p.34.

[48] Several sites have their last use in the first quarter of the 20th century and despite consulting OS maps, notably the 1937 1:25,000 series, it is not always possible to tell if the mill building shown is in use.

[49] VCH *Staffs*, vol. XX, p.34.

SB19	Seisdon Mill. Smestow. Seisdon parish. SO839948	On Smestow below confluence with Black brook. Part of the Wrottesley estate until sold, 1929. A mill was noted in the 13th century. Marked on Yates' map and milled corn to 1950s when it went out of use, date unclear.	Leat still holds water in part in the Smestow meadows. Mill buildings demolished.
SB20	Trysull Mill. Smestow Trysull. SO851944	In 15th century known as *Heykeleye,* later Heycliff. Yates' map shows a mill to the west of Smestow bridge. Milled corn to around 1950, using electricity after the failure of the mill bearings in 1940s. Part of Wrottesley estate, like SB19, sold, 1929.	The leats are still full (at least in part) in the Smestow meadows. Mill building is private housing.
SB21	Smestow Mill. Smestow. Smestow hamlet, Wombourne. SO856916	Lowest purely corn mill on Smestow. Not known for anything other than flour. Origin unknown. Not marked on Yates' map, although present by 1816.[50] Existing buildings may date from c.1840 as the machinery is similar to Wodehouse mill (SB24). Survived to 1930s (date unclear) when the water wheel (possibly up to 14'6'' diameter) was damaged beyond economic repair, perhaps by a flood.	Millpond drained and leats lost. Dunphy notes a 'back stream' in 2012, now disappeared.[51] Recent water company works may have exacerbated this 'drying out' trend. Mill building a private house. Recent extensive woodland growth.
SB22	Great Moor Mill. Nurton brook. Pattingham parish. SO837984	Origin unclear. First noticed in 1914, grinding corn for animal feed. Out of use by the beginning of WWII. Given its location, probably much older than the early 19th century, but difficult to demonstrate.	The mill race may remain as an extended ford. Both Black and Nurton brook courses show signs of straightening. The mill buildings now part of the farm.
SB23	Orton Mill. Tene brook. Wombourne. SO868942	On Tene brook at Showell brook confluence, which may have been straightened. Exact site unclear. William Barnsley built a mill hereabouts in 1551. In 1648 surrendered to Sir Walter Wrottesley. Then nothing known. The valley is large enough for a millpond here. Evidence of three other mills in the Orton township of Wombourne parish. One may be the predecessor of Heath Mill, the others are Trill Mill and Caldwell Mill, both lost.[52] Either could be associated with this site.	No evidence of water features or buildings.

[50] Langford, *S&W Canal*, p.126 refers to it as Smestow corn mill.

[51] Dunphy, *Smestow*, p.86.

[52] VCH *Staffs,* vol. XX, p.212 and below. There is some suggestion *(ibid.*) that this mill could also have been known as Hackley Mill, a name curiously similar to the earlier name for Trysull Mill, SB20.

SB24	Wodehouse Mill. Penn brook. Wombourne. SO886938	A fulling mill was first noticed on the Wom bourne here in 1570. Adjacent land was leased in 1580 to Nicholas Smith of Sedgley who seems to have created a bloom smithy here.[53] Converted to a corn mill, although a blade mill in 1688 and 1693. Burnt down 1814, rebuilt 1840 to grind corn for cattle feed. Continued until 1976.[54] Also generated electricity. Last known working corn mill in the Smestow, with a working life of at least 400 years.	Large mill ponds above and below the mill site and mill race remain. Ponds show signs of heavy siltation. Mill races are in brick-lined tunnels. The mill house and outbuildings remain as part of a farm. The main water wheel is still visible.
SB25	Penn Common Mill. Penn brook. Penn. SO895941	May be the site of the mill mentioned in Domesday Book in Upper Penn manor. Yates' map notes a mill in a suitable position but after this nothing known, including date of closure.	No traces of water features or buildings, confirmed by recent fieldwork.
SB26	Lude/Lyde Mill. Penn brook. Wombourne. SO888940	This site seems to be first mentioned in 1458. May have been at the junction of Lyde brook with Penn brook (after which Penn brook is known as Wom bourne, or Wombrook). Likely to have been used for flour only. Nothing known of its post-medieval history.	No traces of water features or buildings.
SB27	Wombourne Mill. Wom bourne. Wombourne parish. SO878929	At Wom bourne: Small brook confluence, using leats from both. May be site of one of the mills in Domesday. Is one of the two mills mentioned in 1483.[55] Further mention in 1664. Corn and blade mill by 1758, blade mill only, 1816. Closed after its sale in 1854 and before 1889.	No traces of water features or buildings remain. Transformed into a waterside park in the 1960s. Pool drained by 1903.
SB28	Ham Mill. Wom bourne Wombourne parish. SO874928	May also be the site of one of the Domesday mills in Wombourne. No evidence of early medieval use. By 16th century a corn mill. Perhaps a blade or hammer mill during Civil War. Later milled flour until the outbreak of WWI. Walkmill House is next to the former mill site, indicating fulling occurred.	No traces of water features or buildings.
SB29	Hinksford Mill Farm.[56] Himley brook. Himley parish.	North of S&W canal bridge 38 on Himley brook, above confluence with Holbeach brook. Not to be confused with its near neighbour, Hinksford Forge (SB7). Stream here forms boundary between Himley and Swindon (Wombourne	Leats and pools are both visible with some sluices and dams still in use, others dried-up.

[53] VCH *Staffs,* vol. XX, p.213. Nothing else is known of the smithy.

[54] R. Sherlock, *Industrial Archaeology of Staffordshire*, Newton Abbott, 1976, pp.204-5.

[55] See chapter 4 and Cooksey and Cooksey, *Watermills*, p.20.

[56] King, *N Worcestershire*, p.145 refers to this as Kems Mill (Himley). It is possible that this may have been the name of a further, short-lived site.

	SO869901	parish). A mill possibly here by 1593. By 1699 held by a scythe smith, a member of the Raybould family. Later a corn mill. Probably during the 17th century, a blade mill and may have produced iron. Later transferred to corn. On Yates' map. Millers recorded in the 19th century. Out of use in the 1920s, date unclear. By 1972 mostly demolished.[57]	At least one former mill building is still evident.
SB30	Himley Mill. Himley brook. Himley. SO878911	Not to be confused with Himley Forge (SB8). The stream shows signs of straightening. A corn mill in the 19th century which ceased to function around 1900. The millers were linked with those who ran Compton Mill (16) in the same period. Machinery removed in 1920s. Site sold, 1947, as part of the break-up of the Dudley estates.	Pond lasted until at least 1947 and maybe as late as 1970. Now a private garden. Mill building is a private house. The mill wheel, unusually, was inside the mill building rather than outside.
SB31	Cotwallend Mill. Straits brook. Sedgley. SO912927	Perhaps originally on what is now the edge of the 1990 nature reserve. The original pool on the site may have been known as the '*mulle* pool' and it is likely that this marks a medieval corn mill, dating back to at least 1300. Beyond this, nothing is known. Site subject to post-medieval quarrying and coal extraction which removed traces of buildings and water features and may have altered the shape of this steeply-down-cut valley.	All traces of leats and buildings lost. It is likely, given the steepness of the stream that any mill was adjacent to the stream, which would have been dammed.
SB32	Hunts Mill. Holbeach brook. Sedgley. SO914899	At Coopers Bank on the edge of Sedgley parish. A corn mill is noted in 1887, origins unknown.[58] Re-built in the 19th century. Out of use due to nearby industrial activities in the later 19th century. Mill pond not on post-1900 maps.	Millpond is partially extant, heavily silted. No traces of leats. All buildings demolished in the 1970s.
SB33	Coppice Mill. Holbeach brook. Kingswinford parish. SO903906	On Holbeach brook at confluence with Straits brook. This section of Holbeach brook is heavily affected by mining and quarrying. Brook culverted in the 19th century in many places. Mill may have been used for flour milling only, although it is in area where other uses may have been possible. Little else	Silted-up header pool remains. No leat traces. All buildings demolished. Site retained within farm.

[57] One other possible mill building site has been identified by fieldwork within the farm boundaries – see below.

[58] DAHLC DE/4/7/8/56 is a lease of 4 December 1675 from Lord Dudley for a water driven corn mill called Hunts Mill, although it is identified as being in Kingswinford.

		known about its origins or fate – ceased milling by 1914.	
SB34	Holbeach Mill. Holbeach brook. Himley. SO884905	Mill is associated with the nearby large estate, Holbeche House. At least two ponds linked to site to maximise available water. Likely to have been used for corn only, perhaps that supplied from the estate. Origins unknown, and given the age of Holbeche House a medieval origin is likely. The mill is on the north (Himley) side of the brook. Dunphy notes the results of an archaeological survey in the area, which found domestic pottery of the 16th and 17th centuries, implying such a date for its construction. Excavation found that it had been built in at least two phases, and may have housed a cider press.[59] Milling ceased by 1919. The mill still stood in 1965 but was later demolished. No documentary evidence found of its destruction. Cooksey and Cooksey note that this site may have been known as Hubballs mill by Phillip Foley in his accounts of 1669 when it made 'Osmond' iron.[60]	Small pool next to the mill drained in 1920s. Daffydingle pond above mill was probably the first header pond. This was bisected by railway construction in 1915 giving flooding. The area known as Holbeche Osiers, immediately below, may be a consequence, or, more likely, is a silted-up second header pond, designed to make use of the narrow valley to form another header pond for the mill.
SB35	Oak Mill. Holbeach brook. Himley. SO893907	Known as Oak Farm Mill, associated with Oak Farm, on northern (Himley) bank of Holbeach brook, as SB34. No known earlier history, suggesting it was of limited importance, perhaps only working for Oak Farm. Site developed into iron-making facility from mid-1830s. The business became insolvent. Sold in 1849, when the mill was described as the Glynne Arms. Closure date unknown.	No traces visible as later industrial development has affected this part of the valley making site identification difficult. Some buildings may remain within the farm.
SB36	Toys Farm Mill. Philleybrook. Enville parish. SO805875	Called Hay House Mill in 1603 at the death of Henry Wilcox, the first recorded owner. Site may be older. Also, a walk mill pool, implying fulling may have occurred. Two mills on this site may have been in use in the 17th century. By 1638 a corn mill and worked until at least 1845 then closed.	No leat traces visible. A millpond-like feature is in a suitable location, but this may be recent, perhaps created for fishing.

[59] Dunphy, *Smestow*, p.112.

[60] Cooksey and Cooksey, *Watermills*, p.16. King, *N Worcestershire,* p.146, refutes this, arguing that Hubballs Mill was close to Bridgnorth, Shropshire. On balance, King is probably correct.

SB37	Philleybrook Mill. Philleybrook. Enville. SO812881	Sometimes Fillibrook or Fillybrook. May have been the Lutley manor (or township) mill, although this could have been at Lutley Mill (SB38). May be mill mentioned in 1447 when it was confirmed that Bishop of Bath and Wells owned the mill – how this came about is unclear. By 1541 held by Wrottesley family. Passed through the Whorwood family to Joseph Amphlett in 1727. Held by his family members until at least 1840. Sold in 1848 and dismantled later, date unknown.	No traces of a millpool or leats. Buildings demolished.
SB38	Lutley Mill. Philleybrook. Enville. SO818882	On a footpath crossing the brook. Now in Enville estate. Known as Bumblehole in early 19th century.[61] No other material or documentation known. Probably served a local market only. Close to Lutley manor, which may indicate its origins as a manorial mill.	No traces visible. Pond drained. All ponds are fishponds not believed to be associated with the former mill.
SB39	Mere Mill. Philleybrook. Enville. SO822886	On boundary of Lutley and Morfe townships, Enville parish. Belonged to Morfe manor. An ancient site dating to at least 1220. Known as *Aylewynes* mill, Aldwyns Mill and Toys Mill. Mere Mill from 1840. Fulling practised by 1442. Ownership with Toy family for over two hundred years, 1570-1778. Worked as a mill until 1935 when the waterwheel was damaged and it went out of use.	Millpond drained and planted with Poplar trees. Substantial remains of buildings and machinery, which may date to the late 18th Century.
SB40	Morfe Hall Farm Mill. Sneyd's brook. Enville. SO829877	Above Hoo Farm Mill (41). Likely to have milled flour. Earliest reference is 1507, definitively 1609. Known as Hawkes' mill in 1760. Later history unknown. Not on Yates' map, meaning that its closure could have been earlier.[62]	Millpool drained, temporarily reappears after heavy rain.[63] No buildings left.
SB41	Hoo Farm Mill. Sneyd's brook. Enville. SO832878	Above Philleybrook confluence. First noticed in 1840s so may be a late addition. Only a locally useful mill, perhaps used by the farm.	A pond probably created for irrigation occupies the site of the former millpool.
SB42	Spittlebrook Mill. Spittlebrook. Enville.	On the Kinver: Enville parish boundary. The mill house in Kinver, the ponds and leats in Enville. Known as Allsop Mill after the 19th century owners. A long-lasting and substantial mill site with a complex usage history. First reference is	The leat and millpond were silted-up by the 1980s, now drained. Substantial remains of buildings and machinery.

[61] The meaning of this name is unclear. Two locks on the canal system –on the S&W canal and another elsewhere have the same name.

[62] It is known that Yates was not completely accurate or comprehensive in depicting industrial activity.

[63] The pool was present in 1982. VCH *Staffs,* vol. XX, p.111.

	SO845877	in 1574, although may have been the fulling mill recorded in 1516 held by Roger Higgs. Known as Higgs' Mill to 1728. A blade mill in 1603, converted to corn in 1650s, reconverted around 1703. Milled corn in the Napoleonic era. Called Spittlebrook Mill by 1849 and Fox's Mill through to 1918. Worked to 1920s. Machinery dismantled 1967.	
SB43	Checkhill Mill. Spittlebrook. Kinver. SO856878	Also known as Checkhill Walk Mill. Long-lasting and substantial site, linked to Foley family and Kinver cloth industry.[64] First noticed as a blade mill in 16th century. Passed to Jordan family, 1601.[65] Owned by Foley family later, as Philip Foley granted a lease to a scythe grinder in 1683. By 1700 used as a fulling mill. By 1800 converted to mill wheat. Worked until the 1880s. May have generated electricity for Check Hill Mill farm in mid-1930s before closing.	Leats and millpond heavily silted. It is only the flow from the brook which keeps them open. 18th century mill buildings and associated machinery present.

Several other mill names are known in the study area for which it has, to date, not proved possible to accurately identify locations. These include three mills in the Orton township in Wombourne parish known as Trill Mill, first mentioned in 1284; Caldewall Mill, first documented in 1362 and Hadeley Mill, first recorded in 1562. On topographical grounds it is likely that these sites would be in the valley of the Tene brook. It is possible that these may be names of mills which have subsequently changed names such as Orton Mill (discussed under site SB23).[66] Given their potential location, it is likely that all of these would have been corn mills. However, examination of LiDAR scans has indicated some possible sites for these three 'lost' mills, demonstrated below. Further archaeological work will be required to confirm these suggestions.

[64] Fully described in Cooksey and Cooksey, *Watermills*, p.15.
[65] The Jordan family is discussed in chapter 6.
[66] It is possible that the first two sites may be identical, Dunphy, *Smestow*, p.9. VCH *Staffs*, vol. XX, p.212, noted that Trill Mill was first identified in 1284 when it was owned by the Lord of Wrottesley and could be identified as Caldewall Mill in Orton, first mentioned in 1362. Trill Mill was still held by the Wrottesley family in 1501.

Figure 3.2. LiDAR extract showing an area north of Wombourne with two straight sections (indicated with red arrows) in the course of the Tene brook (blue line). These may represent stream course adjustments associated with a lost mill site. Scale 1:5,000.

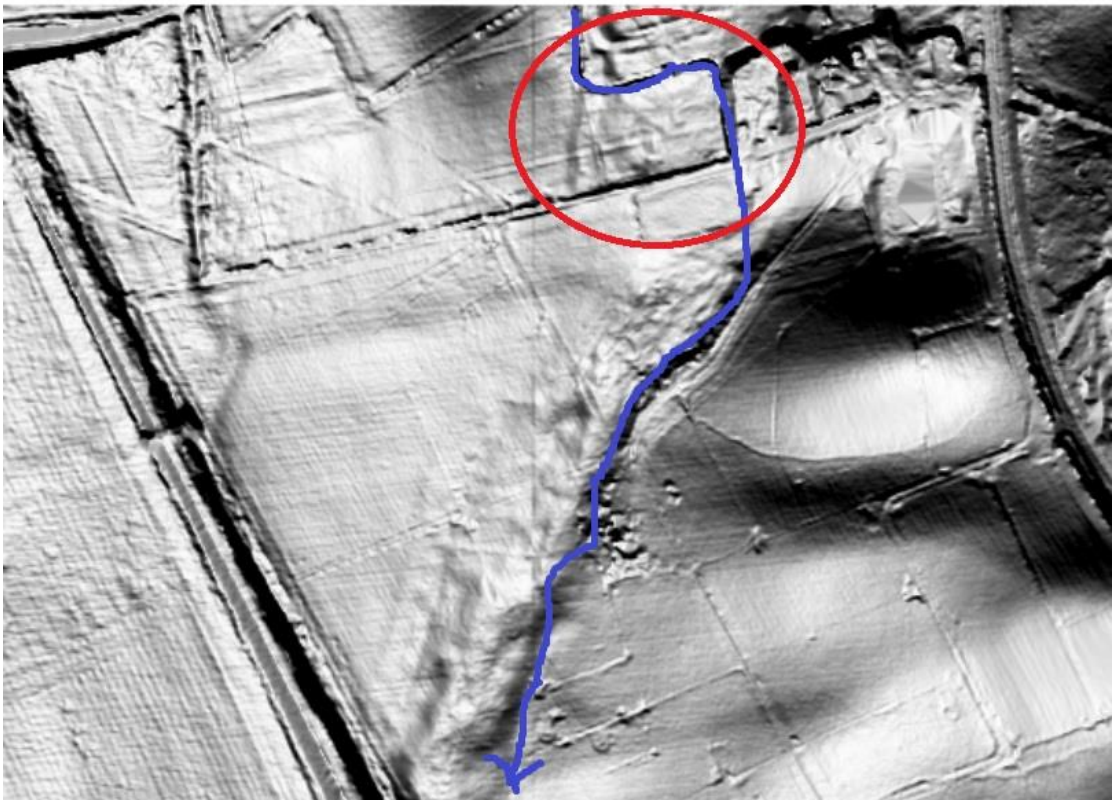


Figure 3.3. LiDAR extract of Orton Grange Farm area (SO 879950). Showell brook, tributary of the Tene brook in blue, possible mill site circled in red. The area in the north of the circle may be a lost mill pool. All other features are probably from 19th-20th century. Scale 1:2,500.

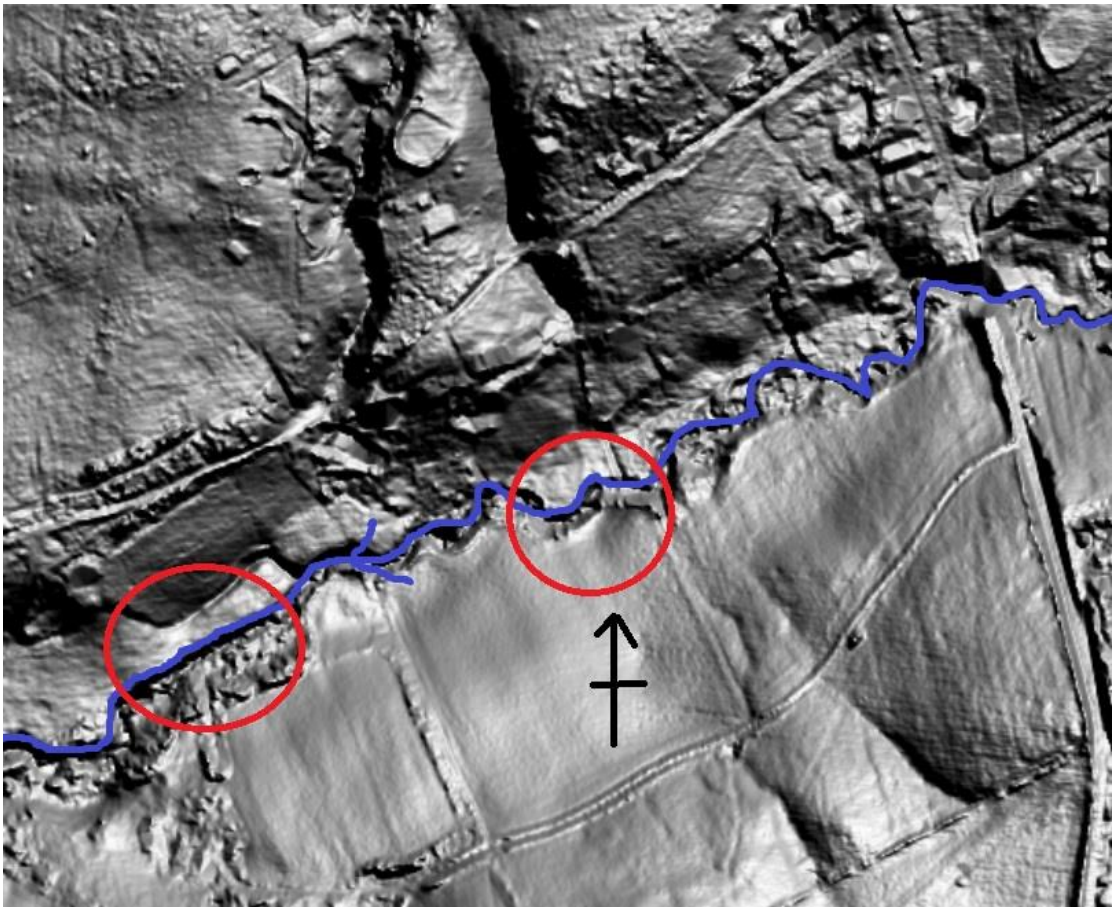


Figure 3.4. LiDAR image of Penn brook crossing Penn Common, near Gospel End, showing two potential mill pool areas circled in red. All other features are 20th century. Scale 1:2,500.

Underhill (only) mentions the mill of Penyval.[67] He noted this as part of the *Inquisition Post Mortem* of Roger de Somery of 1272 and as being either in Sedgley or Orton. In this case, it too could have been renamed perhaps as one of the three mills named above or is another site, now completely lost.

The Dudley Estates records contain references to mills, one of which it has not proved possible to locate: Fundsley Mill. This was identified as being in Baggeridge Wood, part of

[67] E. A. Underhill, *The Story of the Ancient Manor of Sedgley*, Sedgley, 1942, p.38.

Pensnett Chase. This mill may have had a short lifetime as no other references have been found. It too may have been on the Tene brook.[68]

Based on the evidence cited above along with that in chapter 2 outlining the potential difficulties in establishing mill sites in periods of higher stream flow, it is possible to establish a rough working chronology for the creation and development of the mill sites in the basin.

Table 3.2. Possible chronology

Date range	Smestow	East bank tributaries	West bank tributaries
Up to 1150	Furnace Grange (SB1)	Penn (SB25)	
1150-1250	Perton (SB18) Compton (SB16) Seisdon (SB19)		Mere Mill (SB39) Great Moor (SB22)
1250-1350	Wightwick (SB17) Swindon (SB3)	Cotwallend (SB31)	
1350-1450	Hinksford Forge (SB7)	Wombourne (SB27)	Philleybrook (SB37)
1450-1550	Trysull (SB20)	Ham Mill (SB28) Orton Mill (SB23) Lyde Mill (SB26)	Morfe Hall (SB40) Spittlebrook (SB42) Checkhill (SB43)
1550-1650	Greensforge (SB5) Hollow Mill (SB4)	Himley (SB8) Hinksford Mill (SB29) Woodhouse (SB24) Holbeach (SB34) Gornal Forge (SB11) Gornal Wood (SB12) Hasco (SB10) Heath Mill (SB2)	Toys Farm (SB36)
1650-1750	Gothersley (SB6)	Wall Heath (SB9)	
Post-1750	Smestow (SB21)	Hunts Mill (SB32) Oak Mill (SB35)	Hoo Farm (SB41)

This table uses the evidence of mill origins noted in the discussion above. Where no such evidence is forthcoming, the mill name is omitted. It is possible that many mills could be much older than listed here as the dates noted may represent a re-building. Despite these caveats it is possible to note the creation of the iron-making sites in the 100 years post 1650

[68] DAHLC DE/4/7/12/19 lease of 20 October 1640 of Fundsley Mill. An alternative identification is that this is a version of the name of Funsloe Smithy, believed to be in Rowley Regis, some distance from Baggeridge. Funsloe Smithy's precise location remains unknown. Funsloe is discussed in chapter 6.

as the 'industry' became established in the study area. on geographical grounds the two optimum locations for mill sites are at stream confluences (to give two sources of water supply) or as far upstream as possible to stop mills being built even higher up, thus taking the water. This may explain, for example, the early dates for Penn Mill, SB25, on the uppermost reaches of Penn brook and Perton (SB18) on the confluence of the Perton and Smestow. An important caveat is the evidence from the valley profiles presented in chapter 2, where it should be noted that early medieval technology may have found some sites simply too steep, and thus unable to safely accommodate any sudden variation in water flows through for example major storms. This was a problem through to the 17th century as noted by Dud Dudley in his description of mill destructions due to storms (see chapter 2).

Looked at this way, the early dates for corn grinding mills become explicable, and the later dates for mills in sites that have other more established mills around them becomes apparent. The location of iron making sites is also noteworthy in that they are not the most upstream sites but tend to occupy 'downstream' sites where water levels could be managed reliably at a suitable level for most of the year, and in sites where lengthy leat creation was a practical possibility thus ensuring a constant supply of water for power. This marks them out as distinct from corn-milling sites.

3.4. Rising brook sites

Table 3.3. Known water-powered sites in Rising brook.

No.	Name, stream, location, & GR	History, owners and subsequent development.	Extant infrastructure
RB1	*'new firnes'.* Rising brook. Rugeley parish. SK 009139	The most upstream of the locations, below the Bentley brook confluence. Sometimes known as Lord Paget's Blast Furnace, Paget's Furnace, New Furnace, Upper Furnace and Over Furnace to establish the relationship with the original furnace (RB2) nearby.	The two Brindley valley pools may be the original header ponds. Valley floor is too narrow to use leats. Area affected by railway construction and coal mining, including the

		May have been Lord Paget's second furnace. In use by December 1561. Temporarily occupied by the crown after the involvement of the Paget family in the Throckmorton plot. Then leased to Sir Fulke Greville who deforested most of the area. Later leased by the Chetwynd family then in the Foley family 'Ironworks in Partnership' arrangement.[69] Abandoned by 1708 perhaps coincident with a major storm which caused the Rising brook to damage this site and others. The millpool (known as Furnace pool) and dam lasted to the expansion of West Cannock Pit no. 5 around 1914.	shape and size of the pools. Now heavily overgrown. The stream shows signs of straightening, including Bentley brook confluence. By 1980 all surface traces of the buildings and water features disappeared. By 2000 colliery closed and demolished, further affecting the site.
RB2	Old Furnace. Rising brook. Rugeley. SK021147	Sometimes called Lower or Nether Furnace. Owned by Lord Paget and probably his original construction. Origin is unclear but probably post-dates 1549. May have been established on an earlier bloomsmithy site. Out of action by 1578 and replaced by furnace at Teddesley Park (5 miles away) until 1585 when re-started. Worked throughout the 17th century. Closure point unknown.	Two substantial header ponds remain, probably enlarged by coal mining. No trace of buildings.
RB3	Cannock Wood or Cank wood forge.[70] Rising brook and Stony brook junction. Rugeley parish. SK026166	This long-lasting site was originally a '*bloomesmyth*' in 1554. Later described as a 'new forge', then used as a chafery forge 1692-1710, and worked outputs from RB1 and RB2. Also worked in conjunction with the Abbots Bromley Forge, outside this area. Leased by the Hopkins family from 1760.[71] Closed in 1812. Precise site lost as a result of later infrastructure changes.	The header pool was a significant local feature, although now dried out. No signs of leats. No mill-related buildings known. Cottages here known as Forge Row.
RB4	Old Forge. Stony brook and Small brook junction. Rugeley parish. SK022167	Approximate site of a forge known as Old Forge, owned by Lord Paget. The stream confluence is marshy – if this was the same in the 16th century it is doubtful if a mill would (or could) be located here. However, the site may, as RB3, have been a conversion of a bloomsmithy to a forge.	No known water features or buildings. Two of the ponds further up the valley were created by later coal mining.

[69] The Chetwynd family created a short-lived forge in Beaudesert Park, the principal residence of the Paget family.

[70] Cannock Wood (or Cankwood) is the alternative name for Cannock Chase. When this phrase is used it refers to this forge at this site, not the later village of Cannock Wood. Cankwood is the abbreviated term in common use from the Elizabethan period through to the 19th century for Cannock Chase.

[71] See chapter 6.

RB5	Horns pool or Duttons pool. Rising brook. Rugeley parish. SK029171	Owned by Lord Paget. 1807-09 a tinplate mill. Excavation suggests that iron was worked here. This implies it was the location of the oldest slitting mill in the midlands, introduced by Lord Paget (and Walter Coleman) to work the output of his forges and furnaces perhaps in 1611 or 1619. The Slitting Mill was run in conjunction with RB3 from 1622. Later leased by Thomas Chetwynd.[72]	Pool extant. Course of Rising brook is straight and confined between hewn stone banks, therefore manipulated. A leat course may have been exposed by excavation. No traces above ground of any buildings.
RB6	Devitt/Devetts pool. Rising brook. Rugeley parish. SK033171	Site of fulling mill in early 18th century – Anthony Devitt's walk mill. No known evidence of iron working. Origin and final closure dates of this site unclear.	Pool extant. Some leats present. Rising brook shows a marked straightness. No buildings remain.
RB7	Slitting Mill. Rising brook. Rugeley parish. SK035174	Known as the waterworks site due to later building on site. Probably built by the Foley family 'Ironworks in partnership' to deal with the output of their sites in 1692 as the slitting operation at RB5 could not cope with the volumes required. Leased by the Hopkins family in 18th century. Mainly used for rolling iron during the 19th century. Disused by 1884, then demolished. Gave its name to the hamlet of Stonehouse, known as Slitting Mill by the 18th century.	A small pool remains, as does the outfall. Leats visible, largely dried-out. Further leat-like features are overgrown or part of an adjacent ploughed field. All buildings, including a mill worker's cottage, demolished by creation of South Staffordshire Waterworks pumping station in 1933.
RB8	Pool, Hagley Park. Rising brook. Rugeley parish. SK038178	Iron slag found on the lower dam bank, but no documentary evidence for iron-working. Pool origins obscure –an earlier one may have been incorporated as a water feature into the parkland surrounding Hagley hall.[73]	The pool has been heavily altered by 20th-21st Century flood prevention works. No buildings known.
RB9	Hagley Mill. Rising brook. Rugeley parish. SK041181	Perhaps the manorial mill for Hagley manor. No evidence for iron-working, as it was a corn mill throughout. Part of Hagley Park for most of its existence and therefore unlikely to have had an industrial role.	A small pool has been altered by subsequent flood prevention works. No leats known. The mill building now under Rugeley Market Hall.
RB10 and RB11	Forge Road, Rugeley. Rising brook.	Two adjacent mills (Paper Mill and Oil Mill) on opposite sides of Forge Road, Rugeley. Both likely to have been damaged by the 1708 flood (see RB1). The first site was a paper mill, then an	No traces remain, including leats. Rising brook has been culverted here. Ponds filled-in in 1969. All

[72] Thornton, *Ironworks of the Rising Brook Valley*, pp.30-1, which sets out the argument in favour of this identification. See also chapter 6 for a discussion on these families.

[73] Obadiah Lane, an iron master associated with the Foley family, bought Hagley Hall, but there is no evidence that he had a forge or furnace on site. See chapter 6.

	Rugeley parish. SK046183	iron mill around 1760. Later a tinplate works in the 19th century, owned by the Hopkins family. A bark mill in 1890. Closed before 1950 and demolished. The second site was a fulling mill, perhaps from 1303. An iron mill in 1713. Then a rolling mill to 1890 – the last Rising brook iron-making site. May have been the site of one of the Domesday Book mills in Rugeley.	buildings demolished by 1950. Now under roads and car parks.
RB12	Turkeyshall Mill. Rising brook. Rugeley parish. SK050185	Sometime known as Fisher's Mill, adjacent to Leathermill Lane in Rugeley. May have originally been a leather mill, hence the road name. The last mill on the Rising brook before the Trent confluence. Dealt in leather tanning and then corn milling from c. 1788. Demolished before 1900.	No traces remain – only the road name.

The Rising brook sites listed here show a similar history to those in the Smestow, albeit that more of those in the Rising brook basin had shorter working lives. In all cases, almost nothing survives above ground level, apart from some residual water features, such as the furnace header ponds for sites RB2, RB5, RB6 and RB7. The similarity in landscape development in the two drainage basins is readily apparent.

3.5. The sites in their environment.

The iron-making sites can now be examined in more detail to consider the longer-lasting impact of them of them at the micro level in the study area. In landscape development terms, mills, whilst small, through their construction and maintenance could have a substantial impact at the local level in terms of new features being added to the landscape. The presence of a mill alters the landscape by becoming a focal point within it. The needs of the mill, not just in terms of water management, but in ensuring road access for movement of goods has a local impact. These effects were significant in terms of landscape changes at the time and for substantial periods afterward, as is demonstrated below.

3.5.1. Furnace Grange (SB1).

Furnace Grange is the uppermost known iron-making site in the Smestow. Its development as an iron-manufacturing site has been covered briefly.[74] It is so named as it was the grange farm associated with Trescott, and, from the 17th century as a result of its blast furnace. Trescott is a hamlet within the medieval parish of Tettenhall. The Smestow formed the boundary between Penn (Lower Penn) and Tettenhall parishes, with both Trescott farm and Grange farm being on the Penn side of the brook and thus just within Penn parish. This part of Penn appears to be an area of early settlement as the field boundaries for the area, shown on the Penn Tithe map are irregular, suggesting older origins by contrast with those boundaries elsewhere in the parish.[75]

The Cistercian Abbey of Coombe, Warwickshire, traditionally founded in 1150, gained Trescott sometime in the 1190s when the lord of Lower Penn granted it to the Abbey.[76] The proximity of the site to Perton Mill (SB18) was a source of problems for the monks as Perton Mill was upstream of Grange Farm and the mill operations could seriously deplete or stop the water-flow toward them. In a court case, Ralph de Perton, owner of Perton Mill, acknowledged that he had withheld water from the mill at Grange Farm. This legal action cannot be precisely dated but seems to have been in the mid-1190s, perhaps co-incident with the change of ownership of Grange Farm.[77]

The leat which feeds Furnace Grange starts just below Perton Mill and may have been built by the monks to alleviate such difficulties. Map 3.1 indicates that the 'take-off' point was

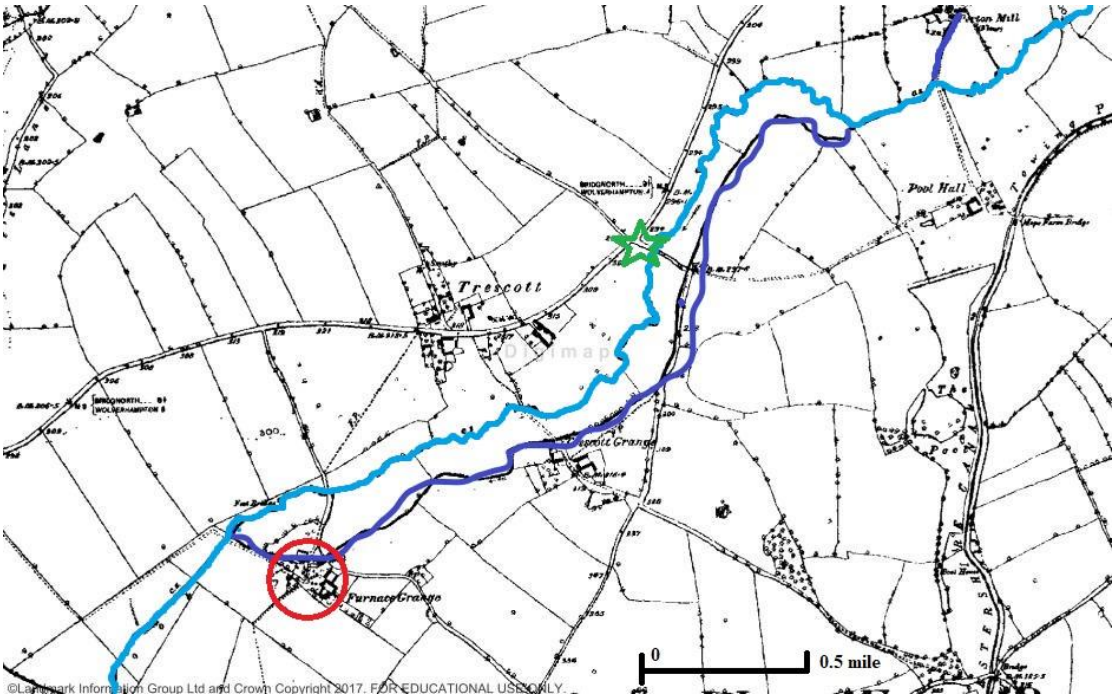
[74] King, 'Grange Furnace', pp.44–48. Also table above.
[75] SRO B/A/15/246 – Penn Tithe map, dated 1843.
[76] D. L. Motkin, *The Story of Coombe Abbey*, Rugby, 1961; G. Wrottesley, 'Calendar of Final Concords or *Pedes finum*, Staffordshire,' *CHS,* vol. III, 1882, p.170. For the charter, G. Wrottesley, 'The Staffordshire Cartulary, series III', *CHS*, vol. III, 1882, pp.221-3.
[77] Wrottesley, 'Staffordshire Cartulary', pp.222-3.

just south of the return of water to the main stream from Perton Mill. Figure 2.3 (in chapter 2) has a second car just visible in the photograph, positioned directly over the original leat channel, and the field-edge gateway marks its course. The leat was, at this point, 10-12' above the level of the Smestow, implying that the leat channel was taken off the Smestow some distance upstream, and holds the 300' OD contour, suggesting that the water flow was slight. The full length of the leat was over two miles – a significant undertaking exclusively using manual labour in the medieval period. It also suggests a waterwheel of 10-12' diameter was theoretically possible – thus illustrating the regular and substantial power that could be used to generate the force to be applied to bellows to smelt iron and/or hammers.

Furnace Grange was recorded again in 1272 when the abbot was sued for ownership of the lands and mill by a descendant of the original grantor.[78] The site may have been dedicated to the production of iron in the latter third of the 16th century by the Wrottesley family, perhaps because of the forceful flow and year-round reliability of the Smestow to provide a regular supply of water (and therefore power) to support the bellows or hammer.

[78] G. Wrottesley, 'Plea Rolls, temp Henry II', *CHS*, vol. IV, 1883 p.206.

Figure 3.5. Furnace Grange – remaining buildings.



Map 3.1. The Furnace Grange leat (in blue) parallel with the Smestow (light blue). The Perton mill leat is also marked. Furnace grange is circled in red. The site of figure 2.3 is at the green star. [79]

[79] Annotated extract from Digimap using the OS 1: 2,500 map of 1880.

The leat is evident on ordnance survey maps throughout the 19th century, but, as it had no practical purpose with the cessation of milling around 1920, it lost its distinct identity as a water channel. By 1960 it had begun to disappear, and it is no longer a landscape feature.

Figure 3.6. Furnace Grange on the extreme right of the photograph. The millrace from the waterwheel to the Smestow ran from the angle of the fence toward the clump of trees on the left which marks the Smestow's course.

All three mills above Furnace Grange, Perton Mill, (SB18) Wightwick Mill (SB17) and Compton Mill (SB16) show that leats and millponds were key landscape features. Compton had two ponds. The upstream pond was below the junction of the Smestow with Graisley brook, and this may be a deliberate construction as it enabled the additional flow of this small brook to be stored to supplement the flow from the Smestow. Here, the leat was

approximately 300 yards in length, and along with the two associated millponds is no longer a landscape feature. Compton was the subject of a legal case in 1338 over ownership.[80]

The millpond at Wightwick (SB17) was a conventional isosceles-triangle-shaped feature. Again, this is close to the confluence of the Smestow with the Finchfield brook, suggesting that the mill siting may be deliberate for the same reasons as outlined above. These features, which must have been, at the micro-level, quite substantial in their time, have all but disappeared. Ownership of Wightwick was disputed between the de Perton and Wrottesley families in the 14th century before acceptance by the de Perton family that ownership lay with the Wrottesley family in 1343.[81]

Perton Mill (SB18) was powered by a leat leaving the Smestow at Netherton, joined by Perton brook. The leat formed a mill pond just above the mill site, augmented by a channel feeding water from the Smestow.

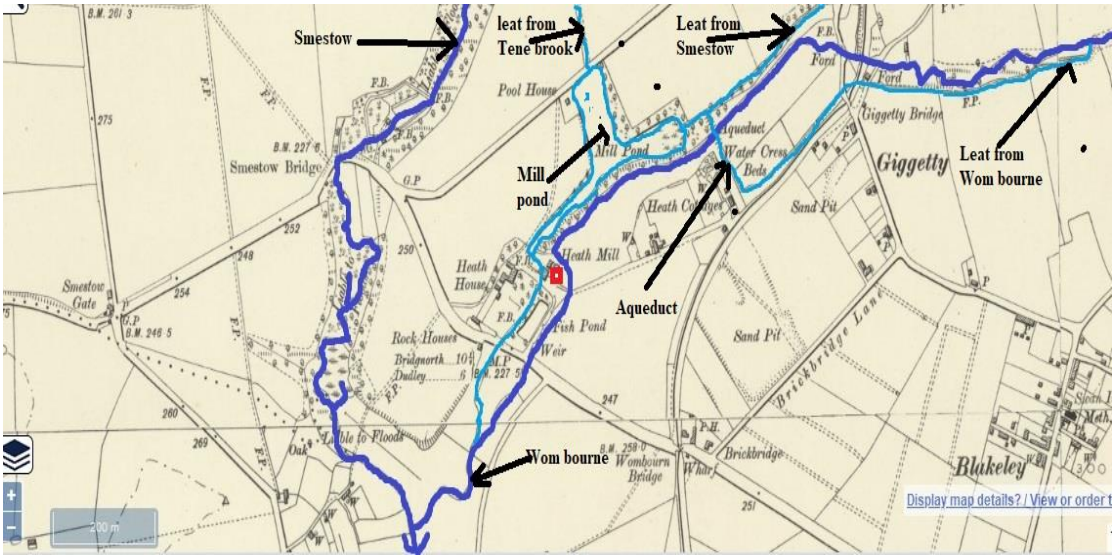
Fieldwork has identified one further site not mentioned in earlier researches, at Compton, located below Compton bridge and therefore approximately mid-way between Compton and Wightwick Mills. Figure 3.7 shows the tell-tale narrowing of what is now the main channel of the Smestow next to a pre-19th century building which is directly built-up from the watercourse edge. The varied nature of the brick and stonework in the building suggests that this wall has been altered through time and it may represent an unknown and undocumented additional mill site. The building describes itself as 'the old mill' suggesting that this is the case.

[80] G. Wrottesley, 'Extracts from the Plea Rolls of the Reign of Edward III', *CHS*, vol. XI, 1890, p.86.
[81] G. Wrottesley, 'A History of the Family of Wrottesley of Wrottesley', *CHS,* new series, vol. VI, part 2, 1903, pp.70, 76, 104, 207-8.

Figure 3.7. 'The Old Mill' at Compton, some 300 yards downstream from the known site of the former Compton Mill showing the channel narrowing, suitable for the placement of an undershot water wheel. The implied 'back stream' is no longer traceable on the ground.

3.5.2. Heath Mill (SB2).

The mill was on the Wom bourne, sited before that stream meets the Smestow. The complex nature of the water management system employed here indicated that this network of channels was built-up over time and in response to a growing need for power from the mill owners.



Map 3.2.[82] The Heath Mill area, showing the three leats (in light blue) feeding the millpool, including the aqueduct. The mill site is marked in red.

The large Y-shaped mill pond is fed from three riverine sources, confirming the impact on the landscape of this mill site, which, locally, was both significant and long-lasting. The 1808 Enclosure map shows two pools, Old and New pools. New pool became the major pool for Heath Mill. Old pool subsequently became a much smaller fish pond associated with Heath House. It is likely therefore that 'New' pool and the leat that fed it from the north were creations of the late 18th century, and its construction may have been inspired by, or used the labour source from, the adjacent S&W canal, created in the same period. This leat is a significant feature, starting some two miles away in Trysull, feeding the New pool at Heath Mill from the north. It is now mostly dried-up, but periods of heavy rain show the course. It is possible that this leat and associated pool reflects a period of increased production by Heath Mill and that more power (or more regular power) was required by the mill owners to enable them to meet demand. The second source of water perhaps constructed at the same time as the long leat from the Smestow, was a 400-500-yard leat from the Tene brook at Ounsdale, a hamlet within Wombourne, which fed the eastern point of the pool.

[82] Extracted from Digimap based on the "6 inch" 1880 OS map.

The third source is the Wom bourne. A leat started east of the canal and ran roughly parallel with the stream until culverted underneath the canal (thus implying it pre-dates the canal and perhaps, therefore, the other two sources of supply to the millponds). It turned sharply south-west, and then was carried by an iron aqueduct over the Wom bourne to meet the leat from the Tene brook just before it joined the Heath Mill pool. The aqueduct has been described as a trough. At over 100 yards long this would have been a locally-significant feature. The cost of the aqueduct and supporting earthworks would not have been minor, especially one that length. This shows the importance to the site owners of ensuring a full millpond keeping the mill working.

Thus, Heath mill had three separate sources of water supply, enabling it to cope with any reductions in water from any one of the sources. Map 3.2 makes these arrangements clear. Regrettably, all these infrastructure features, marking a complex, sophisticated control of the environment have been demolished for housing.

Figure 3.8. Dressed stone on the bed of the Wom bourne at the approximate point the leat to Heath Mill left the stream. There is no trace of the leat on the ground. These stones may be remnants of the original weir.

Between Furnace Grange (SB1) and Heath Mill (SB2) there were two other mills; Seisdon (SB19) and Trysull (SB20). Both benefitted from substantial leats created to ensure their millponds remained at a level suitable for power generation – see map 2.10 in chapter 2, and figure 3.9 below. The leat for Seisdon left the Smestow not long after its confluence with Black/Nurton brook via a weir and was over a mile long before it reached Seisdon millpool. The leat remained a feature in the local landscape until at least 1950. The ownership of Seisdon was disputed in 1227 with one Simon *de Tresel* being successful.[83]

The leat for Trysull Mill is similar in form. It left the Smestow just below Seisdon when a weir took the main course of the Smestow towards Seisdon Hall giving the leat almost a mile to reach Trysull millpool. This watercourse is now largely dry.

[83] Wrottesley, 'Extracts from the Plea Rolls', p.52.

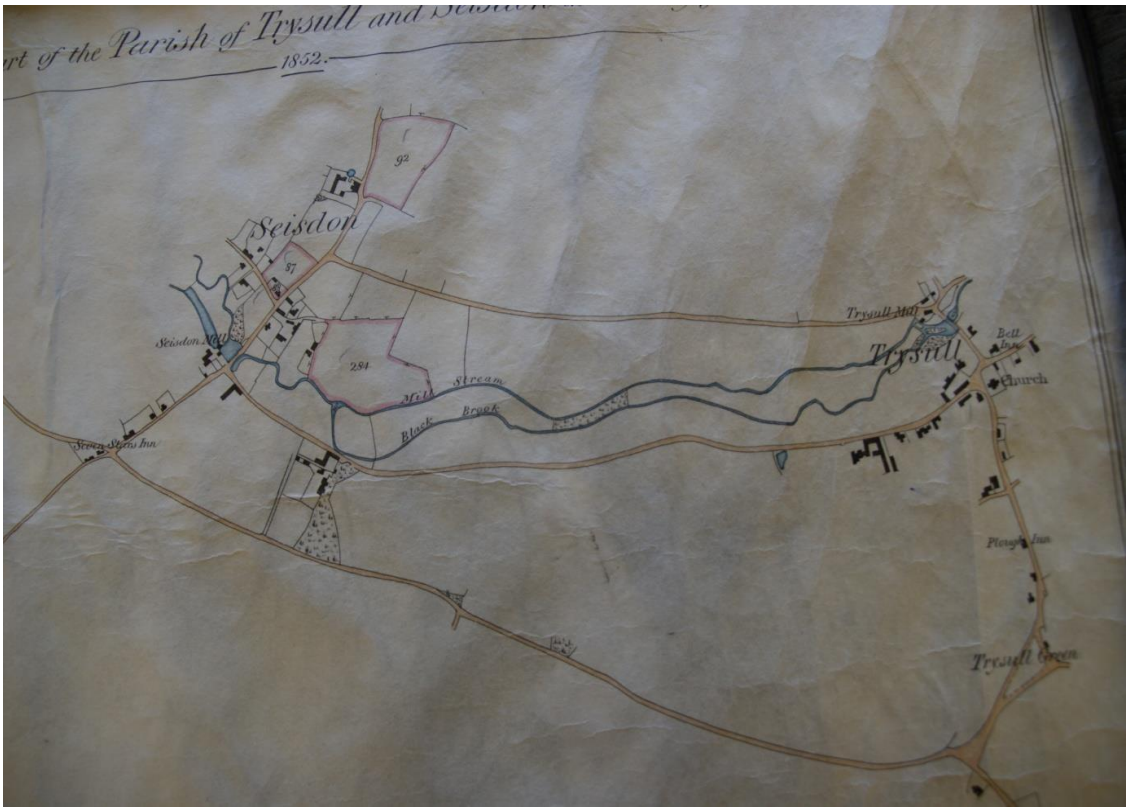


Figure 3.9. Extract from Trysull parish Tithe Award Map showing the leat leaving the Smestow and continuing to Trysull millpond.[84] *A small section of the leat feeding Seisdon Mill is also visible. The main course of the Smestow is labelled 'Black Brook' perhaps nomenclature developed from 'back brook' showing that it was the original course and used for holding excess water flow, as the focus of river management is on the leats. Scale is approximately 2" to the mile.*

3.5.3. Swindon Iron works (SB3).

Below Heath Mill, the next significant location associated with the iron industry is at Swindon, which also benefitted from a large millpond, which had begun to silt up by the 1930s - see map 2.10 in chapter 2. The original size of the millpool at Swindon can be seen in figure 3.10 (below). This indicates the situation about two hundred years after the millpond was created, showing its long-lasting impact on the local landscape.

[84] SRO B/A/15/698 – Trysull Tithe Award, 1832.

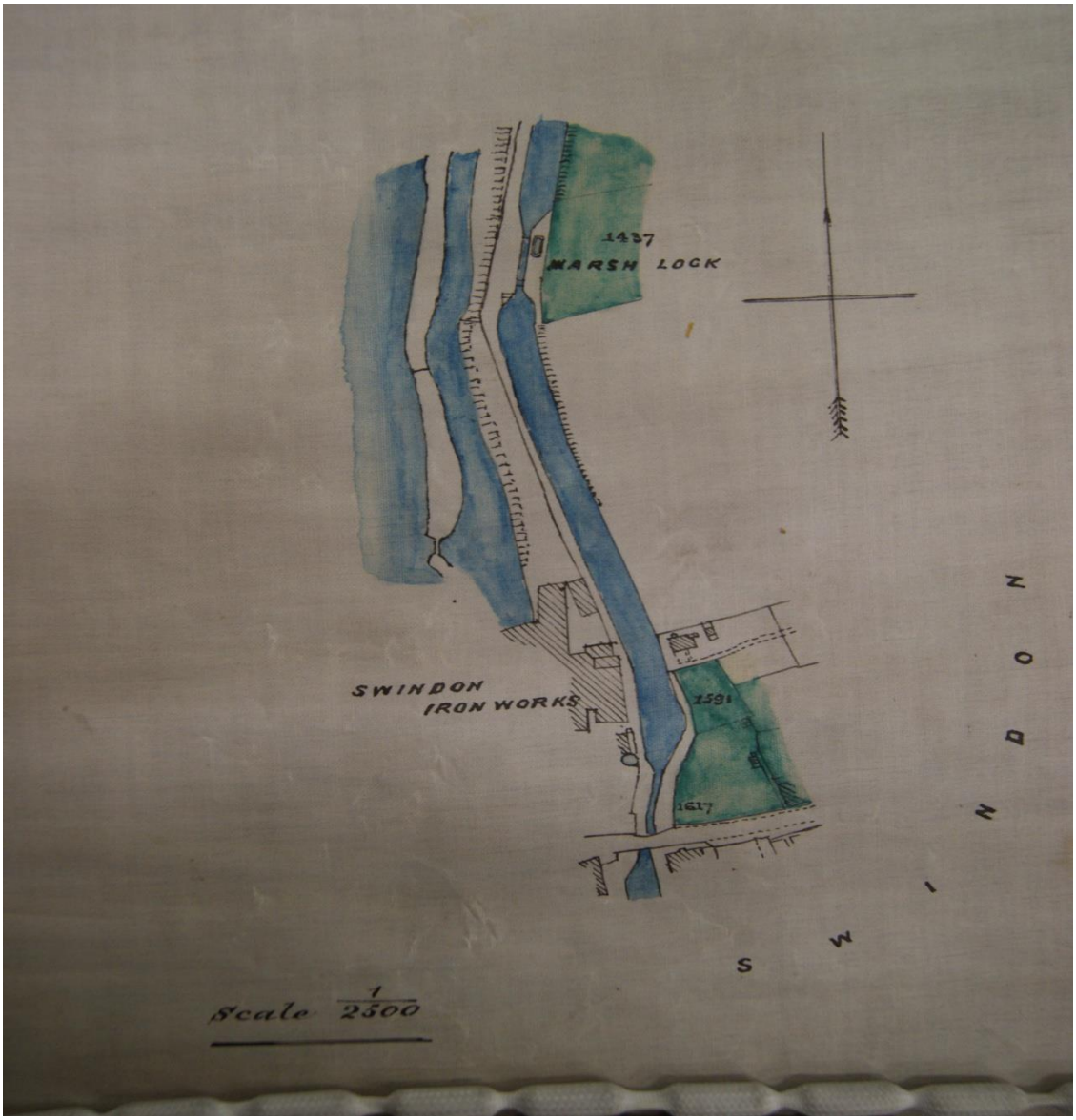


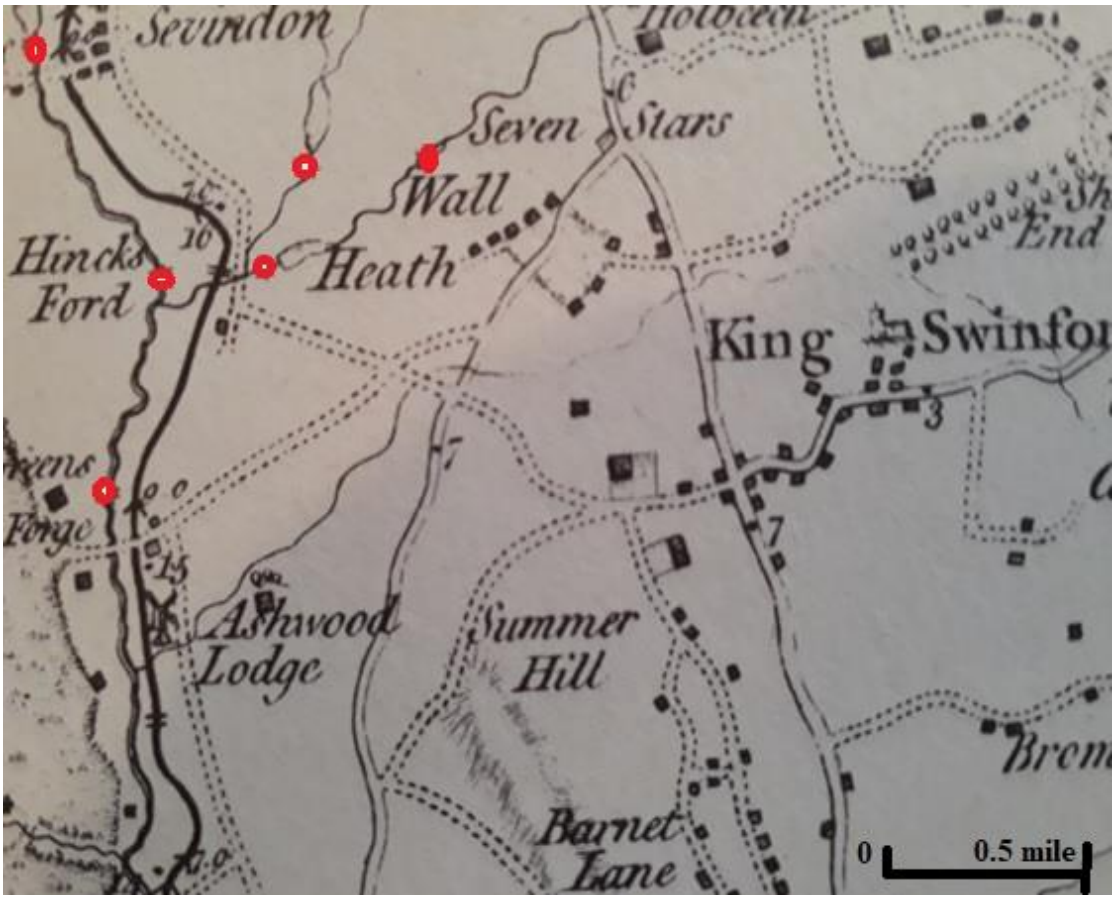
Figure 3.10. Extract from a map of 1879 showing, in the centre, the size of the linear millpool at Swindon. The S&W canal is on the east with Marsh lock (labelled) and Swindon road bridge lock (unlabelled) shown. The Smestow is on the west.[85]

The millpond was a significant landscape feature in the vicinity for over 300 years. Between Heath Mill and Swindon Mill there is only one other mill, in the hamlet of Smestow. Unusually, this corn mill survives (SB21). It was fed by several leats, mostly lost.

[85] SRO (WSL) 130/38/92 – Swindon iron works map. Dated 24 March 1879.

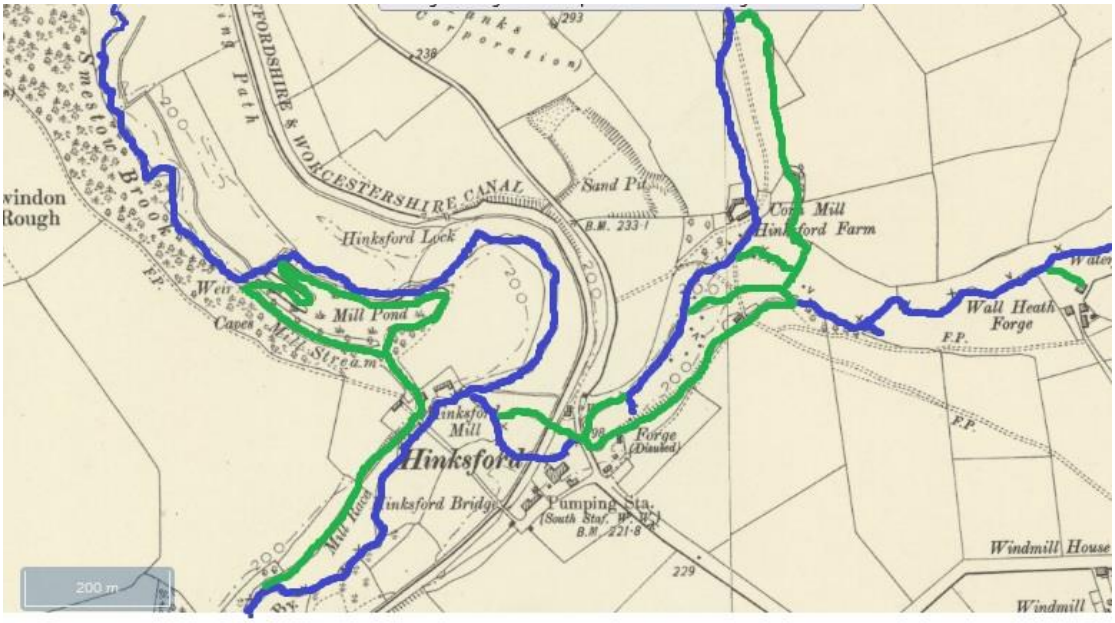
3.5.4. Hinksford mills.

Below Swindon the next complex of mills associated with iron-working lay at Hinksford, the location of several different mills used over time for different purposes, as shown in maps 3.3 and 3.4.



Map 3.3. Extract from Yates' map[86] showing mills marked highlighted in red. Note those at Hin(c)ksford, two on Holbeach brook, and another on Himley brook. Swindon and Greensforge mills are marked.

[86] See 'conventions' for Yates's map. The extract is at double the original size.



Map 3.4. Annotated 1880's OS "6 inch" map showing the complex of channels around the confluence of Himley, Holbeach and Smestow brooks at Hollow Farm, Hinksford. The map shows in green the Hollow Mill pool along with the excavated mill channel along with more leats in green. The Smestow, Himley and Holbeach brooks are in blue.[87]

Hollow Mill, Hinksford (SB4) offers a clear indication of the importance of mills, the water needed to run them and the consequent manipulation of the landscape. Here there is a manually-excavated gorge-like chasm to channel the water flow toward the water wheel at Hollow Mill, shown in figure 3.11. The former millpond is heavily wooded. Only traces remain of what must have been substantial earth-works of the millpond dam and the 'take-off' weir.

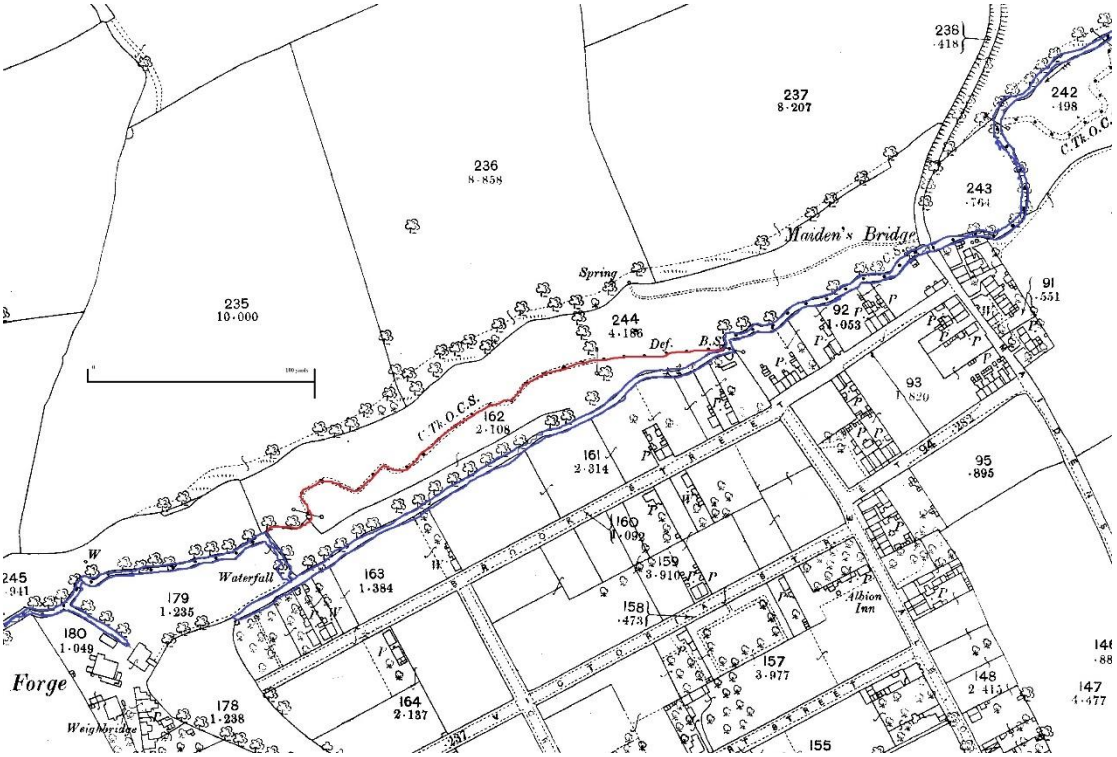
[87] Extracted from Digimap based on the "6 inch" 1880 OS map.

Figure 3.11. The man-made 'chasm' at Hollow Mill, Hinksford, designed to channel the millpond waters toward the mill site. The Smestow is some 100 yards behind the standing figure, and the former Hollow Mill buildings about 90 yards.

Hollow Mill was first recorded in 1678 when the water-course leading to it was leased (or perhaps re-leased), implying that the latest date for the construction of the cut through the sandstone bluff which forms part of the feature known as Swindon Rough must be mid-17th century. It was perhaps a blade mill, and may have been recorded as such in 1657. In the late 18th century, it was converted to a forge (known as Swindon Lower Forge) and associated with the iron trade until the 1820s when it became a corn mill. Its subsequent history is obscure. The mill buildings no longer exist, believed demolished during the 1920s, leaving the 'chasm' as a monument to industry and individual determination to work round (or in this case through) natural obstacles in the landscape, such was the need for water-derived power.[88]

[88] King, 'The North Worcestershire Scythe Industry', p.145.

Other Hinksford mill sites complete the picture of an area managing natural water resources in the landscape; Hinksford Forge (SB7) below the confluence of Holbeach and Himley brooks; Hinksford Farm Mill (SB29) on Himley brook above its confluence with Holbeach brook, and Wall Heath Forge (SB9) on Holbeach brook a half-mile above Hinksford Forge – see map 3.4. Holbeach brook has been straightened from Maidens Bridge to the forge – the parish boundary follows an irregular line just north of the straight cut, presumably the stream's original course.



Map 3.5. The immediate Wall Heath area – the forge is on the extreme west of the map.[89] Note the straightened channel of the Holbeach brook running to the forge, outlined in blue and the parish boundary line in red.

[89] Extracted from Digimap based on the 1880 OS 1:2,500 map for the area.

Figure 3.12. Hinksford Forge – the building is now used as a house. The small wet area in the centre of the photograph marks the site of the original millpool.

An additional potential mill site was discovered by fieldwork, adding to the complexity of the milling operations using these streams. In figure 3.13 a distinct building 'platform' can be identified next to the leat or mill stream suitable for the placing of a waterwheel and related buildings, a space of similar dimensions to the existing remaining mill building.[90] The same area is identified on the LiDAR extract at figure 3.14 which shows traces of a larger enclosure, purpose unknown.

[90] I am grateful to Mr Kelvin Brown who helped identify these sites.

Figure 3.13. The two garden benches are on a raised area, possible site of a former mill building. Behind the hedge is a stream, the overflow from which is apparent behind the tree. This relict channel became visible after heavy rain in June 2019.

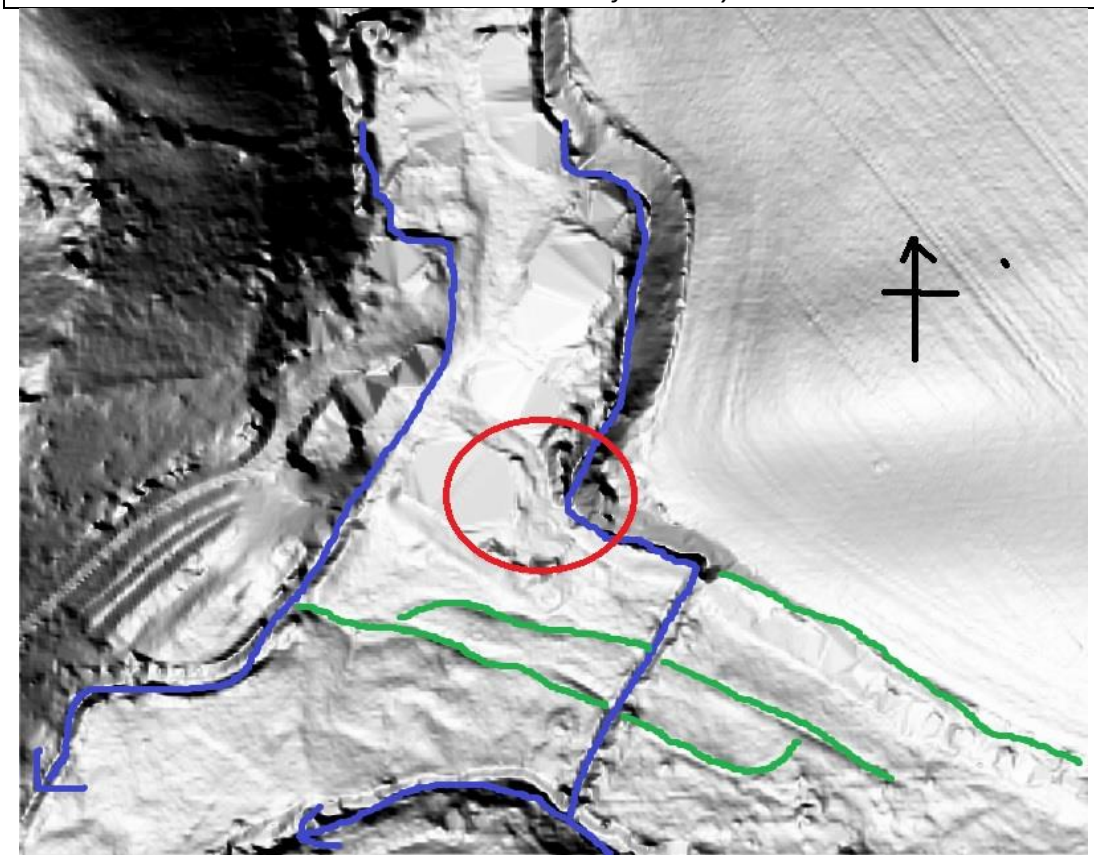


Figure 3.14. The site of figure 3.13 circled in red on a LiDAR scan. Watercourses in blue. Possible relict watercourses in green. Scale 1:1250.

Figure 3.15. The camper van obscures the semi-derelict Hinksford Farm Mill building. The main channel is to the left of the van and runs directly by the side of the building.

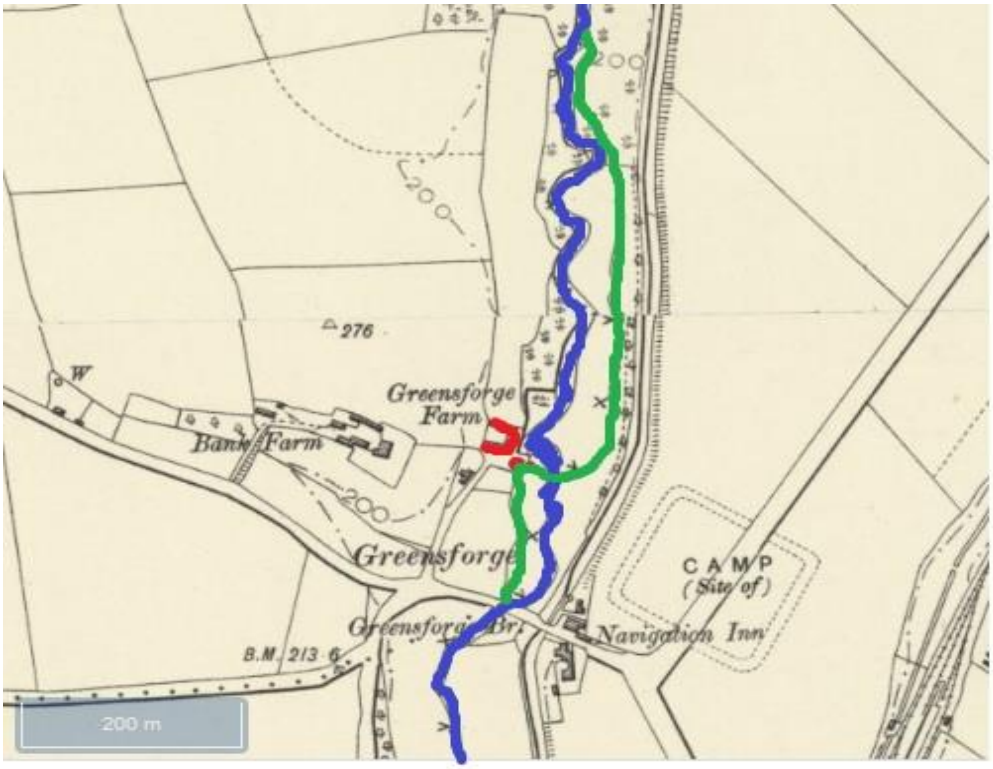
Figure 3.16. Presumed millpond at Hinksford Farm Mill. At least two ponds were in existence through to the late 18th century and continue to partially occupy the valley of Himley brook above its confluence with Holbeach brook for nearly half a mile.

Figure 3.17. One of the surviving leat channels at Hinksford Farm Mill.

3.5.5. Greensforge Mill (SB5).

Greensforge is perhaps named after a Mr Edward Green who was the first known occupier, noted in 1599.[91] The relatively early set-up of the mill, combined with the narrowness of the valley here have produced a 'standard' landscape of millpond and leat, with a return channel after the mill buildings. The millpond has disappeared, and the leat has now mostly dried up. Map 3.6 shows the arrangement in approximately 1880 where the millpond to the north of the mill has dried up.

[91] King, 'N. Worcs Scythe industry', p.145



Map 3.6. The water channels and S&W canal at Greensforge.[92] The Smestow is in blue – the 'back stream, probably the original course as it holds the parish boundary, is in green. Mill site in red.

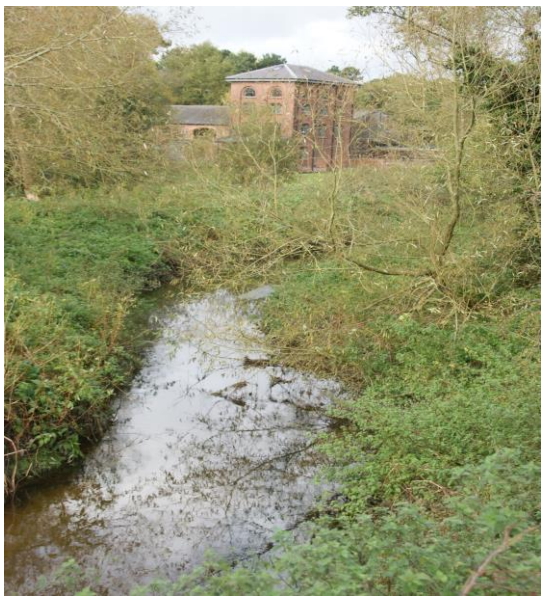
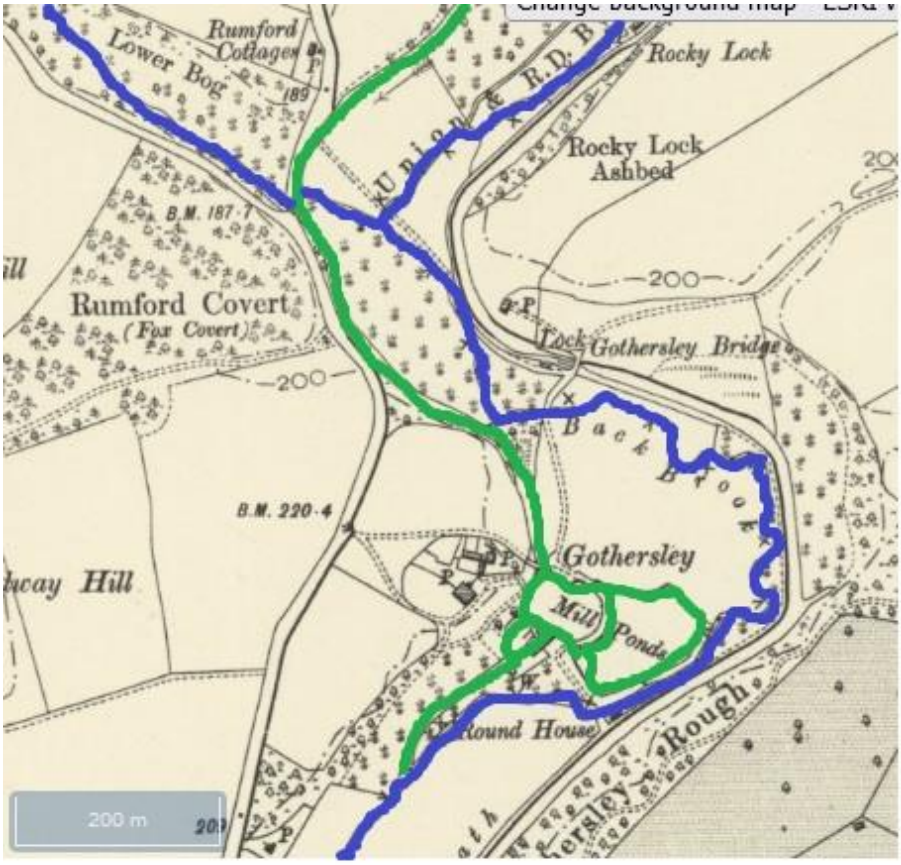


Figure 3.18. The surviving mill buildings at Greensforge, dating from 1890. The main channel of the Smestow is in the foreground.

[92] Extracted from Digimap based on the 1880 OS 1:2,500 map for the area.

3.5.6. Gothersley Iron works (SB6).

Likely financed and constructed by the Foley family, Gothersley's initial designation as a blade mill in the 1670s regularly changed, undergoing several transformations with various owners before its final demise in 1890. Throughout its 200-year lifespan it relied solely on water as its power source. This extraordinary feat is even more remarkable when virtually all other iron-producing sites had turned to coal as a power source over a century earlier.[93] The family links of those who created and ran the site in its later years are discussed in chapter 6.



Map 3.7. Gothersley iron works, 1880.[94] The blue line represents the Smestow's original course, the green lines the leats and pools cut to supply the mill. The blue stream in the NW corner is the Spittlebrook.

As map 3.7 shows, Gothersley, like Greensforge (SB5) had two millponds, fed by the main channel of the Smestow with a millrace for the return. The original channel, identifiable by

[93] VCH *Staffs*, vol XX, p.148.
[94] Extracted from Digimap based on the 1880 OS 1:2,500 map for the area.

carrying the parish boundary, is marked as 'Back Brook'. The millponds and channel have now disappeared into the wooded landscape which characterises this part of the valley.[95] The tracks marked on the map have also disappeared under substantial woodlands.

Map 3.7 includes a feature on the edge of the canal known as Gothersley Round House. This was the principal wharf on the S&W canal for the works. This was a significant landscape feature which has also all but disappeared.

Figure 3.19. Gothersley Round House, photographed from the iron works site, 1989.[96]

[95] The creation of this 'wooded wetland', characterised by Alder and Poplar trees owes much to ongoing water abstraction by the South Staffordshire Waterworks Company.
[96] http://www.lostlabours.co.uk/agenoria/agenoria2/agenoria_gallery/13-18/photo14.htm

Figure 3.20. Repaired remains of Gothersley Round House in 2019. Note the flourishing woodland, which has contributed to the gradual drying-up of the millponds and related channels.

3.6. Other mills in the Smestow basin.

Apart from the sites above, there were additional mill sites in the study area. These other mills demonstrate that the landscape has been carefully manipulated and maintained over time to support them. The mill on Black brook, in the north of the basin, Great Moor Mill (SB22) is an example of two aspects of this tendency. Examination of the site shows that the brook's course, immediately after the mill, has a straight section, presumably therefore artificial half-a-mile long, today forming an extended ford. The site dates to at least 1312 and lasted, with its overshot millwheel, to the end of World War II – over 600 years of stream management and maintenance. The mill was subject to legal dispute. Dunphy notes that in 1312 that two individuals, either the millers or the landowners, Nicholas de Stirchley and

Adam 'at the Gate of Trescote', were accused of 'moving the water' at *Le More* from its course.[97]

The mills in the Wom bourne reflect a different aspect. The most well-known mill is The Wodehouse (SB24). Buildings have survived from 1840, although the site is much older, perhaps dating to the late 13th century.[98] There is an equally old reference to Lude's Mill (SB26) likely named from the stream of the same name. The site is lost, but may be near Lloyd House.[99] Two mills (Wombourne Mill, SB27 and Ham Mill, SB28) in Wombourne are also known, but lost.[100] Wombourne Mill was also a blade mill for a time.[101] Wombourne contains Walkhouse Farm, adjacent to Wom bourne and Ham Mill, which may point to the existence of a fulling mill, which does not appear in any surviving documentation.

Himley brook supported two mills, Himley Mill (SB30) and Himley Furnace (SB8). Himley Mill worked until 1947.[102] Himley Furnace first appears in 1599 and was taken over by Dud Dudley in 1619. He claimed to have made iron using coal for the first time here.[103] The last reference to it is in 1638 when it was back under the control of Edward Sutton, Lord Dudley. The site is lost, but may be under The Great Pool in Himley Park.[104]

Holbeach brook and its tributary Straits brook contained eight mill sites. Some have been lost to later industrial development, especially on the upper Holbeach brook. One, Hasco

[97] Dunphy, *Smestow*, p.45. Dunphy does not give a source for this remark. VCH *Staffs*, vol. XX, p.179, in discussing Pattingham where Great Moor is located, only refers to the site of a former mill.
[98] VCH *Staffs,* vol. XX, p.212.
[99] VCH *Staffs*, vol. XX, p.212, 197. See table 3.2 for a discussion of the word 'Ludes'.
[100] These may be the original sites of the two mills noted in Wombourne in Domesday Book. However, Wombourne parish may have been larger in this period and the Smestow could have formed its western boundary. Therefore, at least one of the sites could be on the Smestow.
[101] King, *N. Worcs*, p.146.
[102] Cooksey and Cooksey*,* 'Watermills and water-powered works…Part 5, Smestow Brook', p.19.
[103] Discussed in chapter 6.
[104] Morton and Wanklyn, 'Dud Dudley: A New Appraisal', pp.48–65. The pools in Himley Park date from the 18th Century.

Furnace (SB10) located at Askew Bridge (to which the furnace has apparently given a version of its name) on Straits brook, just above its confluence with the Holbeach, was also an early site utilised by Dud Dudley.

Figure 3.21. Askew Bridge. Straits brook flows from right to left in front of the trees. The area is pitted and scarred by former industrial activities making accurate location of Hasco Forge (SB10) difficult. The area shown may be the upper millpool, with the forge location just below the bridge, behind the photographer.

Other sites on the Holbeach include another forge associated with Dud Dudley at Gornalwood (SB12) which may have its origins in 1595.[105] The site is lost, but may be on the same site as the later Gornal Forge (SB11) on Smithy Lane. There may have been leats associated with this site from the Fillwell pool, which could have been a header pond, but nothing is discernible on the ground. Below here, the Holbeach provided motive power for other mills, including Hunts Mill (SB32) demolished in the 1970s. The brook's course is

[105] Schubert, *History,* p.181.

extensively culverted due to substantial 19th century excavations of fireclay and coal. Downstream mills include Oak Farm Mill (SB35) Coppice Mill (SB33) and Holbeach Mill (SB34). All had millponds, including the delightfully-named Daffydingle pool which fed Holbeach Mill. All mills are defunct – only traces remain of millponds, apart from Daffydingle. The stream then powers Wall Heath Forge (SB9) described above before descending into a substantial gorge-like feature heavily incised into the plateau area.

The principal tributary stream of the Smestow from the west is the Spittlebrook, with its own feeder streams - Philleybrook and Sneyd brook. These streams provided the motive power for eight mills. All were corn mills, although Toys Mill (SB36) was associated with a walkmill pool which, as with the similarly-named farm at Wombourne, may indicate fulling. Philleybrook Mill (SB37) may be older, it had several disputes concerning ownership. In 1447 it was confirmed as owned by the Bishop of Bath and Wells, when Robert and Katherine Cole gave up any rights to ownership in return for payment. There was a further agreement of this nature in 1541 when ownership was confirmed as with Walter Wrottesley where again a Giles Strangeways, described as a Knight, gave up his 'rights' in return for then substantial fee of £340.[106]

Downstream, the site of Lutley Mill (SB38) is lost. Further downstream, Mere Mill (SB39) has had a long and complex legal history.[107] This may as a result of its location, close to the boundary between Lutley and Morfe manors, where both manors were perhaps keen to assert their rights to have grain milled in the manorial mill. Morfe was divided between two manors, each with a with a separate owner. In 1321 there was an agreement associated with

[106] This sum could be related to other lands noted in the agreement. G. Wrottesley, 'The Final Concords, or, Feet of Fines 1327-1547', *CHS,* vol. XI, 1890, pp.229, 282. The second case notes a large amount of woodland over 40 acres with a further 200 acres of furze and heath, indicating that the area is extensively wooded, or at least heathy. It was in Kinver Forest – see chapter 4.
[107] VCH *Staffs,* vol. XX, p.112.

a change in land ownership in one of the two manors, which allowed for the extension of the mill ponds and altered the course of streams, perhaps indicating that there were issues with the working of the mill requiring a greater 'head' of water.[108] After this agreement, two mills were claimed as dower by the recently-widowed lady of the manor.[109] This is not the end of the story. Sir Fulk Birmingham, who was lord of the other part of Morfe manor, gave leases for the mill in 1346, 1349 and again in 1362 to the lord of Lutley.[110] There was a related dispute in 1356 where the mill was described as ruinous.[111] Unlike many of the mills discussed its buildings survive.

The Sneyd brook feeds Philleybrook and supported two corn mills, Morfe Farm Mill (SB40) and Hoo Farm Mill (SB41). Both sites are drained and re-purposed. This section of Spittlebrook had two corn mills, Spittlebrook Mill (SB42) and Checkhill Mill (SB43). Spittlebrook Mill site dates to at least 1516.[112] It has operated as a corn mill, fulling mill and blade mill, giving it a connection with the iron industry – one of only two such sites west of the Smestow. The last mill on this brook is at Checkhill, in Checkhill Bogs SSSI.[113] Its development and use can be traced through various leases.[114] This mill survives, having been used as a corn mill, fulling mill, blade mill and more latterly to generate electricity.

[108] VCH *Staffs,* vol. XX, p.111.
[109] Wrottesley, 'Plea Rolls' *CHS* vol. XI, 1890, p.38.
[110] EEA A/6/10. Lease by Sir Fulk of Birmingham, 1349. The mill is called *Hylewynesmilne*, probably rendered Ailwyn's Mill in modern English.
[111] J. C. Wedgewood, 'Inquisitions Post Mortem, 1327-66', *CHS,* 1913, pp.162-3.
[112] VCH *Staffs,* vol. XX, p.112.
[113] The SSSI marks a gap, glacial in origin, through a sandstone bluff, followed by the Spittlebrook. This has led to the creation of Alder wooded wetland. Whitehead, *Geology of the Country* p.172.
[114] VCH *Staffs*, Vol. XX, pp.141-3.

3.7. Discussion and conclusions.

Given the presentation of data above, it can be postulated that the micro-management of the water features of the Smestow basin was an important and long-lasting contribution to the development of the local landscape. The manipulation of the landscape in this way was extensive, more intensive than that of the Rising brook, and, probably took place from an earlier point in their respective economic development. The valley profile data presented in the previous chapter makes it clear how the mills were sited to maximise their use of the natural kinetic energy reserves of the streams, even though, as noted in the example of the May 1623 flood, this could still create dangers for mill users.

In turn, it can be argued that the physical nature of the Smestow and its tributaries, as noted in the valley profile charts (figures 2.4-2.12) added a unique element, not fully-replicated elsewhere in other early iron-making areas or sites of mill concentrations. These steep valley profiles probably account for the number of mills, water features, and, their longevity. This is most marked in steeply-falling streams such as Penn brook, the Wom bourne and Holbeach brook and its tributaries The combination of a relatively high local rainfall, suitable sites in the course of the streams, and underlying geology that generated springs, contributed to a reliable flow of water for most of the year. Consequently, these streams were pre-eminently suitable for harnessing, through mills, to create power, despite some of the anxieties alluded to above. It can therefore be argued that the nature of the physical features combined with rainfall levels in the valley drove the subsequent landscape development and economic exploitation.

The corn mill literally provided the ‘staff of life’ to everyone. Therefore, for a miller, access to constant regular and reliable water-flow was essential, even if this meant extensive and expensive manipulation of the landscape, and subsequent maintenance, through the

creation of millponds and water channels. This suggests that control water and its flow was vital and worth defending, and consequently, a resort to law was often used to defend those rights. The types of disputes that arose, as noted above, show how much mill owners invested in access to water-power and retaining constancy of access.

The manipulation of water-courses for economic purposes evidently preceded changes brought by the later iron masters, and those iron masters could therefore call on considerable pre-existing experience in effective water management and the control of water to create power. Given that apart from animal movement and human endeavour, water was the major source of power (until the advent of the windmill) the value placed on this asset becomes understandable, as do the legal remedies sought.

Once iron-making sites had been introduced into the valley, their long-term survival (even through the technological change whereby coke from local coalfields replaced charcoal as the smelting medium) was ultimately derived from this regularity and reliability of water-flow, as in turn resulted in reliable and regular levels of iron production. It was helpful that sources of wood for charcoal, ironstone to produce the iron ore and limestone to act as a flux were available locally, and, in quantity.

An alternative argument is that this type of water feature construction, manipulation and maintenance was a normal feature of landscape development throughout Britain from the medieval period onward when mill technology was fully developed, thus enabling the resources in any river or stream valley to be fully maximised. It follows that the longevity of the mill buildings and water features was due to the continued economic requirement for such activities by the wider resident population.

It is possible to extend the suggestion that the Smestow landscape development was due to geographic factors by examining it in comparison with other intensively-exploited landscapes. An example from Sheffield demonstrates the intensity of exploitation by mills on the Rivers Sheaf and Rivelin.[115] That study shows a level of exploitation there that was at a rate which on the surface apparently far exceeded that in the Smestow. It is doubtful if the Sheaf basin could have accommodated more water mills. Having said this, it is also possible to argue the opposite view, that given the relatively short nature of many streams, and their steepness, that the Smestow was, with approximately 50 mill sites identified, also exploited at a similar level, that is, the maximum level the basin could accommodate. A similar argument can be made for the early iron-making sites in Shropshire where iron deposits are found, medieval woodland was available and the brook at Coalbrookdale has a steep profile and a high number of mills.[116]

Therefore, the geography of the basin, allied with a ruthless approach toward the economic exploitation of resources by land-owners from the late 16th century onward, is one effective explanation for the presence and then expansion of the iron industry in the basin. Given the costs of moving iron ore to other sites, let alone the practical difficulties involved, it was helpful that small useable iron ore sources existed locally. These sources 'jump-started' the nascent industry, but as will be shown in chapter 4 discussing woodland, the long-distance movement of materials, either wood or iron ore, became commonplace as the industry developed. It is not possible, though, to move water-power unless new sites on streams in different basins are preferred.

[115] D. Crossley, 'Water power in the landscape: The Rivers of the Sheffield area', in D. Barker and D. Cranstone (eds.), *The Archaeology of Industrialization*, Leeds, 2004, pp.79-88. The dual economy nature of the workforce, very similar to that of the study area was noted in D. Hey, 'Rural Metalworkers of the Sheffield Region', Department of English Local History Occasional Papers no 5, 1972.

[116] B. Trinder, *The Industrial Revolution in Shropshire*, Stroud, 3rd ed., 2016, p.11; R. Hayman and W. Horton, *Ironbridge*, Stroud, 1999, p.20.

From the material presented and subsequent discussion above it is possible to derive several hypotheses, or working ideas, about the development of the landscape in the study area with reference to its water features. The primary hypothesis is that the combination of the physical features of the drainage basin, coupled with local rainfall levels made for suitable stream profiles that were particularly useful for harnessing to provide power through the medium of mill machinery. The large number of medieval-era mills in the valley supports this proposition. Large is an acceptable term to use as the previous discussion on the River Sheaf makes clear.

The subsequent use of some of these mills as iron smelting sites, and the creation of new sites for iron smelting, all based on a regular and reliable water flow, is a further line of confirmatory evidence. Access to water power to make bellows give a regular blast of air to the forge/furnace is the key determining factor in the siting of early iron-making sites in the basin. The new technology was one of the principal influences in creating the environment whereby it was possible for landowners to positively consider the capital costs of conversion of corn mills to iron forges and furnaces in the 16th century. The same point can be made for the costs involved in leat construction, especially so at Heath Mill (SB2). A marked example is that of Hollow Mill (SB4). Here, the cost of excavating the mill race through the sandstone spur would have been considerable. The mill owner clearly thought that the investment would be more than paid for through the profits derived from the mill output.

A further hypothesis arising from the discussion above is that the presence of water, and therefore power, in the Smestow was the single most important factor in the early location of forges and furnaces. As is apparent, a mill site cannot easily move without extensive river works, and it is doubtful if this is even possible. Therefore, all materials for the creation of

iron had to be brought to the mill where they were used. Once coal in the form of coke became the dominant medium to produce heat, and, later, power through steam or pump engines, the iron industry was able to move to the coalfields on the Birmingham plateau, thus contributing substantially to the creation of the Black Country.

As the power derived from the utilisation of Smestow streams was relatively cost-free, the iron-making sites remained in use, and stayed so for as long as the site machinery and watercourses could be repaired and the mill was of economic value to the owners. Only with the advent of coal-powered forges, furnaces and steam-driven boilers, which rapidly became cheap and then cheaper in the 19th century with railway transportation of coal, did these mill sites in the study area lose out. Even then, because of their perceived value, they continued in use, albeit in declining numbers; Gothersley (SB6) survived until the end of the 19th Century and Swindon (SB3) until 1976.[117]

Thus, the local landscape was considerably impacted, albeit in a low-key micro-level way by the creation of mill leats, retaining dams, and sluices. It is likely, as the examples from Furnace Grange (SB1) and Heath Mill (SB2) indicate, that there was, through time, some restructuring of these watercourses and other features.[118]

The second main hypothesis is that water power was so useful to its owners that it was worth protecting. The limited evidence of medieval legal cases makes this point. The creation, and long-term maintenance of water leats and millponds along with the sluices to help manage the 'head' of water indicates the degree of investment made by mill owners in these sites and in their continuing operation. On average, millponds silt-up to unusability

[117] See chapter 6.

[118] J. Blair (ed.), *Waterways and Canal-Building*, Oxford, 2009, shows that the creation and management of water-courses has considerable antiquity in England. Thus, the skills to make these adjustments may well have been available to site owners in the study area.

after 40 years of use and must be cleared out. With leats, given their relatively slow water flow, as many are almost level, canal-like features, the need to keep them clear of silt and vegetation is more frequent (and labour-intensive) than for millponds. For example, the creation of the complex series of leats that fed Heath Mill pool (SB2) shows the level of skill and investment that was required in construction and maintenance, and that the mill owners felt this was worthwhile.

Once the mill ceased to be of economic value, the water features, for so long an important part of the landscape at the local level could quickly disappear. Millponds and leats were drained as their upkeep was no longer required. In effect, their economic value had sunk to zero, and the advantage that 'free' power had given to the mill owner had gone. Water power, once fully utilised, cannot be increased to further raise production levels to compete with other technologies for iron production, in contrast with coal-fired furnaces, where more sites can be easily built or enlarged, enabling them to use more coal to produce more iron. Additionally, mill buildings were demolished once the cost of maintenance exceeded resources available (unless they could in some way be repurposed). Although a small number of building and features survive in the Smestow, the contrast with Rising brook is marked as there nothing survives of the iron industry other than a small number of ponds.

The third hypothesis is that the landscape change in the valley epitomised in these water features and their related buildings was long-lasting, and once in place, relatively constant, with little alteration other than maintenance. A linked proposal is that although the water features and buildings were relatively small, and not as large as, for example, the creation of a deer park or a landscaped park such as those at Himley or Enville, their effect can be considered as great as a result of their longevity. Water-powered mills are at least a millennium old in England, and, in this basin, some may have this antiquity on their sites.

The fourth hypothesis is that although the water features and related buildings in the Smestow are part of the 'built' landscape, the impetus to create and maintain them reflects economic impulses, rather than a desire to improve or adjust the landscape for its own sake. Consequently, these features reflect changing economic priorities, as both their creation and later abandonment (or deliberate destruction) suggest. This point is elaborated in chapter 6.

Finally, the overall landscape effect, in geographical terms, of the creation of the iron industry in the valley through the medium of the control of water-courses and harnessing them for power, is marked. There were many miles of leats and drainage channels and ponds, dams, and header pools. All of these required the construction of new buildings, and influenced road networks due to the need to bring in raw materials and bring out finished goods. This survives, at least in part, in the current road network and other transportation arteries in the basin, which form the subject matter of chapter 5.

CHAPTER 4. WOODLAND IN THE LANDSCAPE.

4.1. Introduction.

This chapter will seek to answer two of the questions posed at the end of chapter 1. The first being, to what extent was considerable woodland necessary to the initiation and subsequent development of the iron industry during the 16th and 17th centuries in the Smestow basin. The second question, related to this industrial development, is to investigate to what extent woodland in the basin is a 'different' area, a distinct or in some way separate zone, outside the normal 'rules' of landscape development or general historical movements associated with land ownership and usage of wooded areas. Fox argued that woodlands, especially those in wold environments, of which the study area is one had different landscape and social histories, a proposition supported by others, notably Roberts and Wrathmell.[1]

To answer these questions, woodland aspects of the landscape in the Smestow will be examined as well as how these elements changed through time, using, to some extent, aspects of the *long durée* approach outlined in chapter 1 to investigate long-term changes in the distribution and use of woodland. It considers the uses made of this natural resource, and how need for wood in the form of charcoal to provide the heat source to smelt or forge iron affected the ongoing development of the landscape. There is a special focus on the development of Kinver Forest, with a specific examination of the key period of change for the Forest and its landscape which, it is proposed, was the 13th-15th centuries, prior to the large-scale establishment of the blast furnaced-based iron industry in the area. Comparison

[1] H. S. A. Fox, 'The people of the wolds in English Settlement history', in M. Aston, D. Austin and C. Dyer (eds.), *The Rural Settlements of Medieval England*, Oxford, 1989, pp.77-101. B. K. Roberts and S. Wrathmell, 'Peoples of wood and plain: an exploration of national and local regional contrasts', in D. Hooke (ed.), *Landscape – The Richest Historical Record*, Birmingham, 2000, pp.93-95

is made with the landscape development of the Rising brook drainage basin in Cannock Forest where relevant. Evidence is also drawn from the landscape development of wooded areas adjacent to Kinver Forest including Pensnett Chase, a 'private' woodland owned by the Barons of Dudley.

Although there have been very detailed studies of woodland and specific forests such as Rackham's seminal review of Hatfield Forest, the relative paucity of material available when considering Kinver Forest makes such a detailed study difficult to pursue. Nevertheless, the approach adopted by Rackham and, later, Williamson, will be used where appropriate to enable conclusions to be drawn.[2] The work of Jones and Page in examining woodland settlement and development in what was, albeit briefly, also a Royal Forest straddling the Northamptonshire/Buckinghamshire boundary, will also be utilised as it adopts a useful holistic approach using evidence from a variety of sources.[3]

A comparison is also made with the Weald of Kent and Sussex, as this was also the site of early iron working.[4] The iron industry in the Weald was perhaps at its peak in the 16-17th century period, the period considered here. Additionally, the Weald was an area of extensive landscape manipulation, with 'hammer ponds' built to enable a steady supply of water power for mills and bellows running blast furnaces and forges.

The Smestow basin includes the northern part of the Forest of Kinver, an area created by Royal *fiat* and subject to forest Law. Consequentially, documentary sources for the

[2] O. Rackham, *Hayley Wood, its history and ecology*, Cambridge, 1975; O. Rackham, *Ancient Woodland. Its history, vegetation and uses in England*, London, 1980; O. Rackham, *The Last Forest, the story of Hatfield Forest*, London, 1989; G. Barnes and T. Williamson, *Rethinking Ancient Woodland; The Archaeology and History of Ancient Woods in Norfolk*, Hatfield, 2016; T. Williamson, G. Barnes and T. Pillat, *Trees in England*, Hatfield, 2017.
[3] C. Dyer, R. Jones and M. Page, *The Whittlewood Project: Medieval Settlements and Landscapes in the Whittlewood Area*, 2005. York. https://doi.org/10.5284/1000289 (accessed 22 January 2022)
[4] See J. Hodgkinson, The *Wealden Iron Industry*, Stroud, 2008.

development of woodland in the basin, its uses, and the changes to it, especially losses to arable cultivation, are of royal legal origin.[5] Some parts of the remainder of the basin, that is areas away from Kinver Forest, such as Pensnett Chase, were also wooded up to late medieval times. As these areas were not part of the Royal Forest, their development must be traced through other methods, discussed below. Much fuller documentary detail exists for the creation and development of the iron industry and its effect on the wooded landscape in the Rising brook basin in the Cannock Forest comparison area. The explanation partly lies with the survival of papers outlining its development held by the Paget family.[6]

4.2. Woodland in Britain.

Britain has always been a well-wooded island, although the proportion of land under tree cover has varied substantially through time. As such, the general development of trees, woods, and wooded lands, especially concerning the rate of deforestation, as settlement creation was prioritised, and the uses to which woodlands were put, has been the subject of some considerable scholarly debate and research.[7]

Wooded areas have always been economically valued for four principal reasons; firstly, for fuel for fires for warmth and cooking; secondly for timber for building, along with building materials and tool production; thirdly as a 'reserve' for game animals such as deer, wild boar, and rabbits along with all the opportunities for elite social display and recreation that

[5] These are J. Birrell, 'The Forests of Cannock and Kinver', pp.1-276, which complements the initial translation and printing in Wrottesley, 'The Pleas of the Forest, Staffordshire …', pp.123-80. The history of Kinver Forest is in VCH *Staffs,* vol. II, pp.343-8. Cannock Forest is dealt with in the same volume, pp.338-43

[6] Gould, 'Food, Foresters, Fines and Fellows', pp.21–39.

[7] N. D. G. James, *A History of English Forestry,* Oxford, 1981; O. Rackham, 'Ancient Woodland and Hedges in England' in S. R. J. Woodell (ed.), *The English Landscape,* Oxford, 1985, pp.68-105; O. Rackham, *A History of The Countryside,* London, 1986; J. Thirsk (ed.), *The English Rural Landscape,* Oxford, 2000; J. Langton and G. Jones (eds.), *Forests and Chases in Medieval England and Wales c.1000-c.1500,* Oxford, 2010.

organised hunting activities offered woodland owners. Their final use was feeding domestic animals, such as pigs and sheep, through the development of woodland pasture, which, as an agricultural practice, may well be of pre-Roman origin in Britain. Relevant to the discussion is the concept of 'the wold' and woodland pasture economy, the development of coppicing, and transhumance involving pigs.[8] These elements were both competing and complementary. The relative importance of each aspect has varied through time and with the nature and preferences for usage by woodland owners.[9]

Turning wood into charcoal for industrial purposes can perhaps be seen as a secondary use, which post-dates the original four outlined above, even though charcoal-making as a practice seems to be at least 2,000 years old.[10]

Rates of woodland clearance in the lowland zone of Britain proceeded at various paces in different parts of the island so that a generalised introduction to the development of woodland in Britain is not straightforward. Much of what is now central and southern England had been mostly cleared of large expanses of woodland by the end of the Romano-British period. The study areas lie on the very northern edge of this zone, so even this statement is tentative. Although there may have been local regrowth in the fifth and sixth centuries, the Anglo-Saxon era in the south and east of Britain was, it seems, characterised in part by a continuation of the use of Romano-British fields and agricultural practices. Woodlands were carefully managed and appropriately exploited through versions of the

[8] For the idea of the wold and its specific identity, see A. Everitt, 'River and Wold', pp.1-19, and H.S.A. Fox, 'The Wolds' in J. Thirsk (ed.), *The English Rural Landscape,* Oxford, 2000, pp.55-61; R. Jones and M. Page, 'Characterizing Rural Settlement and Landscape: Whittlewood Forest in the Middle Ages', *Medieval Archaeology*, vol.47, part 1, 2003, pp.53-83, adopt a different approach. All these sources inform this discussion.

[9] O. Rackham, *Ancient Woodland*, pp.142-7, 153-5. It is probable that sheep were involved in woodland pasture in the Smestow, but research has revealed that real evidence for this is lacking, other than the one reference to a shepherd discussed below.

[10] D. Crossley, 'English Woodlands and the supply of fuel for industry', *Industrial Archaeology Review*, vol. 27 part 1, 2005, pp.105-12.

coppicing system to meet the many demands of a thriving local economy, often at more than a subsistence level.[11] The Domesday survey shows the vital nature of woodland to almost every community with constant references to the amount of woodland in each manor or *vill*.[12]

The post-Domesday era is marked by the creation of areas subject to Forest Law.[13] The origin and development of Royal Forests from the time of William I has been subject to substantial review.[14] The introduction of forest law to large areas of England was a Norman innovation, imposed soon after the Conquest, to enhance and protect the king's hunting rights.[15] The fines levied by the Royally-appointed justices of the forest on those who trespassed or committed other infractions of Forest law such as killing deer, clearing woodland, or keeping hounds in the forest meant that the application of these laws became a substantial source of royal income.[16] The forest *eyres* (the mobile courts created to primarily set and collect fines) were particularly profitable, and the King became financially dependent, to some extent, upon his ability to inflict heavy fines. Offences included actions against either the structure of the forest (offences against the *vert*, or plants) or the forest fauna. The two principal

[11] C. Grocock, 'Barriers to Knowledge: Coppicing and Landscape Usage in the Anglo-Saxon Economy', in N. J. Higham and M. J. Ryan, *Landscape Archaeology of Anglo-Saxon England,* Woodbridge, 2010, pp.23-37.

[12] The 're-growth' debate has inspired much scholarly comment, perhaps starting with H. C. Darby 'Domesday England', p.52 in H.C. Darby (ed.) *A New Historical Geography of England before 1600*, Cambridge, 1976.

[13] Not all land in Royal forests was owned by the King. The designation of whole settlements as being 'in the forest' inhibited any growth or development by the owner – one of the many reasons why the application of forest law was detested by those who lived within its boundaries, and, consequentially, why a detailed knowledge of those boundaries was so important.

[14] M. L. Bazeley, 'The Extent of the English Forest in the Thirteenth Century', *Transactions of the Royal Historical Society*, vol. 4, 1921, pp.14-72; C.R. Young, *The Royal Forests of Medieval England,* Leicester, 1979; R. Grant, *The Royal Forests of England,* Stroud, 1991.

[15] Forest as a legal term is derived from the Latin *foris*, meaning outside. Forest land was legally distinct by being outside the normal law of the land and answerable only to the King or his representatives. Individuals living or working in the Forest area had rights which were not part of the normal civil law which applied to un-Forested areas.

[16] See for example, J. Birrell, 'Who poached the king's deer? A study in thirteenth century crime', *Midland History*, vol. 7, part 1, 1982, pp.9–25.

offences relevant here are *purpresture*, illegal enclosure of lands within the bounds of the forest, and assarting, the clearing of land for agricultural purposes.

The crown rapidly discovered that land under Forest Law could also provide other opportunities for financial remuneration by selling off hunting rights. That discovery led in turn to the development of 'private' parks.[17] Assarting was financially advantageous - by extracting a fine for enclosures that had already happened, recognising a *fait accompli* accepting that the land had been lost for Royal 'Forest' purposes, but profiting thereby.

Given that a 'hierarchy' can be said to exist of private land that runs from Royal Forests through aristocratically owned chases, then parks and finally to warrens, where access was marked by stringent limits, it is possible to demonstrate that this structure appeared in and around the two study areas from the 13th century onwards. A prominent early example was the creation of Sutton Chase, formed where Cannock Forest and the Forest of Arden (in north Warwickshire) met.[18] Originally Sutton Forest, it was exchanged by Henry II with the Earl of Warwick for lands in Rutland. Sutton Forest became Sutton Chase, and the rights of the crown were transferred to the earl.[19] At various times throughout the medieval period at least 26 Chases were in existence in England.[20] The creation of Pensnett Chase in the Smestow, one of these 26, owned by the Lord of Dudley, is examined below.

[17] S. A. Mileson, *Parks in Medieval England*, Oxford, 2009.
[18] Arden was not a Royal Forest; it was the most heavily wooded and upland part of Warwickshire. Cannock Forest represented its northern extension into Staffordshire.
[19] M. A. Hodder, 'Earthwork Enclosures in Sutton Park, West Midlands', *Transactions of the Birmingham and Warwickshire Archaeological Society,* vol. 89, 1978-9, pp.166-70; Gould, 'Food, Foresters', p.23.
[20] L.M. Cantor, 'Forests, Chases, Parks and Warrens', in L.M. Cantor (ed.), *The English Medieval Landscape*, London, 1982, p.70.

Parks began to be increasingly created from this period. At their maximum extent, it is estimated that there were up to 2,000 deer parks in medieval England.[21] Typically, these were smaller than Chases and were the areas surrounding a nobleman's favoured residence, and securely enclosed.[22] These sites included woodland to provide cover for deer and for fuel or timber. Often such Parks represented the formalisation of aristocratic acquisition, sometimes quite illegally, of land around the edge of Royal forests. Examples from Cannock Forest include Haywood Park, Wolseley Park, and Hagley Park.[23]

The Barons of Dudley successfully attempted a similar activity with the creation of Dudley Old and New Parks and later Himley Park in the Smestow basin. Enville Hall and Park (property of the Grey family, later Earls of Stamford) followed in the 19th century. Wrottesley Park was just to the north of the study area.

4.3. Early medieval development of Kinver and Cannock forests.

Before considering the medieval development of the woodland it is important to consider what is known of the pre-medieval era. As noted in chapter 2, Staffordshire sits athwart the three primary watersheds of central England. Substantial expanses of woodland have characterised the interfluve areas between all three drainage basins through time. These interfluves, especially in the Smestow area, seem to have been heavily wooded for most of

[21] Cantor, 'Forests, Chases, Parks and Warrens', p.81. R. Liddiard (ed.), *The Medieval Park: New Perspectives*, Macclesfield, 2007. Some deer parks may be older - R. Liddiard, 'The Deer parks of Domesday Book', *Landscapes*, vol. IV, part 1, 2003, p.9.

[22] Parks could be created by ecclesiastics. Beaudesert Park in Cannock Forest owes its origin to the Bishops of Lichfield. For parks in Staffordshire see L.M. Cantor, 'The Medieval Parks of South Staffordshire', *Transactions and Proceedings of the Birmingham Archaeological Society*, vol. LXXX, 1965, pp.1-9.

[23] Brown notes, p.110, that a royal licence had been granted to enable a game park at Wolseley in 1469; D. Brown, 'The Variety of Motives for Parliamentary Enclosure: The example of the Cannock Chase area, 1773-1887', *Midland History*, vol. XIX, 1994, pp.105-27. Henry, Lord Paget allowed Shugborough to expand by encroachment on his lands as late as 1771. Gould, 'Food, Foresters', pp.36-7.

their history. The effect of glacial deposits in affecting soil creation and the type of vegetation cover it can support was also noted in chapter 2 (maps 2.4 and 2.5 in particular) where a combination of heath and woodland is the typical vegetative response.

Some evidence of the nature of the size and extent of the woodland in the first millennium AD can be found in charters and place-names. Two surviving early English charters that cover what is now south Staffordshire have been discussed by Hooke.[24] The charters, S860 (dated to 985AD, which includes a reference to Trescott and Tettenhall, with a boundary clause for Trescott) and S1360 (undated, covering Ashwood)[25] show, in their boundary clauses, sparse references to woodland – the majority refer to watercourses or roads. Only one bound specifically refers to woodland – the 'wet wood' at Upper Penn. An individual tree is also identified. In this area, water already appears more important than woodland as a boundary feature.

Thus, the study area, certainly the most northerly part, cannot be described as 'heavily wooded'. Clearance of woodland has already taken place, and this may have been at some distance in time before the date of the charters. Establishing pre-Domesday detailed histories of the changes in woodland use in the Smestow, or that of the Rising brook, is not straightforward. Where agricultural practices are concerned, there is some evidence from two place-names of a transhumance economy (Swindon and Kingswinford, the hill of the pigs and the pigs' ford respectively). Evidence for the use of woodland as woodland pasture is scarce but exists.[26]

[24] Hooke, 'The Landscape of Anglo-Saxon Staffordshire', pp.32-42.
[25] See https://esawyer.lib.cam.ac.uk/charter/860.html# and https://esawyer.lib.cam.ac.uk/charter/1380.html# (both accessed 20 January 2020).
[26] Birrell, 'The Forests', p.11. R. H. Hilton, 'Lord and Peasant in Staffordshire in the Middle Ages', *NSJFS,* vol. X, 1970, pp.1-20.

A full discussion of the early English place-names of the study area is not appropriate here, except to note that several seem to be derived from *lēah,* indicating areas of cleared ground. Other names such as Perton, Himley and Aldersley refer to trees; pears, hops and alder trees respectively.[27]

Staffordshire was the heaviest-wooded county in the midlands in the immediate post-Domesday era, with around a third of its acreage estimate as woodland.[28] The distribution by ancient parish in the study area is below.[29]

Table 4.1. Domesday Woodland – Smestow basin.

Place (holding)	**Amount of woodland**	**Notes and additional resources listed**
Amblecote	Woodland size unspecified.	2 acres of meadow, presumably on the banks of the River Stour, which formed the southern boundary of Amblecote.
Bobbington	Woodland pasture a league long and half a league wide.[30]	Described as woodland pasture, indicating its primary agricultural use rather than specifically as woodland.
Catspelle.[31]	None recorded.	Described as 'waste' and 'in the King's Forest'.[32]
Cippemore.[33]	Woodland a league in length and width.	The entry records that the King holds the woodland 'in the Forest'.
Cocortone.[34]	None recorded.	Described as 'waste', suggesting that this is part of Kinver Forest.

[27] M. Gelling, *The West Midlands in the Early Middle Ages*, Leicester, 1992, p.6. The element becomes -ley in modern English place-names. The meaning of *lēah* as a place-name element has varied through the Anglo-Saxon period from 'settlement in a clearing in a wooded area' through to 'settlement by a wood' toward the end of the period. The origin of the place-name element is traditionally taken to be of Germanic origin, but need not necessarily be so.
[28] Rackham, *Ancient Woodland*, p.114.
[29] Derived from J. Morris (ed.) *Domesday Book, Staffordshire,* Chichester, 1976, supplemented with D. Desborough, *The Staffordshire Domesday*, London, 1991.
[30] Traditionally, in the midlands, a league is 1½ miles. Thus, if it was a rectangle, this woodland would be 1½ miles in length and ¾ of a mile wide, implying a size of 1.125 square miles.
[31] Usually identified as Chasepool, near Swindon township in Wombourne parish. Later *caput* of Chasepool Hay, Kinver Forest.
[32] 'Waste' is the translation of the Latin *'vasta est'*. For a possible explanation of the specific usage of this term in Seisdon Hundred in Staffordshire, see R. Studd, 'Recorded 'waste' in the Staffordshire Domesday', *Staffordshire Studies*, vol. 12, 2000, pp.121-34. Studd's explanation is followed here.
[33] Usually identified as lost *vill* between Enville and Kinver.
[34] Usually identified as a lost village and now only recorded as a lane (Crockington Lane) between Trysull and Seisdon. The entry for Kingswinford also refers.

Enville	Woodland a league long and half a league wide.	The entry records that the King holds the woodland and that it is 'in the Forest'. As with the three entries above, this is presumably Kinver Forest. 4 Acres of meadow are noted, perhaps bordering the Smestow.
Haswic.[35]	None recorded.	The entry notes 'now waste because of the King's Forest.'[36] Also, 'half of the woodland which is in the forest belonged there'.[37]
Himley	Woodland – size not specified.	2 acres of meadow, again presumably by the Smestow or Himley brooks.
Himley	No woodland noted.	An acre of meadow noted.
Kingswinford	Half a league long by 3 furlongs wide.	Contains a mill (valued at 2s) plus meadow, and ½ hide described as waste at 'Cocretone'.[38]
Kinver	3 leagues long and 1 wide.	Contains 2 mills (valued at 20s) and meadowland.
Morfe	The woodland has 2 leagues length and as much width.	Described as 'waste' and therefore presumably in Kinver (or perhaps Morfe) Forest.
Orton	None recorded.	4 acres of meadow.
Patshull	Woodland half a league long and 4 furlongs wide	Mill recorded.
Pattingham	1 league long and half a league in width	
Penn[39]	None recorded.	4 acres of meadow.
Penn[40]	None recorded.	Mill recorded (valued at 2s). Also held 4 messuages in Stafford.
Perton	½ league in length and width	Meadowland
Sedgley	Woodland 2 leagues long and 1 wide	16 acres of meadowland.[41] The woodland is quite large by comparison with neighbouring *vills*.
Sedgley	None recorded.	2 acres of meadow.
Seisdon	None recorded.	4 acres of meadow.
Tettenhall	Half a league in length and width[42]	A hide in Compton and ½ hide in Wightwick are noted as part of the manor.
Tettenhall	None recorded	Does not belong to the Clergy but to the King.
Trescott	None recorded	
Trysull	None recorded.	Mill (4s) and 4 acres of meadow.
Wombourne	None recorded.	2 mills (4s) and 4 acres of meadow.

[35] Identified as Ashwood, just north of Kinver.

[36] Implying that the whole *vill* had been absorbed into the 'Forest', presumably Kinver Forest.

[37] The meaning of this statement is obscure, but could suggest that half of the total amount of the woodland in *'Haswic'* belongs to the Clergy, implying that the King holds the rest.

[38] See footnote 29. The two *vills* are identified as the same place despite the spelling difference.

[39] Usually identified as Lower Penn.

[40] Usually identified as Upper Penn.

[41] The entry notes the Priests of Wolverhampton claim part of the woodland. The woodland may be a part of what was to become Tettenhall wood, a northern outlier of Kinver Forest.

[42] This may also be part of the origin of Tettenhall wood.

The absence of woodland in some *vills*, for example Penn, is noteworthy, as these areas may well have formed parts of what was to become Pensnett Chase, discussed below. This suggests that not all woodland may have been recorded.

The equivalent entries for the Rising brook are:

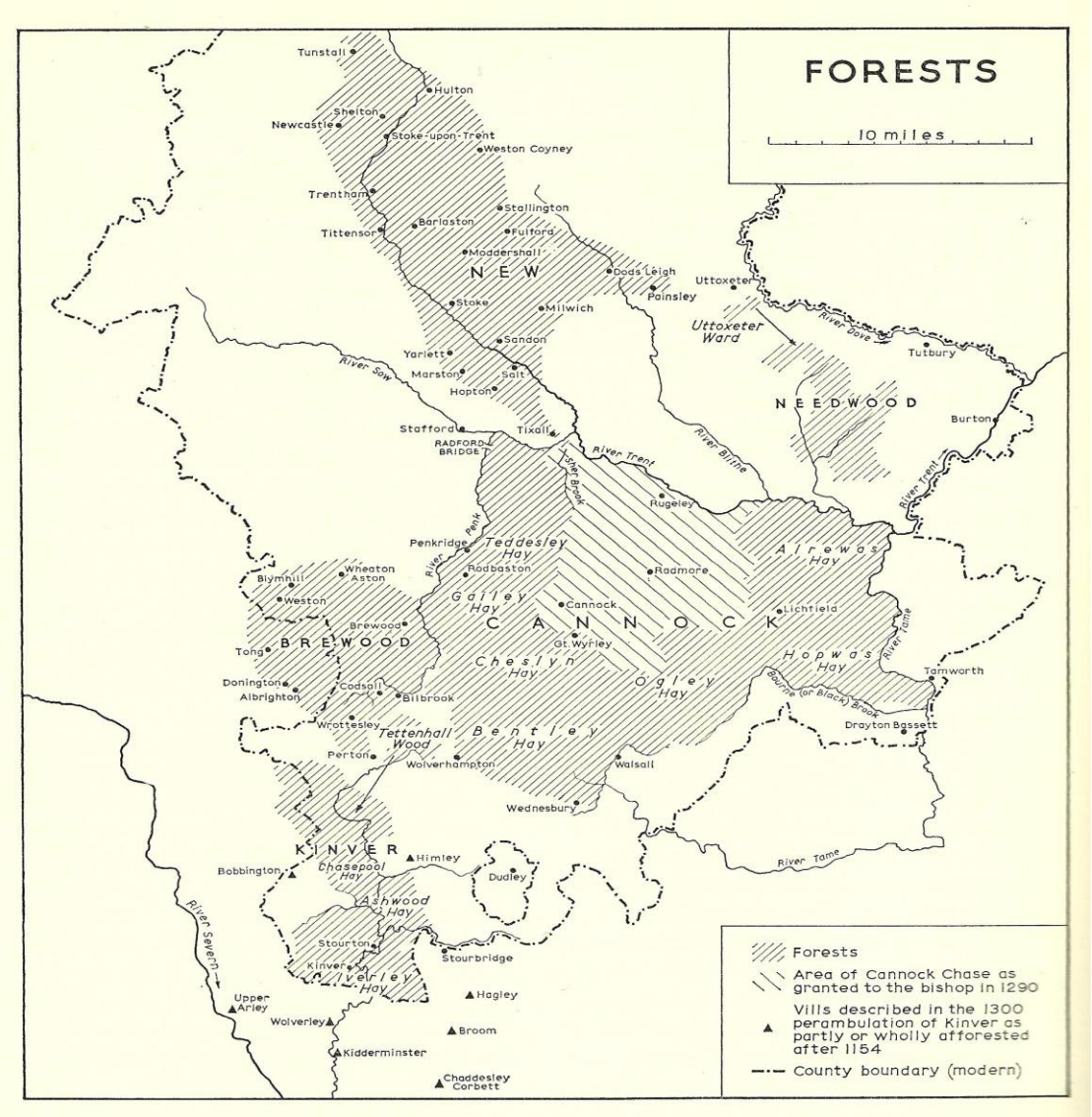
Table 4.2. Domesday woodland – Rising brook area.

Place	Amount of woodland	Notes
Rugeley	3 leagues long and 2 wide.	A mill and 3 acres of meadow.
Cannock	4 leagues wide and 6 leagues long.	
Cannock	Not recorded.	12s paid annually.

It should be noted that these entries show more woodland than that for any individual entry in the Smestow basin. Assuming a league is 1½ miles, these figures, using a nominal rectangle of 6 by 9 miles gives 54 square miles, which with the entry for Rugeley (4½ by 3 miles, 13½ square miles) total 67½ square miles. Cannock Chase AONB by comparison is 30½ square miles, and not all of this is woodland, which indicates the possible extent of the loss of woodland over time. Adding together the entries for surrounding areas to Cannock and Rugeley (Brocton, Baswich, Handsacre, and Longdon) gives a picture of a heavily wooded, wide area. These parishes along with others to the south of Cannock and Rugeley were the nucleus of the Forest of Cannock. The nature of these woods and the way in which they were used for swine (transhumance) has recently been discussed on a county-wide basis, suggesting that woods could be seen as expression of lordly control of the landscape and the activities practised in it.[43]

The post-Domesday history of the two forests can be viewed through their development as Royal Forests in England, and as part of the Royal forests in Staffordshire, the county-wide extent of which are mapped below.

[43] A. Sargent, 'The Domesday Woods of Staffordshire', *CHS*, 4th series, vol. XXVII, 2023, pp.41-71.



Map 4.1. Royal Forests in Staffordshire.[44] The boundaries of Needwood and New Forests have been subsequently revised. Kinver Forest extended south into Worcestershire as the map indicates. Morfe Forest occupied the area between Kinver and the Severn. Pensnett Chase, discussed below, may have occupied the space between Kinver Forest and Dudley.[45]

Cannock is not recorded in documents as a Royal Forest until the 1140s and Kinver not directly until 1168.[46] Nevertheless, Domesday Book clearly shows the beginnings of the formalisation of Kinver Forest with the entry for *Haswic* (table 4.1) being declared as waste 'on account of the King's forest'. The additional references to *Catspelle, Cippemore* (a lost

[44] VCH *Staffs*, vol. II, p.336.

[45] The eastern boundary of Cannock Chase is erroneously positioned, as the western part of Longdon parish was not part of the grant to the Bishop of Lichfield.

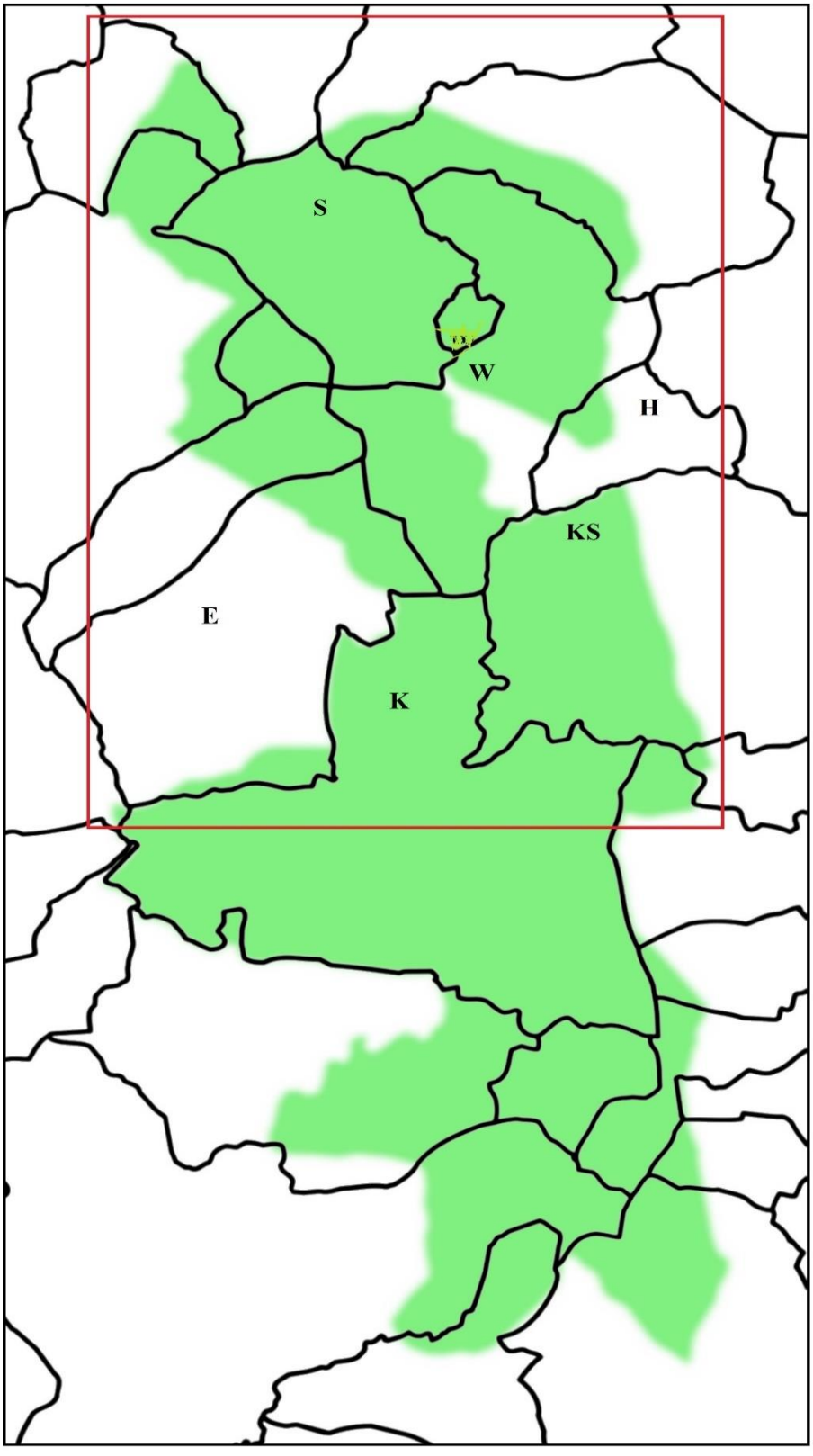
[46] Birrell, 'The Forests', p.1. G. Wrottesley, 'The Forest Tenures of Staffordshire,' *CHS*, new series, vol. X, part II, 1907, pp.189-243.

settlement probably between Enville and Kinver) and Enville (in part) indicate that the Forest was in the state of formation at the time of the survey. The Forest extended into Worcestershire where the county is contiguous with the Kinver parish boundary. The southern part of Kinver Forest in Worcestershire may originally have been known as the woodland (or waste) of Kidderminster.[47]

King has provided a guide to the extent of the Forest, and James a full analysis of the boundary point place-names noted in the 1300 perambulation which, in James' view describe only a partly-wooded landscape.[48] An annotated version of James's proposed boundary is as shown below (map 4.2) although it should be noted that James' identification of the boundary points identified in the 1300 perambulation describes a slightly larger area, mostly in the northern part of the Forest. Nevertheless, James' analysis and location of the boundary waypoints in the perambulation is persuasive, including the extension of the forest into what is now Worcestershire, and is accepted here

King suggested that most of the woodland areas may have been continuous, or nearly so in the 'Anglo-Saxon' period, but, by the Norman period, and certainly by 1300, Kinver Forest and surrounding areas of woodland were being steadily broken up into more discrete units, with losses most evident in the southern section.

[47] VCH *Staffs,* vol. II, p.343, footnote 4.
[48] P. W. King**,** 'The Minster *Aet Sture* in *Husmere* and the northern boundary of the *Hwicce*', *TWAS*, 3rd series, vol. 15, 1996, p.75. K. James, 'The Norman Forest of Kinver: An analysis of the Forest's extent and place-names recorded in the Great Perambulation of 1300 CE', *TSAHS*, vol. LIV, 2023, pp.1-31. The map is taken from figure 1, p.2.



Map 4.2. James' estimation of the extent of the medieval Kinver Forest (shown in green) based on pre-1888 parish boundaries. The red line marks the study area. K is Kinver, KS, Kingswinford, E, Enville, H, Himley, W, Wombourne and S is Seisdon. James does not give a scale for his map.

The size of Kinver Forest has been debated, with the perambulation of 1300 offering a suitable starting point, as no earlier documentation has survived. The perambulation reflects the position after approximately 220 years of existence and development, during which there may already have been substantial effects on the Forest boundaries.[49] The area described extends into Worcestershire south of the Smestow basin and continued toward the later Wyre Forest in the west of Worcestershire. Listed as within Kinver Forest were:

"Nether Penne, Overton*,* Tresel, *and* Seysdon*, Womburne, and Swyndon, and a part of* Humeleleye*, a part of the land of Kingeswyneford, a part of the land of* Amelecote*, the* vill *of Wolaston, a part of Swyneford, of* Pebbemor*, of* Haggeleye*, of Brome, the* vill *of* Chirchehull*, the* vill *of* Wennorton*, a part of* Yeldentre*, of Chaddesle, of Hurcote, of the waste of Kyderminstre, the* vills *of Dunclent,* Hetheye*, and the* vills *of Wolvardesley, Kynyngford, Arleye,* Evenesfeud *, Morf, and Lutteley, Bobyngton, with the wood and the wastes and the appurtenances, have been afforested since the coronation of King Henry the great-grandfather of the present King".*[50]

The wide extent of the afforested land can be gauged from this description and map 4.2. In these bounds, the Smestow is referred to twice. Initially the bounds begin 'at the water of *Smethestall*', and then 'descending by the *Tresel* water' showing that the older name was still in use at the turn of the 14th century. The bounds complete the circuit by 'descending by this road to *Smethestalleswey*, and by *Smethestalleswey* as far as *Smethestalleford*, at the place whence the bounds commence'. This may suggest that *Smesthestall* refers to a specific part of the river, rather than its full length at this period.

Additionally, the bounds noted a detached area to the north of the Forest:[51]

"And they say that the wood of Kyngesleye, and the manor of Tettenhale by the bounds written below are the demesne of the King in the forest, that is to say, from Whistewykeford ascending by the road which leads from Whistwyke towards Stafford as far as the mill of

[49] G. Wrottesley, (ed.) 'The Pleas of the Forest, Staffordshire', pp.79-180. James, *Kinver*, pp.1-3.
[50] *Nether Penne* is Lower Penn; *Overton* is Orton, a township in Wombourne. *Tresel* refers to Trescott (or possibly Trysull). *Humeleleye* is Himley. *Amelecote* is Amblecote. The next 16 places are in Worcestershire as far as Chaddesley Corbet, until *Evenesfeud*, Enville, Staffordshire, followed by Morf(e) and Lutley, concluding with Bobbington. The Jurors, in describing the properties and settlements in the Forest, claim that these bounds have been the case since the coronation of Henry II in 1154.
[51] G. Wrottesley, (ed.) 'The Pleas of the Forest', p.180.

Rodesford, and thence to the Dounpoul, thence descending as far as Milboruwe wall, and so descending as far as the Whitebon in Saffemor, and so descending as far as Oxneford, and then ascending by a sichet *as far as the high road which runs from Trescote to Wulverenhampton, and so by the said road as far as Poukediches Lydeyate, and thence by a road as far as Wythewykesforde."*

These bounds refer to the area later known as Tettenhall Wood, near Wolverhampton. Tettenhall Wood existed as a separate settlement into the 18th century, retaining some woodland cover. James offers an interpretation of the boundary points showing a clear overlap with medieval manor of Tettenhall Regis.[52] It was shown, minus the wood, on Yates' map (1775).[53] The wood was the subject of deforestation from an early period and parts of it were rapidly turned over to pasture, certainly by the mid-14th century.[54] Assarting was mentioned around Wightwick on the south-eastern extension of the Wood in forest courts (*eyres*) in both 1271 and 1286, indicating early pressure on this isolated but relatively large block of wooded land.[55] It was known as Tettenhall Wood by 1613 and enclosed in 1809.[56] It was managed as part of the manor of Kinver.

Conventionally, Kinver Forest, like Cannock, was divided into smaller units known as hays.[57] Kinver had three, Ashwood, Chasepool and Iverley, the latter including Tettenhall Wood. Ashwood Hay included Prestwood, which acted as its nominal centre. James notes that the

[52] James, 'Kinver', pp.5-10
[53] VCH *Staffs,* vol. XX, p.2 and see 'Conventions' above for Yates' map.
[54] SRO D593/A/2/16/4, Grant of common of pasture in Kyngsleye wood, manor of Tettenhall, dated 1346 and discussion below.
[55] G. Wrottesley (ed.) 'The Pleas of the Forest', pp.144, 168, 180.
[56] SRO D1235/4/2 - Properties allotted under the Tettenhall Wood Enclosure Act, 1815-54, and SRO Q/RDc/66; Tettenhall Enclosure Act, 1809. The Tithe Award is similar, SRO D3363/6/1 - Traced copy of Tettenhall Wood enclosure award plan (no date).
[57] A hay is typically a sub-division of a wooded area, with boundaries marked by raised banks of earth. The date of the creation of both Cannock and Kinver hays is unclear –possibly the hays were established when the Forest were created, perhaps contemporaneously with the Domesday Book entries, table 4.1 and map 4.1. Evidence for their existence in the form of boundaries or woodland compartments has so far defied identification through fieldwork and LiDAR image analysis.

hays in Kinver may reflect a pre-Norman origin as livestock enclosures to facilitate hunting.[58] Cannock had seven hays, and, from 1290, the Bishops' chase – see map 4.1.

The 'Pleas of the Forest' for Kinver Forest emphasise the importance of the woodland, and the changes which affected it over time. Loss of woodland to agriculture, via assarting, was common, and some manorial landlords may have actively encouraged their tenants in this regard, as their income would increase at the expense of the King. *Purpresture*, illegal encroachment and enclosure of land belonging to another (usually the King) was practised. Considered as a whole, the central concern of the Pleas is with the protection of deer. The value of the woodland, and its pasturing opportunities to the local economy seems relatively low, but evident. This suggests that the landscape can best be considered as only slowly changing through this period and represented a mixed agricultural economy, not one of complete woodland cover retained for hunting purposes.

The view of the Forest made in 1235 for Kinver noted that the Forest is 'well kept in respect of vert and venison'.[59] This changed with the Pleas of 1262 which detailed 14 cases of assarting or *purpresture* in Tettenhall, presumably on the detached portion of Kinver Forest. The cleared land was sown with oats in all cases, presumably indicating the poor quality of the soil, as noted in chapter 2 above and perhaps also the pressures exerted by an increasing population in the area. Income from pannage was noted from the period 1248-62, although not every year was recorded, and for some years the income was nothing (1258-60). In 1256 no income was reported due to lack of mast. The maximum amount recorded was in 1261 when income totalled £9 10s 4d. Conversely, the lowest amount collected was 6s 7½d in

[58] James, 'Kinver', pp.28-30.
[59] Birrell, 'The Forests', p.23, translating TNA E32/187, Plea Roll of Staffordshire Forest Eyre, 1262. Again, this contrasts with the relatively minor recorded importance of woodland pasture, even though this agricultural activity may have been the primary concern of those who lived in or close to the Forest. Also, Sargent, 'Swine Woods', pp.63.

1262. The evidence does indicate that the general features of woodland pasture existed in places within Kinver Forest, with the variations in income probably reflecting normal seasonal fluctuations in what is a natural phenomenon.

The 1262 Pleas note five fines for the 'taking away of wood', a low level, which should be contrasted with 275 fines imposed for the same offences in Cannock at the same date. Three of the named individuals fined in Kinver Forest were described as charcoal burners, giving an indication of their use of the wood, and implying the (unmentioned) presence of bloomsmiths using that charcoal for iron smelting. Two smiths were identified and fined for assarting – tantalisingly we do not know what they did as smiths in any detail, but it is tempting to link the two activities and occupations. One other item refers to a miller, named as Roger Hillary, who was given permission to re-build his mill at *Bradmede*, which unfortunately cannot be located, but demonstrates that mills were present.

These pleas also considered thefts of deer. In Kinver one miscreant was described as a shepherd, indicating that flocks of sheep could now be found in the area, implying enough cleared ground for this activity to occur, a system of woodland pasture was practised, and that sheep were tolerated by Forest officials.

The next visitation to Kinver was in 1271 when there were 27 fines for woodland offences – one of those named was described as a carpenter, again giving some indication of the use of timber.[60] The same document also confirmed a grant to the Prior of Worcester, Leo de Romiley, allowing him to enclose his wood at Horewood and take it into cultivation, hinting at some of the pressures on Forest land, and, through this action making a significant

[60] Birrell, 'The Forests', pp. 59-106, translating TNA E32/184, Plea Roll of the Staffordshire Eyre, 1271.

negative impact on the size of Kinver by making his own, private and presumably coppiced woodland.[61]

The 1271 visitation noted five cases of new assarts, all small, all half an acre in extent, but spread across Bobbington, Wombourne, Morfe and Lutley (townships in Enville parish). All assarts were reported as sown with oats. There are references to a further 15 people making new *purprestures* in Tettenhall Wood, the total estimated at 16 acres. Seven individuals were fined for taking in 10 acres and sowing with oats at Wightwick in the southern section of Tettenhall Wood. This visitation also identified what are described as older assarts associated with 19 people who were fined for a total of 26½ acres mostly sown with oats and rye.[62] These 'earlier' assarts were in Tettenhall and spread south down the Smestow valley to include Sedgley, Orton and Wombourne *vills*.

Again, the number of individuals involved in similar activities in Cannock Forest was far greater. The nine years of pannage returns for the period 1256-65 show how haphazard reliance on this resource, either for food for pigs, sheep or as a source of Royal income, could be, as for six of these years no mast is reported and returns for the other three years were (suspiciously rounded figures of) £2, £4 and £6.

The view of 1286 for Kinver showed a similar pattern to that fifteen years previously.[63] It noted losses to Kinver Forest, notably where the Prior of Worcester was given permission to assart 100 acres of wood near Shatterford in Arley parish in the then south-west corner of

[61] See TNA C143/2/34 - Leo de Romely to impark his wood of Horewode in Kinver forest. Stafford. Dated 52 Henry III (1268).
[62] Presumably they are described as older in that they did not happen within 12 months of the time of the 'view', but sometime between then and the previous 'view' of the forest.
[63] Birrell, 'The Forests', pp. 108-81, translating TNA E32/188, Plea Roll of Staffordshire Forest Eyre, 1286.

Staffordshire.[64] Five cases of 'offences against the vert' were noted and fines allocated, indicating pressure on resources. An interesting sidelight was the mention of a dead hind at Himley, where it was described as lying on the heath between *Ashwychford* (Ashwood) and the township of Himley, showing how the landscape in the central part of the basin was moving from woodland to heath through steady loss of woodland cover, which is not otherwise directly recorded in these documents, but was probably a feature of the landscape changes in this part of the basin. Later, the same document noted the enclosure at Horwood (see above) the wood at *Berches* (in Kinver) and the 'waste' of William of Orton's wood at *Puttley* (the site of which is now occupied by Bearnett House some 3 miles south-west of Wolverhampton) which was taken into the King's hands. [65]

There were references in 1286 to further encroachments on the detached woodland at Tettenhall including the building of houses and further assarting creating fields sown with corn, indicating that they were not new. The Regard notes fines for several other individuals for assarting at Wombourne along with a further fine for assarting in Bobbington, Morfe and Lutley townships in Enville. The total amount fined for these assarts was £4 3s 6d which suggests how royal coffers could be enhanced (if only once) by accepting these losses of wooded land. The 1286 Regard noted new assarts. Tettenhall figured prominently with 12 individuals responsible for assarting 6½ acres and one rood between them. The Crown recovered £1 14s 4d in fines. The crops (this time spring or winter corn) were assessed at 4s in total.

[64] Shatterford, a bowdlerised version of the original rather-more-unfortunate Shitterford ('the ford of the stream used as a sewer') was on the main route to a crossing of the River Severn at Arley.
[65] Such as Big and Lower Putley. SRO B/A/15/246 - Penn Tithe map, 1843. Horovitz, in his discussion of this name notes 'the wood of Putley' was present here in 1286, Horovitz, *Place-names*, p.446, VCH *Staffs*, vol. XX p.212, A. Dunphy, *Tales from Penn Forge*, Penn, 2002, p.49.

Evidence was given of assarting elsewhere. Roger, described as son of *Hawysia* of Wombourne, assarted two acres, sown with wheat, for which he was fined 2s. Thomas of Penn also assarted an acre (presumably in Penn) and was also fined 2s. Altogether, the Regard lists a further 18½ acres and 4 roods separately assarted (and sometimes enclosed) by 17 separate individuals (including the local vicar and manorial reeve) all by agreement with William of Orton, the landowner. The Forest officials who let this happen were imprisoned. There were further assarts recorded in Bobbington – three people with three acres and three roods. The houses built were allowed to stand as they were not 'to the detriment of the forest', indicating that the area, perhaps on the periphery of the Forest, was no longer considered to be valued for hunting.

Activities on what are described as 'old enclosures' were also considered, and fines allocated. Again, Tettenhall figures prominently with 64 acres and 3 roods identified as old *purprestures* enclosed with a small ditch and a low (albeit dead) hedge. Ashwood was mentioned, with Wybert of London holding five acres there sown with spring and then winter corn. Six acres at Upper Penn were similarly mentioned. New *purprestures* were listed at Tettenhall, 31 acres in total.[66] In all cases, along with the fine, the enclosure was to be torn down. It is not known if this happened, or, if un-recorded payments of (additional) fines enabled the fields and buildings to continue to exist. On balance, given the steadily declining area of woodland, the latter seems likely.

A relevant remark from the contemporaneous view of Cannock noted illegal sales of oaks, alders, birches and holly saplings.[67] Oaks were of some worth, valued at 12d to 18d each. Peat-digging occurred, and several individuals were fined for the creation of a hearth for

[66] In one case, which gives an insight into the pressures of the times, the Forest officials were challenged why they had permitted one enclosure. In response they claimed that the Clerks of Wolverhampton had threatened them with excommunication if they did anything about it.
[67] Used to make carts, valued at 8s.

burning charcoal 'without licence and without warrant', suggesting that for Cannock Forest these activities occurred both with and without permission. Simon Jurdan along with the relevantly surnamed Richard *le blomere* were fined for making a forge in Cannock Forest, location unfortunately not specified. Robert and Thomas of Bentley were fined for felling 30 oaks in the wood of Bentley to use in a forge located in the wood.[68] The largest number of felled oaks listed was 50 in Hopwas Hay. Other offences in Cannock Forest of assarting, ditch-building, house construction, removal of impounded pigs and cattle (implying both pannage and woodland pasture practices) and 'wasting' (meaning clear-felling) were noted. Most assarts were sown, although some were described as fallow or left as pasture. It is safe to assume that similar issues affected the Kinver woodlands. A telling note as to the size of the Forests occurs where Philip Marmion, Lord of Tamworth, was found responsible for the waste of Hopwas Hay in Cannock by the removal of the enormous figure of 5,000 oaks. Admittedly this must be a rounded figure, but it does indicate the size of the wooded area and what it could offer the unscrupulous.[69]

Returning to Kinver, income from mast for 13 years from 1271 was recorded; eight show a nil return. Two years showed returns of 10s 2d and 12s 11d which bear comparison with the remaining two years where the returns were in excess of £5 and £14 and perhaps represent beneficial climatic fluctuations. The returns from Cannock were similar. These figures suggest that regular wood-pasturing was not able to sustain herds of swine and that therefore it was unreliable as an agricultural practice. From this supposition it can be suggested that the real non-hunting use of the forest was based on assarting land for crops, perhaps due to a steadily rising population pre-1350. This may account for the constant assarting activities recorded in the 'views' of the forest.

[68] Birrell, 'The Forests', p.146, translating TNA E32/188, Plea Roll of Staffordshire Forest Eyre, 1286. The 17th century Jordan family, of which Simon may be an earlier member, are discussed further in chapter 6 below.
[69] Birrell, 'The Forests', p.181.

Warfare, in Wales, Scotland and France was both an expensive and extensive characteristic of the reign of Edward I. To help with funding these costs, the King eventually turned to his Royal Forests to rent lands ('arrentation') and sell wood. The results of these policies give a further insight into landscape development.[70] Staffordshire arrentations were made between 1296 and 1307 in which the steady destruction of Tettenhall Wood can be glimpsed.[71] The 1296 arrentation noted over 100 separately named individuals paying money for small assarts, normally of half an acre in extent with two 'outliers' of 10 and 20 acres respectively as the two largest. Further 'sales' of the Royal lands are noted in Kinver at Ashwood, Kingswinford, the site later to become known as Gothersley (SB6) as well as places in Worcestershire. Altogether the King arrented 148 acres at £2 6s 3d in annual rents. Land described as 'waste' was also rented out - 37½ acres in total, spread across Kingswinford (Ashwood Hay) Swindon township in Wombourne and the manor of Kinver. This again suggests that some sort of timber felling was being practiced, to the detriment of the level of woodland cover. A further arrentation, this time of only 4½ acres, occurred in 1304, but was repeated later in the year for the much larger area of 108 acres, half of which was to Agnes de Somery in Ashwood Hay.[72] The comparison with Cannock is telling in that 1,487 acres were arrented in Cannock with further losses of 43 and 38 acres in later arrentations, showing the steadily declining size of the woodland cover in both Forests.

Timber was sold as part of this process by the Royal Exchequer.[73] In 1301 Chasepool Hay, Kinver, was the site of sales of 93 oaks, raising £8 7s 4d. The same day also saw a sale in

[70] TNA E36/75 – Transcripts of inquisitions concerning 'arrentations' or demises of assarts and wastes in divers forests, 9-35 Edw I.
[71] Birrell, 'The Forests', pp.182-91, her translation of the above document.
[72] This purchase may mark an addition to the de Somery chase, Pensnett Chase, and in effect the gradual transfer of Ashwood Hay into Baronial hands and its separation from Kinver, discussed below.
[73] TNA E101/138/28, PARTICULAR FORESTS (SOUTH OF TRENT): Account of wood sales (Bringwood and Prestwood). 29 Edw I; E101/138/29, PARTICULAR FORESTS (SOUTH OF TRENT): Account of wood

Ashwood Hay, where 106 oaks raised £10 1s 10d. Later sales in the same year at Chasepool, were for 51 oaks (£5 11s 6d) and then 54 oaks for £5 6s 4d with the Ashwood sales of 29 oaks for £3 0s 4d. There was also a sale at Iverley Hay in the south of the Forest of 164 oaks generating £5 10s 10d. Of the purchasers, three millers were identified and one dyer, probably indicating some 'industrial' use of the timber. Several sales were made to clerics, including the vicars of Penn and Sedgley and the intriguingly named 'Walter there (sic) Doctor'.

The death of one of the Lords of Dudley, John de Somery in 1322, gives a further insight into the state of the Forest. He was the last of the de Somery family to hold the lordship before it passed to the Sutton family, although the *Inquisition Post mortem* for him is not dated until some years after his death.[74] It described as 'waste' the bulk of his holdings in Dudley, Kingswinford and Kinver manors, implying, if the term waste still had the same meaning as argued by Studd for the Domesday entries, that these areas remained partly-wooded.[75] Alternatively, it could mean that they had been clear-felled, but given the aristocratic impulse to hunt deer, this is unlikely.

In the 14th century general inquisitions replaced the forest Eyre; for Kinver, the earliest for which records survive is from 1338. Primarily concerned with sparrowhawks, it noted an incident in Ashwood Hay, confirming that the hay was still in existence, and again referred to the Trysull stream (rather than the Smestow brook) and noted, tantalisingly imprecisely, that

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sales (Chaspell, Teddesley, Alrewas, Hopewas). 29 Edw I, and E101/141/18, PARTICULAR FORESTS: SOUTH OF TRENT: Account of wood sales in Kinver forest. 29 Edw I. These are translated in Birrell, 'The Forests', pp.192-7. E101/138/18 is mostly concerned with Kinver Forest sales.

[74] TNA C 47/11/8/5 inquisition as to waste held by John de Somery, deceased, in Kinver forest, dated 4 Edw III (1331).

[75] Studd, 'Recorded Waste', p.121.

it was the boundary of the Forest in the Wombourne area.[76] Two further inquisitions were noted for 1365 and 1366,[77] both of which detailed an incident in 1358 where a large force of men, all identified by name,

> *"by force of arms, namely bows and arrows, swords and other diverse weapons, attacked the foresters and regarders in the fields of Wolverhampton and beat and wounded John ate More forester, as a result of which the foresters and regarders fled in fear of death and were unable to make the regard which they were sworn to on the part of the king, in perfidy of the crown of the lord king and disherison of his forest right."*

The second document noted that the royal party had been in Kingsley, the detached part of Kinver near Tettenhall Wood and were going, presumably via Wolverhampton, to Ashwood Hay. The financial loss to the King was estimated at £200. The case demonstrates both the absolute dislike of the forest laws on the part of the population and the continuing value of the woodland to the Royal coffers.

Finally, the position concerning Brocton Coppice, identified as a remnant of the medieval Forest of Cannock, needs to be considered. Recent fieldwork has given an insight into the nature of the woodland environment at that time, which is likely also to apply to Kinver Forest. Today, Brocton coppice is occupied by around 600 mature sessile oak trees (*quercus robur*).[78] These are spaced well apart, and many of the gaps between the trees show traces of trees or root balls, indicating that more oaks were present in an earlier period. The surviving oaks are of a substantial girth, probably indicating an equally substantial age. A

[76] TNA E32/191, Inquisitions into the state of Cannock forest and TNA C47/11/4/10, Staffs: forest inquisition on the misdemeanours of John de Benteleye, forester of Bentley. The latter includes a petition from the poor people of Wednesfield and Willenhall (in Bentley Hay, Cannock). TNA E32/281 - Roll of 51 inquisitions concerning the state of the forest before Bartholomew de Burghersh, keeper of the forest south of the Trent, and his deputies, in Northamptonshire, Wiltshire, Rutland, Worcestershire, Buckinghamshire, Gloucestershire, Oxfordshire, Herefordshire, Shropshire, Hampshire, Somerset, Staffordshire, Huntingdonshire and Essex. Translated in Birrell, 'The Forests', pp.205-6.

[77] TNA E32/313 - Inquisition concerning the state of the forest of Kinver and TNA E32/314 - Inquisition concerning the state of the forest of Kinver.

[78] S. M. Potter, C. M. Welch, and L. W. Burrows, 'History, science and passion in the service of woodland conservation: the example of Brocton Coppice', *Quarterly Journal of Forestry,* vol. 92,1, 1998, pp.38-46.

randomised 10% sample of these trees measured in November-December 2019 gave girths in the range 2.95-6.15 metres.[79] There was a two-peaked distribution of girths centred on 3.5 and 6 metres. Applying standard growth factors derived from the table produced by Mitchell's rule would suggest that the largest trees began life in the centre of a well-wooded area around 1350.[80] That they have survived from this period may mark the temporary decline in human pressures on woodland associated with the arrival of the Black Death from 1348 onwards as well as the move in the economic centre of gravity of the Forest to the Rising brook in the 16th century to utilise its motive power. Notably, Brocton Coppice is the furthest point in Cannock Forest from suitable mill sites. From this analysis, it can be confidently suggested that the medieval wooded landscape of Cannock, and presumably Kinver, was one dominated by oak trees, and, probably subject to coppice management.

Presumably not co-incidentally, the second peak in girth dimensions gives an average age for those trees of around 350 years, indicating that they may have been developing at the time of the disruption to industry and trade occasioned by the Civil War over the period 1640-7 or the later plague years of 1665-6, when it can be safely assumed that human activities again declined, allowing the oaks to become established.

4.4. Pensnett Chase.[81]

Pensnett Chase is the private Chase held by the Lords of Dudley, first mentioned in the 13th century, which lasted through to its enclosure and demise in 1784.[82] It probably covered the

[79] I am grateful for the support of David Foster of Ball Green in identifying and measuring these trees.
[80] http://www.ancienttreeforum.co.uk/wp-content/uploads/2015/03/John-White-estimating-file-pdf (accessed 20 January 2020).
[81] Little research has been undertaken on this area. Published material includes D. R. Guttery, *The Story of Pensnett Chase*, Brierley Hill, 1950, and C. J. Baker, 'Pensnett, its name and origins,' *Staffordshire History*, vol. 58, Autumn 2013, pp.3-16.
[82] SRO Q/RDc/112 – Kingswinford Enclosure (Pensnett Chase) Award, 1787.

eastern edge of the study area, occupying the ridge (and lower slopes) that separate the Smestow basin from the Birmingham plateau. It was a wood- and heath-covered area which extended north from Kinver through Dudley, Sedgley, Kingswinford and Himley as well as Penn (Upper and Lower). It probably extended from the wooded area represented by Tettenhall wood on the edge of the high ground occupied by Wolverhampton, along the eastern flank of the study area, down to Kinver, giving one continuous belt of wooded ground extending over 15 miles. This area carries the line of the watershed between the Smestow, ultimately feeding the Bristol Channel, and the River Tame headwaters, feeding the North Sea.

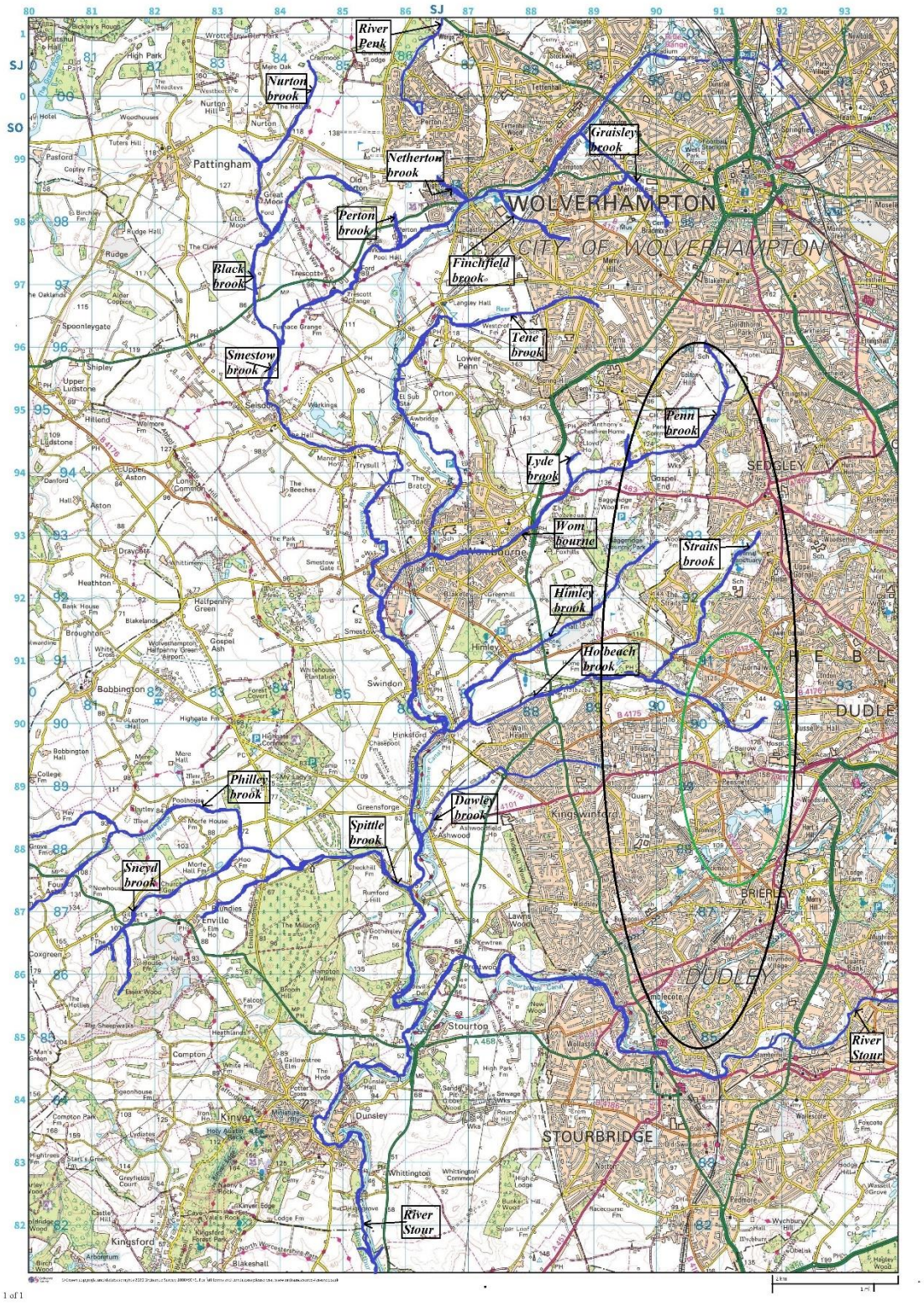
Although Pensnett Chase was not formally part of Kinver Forest (although some elements of it may have been 'extracted' from Kinver's northern edge) it represents the history in landscape development terms of what must have been a densely wooded zone, and the Chase, for much of its history was certainly co-terminus with Kinver Forest.

The meaning of the name Pensnett is unclear as it has been confused with the name *Penninak*, which, from medieval documentation, seems to apply to a wooded area occupying a similar location.[83] Horovitz discussed this, noting that the early name sources are divisible into those which are variants of either *Pensnaed* or *Penninak*.[84] Horovitz suggests that far from a 'confusion' these are in reality two separate names and therefore two places.[85] Baker notes in summarising the evidence that those variants associated with *Pensnaed* refer to the wider area, whilst those naming *Penninak* seem to refer to a specific piece of woodland. Both names emerge into the written record in the 13th Century.[86]

[83] Noted in Horovitz *Place-Names*, pp.433-4. It seems to mean 'Penny Oak'.
[84] Horovitz, *Place-Names*, pp.433-4. Pensnett consists of two elements - the 'Celtic' *penn* with the Anglo-Saxon *snaed*, meaning a cut-off portion of land.
[85] Horovitz, *Place-Names*, pp.434-5.
[86] Baker, 'Pensnett', p.8.

The smaller *Penninak* wood may have been located near the boundary area between Dudley and Kingswinford and Sedgley. Possibly it was one of the longer-lasting wooded sections of Pensnett Chase, occupying a roughly north-south line within Pensnett's boundaries. This suggestion indicates that Guttery's idea that Pensnett Chase was represented by the then (1950) extant woodland on Brierley Hill is incorrect, and that Horovitz's proposal, of two separate names for two separate wooded areas that overlapped in time and space, and have (perhaps not surprisingly) become conflated, is correct. A tendency to merge the two names would be especially marked if, as is argued here, both the Chase and *Penninak* wood were subject to steady loss of woodland and eventually, their remnant heath-covered land as well. It is noteworthy that the place-name element 'oak' is a feature of many smaller place-names hereabouts from Oak Mill Farm (SB35), the much later Round Oak ironworks, to Penny Oak itself, in Himley. The implication is surely that there was a substantial oak wood in the vicinity, which had a lifetime sufficient to generate local, albeit minor, place-names.

Just as the name and origins of what was to become Pensnett Chase are obscure, its location and extent are equally difficult to pin down. The Chase's boundaries may have fluctuated through time. At its peak it seems to have extended across Himley, Kingswinford, and Dudley and, perhaps surprisingly, as this would signify acquisition of lands formerly in Kinver Forest, across the Smestow into Enville and Bobbington. At its greatest extent it may have reached the border with Shropshire. It may have been based on some of the wooded areas referred to in those parishes or manors listed in Domesday with its core in Kingswinford. The likely 'average' is tentatively mapped as map 4.3 below.



Map 4.3. Possible medieval extent of Pensnett Chase – black line. Green line may be Penninak wood.

Although the boundaries of the Chase remain vague with the passage of time, one aspect is definite - the River Stour, the southern edge of the medieval Kingswinford parish, marked its southern boundary. It is noteworthy that residents of the area south of the River Stour, in Worcestershire, long used their 'traditional' rights to move livestock across the river and into Pensnett Chase and feed them on its fruits, indicating tenurial social and economic links and long-standing customs in place over what was to later become a county boundary.[87]

The earliest-known reference to the area is the 1205 land exchange between King John and Ralph de Somery, Baron of Dudley, where de Somery's lands in Wolverhampton were transferred to the King in exchange for the Royal holdings in Kingswinford that became part of the Chase. Baker noted that some of this land was common land, and that although it had moved from royal to private ownership, Forest law still applied.[88] The application of Forest law suggests that the area, or some of the area, was considered, at this point at least, to be part of Kinver Forest. Such a transfer may indicate how land formerly in the Royal Forest was able to become part of Pensnett Chase, and how the Chase grew at the expense of the Forest of Kinver.

The Barons of Dudley used the Chase as a key part of their wider estate in the area. Its woodland later became the base for Baggeridge Park, just inside Sedgely parish, as well as the source of wooded land to create Dudley New Park (to complement Dudley Old Park)

[87] Guttery, *Pensnett Chase*, p.9; P. E. Chandler, 'Kingswinford, Part II – Pensnett Chase', *TB*, vol. 21, 3 1988, pp.12-17, especially p.14.
[88] Baker, 'Pensnett', p.4.

which was extracted from the Chase in the 18th century.[89] Himley Park was similarly extracted, but the date for this is not clear.[90]

It may be possible, using LiDAR, to potentially identify a boundary of the Chase. The urbanisation of much of the area previously covered by Kinver Forest makes such identification difficult, but figure 4.1 below of a section of Himley Park just north of the Great Pool shows a speculative boundary line not evident as a hedgerow or other feature on 19th century maps.

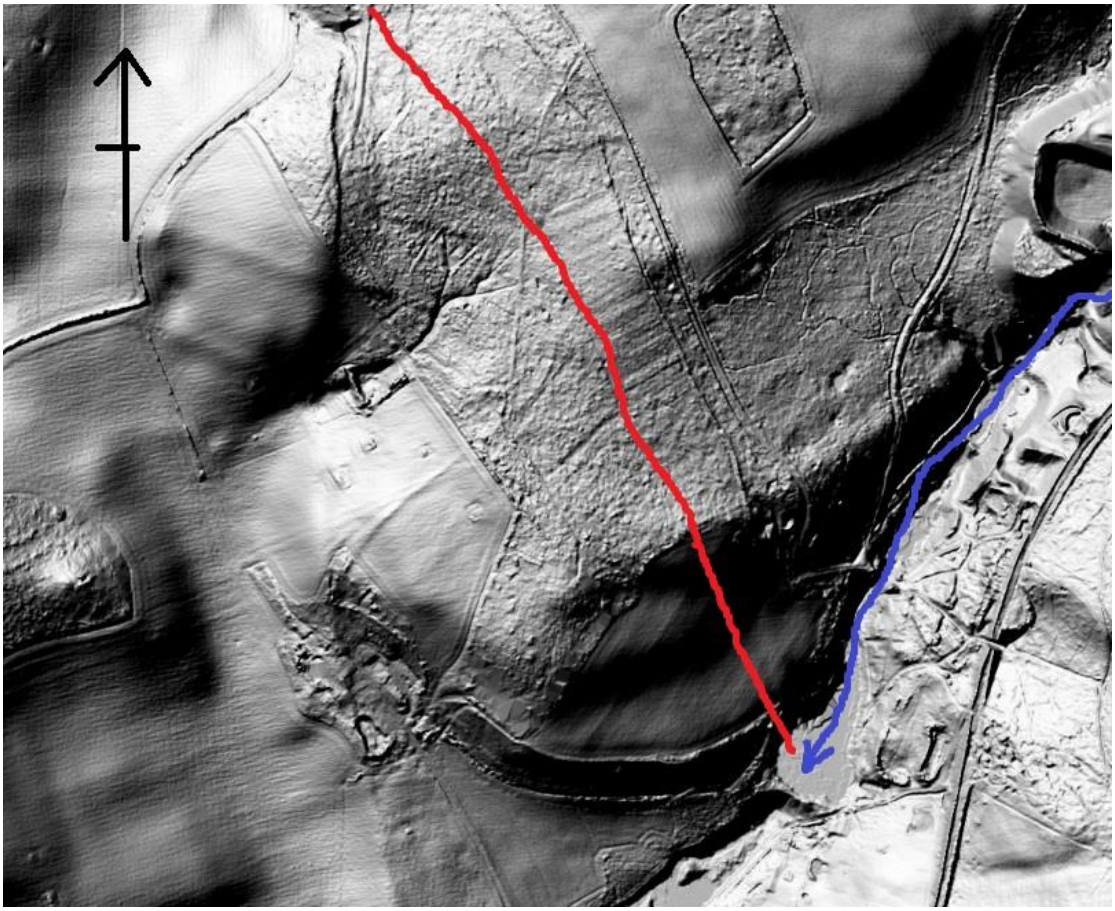


Figure 4.1. LiDAR image of the western section of Himley Park showing a speculative woodland boundary bank, outlined in red – perhaps an edge of Pensnett Chase.[91] The other feature evident is the valley of the Himley brook noted in blue. Scale 1:5,000.

[89] See DALHC DE/3/10/3 where Edward Sutton, Lord Dudley (1567-1643) appointed his brother, John Sutton, Keeper of Pensnett Chase on 31 October 1595, thus confirming the family's hold on the area. Baggeridge later became the site of Baggeridge Colliery.

[90] Baker, 'Pensnett Chase', p.14 notes that a deer park was present at Himley in 1711 but the park had been established before this point. See Dudley HER 15299.

The early landscape use of Pensnett Chase, other than for hunting, is unclear – especially concerning pannage and/or woodland pasture rights – although it is likely that any residual 'commoner' rights will have been quickly extinguished in favour of using the area entirely for deer hunting. Mining for coal and later fireclay was also established from the 13th century and Chandler notes that 'Lord Dudley…tried to promote industrial development, whilst not wishing…to disrupt traditional pleasures and profits'.[92] Pannage was not extensive and is rarely recorded, a pattern like that noted for Kinver Forest.

The later history of Pensnett Chase is one of steady loss of woodland cover.[93] The substantial mineral reserves on and below its surface resulted in most traces of wood and heath being lost by 1800 in favour of rapid industrialisation (and later urbanisation, especially in Sedgley) leaving the name Pensnett to apply only to the south-western part of Kingswinford parish, one of the original 'core' areas of the Chase. In summary, the landscape history of Pensnett Chase is further evidence for the general trend of woodland clearance as outlined above in the discussion of Kinver Forest.

4.5. Early Modern landscape development in Kinver and Cannock forests.

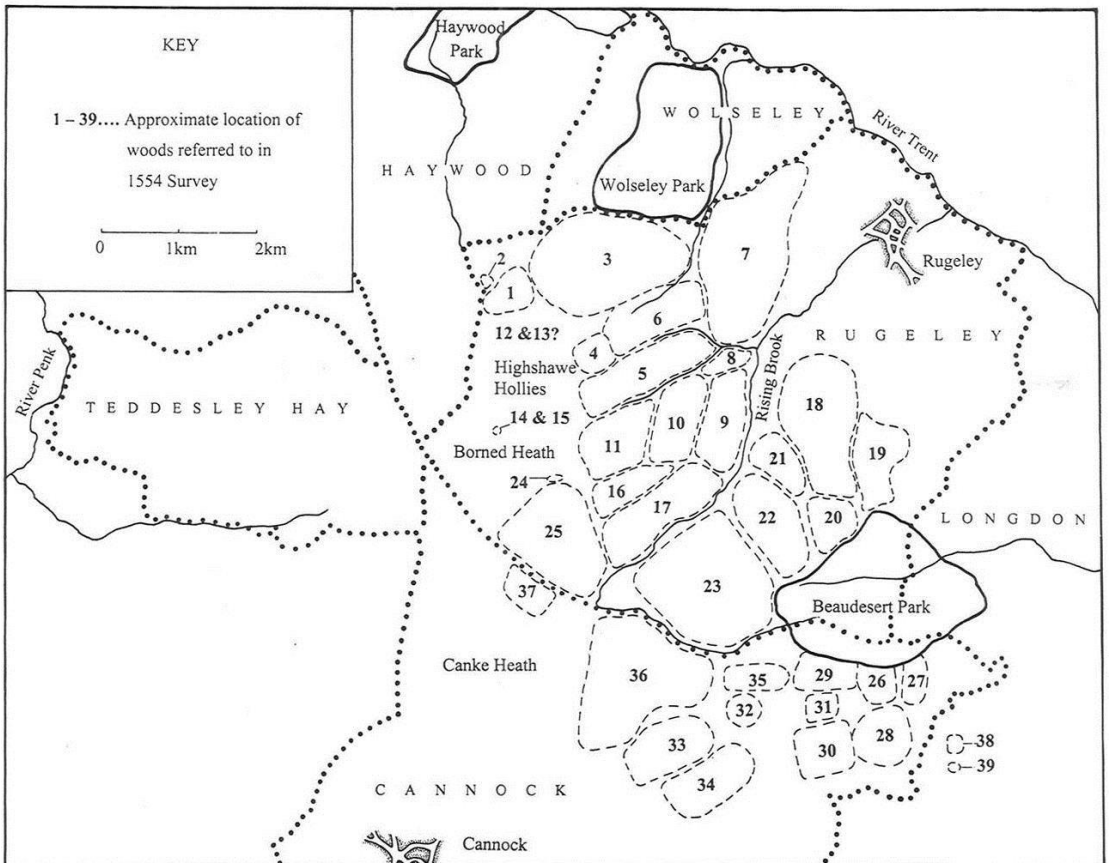
Looking first at Kinver, and as with other royal forests, officials were appointed to various posts associated with the management of the forest on the King's behalf, either for the Forest as a whole or individual hays. Chasepool Hay was granted to John Sutton, the fourth of that name and the first Baron Dudley in 1454. Despite later losing control of Chasepool

[91] This may even reflect a pre-1300 boundary of Kinver Forest given the apparent transfer of lands from the Forest to the Chase noted above.
[92] Chandler, 'Pensnett Chase', p.14.
[93] Chandler, 'Pensnett Chase', pp.14-5 notes that by the end of the 17th century all woods on the Chase were coppiced and brought £200 annually to Lord Dudley.

Hay to the Duke of Norfolk and then later still to their distant relative the Duke of Northumberland, the rights for herbage and pannage returned to the Lords of Dudley in 1553 (with the attainder of the Duke of Northumberland) in the person of Edward Sutton, 4th Baron Dudley. The later grant also included similar rights for Ashwood Hay. In this way, the family managed, in effect, to transfer both Ashwood and Chasepool Hays into their own possession away from royal control. Subsequently, they were perhaps managed as part of Pensnett Chase, which may have contributed to the confusion of boundaries as noted in the earlier discussion on the latter.

The history of Cannock was similar, with trees mostly cut down or sold. Only Bishops' Chase remained as heavily wooded through the 16th century, having been transferred to Sir William Paget in 1546.[94] Welch mapped the geography of the residual Cannock woodlands in 1554 – map 4.6.[95] The ongoing steady loss of woodland is noted, with rabbit warrens being created later on the Chase, and perhaps also more sheep using the growth of grasslands which replaced the trees.[96] Civil unrest at these activities, especially enclosing tracts of land on the Chase, was not uncommon.[97]

[94] VCH *Staffs*, vol. II, pp.342-3. Bishops Chase forms the core of the current Cannock Forest AONB.
[95] Welch, 'Elizabethan Ironmaking', p.32, figure 1. Appendix 4 in that paper lists the primary source as a 1554 survey of two bailiwicks within the Forest for the Paget family – SRO D(W)1734/2/3/43.
[96] Welch, 'Elizabethan Ironmaking', p.63.
[97] C.J. Harrison, 'Fire on the Chase: Rural Riots in Sixteenth Century Staffordshire', *CHS*, 4th series, vol. XIX, 2014, pp.97-126.



Map 4.4. Late 16th century Cannock Chase.[98]

It is likely that the situation in Kinver would have been similar, although ownership remained at least nominally, with the sovereign. Of the three hays of Kinver, only Iverley retained any integrity as a wooded area from the period after 1600, as its management remained in royal hands. By 1604, the game that lived there had disappeared, a development explained locally as due to the loss of woodland, which thus enabled the process of enclosure to begin. Yet, a Commission, noting assarts in Wombourne, Kinver and Kingswinford parishes in 1605, implied that considerable quantities of woodland remained capable of being assarted.[99]

A small, contemporaneous glimpse of the wider Kinver area landscape is afforded by a brief consideration of the aftermath of the Gunpowder Plot in November 1605. Some plotters

[98] C. M. Welch, 'Elizabethan Ironmaking', p.32, figure 1, 1554 survey.
[99] VCH *Staffs*, vol. II, p.348.

were tracked to Holbeche Hall (in Kingswinford) and on their discovery they sought refuge in the surrounding woodland, suggesting that the area contained thick enough tree cover for practical concealment from pursuers. Indeed, some woodland must have remained, as it was sufficient to enable a sale of 1,560 trees in 1609. In 1614 the Crown continued to claim the manor of Tettenhall as part of the Forest of Kinver, the detached part of Iverley Hay.[100]

When Dud Dudley took over the management of his father's ironworks in Pensnett Chase in 1622, he noted that wood was scarce in the neighbourhood, hence his early attempted use of 'pit-coal' to smelt iron.[101] Again, this implies that in the centre of the Smestow basin most wood had gone, replaced by heathland or fields, with woodland only surviving in the 'core' area of Kinver.

Edward Sutton's financial difficulties colour much of the evidence of the earlier 17th century landscape changes in the southern part of the Smestow. The disposal of land and mineral rights to Thomas Parkes of Willingsworth, a near neighbour, reflect this impecuniosity.[102] The sale agreement referred to Ashwood and Chasepool Hays, indicating that they still existed as distinct entities as late as 1633.

Both James I and later Charles I continued to be interested in asserting what they saw as crown rights in Kinver Forest, presumably for financial value, until 1647. In Compton Hallows manor, in Kinver, Thomas Foley leased Compton Park in 1651, but under the terms of the lease Foley could cut down most of the timber, implying the area was still wooded; 80 deer

[100] VCH *Staffs,* vol. II, pp.347-8.
[101] H. S. Grazebrook, 'Junior Branches of the Family of Sutton, alias Dudley', *CHS*, vol. X, part II, 1889, p.28, quoting from Dudley's quasi-autobiography, *Metallum Martis*. See chapter 6.
[102] NRO C3240, Demise and Quitclaim dated 10 July 1633. This document marks the transfer of Swyneford Regis (Kingswinford) from Thomas Parkes to others. The Parkes family is discussed further in chapter 6, as is Edward Sutton.

had also been noted in the previous year.[103] By 1672 Compton Park had become Compton Park farm. Despite these changes, and perhaps in a tacit recognition of the quality of the soils, woodland remained, with Roughpark wood and Birch wood (adjacent to Enville parish) still surviving today.

Scattered additional parcels of woodland also survived, notably Checkhill wood, which was 140 acres in extent in the early part of the 19th century. This included a coppice called 'the Million' which continued in existence until 1946 when it was extensively augmented by Forestry commission planting to become the major landscape feature it is today. Evidence of systematic coppicing as a woodland management practice remains elusive except perhaps in later place-names attached to specific areas of trees especially on Cannock Chase, for example Furnace Coppice and new Coppice mentioned on map 4.7 below. Even less evidence is available from the study area (apart from the identification of The Million noted above as a coppice) and this remains an area where further research is required.

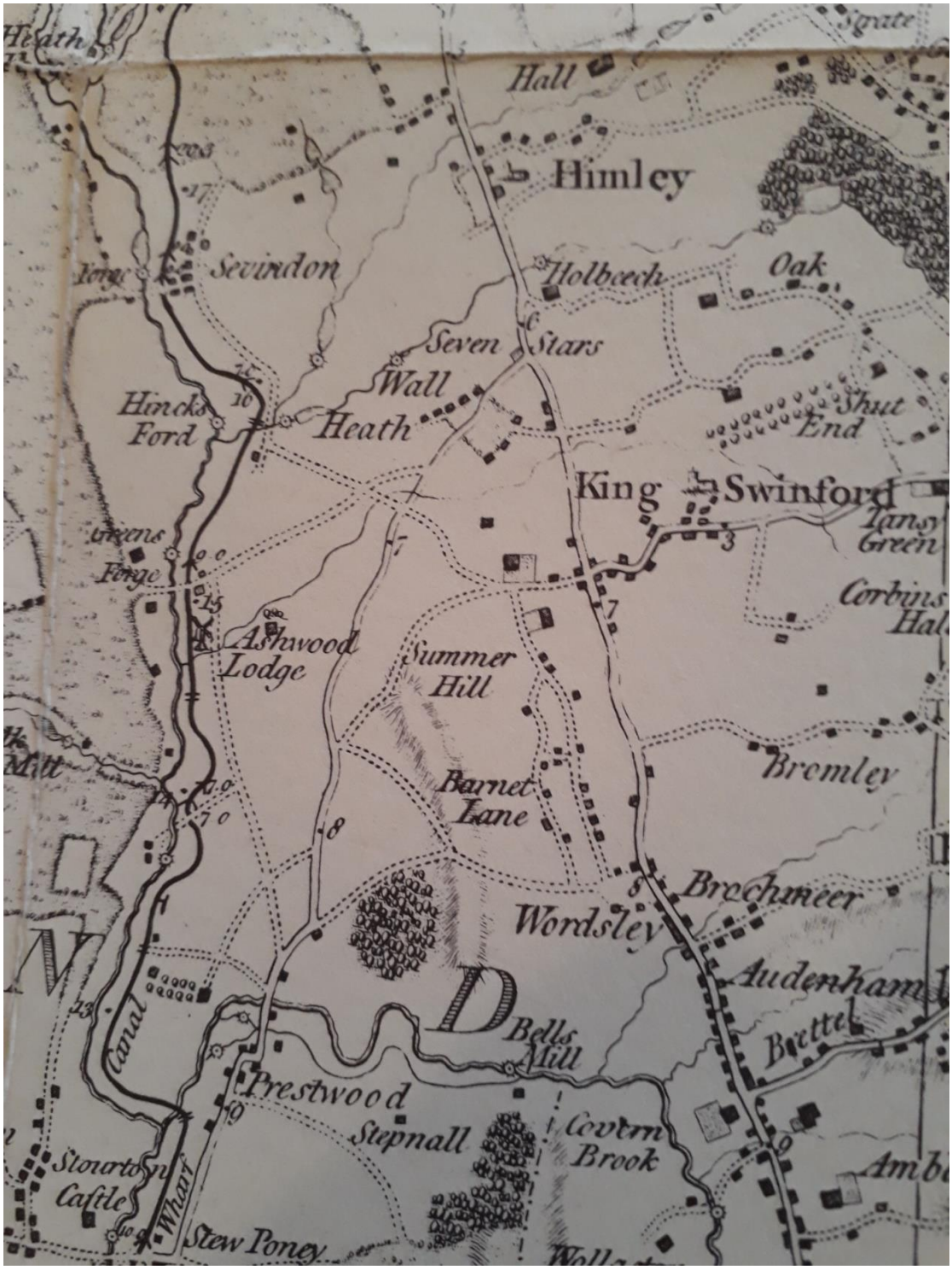
In reality, by the early 17th century, the use of the whole of the Iverley Hay area for hunting had almost ceased, although enough heath land (presumably wooded scrub) was left to encourage a formal enclosure agreement at the end of 18th century.[104] The Kinver Enclosure and Tithe Maps and Awards from 1774 and 1850 document these changes, revealing several references to earlier informal enclosure. With common land or heath land on the south and east in adjacent parishes it can be suggested that by the 18th century the wooded areas had substantially declined. The 1850 Tithe Map still shows wooded areas around Kinver Edge,

[103] VCH *Staffs*, vol. XX, p.141.
[104] Guttery, *Pensnett*, p.9. Peacock notes that "by the end of the 1670s most of its timber had been felled for the nearby forges", Peacock, *Seventeenth Century Foleys*, p.169.

but field names such as Heath Field, Common Field, New Inclosure, and Innage outline the process of land reclamation for arable or sheep pasture.[105]

Comparison with similar tithe maps from elsewhere in the Smestow valley shows that only relict areas of woodland were left. In Sedgley, for example, the main 'crest' of the ridge overlooking the valley at Gornal, known as Gornal Wood had all but completely vanished.[106] Trysull, in the centre of the basin, showed almost no woodland at all.[107] Ashwood Hay had a similar history. Reduced to heath land by the beginning of the 17th century, with no real woodland areas, the heath was enclosed mainly as three open fields in the 1680s, on long leases, and enclosed again by Parliamentary enclosure when the leases expired in the 1780s. The remainder of Ashwood was then part of Kingswinford parish.[108] Chasepool Hay's later development mirrors that of Ashwood. By 1600, the area was predominantly heath land, and Chasepool Lodge was the main building in it. This was later occupied by one Edward Green, who is the individual most likely to have given his name to nearby Greensforge (SB5) discussed in chapter 3. The area remained owned by the Dudley estate until sold in 1947.[109]

[105] For Kinver's 1774 enclosure see SRO Q/RDc/36 Kinver Enclosure Act, 1779; SRO Q/RDc/59 Kinver Enclosure Award, 1804; SRO B/A/15/182, Kinver Tithe map, 1850; SRO B/A/15/553, Kinver Tithe Award, 1850.
[106] Sedgley Tithe Award, SRO B/A/15/651 (1845); SRO B/A/15/271 Sedgley Tithe Map, 1850. Gornal Wood is a 'squatter' settlement on irregularly-shaped pieces of land illustrating piecemeal earlier enclosure on the woodland edge by cottages and buildings.
[107] SRO D548/A/PD/2 (Trysull 1778 Enclosure Map) and D548/A/PD/1, Trysull Enclosure award. 1778.
[108] SRO B/A/15/178 - Kingswinford Tithe map, 1839.
[109] SRO Q/RDc/53 – Wombourne Enclosure Act, Swindon township, 1796.



Map 4.5. Extract from the southwest part of Yates' map showing residual woodland at Himley (associated with the parkland of the Lords of Dudley) and by the River Stour at the map foot. Prestwood, Greensforge and Ashwood Lodge are visible, marking the area of the former Ashwood Hay. The heathland to the north of Swindon marks the former Chasepool Hay. The extract's scale is 2" to the mile.

Figure 4.2. The view north from Kinver Edge across Kinver village illustrating the nature of the present woodland coverage in Kinver and Enville.

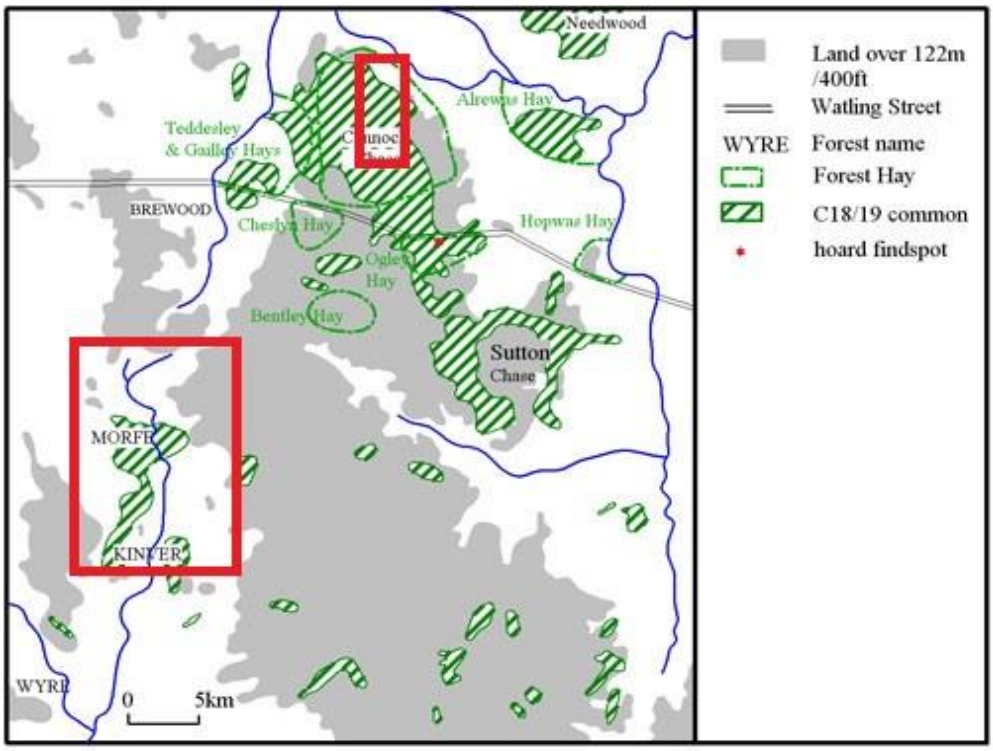
Figure 4.3. The view north east from Wombourne illustrating the present woodland coverage and the western edge of the Birmingham plateau.

Cannock has had a similar post-1800 history to Kinver, albeit developing more slowly. Yates' map of 1776 depicted a predominately heathy area with some remaining woodland including the significantly-named Furnace Coppice. Iron-founding was still operational in Rising brook after 1800, and consequently a regular supply of wood was necessary.

Map 4.6. Extract from Yates' map showing the Rising brook and Rugeley (then spelled Rudgley). The extract's scale is 2" to the mile. Note the forge in the centre of the map (RB3) with associated coppice and mill pool as well as small parcels of remaining woodland including Furnace Coppice at the southwest corner of the extract. Rugeley Forge (RB11) is also shown. The settlement of Stone House is now known as Slitting Mill – the mill itself is marked and located east of the settlement (RB7).

By 1834, at the time of the first Ordnance Survey map, the Chase was showing only residual woodland, mostly concentrated on the Paget family's house and park at Beaudesert, with small patches of woodland elsewhere.

Map 4.7. Extract from 1834 Ordnance Survey Map (1" to the mile) showing a similar area to Map 4.6 southwest of Rugeley, with modern spelling. Stonehouse is still named as such, and the adjacent mill is now identified as a Rolling Mill (RB7). Remaining woodland is concentrated in Beaudesert Old Park, and although several named coppices are identified, Furnace Coppice is now no longer described as such. The area is so bare of trees in part that some individual trees are named.



Map 4.8. Common lands and hays in the wider Cannock and Kinver areas, 18th-19th centuries. Study and comparison areas are outlined in red.[110]

The picture in terms of tree cover remained broadly static through to the post-World War I period and the creation of the Forestry Commission in 1919, which, in 1920, acquired rights to Cannock Chase, and began planting trees on the western edge of the Chase. The main period of Forestry Commission planting was 1921-29, when over 6,700 acres began the process of re-afforestation to produce the basis of the landscape of the AONB visible today.[111]

[110] https://finds.org.uk/staffshoardsymposium/papers/dellahooke. The hoard findspot is noted on this map as it is taken from a symposium addressing the wider issues of the material found in the Staffordshire hoard.

[111] H. Goode (ed) *The Natural History of Cannock Chase,* Stoke-on-Trent, 1973, pp.23-5.

4.6. The use of Kinver, Cannock and other woodlands for charcoal production.

The use of woodland to make charcoal with the British Isles is not a new phenomenon and has been practiced for at least 2,000 years as the archaeological record indicates.[112] It gave rise to the occupational surname Collier, meaning charcoal burner, long before the term came to mean coal miner.[113] The demand for wood from trees for charcoal production, often seasonal, required effective woodland management, known as coppicing. It was a well-established practice with clear 'rules' associated with woodland harvesting on 7, 10- or 20-year cycles depending on the uses to which the wood was put.[114] Map 4.8 shows Furnace Coppice in the Rising brook, believed to be created specifically as a coppice for use as a source of wood for charcoal. Similar woodlands, also described as coppices, can be found in the Smestow.[115]

These management practices took time to learn. With the temporary eclipse of the Paget family as a result of the Throckmorton Plot in 1583, possession through a lease of the furnaces in the Rising brook valley passed to Sir Fulke Greville, an Elizabethan courtier. He set about maximising his unexpectedly-acquired assets by ordering his agents to step-up iron production using the woodland resources from the Chase to the full. The effect, according to contemporary commentators, was, almost immediately, to completely remove the tree cover across large areas of the Chase. The reduction, which must have had a considerable impact locally, lived long in the collective memory.[116]

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[112] Hayman, *Ironmaking*, pp.131-2, which described the difficulties of finding evidence of charcoal burning sites in former industrial areas or newly-wooded areas.

[113] P.H. Reaney and R.M. Wilson, *A Dictionary of English Surnames,* Oxford, 3rd ed., 1995, p.105.

[114] B. Short, 'Forests and Wood-Pasture in Lowland England' pp.124-5, in Thirsk, *The English Rural Landscape*.

[115] For example, Gornal Coppice, clearly visible in SRO B/A/15/271, and Barrow Hill Coppice in Pensnett Chase in Kingswinford.

[116] Welch, 'Elizabethan Ironmaking', p. 38, gives an indication as to how this view of Greville's actions might have inadvertently begun. F. W. Hackwood, *Chronicles of Cannock Chase*, Lichfield, 1903, pp.77-

As noted in chapter 1, detailed evidence of the early development of the iron 'industry', and therefore charcoal usage in the Smestow is lacking. There is some later medieval indication of such usage, for example a 'new' smithy at Himley (suggesting the existence of an 'old' smithy) was recorded in 1585 with another in the area nine years later.[117] In 1586 in Sedgley, at Gornal Wood, a smithy was leased by Lord Dudley to one Richard Hamnett, and in 1610 the death of a 'finer' is noted at Ettingshall, a Sedgley township.[118] Slightly earlier, there is evidence of the conversion of a corn mill in Wombourne to a hammer mill.[119] By 1620 at least three furnaces were in existence in the Smestow basin using, no doubt locally-derived, charcoal for fuel.[120]

By 1620, the Foley family, in the person of Richard Foley (1580-1657), had begun to acquire iron-making sites. The Foley family almost immediately demonstrated a very different approach to Fulke Greville and other ironmasters toward woodland. The surviving correspondence of Richard Foley and other family members is full of ever-more extensive agreements for the provision of wood or woodland for fuel for furnaces. The widespread distribution of the furnaces at any one time owned by the family, from Cheshire through

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8, noted that Grenville 'had devastated the woods of the Chase'. He adds that when Grenville took over the lease there were 3,123 acres of woodland, with less than a quarter of that left by 1595. This is supported by a witness statement in an inquisition held in 1610 as to the state of the woodland, TNA E178/4553 STAFFORDSHIRE: Cannock Chase. Inquisition as to the iron works and spoil of the woods. 8 James I.

[117] DALHC DE/4/7/6/5 Lease, 1585. The lease refers to the 'new smithys' of Himley, along with woods and ironstone from Ashwood and Chasebell (correctly Chasepool) Chases in Himley and Sedgley. The rent was 10s for every dozen of coal and ironstone.

[118] DAHLC DE/4/7/4/15, a counterpart lease of 6 April 1586 to Richard Hamnett, a servant of Edward Sutton, Lord Dudley, from the same. A finer is an occupation associated with the refining of cast iron.

[119] Probably a reference to the development of Swindon Mill (SB3) in Wombourne. DAHLC DE/3/4/1/2 is a later copy of court roll for Wombourne dated 3 July 1427 including a memorandum of 14 October 1559 referring to the conversion of a fulling mill to a corn mill owned by Halesowen Abbey. This is the origin of the furnace at Swindon, which had become a finery forge by the 1620s.

[120] Dud Dudley (*Metallum Martis*) refers to the existence in 1619 of forges at Greensforge (SB4) Swindon (SB3) Heath Forge (SB2) and his own furnaces at Hasco Bridge (SB10) and Himley (SB8). Dudley also refers to Cradley Furnace on the River Stour, slightly outside the study area but pertinent here to illustrate the growth of the industry in the wider area.

both the Cannock Chase and wider Smestow areas (notably their sites in the Stour Valley) and south to Gloucestershire and Herefordshire, chiefly the Forest of Dean, meant that their concern over the supply of fuel was especially wide-ranging. For the period 1650 to 1680 over 100 separate letters, related correspondence and quasi-legal agreements exist concerning ensuring adequate supplies of wood. The papers enable an analysis of their searches, and a consideration of how woodland was managed by both owners and users over this period. Key material from the Foley family papers has been summarised on the following table:

Table 4.3. Foley family wood and woodland purchases, 1650-1709 affecting the study area.[121]

Date	Activity	Notes	HRAC reference
4 February 1650	Sales of wood from a coppice called The Moore, Kingswinford, Staffordshire.	In the Smestow valley.	E12/VI/KAc/114 – sale document
5 March 1655	Purchase of wood from Patshull, Staffordshire.	On edge of Smestow basin	E12/VI/KAc/21 – sale document
26 February 1656	Wood purchased; location unknown.		E12/VI/KAc/24 – sale document
9 July 1660	Sale of Wood from Pool Hayes, Wolverhampton.	On edge of Smestow basin.	E12/VI/KAc/46 – sale document
20 August 1660	Thomas Foley buys 60 tons of timber and 1,000 cords of wood for charcoaling purposes in Arley, Staffordshire and Hagley, Worcestershire.	Arley was nominally part of Kinver Forest.	E12/VI/KAc/41 – sale document
20 May 1662	Agreement between Thomas Foley and Humble Ward, Lord Ward for the sale of all wood fit for cordwood on the estates of Lord Ward including Dudley Castle Hill, The Roundabouts (part of Pensnett Chase owned by	This agreement demonstrates what appears to be a lack of interest on the part of the Ward family in the potential mineral wealth underneath their lands. This may an	E12/VI/KAc/44 – sale document

[121] The papers of the Foley family are held under reference E12 by Herefordshire Archives and Resource Centre (HARC). I am grateful to Rupert Foley for permission to examine these. The family is discussed in chapter 6.

	Lord Ward) Old Park near Dudley, Wrens Nest Hill and Himley Park (the new home of Lord Ward) for 21 years.	example of aristocratic distaste for 'industry'. This position did not continue within the Dudley estate past 1750 when financial pressures dictated a different approach.	
12 March 1665	Agreement with Sir Walter Wrottesley by Thomas Foley for the sale of wood from Perton and Trescott.	Both in the Smestow valley.	E12/VI/KAc/51 – sale document
25 February 1679	Agreement between Philip Foley of Prestwood House for the sale of woods from Sir William Wrottesley at Woodford Grange, Staffordshire for £48 4s 6d.	In the Smestow basin.	E12/VI/KC/76 – sale document

Against this pattern of purchases needs to be set the much more extensive related acquisitions from lands outside the study area but which replicate this pattern.

Table 4.4. Additional purchases of woodland, 1650-1709 by the Foley family outside the study area.

Date	**Activity**	**Notes**	**HRAC reference**
28 October 1650	Sales of wood near Little Aston Forge, Warwickshire.		E12/VI/KAc/8 – sale document
2 February 1653	Receipt for wood sales in Bordley, Worcestershire.		E12/VI/KAc/16 – form of receipt
25 February 1653	Receipt for purchase of wood from Edward Littleton of Pillaton, Staffordshire.	Location unspecified. Likely to be outside study area.	E12VI/KAc/14 – sale document
5 April 1654	Sale of wood from Sir Richard Leveson of Lilleshall, Shropshire.		E12/VI/KAc/18 – sale document
12 April 1654	Further sales from Sir Richard Leveson of wood from Lilleshall and Sherriff Hales, both in Shropshire.	See discussion below.	E12/VI/KAc/20 – sale document
26 February 1656	Wood purchased; location unknown.		E12/VI/KAc/24 – sale document

17 February 1657	Sales of wood from Ombersley, Worcestershire.		E12/VI/KAc/28 – sale document
14 September 1666	The sale of 12,000 cords of wood from woods in Herefordshire belonging to Viscount Scudamore.	A substantial commitment to meet this large amount.	E12/VI/DAc/4 – sale document
8 March 1667	Sales of wood from Haugh Wood, Fownhope, Herefordshire.		E12/VI/DAc/10 – sale document
26 March 1668	Philip Foley's agreement with William Leveson-Gower for 1,000 cords from his woods at Tearne, Shropshire.		E12/VI/KC/14 – sale document
1 April 1669	Further sale of wood to Thomas Foley.	Location not specified.	E12/VI/DAc/7 – sale document
25 August 1671	Sale of wood from the Dean of Gloucester – Grove wood and crops of trees in Ham Hill and Bushy, near Churchham, Gloucestershire.		E12/VI/DAc/12 – sale document
30 November 1672	Sale of 5,000 cords on estate of John Parry in Dulas Chirdock, Longtown and Rowden, Herefordshire.		E12/VI/DBc/11 – sale document
1 July 1673	Lease of woods in Lye Park, Wesbury, Gloucestershire (except bodies of trees of 30 years growth) with liberty to cut and coal wood.		E12/VI/DBc/10 – lease document
20 May 1675	Lease of woods at Ledbury and Colwall, Herefordshire.	Probably all on the Malvern Hills ridge.	E12/VI/DCc/31 – lease document
6 August 1682	Sale of woods from Royal Forests (unspecified) to make 8,000 short cords of 2' wood.	Equal to 4,000 standard cords. May have included material from Kinver.	E12/VI/DCc/7 – sale document
30 October 1683	Further sale of woods from Royal forests for 7,000 short cords.	As above.	E12/VI/DCc/8 – sale document
12 May 1685	Sales of woods from the Forest of Dean, Gloucestershire, through Thomas Agar, Surveyor-general of His Majesty's woods this side of the Trent.		E12/VI/DDc/5 – sale document

12 August 1685	Purchase of Coppice Wood in Longhope, Herefordshire.		E12/VI/DDc/8 – sale document
5 October 1685	Wood bought as cordwood from Thomas Agar.	See above	E12/VI/DDc/14 – sale document
30 March 1709	Sale of 200 Timber trees in Cowley Park for £650.		E12/VI/DEc/18 – sale document

As well as the above references, there are several undated items concerning sales of woods to members of the Foley family.[122] Some of these covered several years, such as the detailed list of sales by Andrew Yarranton from New Park Woods, Rock (Worcestershire) over the period 1672-9.[123] One item referred to sales by him to Thomas Foley over a projected 25-year period. There are also detailed accounts for extensive transactions covering some years with other landowners.[124]

Some of the arrangements outlined above show relationships through time between the Foley family, as purchasers of wood and several locally-based landed families, chief amongst whom is the Leveson, later Leveson-Gower, family. The Leveson family's original seat was at Lilleshall, Shropshire, on former monastic property, which had been heavily wooded. The Foley family first sought access to the woods at Lilleshall in the time of Sir Richard Leveson (1598-1661). An agreement between Sir Richard and Thomas Foley of 11 February 1641 allowed for the removal of the substantial amount of 1,000 cords of wood per year.[125] Such a

[122] For example, HRAC E12/VI/KAc/23 concerning further sales to Thomas Foley of wood from Bordsley Park. This is undated but from the handwriting (and location specified) may date from the 1650s. Thomas's son, Philip Foley, agreed the sale of 2,000 cords from Claverley, Stockton, Bobbington and Quatford at an unknown date, probably sometime in the 1690s; HRAC E12/VI/KC/15-18. Lord Mazarine (probably Sir John Clotworthy, 1st Viscount Massereene) sold 4,000 cords, outlined in HRAC E12/VI/KC/28.

[123] HRAC E12/VI/KC/33-45. Miscellaneous documents covering period 1672-9.

[124] HRAC E12/VI/KC/1 listing transactions with Sir William Wrottesley (see chapter 6) for cordwood over the period 1668-9; Similarly, HRAC E12/VI/KC/11-13 which covers the period 1669-70. There are further accounts for transactions with John Shaw for cordwood in HRAC E12/VI/KC/2-10.

[125] SRO D593/C/21/6. There is a related document which appears to be a release from the agreement, dated 1665 – SRO D593/C/14/4. A cord in this agreement is valued at 7s 4d. There is a mention of these transactions in the Foley papers, see HRAC E12/VI/KAc/97, which is an account of transactions

document, which is open-ended in terms of the length of the arrangement, appears to have created a commitment on the part of Sir Richard to ensure his woodland was appropriately managed to enable the delivery of this amount of wood on an annual basis – in short, a constantly-renewable coppicing (or pollarding) approach to woodland management. There was also an assumption that Thomas Foley (or his successors) would continue to both need and buy wood in such quantities. Bowen notes, without identifying a source, that 'wood was carried no more than 10 miles overland', although these agreements indicate a substantially greater distance of some 30 miles if moved to the centre of the Foley family operations in Staffordshire.[126] Bowen's comment, along with the material presented above, suggests that wood (and charcoal) could be moved to iron-making sites, rather than creating new furnaces and forges in areas where wood and charcoal was plentiful. Additionally, the comment implies both the existence of a workforce willing to undertake this carrying activity and tracks to enable them to move carts to and from woods and blast furnaces.

There is a further related agreement, dated 1 December 1674, between Sir Richard's later successor, Sir William Leveson-Gower (1647-91) and Thomas Foley's third son, Philip Foley (1648-1718).[127] This agreement enabled the taking of cords of wood from Lilleshall and other Leveson properties in Sherriff Hales and Donnington, Shropshire, for the Foley family furnaces at Lilleshall and Wombridge (also in Shropshire, under 10 miles away). The agreement specifically excluded sales of holly and hawthorn as these were food and shelter for deer, suggesting that the Leveson woodland was still subject to conflicting uses – a cash resource as well as a social ornament in the life of the owner.

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with Sir Richard Leveson over the 14-year period 1647-61. The Leveson estate at Lilleshall is discussed in J.P. Bowen, 'From Medieval Deer Park to an enclosed Agricultural and Developing Industrial Landscape: The post-medieval evolution of Lilleshall Park, Shropshire', *Midland History*, vol. 38, part 2, 2013, pp.194-212.

[126] Bowen, 'From Medieval Deer Park', p.209.

[127] SRO D593/C/21/6/6. Agreement concerning sale of wood, 1674

The Foley family were probably well aware of the importance of coppicing. An otherwise unknown William Painter wrote an extensive letter to Thomas Foley giving him three and a half pages of advice on woodland management, when to cut poles – "poles should be stripped and left standing – cut in winter" and the management of coppices for the effective production of charcoal.[128] Although this advice in this letter appears to specifically relate to woods around Stoke Edith in Herefordshire, a property bought by Thomas Foley in 1670 and still held by the Foley family, it may have had a more general application to all woodlands owned or leased by the family, although cannot be directly used to suggest that coppicing was practised in such sites in this way.

4.7. Discussion and conclusions.

To summarise this discussion of the development of the wooded landscape of the study area, place names, the two 10th century charters and the Domesday survey provide some evidence to show that the Smestow was well-wooded, especially in its southern part. The woodland cover became the nucleus of the later Royal Forest of Kinver and probably Pensnett Chase. This is the position reflected in the Domesday Book entries which seem to catch Kinver Forest at its moment of creation. It is probable that assarting, to use a later term, may well have been a feature of much of the 10th-11th centuries.

Early medieval woodland usage had a primary purpose in providing timber and wood for building, tool-making, and fuel. After the Norman Conquest, hunting may have been the primary use. Agricultural use, although is not clearly identified, but by analogy with other areas and two place names referring to pigs, it is possible to suggest that wood pasture and

[128] HRAC E12/VI/C/10, letter dated 14 January 1707. Stoke Edith woodland is managed in this fashion today – R. Foley, *pers.comm*.

transhumance were practiced. Consequently, it can be further suggested that the Smestow basin can be seen a 'wold' area with agricultural practises consistent with this designation.

The Royal forests in both the study and comparison area, as wooded landscapes survived to the late 17th century. Although Royal ownership and the hierarchy of officials created to represent the interests of the King did to some extent make both Forests 'special', this is only in as much as different laws and a cadre of officials to implement them, applied. Neither these laws nor their upholders stopped or even inhibited the local, small-scale, process of woodland clearance that had clearly begun in the pre-Norman period and was a feature of much of the rest of England as well. The steady loss of woodland in the 'private' Pensnett Chase emphasises this pattern. In this way the royal forests were not particularly different to other wooded areas in the landscape, and their subsequent history was not significantly different either.

By the mid-16th century both Forests were in effect confined to their core areas. Cannock Chase, by then owned by Lord Paget in its entirety, represented the former Cannock Forest. Iverley Hay had the equivalent position in Kinver Forest. At this point the landscape development of the study areas diverged in that a larger-scale iron industry had begun to develop in Cannock Chase from at least 1560 and was quickly extended to utilise resources from elsewhere in the county. The process in the Smestow basin got off to a slower, less intense start perhaps some 30 years later. Nevertheless, the output of bar iron from the study area was quickly taken up as the 'feeder' industrial base for several craft or domestic activities undertaken locally and in adjacent settlements. These activities included the domestic manufacture of nails in 'shops' or outhouses, as well as manufacture of a variety of iron implements.

Woodland was also a social amenity, which may have helped its later 18th century and 'post-industrial' retention in the landscape. It enabled aristocratic display of wealth through deer hunting - not just a medieval phenomenon, as hunting lasted through to modern times. The addition of woodland as a scenic backdrop for parks, where Shugborough Park, home to the Earls of Lichfield, is an example. The deer-hunting activities of the Lords of Dudley in Pensnett (and later Himley Hall and Park) and Baggeridge have already been noted. The creation by the Earls of Stamford of a park at Enville on the western side of the study area in the 19th century also exemplifies this 'display' feature.[129]

Therefore, the landscape was a function not just of its natural resources in terms of wood, reflecting the quality of the local soils, derived from the local geology, and water, but also external factors such as careful, future-focused, woodland management, as well as mercantilism, both in individuals and their working relationships and business arrangements.

The potentially substantial demand for wood in the form of charcoal from the 16th century onward for iron production was often pointed to by contemporary commentators as being responsible for the widespread destruction of woodlands from that point. The reduction of the amount of woodland gave rise to the suggestion that the development of the iron industry had resulted in the destruction of woodlands in England, as the industry was seen as the most obvious and dramatic change to the 'traditional' uses and extent of the woodlands in the study areas.[130]

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[129] The concept of *'homo ludens'*, the play (or play and display) element in human culture, which this aspect of the discussion typifies, was developed in J. Huizinga, *Homo Ludens: A Study of the Play-Element in Culture*, London, 1949. Lord Paget's decision to create a blast furnace in his woods marks what may well be the first move away from '*homo ludens'* into a more economic understanding of the worth of such a landscape to its owner – '*homo economicus'*.

[130] Dudley, *Metallum Martis*, pp.12-3 notes this. Although somewhat self-serving, Dud Dudley does suggest that his aim in seeking to learn and then commercially exploit the knowledge of smelting iron ore without charcoal but with mineral coal was to preserve trees for ship-making uses: "for the making of Iron into cast-works, and bars, but also for the Melting, Extracting, Refining and Reducing of

Contrary to the 'woodland destruction' argument outlined above, Hammersley noted that a large blast furnace 'could work for ever' by using the charcoal derived from 7,000 acres of coppiced woodland.[131] On this basis, as Hammersley argues, the charcoal-based iron industry, whilst locally a problem in terms of managing woodland reserves, could be a more significant problem if demand was initially high and woods were *not* managed. However, this may not be the case when looked at in terms of woodland management over a wider area, even with competition for woodland (and charcoal) resources from other industries such as glass-making, ship-building, house- or equipment-building. In the southern part of the Smestow, glass-making was the principal 'competitor'.

The calculation by Hammersley can be contrasted with those who argued that the iron-makers were responsible for the despoliation of England's woodland.[132] The economic value of woodland was well-understood by landowners at the time. Watkins suggested that the greatest value of aristocratically-owned wooded parkland lay in its woodland, as each acre of woodland could provide two tons of underwood (provided this was managed and underwood felled every two years) assuming that the woods in the parkland were part of a well-established woodland system of coppicing.[133]

As Appendix A describes, blast furnaces quickly developed air-based systems using bellows, thus enabling greater heat to be applied to the process of smelting, and the motive power

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all Mines, Minerals and Mettals, with Pit-cole, Sea-cole, Peat, and Turf, for the Preservation of Wood and Timber of this Island;"

[131] G. Hammersley, 'The Charcoal Industry and its Fuel, 1540-1750', *Economic History Review*, vol. 26, part 4, 1973, p.606 ('large' is not precisely defined). See also Crossley, 'English Woodlands', pp.105-12. Hammersley noted that a smaller furnace (producing less than 200 tons of iron a year) would require 2,000 acres.

[132] Summarised in Schubert, *History*, pp.218-22. See also J. Evelyn, *Sylva*, London, 1664, pp.71, 93, outlining how coppicing should work.

[133] A. Watkins, 'The woodland economy of the Forest of Arden in the later middle ages', *Midland History,* vol. 18, 1993, p.23.

for driving the bellows was water delivered through the cogs and gearing associated with a water mill, typically using an overshot water wheel. From the time water wheels were in use, the iron-making sites had to have a fixed location, so the ironstone and charcoal had to be transported to it. As local woodland resources became exhausted, these materials had to be transported ever-greater distances as more remote resources were tapped. In effect, this became a problem doubled when it is remembered that the indirect process of iron manufacture required both a blast furnace and, for the second part of the process, a forge. The forge also used water-derived power for its own bellows as well as charcoal for heat.

Although local uses of woods for domestic purposes continued, it is apparent by the end of the 17th century, that across England as a whole, demands for timber for ships, combined with need for wood for charcoal, had begun to seriously deplete the timber resources available. It can also be argued that the rise of the blast furnace method and consequent ready availability of iron goods to a variety of different markets began to change both personal and collective or societal relationships with woodland. Contemporary commentators lamented the loss of woodland to the ironmasters through the heavy coppicing of existing 'stands' of managed trees to create sticks of wood to be seasoned as charcoal.[134] Between 1540 and 1640 timber prices rose 700% - the comparable figure for foodstuffs was less than half at 300%.[135]

Tables 4.3 and 4.4 indicate that this contemporary perception of wholesale, widespread, woodland destruction may not have been completely accurate. As outlined in the discussion above, the changes in this period to each woodland, or group of woods, need to be looked at as a unit, and local explanations for change sought.[136] This 'local' approach, a key conclusion

[134] James, *A History*, p.163.
[135] Morton and Wanklyn, 'Dud Dudley, a new appraisal', p.49.
[136] G. Hammersley, 'The Charcoal Industry', pp.593-5, and Welch, 'Elizabethan Ironmaking' , pp.17-74.

from the analysis in this part of this thesis, is especially valuable when the activities of the Foley family are considered.

As iron goods and domestically-produced bricks became cheaper to produce, and therefore commonplace, individual, and social relationships with woodland altered again. From the late 18th century, wood remained valuable as a source of primarily domestic fuel, but with the ready availability of coal for fuel, domestic and industrial, the primary usage of woodlands became confined to ship-building, tool-making and some domestic architecture. Woods were no longer vied over in the same way by several competing groups. Therefore, woodland management deteriorated across much of the country, and timber for specific purposes (notably ship-building and domestic architecture) began to be imported in quantity. The relative cheapness and fecundity of these sources, as well as the quality when compared to the domestic product, may also be relevant.

In summary, it has been proposed in other studies that iron smelting caused a substantial reduction in tree cover in the British Isles with iron-makers desperately seeking supplies from ever further afield. It has also been argued that this is not the case, with supplies being carefully managed to ensure a regular and steady supply. A third argument has been suggested here, indicating that there is no over-arching general theme applicable to all iron-making sites, and that the impact of each furnace needs to be considered on an individual (or group) basis. What does seem evident from a study of the information available for the Smestow iron-making sites is that a 'local' explanation is apt, and the material from the Foley family papers tends to support this analysis. A novel conclusion from this thesis is that iron-making and local wooded landscapes co-existed in a form of mutual dynamic equilibrium that survived for a period in excess of 150 years from around 1590 through to the widespread adoption of coal for smelting and the consequent movement of the iron

industry to new sites from the 1760s onward. After this date, this pattern of mutual inter-dependence ceased to be relevant.[137]

An overarching conclusion that can be drawn is that woodland management, and effective ongoing woodland management, became a key issue for those landowners with wood to sell to the iron industry. It was also of vital interest to the iron-makers as without effective management, that is the practice of pollarding or coppicing, they themselves could not have survived economically for any extended period. The other industries and domestic practices then dependent on timber such as ship-building, house-building, tool-making and so on also required the same material, as they were in competition with each other for what only became a scarce (or scarcer) resource as a result of the growing demands of the iron-makers. These factors came together to create what seemed to be a constant search for unexploited but manageable woodland combined with a willingness on the part of the iron-makers to transport wood more than 10 miles to their iron manufacturing sites.

Having said this, it has been demonstrated here, apart from Sir Fulke Grenville in the central part of Cannock Chase, that landowners (and iron-makers) did not set out to destroy woods by clear-felling to produce charcoal. It became quite quickly apparent to them that clear-felling was a form of economic suicide for the iron industry. Therefore, every landowner had to, of necessity, practice a form of coppicing, and iron-makers knew this too, as indicated by the letter on coppicing from William Painter to Thomas Foley cited above. It was the demand for yet more iron, especially in the form of bar iron from the market end-users, that drove ironmasters to look for ever-more-distant sources of wood to keep their blast

[137] For the 'localised' argument, see J. Hacher, *The History of the British Coal Industry Volume 1 before 1700,* Oxford, 1993, p.32. This argument is also made, albeit not in the manner stated here, by Welch, 'Elizabethan ironmaking', pp.61-4, with reference to the Paget family stewardship of Cannock Chase and their gradual realisation of the need to preserve resources rather than sustain profits, too late to protect the woodlands of the Chase.

furnaces 'in blast', hence the exploitation by the Foley family in particular of woodland further away from their 'core' sites and nearer the extremities of the Kingdom.

Comparison with the Wealden iron manufacturers shows a similar pattern of events. The forest cover of the Weald in Kent and Sussex was not destroyed in the 16th and 17th centuries despite the continuous use over many centuries of woodland for charcoal-based blast furnace casting of iron, mostly for ordnance.[138] Even in smaller woodland areas such as that in the Shropshire industrial district centred on Coalbrookdale, the woods of the Lilleshall estate and surrounding areas continued to exist.[139]

The thesis of woodland destruction does not therefore seem to be valid for either of the study areas – it is 'localism' that offers a more satisfactory explanation, and once coke began to be used as the heat source in blast furnaces, the ownership of distant woods ceased to be an issue for iron manufacturers.

From the discussions above, several further hypotheses can be drawn. The first relates to the relationship between the presence of woodland and the location and subsequent development of the iron industry. Much of the land that was under woodland cover in the 16th and 17th centuries can be considered as marginal – not just economically, but also geographically, as well as for agricultural use and settlement opportunity. In the case of Cannock Chase, it is the fortunate co-location of water power with locally-available sources of iron stone, combined with Lord Paget's wish to derive profit from what could be argued were otherwise economically almost worthless quantities of wooded land, that facilitated

[138] E. Straker, *Wealden Iron*, London, 1931, pp.123-6; Hodgkinson, *The Wealden Iron Industry*, p.20, which notes constant coppiced management of woodlands to provide charcoal into the 18th century.
[139] Bowen, 'From Medieval Deerpark', pp.200-212.

the development of the iron 'industry' in the Rising brook.[140] Cannock woods were perceived by Elizabethan commentators as of little value. A report by one John Tavernor noted that Cannock woods 'standeth so far from the sea' and 'is of no value for shipbuilding'. Consequentially, the Chase was of little use 'unless it be converted to ironworks'.[141]

The Smestow had a different history. The presence of woodland, whilst helpful in being an initial source of wood for charcoal, seems almost incidental to the later development of the iron-making industry. By the time the industry was established the woodland resources of the area had been considerably diminished. Although there was evidence of earlier iron-smelting using local supplies from Sedgley, it is argued here that it was the example of Lord Paget and his successors working elsewhere in Staffordshire, as well as the conversion of nearby corn mills in the valley of the river Tame, just to the north of the Smestow, that appears to have provided the initiative for the conversion of existing water mills into iron furnaces and forges, as evidenced by Trescott Grange (SB1) and Swindon (SB3), former corn mills. Only once these sites had been acquired by Richard Foley from earlier, less successful owners (discussed in chapter 6) did the industry in the Smestow area experience a period of growth. As this expansion got underway, the Foley family also acquired interests in furnaces and forges outside the study area. They showed their growing need for wood to make charcoal to feed the furnaces and forges by seeking wood supplies from wherever they could be had, as tables 4.3 and 4.4 demonstrate.

Only a small proportion of the Foley family documentation shows woodland within the Smestow being utilised in this way by the Foley family, perhaps because, as has been

[140] Welch, 'Elizabethan Ironmaking', pp.29-31, for a discussion. Lord Paget had other ironworks outside the Rising brook area, at Teddesley Hay to the west of Cannock Chase and at Abbots Bromley in the north of Staffordshire. These may have been managed in conjunction with those in the Rising brook.

[141] Quoted in Hackwood, *Chronicles of Cannock Chase*, p.146. The concept of 'managed resource' is entirely absent from these comments.

considered, there was by this time, relatively little left or accessible to them. They also may not have been prepared to pay enough, and lost access to woodland to their competitors or those who wanted the woodland for other purposes. For the Smestow, access to water-power (therefore 'free' power), was the dominant factor in the initial creation and continuing survival as profitable enterprises of the iron-production sites. The happy initial co-location of woodland and iron reserves lasted only a short while as the iron reserves quickly became exhausted and wood, as charcoal, and iron, either in the form of ore or bar/pig iron, was shipped in from elsewhere.

The second hypothesis concerns the impact of the industry on the landscape. From the earlier discussion it is evident that enough woodland remained into the later 16th century in the Smestow basin to enable the iron industry to be established. This woodland, at least in part, had to remain and be managed to provide a continuous source of charcoal. In this way, the industry acted to preserve (or at least conserve) woodland rather than destroy it.

The third hypothesis is that, perhaps fortuitously, as demand for iron and iron products rose, it was a relatively straightforward activity to ramp-up production by greater use of the other available resources. In this case, rainfall, combining with gravity to produce streams with considerable potential energy over their length, enabled the creation of additional water-powered mills using existing technology to respond to these economic demands. Then, new technology in the form of the slitting mill, which also used charcoal and water, could be co-located with forges and fineries, or at least nearby, giving an early form of industrial integration. Again, woodland, and in particular managed woodland through the effective use of the coppicing system, was an essential part of the processes outlined here – woodland was required for the charcoal which was the initial source of heat used in all these processes until it was overtaken by coal or coke.

A fourth hypothesis is that in the Smestow that while woodland resources did not run out or become exhausted – woodland was managed – there just was not enough of it locally to produce enough iron to meet rising demand for iron products. The growth of the industry was curtailed by its restricted power supply (water) and by competing uses for woodland. In perhaps the same happenstance fashion that the internal combustion engine and the motor car arrived to stop late 19th century streets being inundated by horse dung, the successful outcome of earlier experiments with coke-smelting happened at the right time to minimise the dependence of the iron industry on charcoal. Equally fortuitously, this development minimised the dependence of iron goods producers on small watermills driving small furnaces and forges only able to produce relatively small quantities of iron. Once coke-based smelting became widespread by 1780, there were, very soon, no charcoal-based blast furnaces left in Staffordshire. Technological change had opened-up, conserved, and then shut down the industry in the study area, leaving today's relict sites.

CHAPTER 5: TRANSPORT ROUTES AND SYSTEMS - THEIR EFFECT ON LANDSCAPE DEVELOPMENT.

5.1. Introduction.

This chapter investigates how existing communications routes through the study area affected the development of the iron industry in the 16th-18th centuries by a consideration of 'natural' routes along rivers, then man-made roads and tracks, then canals and finally railways. This investigation will focus on the use these methods of transportation made of the study area's natural routeways and whether new communications routes were influenced by the location of iron-making activities. Specifically looking at rivers, the impact of routes from the study area to the River Severn will also be considered, as it will be argued that the presence of this river, albeit some 10 miles away at its closest to the study area, had a considerable effect on the development of routeways and the landscape as well as the iron-making activities in the valley as it was the most effective method for the bulk transfer of heavy materials such as iron. Routeway developments in Staffordshire have been sparsely considered to date. Apart from overviews in the Victoria County History, coverage has been limited to partial discussions of the development of the turnpike road system in the county, general descriptions of railways and notes on the creation of the canal network.[1]

Travel by water began on rivers and later seas, within sight of shore first before more testing journeys were attempted. The invention and then regular usage of canals, perhaps initially in China, is at least 2,000 years old. Discussion on the development of canals (and rivers as navigable routeways) in England has largely followed the pioneering works of Hadfield and

[1] VCH *Staffs*, vol. II; S.A.H. Burne, 'Roads'; M. J. Wise 'Canals'; and P.L. Clark, 'Railways', pp.275-334. Locally focused monographs exist; R. Francis, *A Transport History of Cannock Chase*, Cannock, 1975; R.A. Lewis, *Staffordshire Roads 1700-1840*, Stafford, 1968. A full list of pre-Ordnance Survey maps of Staffordshire is available in G. L. King, *The Printed Maps of Staffordshire, 1577-1850*, Stafford, 1982 and is used in the discussion on roads below.

Rolt, and both the S&W and T&M canals have had specialist histories prepared.[2] The development of rivers as trading routes has been noted by, again, Hadfield and Hindle, as well as Willan and later Hayman, both of the latter with reference to the River Severn.[3]

The last of the methods of transport to be considered here, that of the railway, although originating as tramways or plateways in the 18th century in various parts of Britain, came into national and later global prominence from the 1830s. It is not proposed to review railway history here in any detail except to consider the specific impact of railways on the overall landscape development of the study area.

All four of these transport methods and the routes they utilised (or created) had the potential to have a profound effect on the landscape through which they ran. The impact of these four types on landscape development and how these methods inter-acted with the charcoal-using iron industry in terms of supporting or sustaining the development of the industry over time is considered. The interactions are particularly marked when investigating how iron ore and charcoal were moved to the principal iron-making sites and how iron was moved out of the area to end-stage manufacturers using any of the four transport methods listed above.

Two geographical/topographical points are germane to this discussion. First, the downstream orientation of the Smestow basin is, roughly, north-south. A glacial ice-dammed lake spillway created a col at its northern end, enabling an easy route northward out of the valley of the Smestow and down into the valley of the River Penk, River Trent and

[2] C. Hadfield, *British Canals; An Illustrated History*, Newton Abbot, 4th ed., 1969; L.T.C. Rolt*, Navigable Waterways*, London, 1969; Langford, *The S&W Canal*; J. Lindsay, *Trent and Mersey Canal*, Newton Abbot, 1979; R. Shill, *The Trent and Mersey Canal: A History*, Marlborough, 2021.
[3] C. Hadfield, *Canals of the West Midlands*, Newton Abbot, 1966; J.F. Edwards and B. P. Hindle, 'The transportation system of medieval England and Wales,' *Journal of Historical Geography*, vol. 17(2), 1991, pp.123-34, Hayman, *Severn*.

ultimately east coast ports such as Hull – see chapter 2. The effect of the Smestow/Penk north-south through-route on the local topography and the development of the transport pattern thus needs to be considered, and this 'deterministic' point is examined below. The same principle does not apply to the comparison area, the Rising brook valley, even though it too offers a glacially-manufactured 'through route' across the upland occupied by Cannock forest, as the valley routeway only ever appears to have been of minor, local importance.

Second, Staffordshire is an inland county in the middle of England. Although obvious, it is important to highlight, as, in common with other midland counties, and for almost all its history, Staffordshire was not a destination for routes or travellers in its own right. As far as major routes were concerned, the county was somewhere on the way from somewhere to somewhere else. For Staffordshire, the principal route was London to Chester, as Chester was the 'starting point' for travellers to north Wales, Ireland, the northwest of England, or Scotland, by land or sea until the latter part of the 18th century. Today, the Staffordshire section of the 'Chester Road' is marked by the course of the A51 road. Once Chester was replaced as a port of embarkation by Holyhead, the preferred cross-county route shifted south, represented today by the line of the A41 road which crosses the northernmost part of the Smestow valley at Tettenhall. Later still, the 'A41' route was superseded by the re-used line of the Roman Watling Street, the modern-day A5. The characteristic through-route nature of Staffordshire remains the case when the modern-day motorway, major road network, and the railway equivalent, are considered. Consequently, most roads developed in the study area were purely local roads, serving a local purpose, with limited connectivity.

5.2. Rivers.

Rivers were the veins of the body politic.[4]

Rivers have always been used by humans as natural routeways. Such usage has been through travellers or traders either using the river itself to sail or paddle along, or the valley area to walk through, or the interfluve or watershed to walk along. Crossing points have been marked by votive offerings in the past. The correlation between watersheds and routeways, especially for smaller rivers has been a feature of recent landscape analyses in the UK.[5] Rivers have therefore had a multiple use in the landscape, as a boundary, routeway, trade link and as a natural resource for agriculture. The study area, the Smestow basin, along with its outlet, the Stour basin, is a small part of the much larger drainage basin of the River Severn and, it is argued, the development of the landscape in the study area has been directly affected by this relationship. Comparison will also be made with the similar relationship between the Rising brook and the River Trent.

5.2.1. The River Severn.

'the busiest in Europe'[6]

The Severn is the longest river in Britain at 220 miles in length, traditionally divided into upper, middle, and lower sections. From at least Roman times it has been used as a major trade route, sometimes with a focus on Bristol as the entrepôt, sometimes Gloucester.[7] It has been described as a 'free river' meaning that there never have been any tolls on traffic

[4] Hadfield, *British Canals*, p.15.
[5] Noted in Williamson, *Environment, Society and Landscape*, pp.89-94.
[6] Rowlands, *Masters and Men*, p.99
[7] Hadfield, *British Canals*, p.18, describes it as the main water carrier of England. Gildas in *De Excidio Britanniae* noted that 'luxuries used to come' during the Roman period. See Gildas, (ed. M Winterbottom) *The Ruin of Britain*, 3:2, Chichester, 1978, p.16. More general surveys related to Severn-borne trade are D. Hussey, *Coastal and River Trade in Pre-Industrial England: Bristol and its Region, 1680-1730*, Exeter, 2000; B. Trinder, *Barges and Bargemen: A Social History of the Upper Severn Navigation 1660-1900,* Chichester, 2005; M. D. G. Wanklyn, 'The Severn navigation in the seventeenth century: long-distance trade of Shrewsbury boats', *Midland Hist*ory, vol.13, 1, 2013, pp.34-58.

using the Severn for trade.[8] Trade on the river was initially mostly coal from Shropshire (Coalbrookdale), although timber was floated downriver in rafts or floats. Apart from categorizing such movements as early, it is not possible to state when such trade started – it was certainly a feature of the 16th century, but may have begun much earlier. Trade in merchandise was well-established by the middle of the 17th century and became focussed on several Severn-side towns, including Bewdley and its transpontine neighbour, Wribbenhall, Worcestershire.

Bewdley and Wribbenhall acted as transhipment points for a wide area of the west midlands, Cheshire, and Lancashire. Bewdley was the base used by the Foley family for their own transhipments of iron ore from the Forest of Dean and iron exports via the River Severn to the rest of the UK, as they rented their own warehouse (precise location still unknown) there for long periods.[9] Yarranton stated in 1677:

> *'the greatest part of the Forest of Dean sow iron is sent up Severn to the forges in Worcestershire, Shropshire, Staffordshire, Warwickshire and Cheshire and there it is made into bar rod, and because of its kind and gentle nature to work it is now at Stourbridge, Dudley, Wolverhampton, Sedgley, Walsall and Birmingham bent, wrought, manufactures into all small commodities and diffused all England over, and thereby a great trade made of it, and when manufactures into most parts of the world'.* [10]

The iron trade on the Severn lasted until at least 1809. Other traded products included fireclay, lead ore, textiles, and agricultural products. In short, the bargemen, especially Bewdley bargemen, carried 'Manchester packs' (textiles), 'Staffordshire crates' (pottery) and 'Birmingham hardware' (iron-manufactured goods). Trade diminished from the 1830s due to the impact of the railway.

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[8] Hadfield, *The Canals of the West Midlands*, p.119, Rowlands, *Masters and Men*, pp.99-101.
[9] It is possible that this could have been later owned by John Penn of Wribbenhall, who advertised his 'long-established' warehouse for bar iron storage in 1774 - see Trinder*, Barges and Bargemen*, p.47.
[10] Yarranton*, England's Improvement*, pp.44-5. In this context 'sow' means pig iron.

The development of Bewdley as an inland port was considered by Pagett.[11] He noted that movement of Iron ore from the Forest of Dean was recorded at that town as early as the 15th century and it was brought ashore there to service 'the multitude of small forges built on small tributaries of the Severn for processing'.[12] By the 16th century importation of charcoal was observed. Records of the Beale family (noted Bewdley watermen) show considerable amounts of iron taken to the port of Bristol in the late 17th century when the Foley family was most active.[13]

Although Bewdley's hinterland enabled the carriage of a multitude of goods over an extensive period until the S&W canal at Stourport substantially reduced the trade, movement of iron ore and iron products was of long-lasting importance. Using Gloucester Port books as a principal information source, Davies examined the pre-1700 trade of Bewdley in detail.[14] He showed that where the Foley's warehouse was concerned, during the 1660s and 1690s, iron was sent from Newent, Broad Oak and Ashleworth in the Forest of Dean and wrought iron received from places such as Sheinton in Shropshire. Wrought iron stored in Bewdley was sold to Birmingham and Black Country merchants for the creation of iron products such as scythes. He notes that between 1692 and 1700 a mean of just over 600 tons per annum was received from the Forest of Dean.[15] Rowlands observes that the total amount of bar iron sold by the Foleys at Bewdley between 1692 and 1710 was over 2,500

[11] C.M. Pagett, 'The River', in L.S. Snell (ed.), *Essays Towards a History of Bewdley*, Birmingham, 1972, pp.69-77.
[12] Pagett, 'The River', p.69.
[13] Pagett, 'The River' p.71 quoting from Port of Gloucester Port Books, TNA E 190/1253/9 THE HEAD PORT OF GLOUCESTER. Port: GLOUCESTER Official: Customer and Controller Coastal. Mid 1699-Dec.1699.
[14] S. W. Davies, 'An Economic History of Bewdley before c.1700', Unpld University of London (LSE) PhD thesis, 1981. For Gloucester port books, see previous reference and N. C. Cox, D. P. Hussey and G. J. Milne, *The Gloucester Port Books Database, 1575-1765*, University of Wolverhampton, 1998.
[15] Davies, 'An economic history', pp.275-87. This period correlates with the greatest expanse of the Foley family iron trading business -'the Ironworks in Partnership'- which extended from Gloucestershire to Cheshire, discussed in the following chapter.

tons – an average of 150 tons a year. Some 256 customers are recorded over the same period, indicating the substantial economic base of Foley activities.[16] Trinder quotes the contemporary Swedish commentator Angerstein as noting that Bewdley imported over 2,000 tons of iron from sources inside and outside the UK, much of it destined for local consumption in forges and furnaces.[17] The sources would of course have included the study area, both as an importer and exporter of bar iron. Rowlands simplified and summarised the main movements of iron through Bewdley as shown in figure 5.6 below. [18]

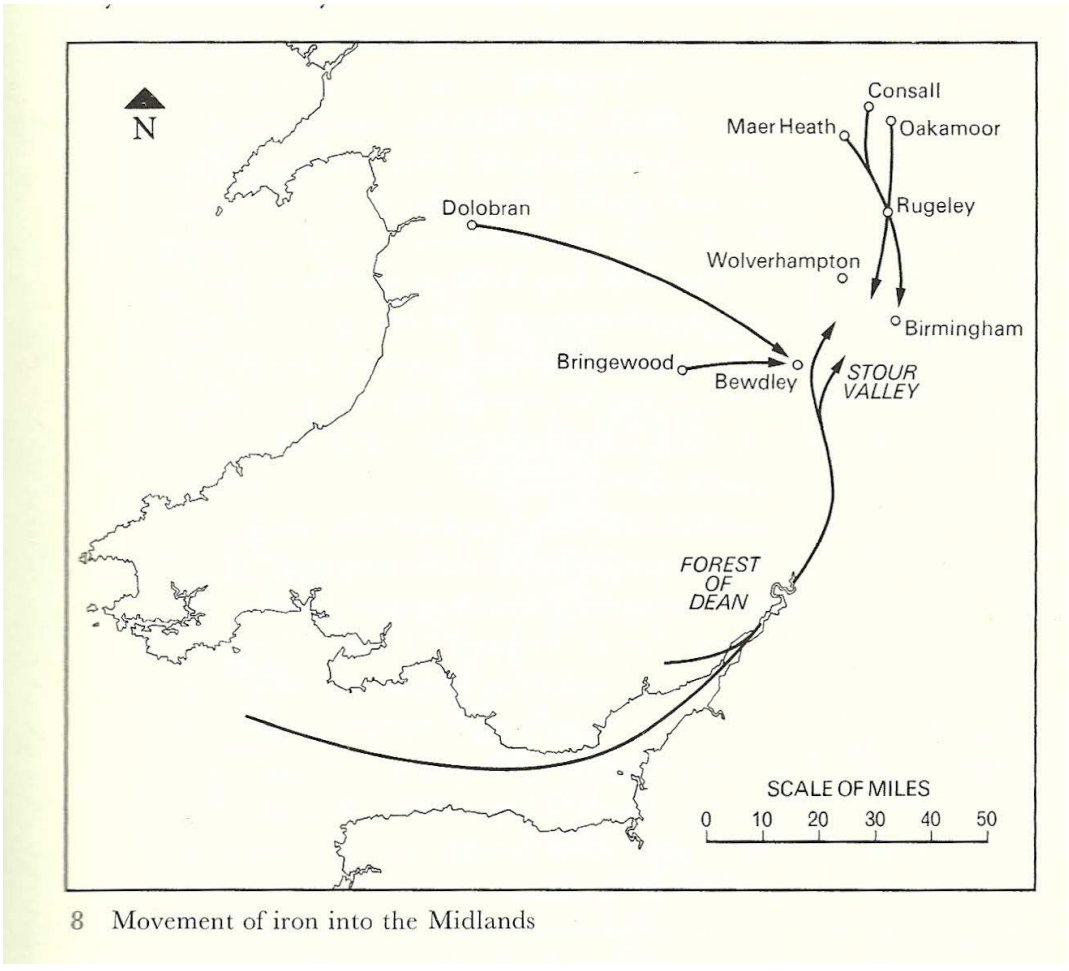


Figure 5.1. Movement of iron into the Midlands.

[16] Rowlands, *Masters and Men*, p.58, quoting documents in the Foley archive in HRAC. Unfortunately, it has not proved possible to trace these as the indexing system used for the archive has substantially altered since 1975.

[17] Trinder, *Barges and Bargemen*, p.90.

[18] Taken from Rowlands, *Masters and Men*, p.55. This shows typical movements of both ore and refined iron focussed on Bewdley in the middle of the 18th century.

A final, interesting, example of the importance of Bewdley to the development and maintenance of the iron industry (and therefore the landscape) in the study area concerns some scythes made in the industrial hamlet of Gornal in Sedgley (and therefore presumably using iron from Grange Furnace, SB1 (as it was the nearest active forge to Gornal). These were sent to the Foley warehouse in Bewdley. From there the consignment was split, some travelling by water to Bristol and the remainder by water and land to London for onward sale in lieu of a debt owed.[19] The transaction showed the centrality of the town and its facilities for the export of finished goods and its link between the industrial activities of the study area and their export markets.

Although the Smestow is only a very minor part of the Severn basin, the Severn's presence was crucial to maintaining the iron industry in the basin in the pre-coal-using era of the industry by providing the main route for imports of iron ore and exports of part-finished or finished goods. In the case of exports, these were via the River Severn and the Bristol Channel, or through trans-shipment at Gloucester and overland to the River Thames at Lechlade before being moved to London.[20] Bewdley played a key role in the development of the west midlands 'industrial complex', and, as noted, above was the fulcrum of the economic trading links and therefore market relationships between the Smestow and the Severn.

5.2.2. The River Trent.

It is informative to compare the impact of the River Severn on the landscape development of the study area to that of the River Trent on the comparison area. The Trent is the third largest river in England after the Thames and Severn.

[19] Rowlands, *Masters and Men*, p.32, again quoting documents (subsequently re-numbered) in the Foley archive in HRAC.
[20] I*bid.*, p.101.

Historically the River Trent was not used for navigation above Burton-on-Trent and there is no evidence of any navigation from the comparison area (Rugeley) where the Rising brook met the Trent, as the river was too shallow and with an inconsistent flow. Consequently, there is little evidence of any movement of iron goods from Rugeley to the River Trent for export. Such evidence as there is suggests that owners of Rising brook ironworks looked south to the *entrepôt* of Bewdley for their export route. Therefore, the impact of the Severn on landscape development can be seen to be far more important than that of the Trent on the comparison area.[21]

The head of navigation for most of the medieval period and prior to the construction of the T&M canal was at Wilden Ferry, just downstream of Burton-on-Trent. Attempted improvement of the Trent to Burton took place in 1699 under the aegis of Lord Paget – perhaps the last time the Paget family was directly involved in sponsoring, using their capital, technological change. This aspect of aristocratic involvement in change is considered further in the next chapter.

5.3. Roads in the Smestow basin and their development through time.

Before the Roman came to Rye or out to Severn strode,
The rolling English drunkard made the rolling English road.
A reeling road, a rolling road, that rambles round the shire,
And after him the parson ran, the sexton and the squire;
A merry road, a mazy road, and such as we did tread
The night we went to Birmingham by way of Beachy Head[22]

The study area was crossed by 'ancient' trackways, at least one Roman-era road and several tracks are also mentioned in early English charters that cover parts of the area. It is therefore

[21] Even when the Trent navigation was opened to Burton finally in 1712 difficulties persisted as a result of high land freight rates.
[22] G. K. Chesterton, *The Collected Poems of G. K. Chesterton*, London, 1927. The poem is from 1913.

important to acknowledge that whilst the survey below considers what are in effect post-medieval roads and tracks, that there already was a substantial earlier set of established routes in existence that affected the further development of routeways in the period under discussion here.

5.3.1. Medieval roads.

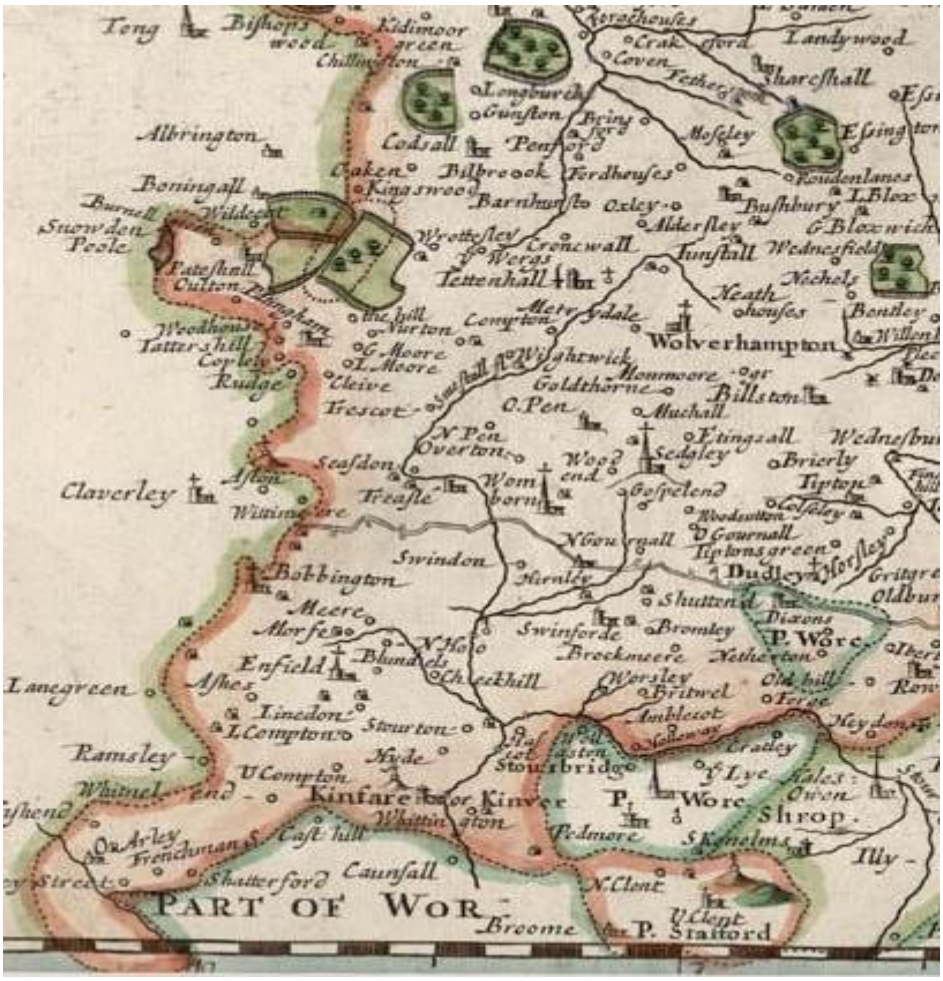
The basis of the medieval road system in the northern part of the Smestow has been postulated by Hooke and Slater.[23] In the southern part of the study area tracks did exist, for example, from at least 1086 the priests of Wolverhampton held property in Prestwood within Kinver Forest and presumably used the Smestow valley or the higher ground on its edge to travel to Prestwood from Wolverhampton. The priests also held property, prior to 1066, in Upper Arley in the far southwest of the county, and must have had a route to Upper Arley from Wolverhampton, again using the valley. All other routes of that period are likely to have been of a purely local nature.

The first known map of the county, Saxton's map of 1579, is devoid of roads in the study area, noted Wolverhampton as the largest town and marked the Smestow as 'Smestall flu'. Speed's map of 1610 was likewise bare of roads, but marked Pensnett Chase inaccurately *west* of the Smestow (see chapter 4). On that map Kinver forest was not depicted, but Morfe forest was marked.[24]

Roads appeared on later maps. Ogilby, in his 1675 collection of strip maps under plate 50 noted a route from Birmingham via Oldbury and Himley, which crossed the Smestow as a ford (rather than as a bridge) near Trysull before proceeding to Bridgnorth and Shrewsbury.

[23] D. Hooke and T. Slater, *Anglo-Saxon Wolverhampton*, Wolverhampton, 1987, p.22 (figure 1.5).
[24] A. D. M. Phillips and C. D. Phillips (eds.), *An Historical Atlas of Staffordshire*, Manchester, 2011, pp. 20-5. Note that it cannot be assumed that no roads existed – simply that Saxton did not display them.

Part of the route is still evident on the ground, represented by the B4176 road east and west of Himley. The ford was superseded by the Smestow bridge which gave its name to the hamlet that was associated with it and later its mill (SB21).[25] Ogilby also noted a 'forge' near Swindon, probably SB3. Morden's 1695 map showed the same route as Ogilby, with more detail on the villages it passed through in the area which later became the Black Country - see map 5.1. Richard Blome's map of 1715 noted this road along with a road from Wolverhampton to Stafford, approximating to the line of today's A449.



Map 5.1. Extract from Morden's map of Staffordshire.[26] Only one road is marked, crossing the Smestow north of SB3 at Swindon.

[25] J. Ogilby, *Britannia*, London, 1675. A colourised version of Ogilby's plate 50 is at http://www.fulltable.com/vts/m/map/ogilby/c/50.jpg (accessed 7 May 2020).

[26] https://www.search.staffspasttrack.org.uk/Details.aspx?ResourceID=11173&PageIndex=1&KeyWord=morden&SortOrder=2. Extract used with permission of Staffordshire Pasttrack (Accessed 20 May 2020).

Later 18th century maps provided more detail on roads. Emanuel Bowen produced maps of Staffordshire over 1740-60 which showed a more detailed network of roads. One map, dated 1749, outlined a set of roads radiating from Wolverhampton across the north of the study area, including a road later to become the A41 heading northwest into Wales. The road to Bridgnorth, holding the same line as the Anglo-Saxon era *bradan straete* through the 'Tettenhall gap' was also apparent. A 'new' route, keeping to higher ground, is evident on the eastern edge of the study area connecting Wolverhampton with Dudley, taking an indirect line via Sedgley. Additionally, the route from Birmingham via Oldbury was shown as diverted via Dudley to Himley and on toward Shrewsbury.

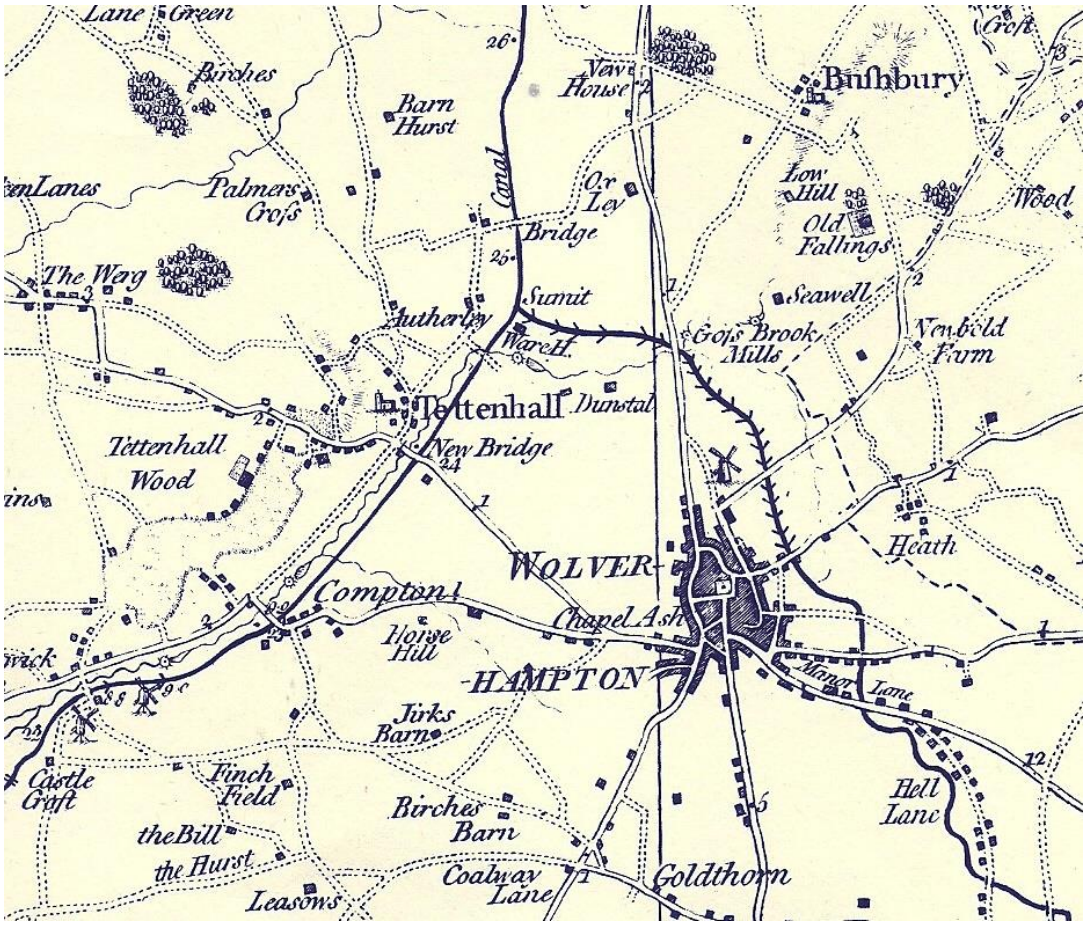
Finally, Bowen's map noted a route in a south-westerly direction from the road connecting Birmingham with Bridgnorth via Himley as referred to above. The route went through Enville before reaching Upper Arley, at this time still in Staffordshire, before terminating presumably at the ferry across the River Severn.[27] It may have had its origins in the later Anglo-Saxon era when Upper Arley was owned by the priests of Wolverhampton as evidenced by the Domesday survey. The early medieval 'Chester Road' via Kinver and Pattingham was not shown on any of these maps, probably indicating its post-medieval decline in importance, although it survived to be turnpiked, at least in part, in 1762 for the section from Highgate Common in Enville through to Bobbington.[28]

Yates' map, originally surveyed in the early 1770s, brings this discussion of pre-OS maps to a close. A comprehensive discussion of the map and its origins has been provided by Phillips,

[27] Some parts of this road are not evident on later maps, notably Yates' map, which casts doubt on its continuing existence. It is shown on Harrison's later county map of 1788, perhaps implying that his map is based on Bowen's map and may not represent the true situation 'on the ground' at the time of publication.

[28] VCH *Staffs*, vol. XX, p.94, noting that the road had gone out of use around 1800.

as well as a new printing on six sheets of it.[29] Yates depicted many roads in the valley; an extract is at map 5.2. Bridges (perhaps replacing fords) had begun to be a feature, with those shown on map 5.2 at, heading southward, Tettenhall (the new bridge), Compton and Wightwick. Others were noted further south, outside this extract, for example at the hamlet of Smestow.



Map 5.2. Extract from Yates' map showing the growth of minor roads and construction of bridges on the Smestow around Wolverhampton. Scale 2" to the mile.

[29] A. D. M. Phillips, 'A map of the county of Staffordshire by William Yates, 1775, with an introduction by A. D. M. Phillips', *CHS,* 4th series, vol. 12, 1984, pp.iii-xxxvi.

5.3.2. The age of the turnpike and enclosure roads.

The development of the turnpike road in England in the 18th-19th centuries has been discussed extensively,[30] and the development of the system in Staffordshire has been considered.[31] Within the study area, the road from Stourbridge to Wolverhampton was turnpiked quite late; the turnpiked section went as far north as Kingswinford in 1753 and finally reached Wolverhampton in 1761.[32] The route from Wolverhampton to Bridgnorth was turnpiked in 1748. The Birmingham to Shrewsbury road via Himley noted above was turnpiked in 1790, suggesting that by this time its importance as a route had been overtaken by others.[33] Other than these routes, the roads across and within the valley remained resolutely local in nature suggesting that turnpikes in Staffordshire essentially were links in wider national system rather than of local value. Complaints by residents elsewhere in Staffordshire about the volume of traffic associated with 'The Irish Mail' on routes to Holyhead bear this out, as the parishioners complained about the cost of repair.[34] A potential conclusion at this point is that the turnpike road had little effect on the landscape in the study area – it formalised, if not fossilised, the then current road system, and, kept these more important roads relatively clear of the valley. A second conclusion must be, due to the absence of complaints about usage that were reported, that the effect of any transportation of bar iron was minor. Undoubtedly, before the advent of the canal, these roads were used, but any such evidence does seem to be at a low level, suggesting only a marginal impact.

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[30] J. Copeland*, Roads and their Traffic, 1750–1850,* Newton Abbot, 1968; W. Albert, *The Turnpike Road System in England 1663–1840,* Cambridge, 1972; E. Pawson, *Transport and Economy: the turnpike roads of eighteenth-century England*, London, 1977.

[31] VCH *Staffs* vol. II, pp.280-3; Lewis*, Staffordshire Roads*, pp.6-15; A. D. M. Phillips and B. J. Turton, 'Staffordshire Turnpike Trusts and Traffic in the Early Nineteenth Century.' *The Journal of Transport History,* vol.8(2), 1987, pp.126-46.

[32] VCH *Staffs*, vol. XX, p.52.

[33] VCH *Staffs*, vol. XX, p.187.

[34] Lewis, *Staffordshire Roads*, p.v.

Settlements in the Smestow valley were subject to the enclosure movement in the last quarter of the 18th century and the first quarter of the 19th. The enclosures created a number of new roads, again, from an inspection of relevant enclosure awards, for local purposes only.[35] These enclosure routes complemented the existing road pattern and it is not proposed to discuss them further here, other than to note the straightening of sections of the Stourbridge to Wolverhampton road, today's A449, and the continuing presence of the 'Old Chester Road' in Kinver and Enville as a relatively minor route which did not, as a 'through route', significantly extend beyond the parish boundaries.

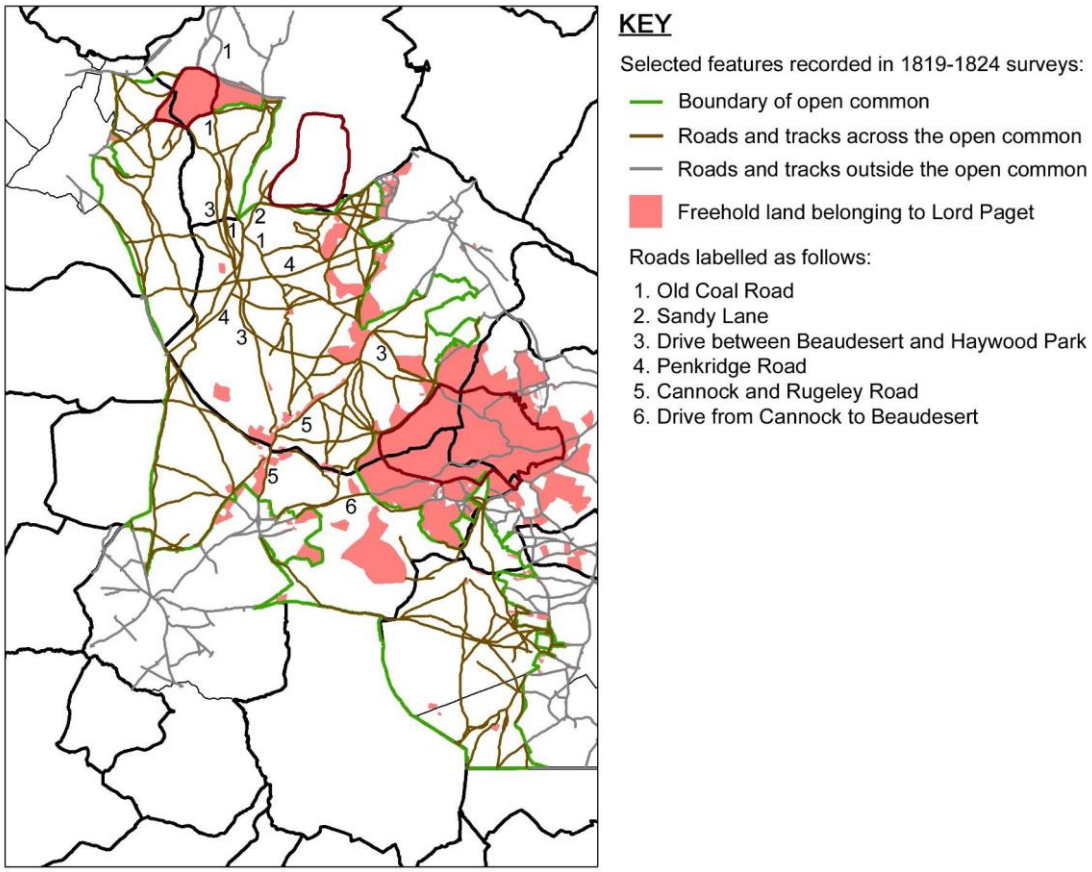
Fowler's map of 1822 (and its subsequent revision in 1839-40) of Kingswinford shows the post-enclosure development of field-paths and minor roads in this large parish, which can be taken as indicative of the changes affecting the wider study area, although it must be noted that Kingswinford was a large parish with many settlement foci and considerable mineral reserves which were undergoing extensive exploitation at this point.[36]

[35] Emphasised by the Kinver award – which shows the creation of field and farm access routes. SRO Q/RDc/36 – Kinver Enclosure Act, 1779.
[36] DALHC PR24/14/4; Fowler's map of Kingswinford, 1822.

Map 5.3. Extract from William Fowler's 1822 map of the parish of Kingswinford illustrating the development of local routes in the centre of the map. The canal shown is the Stourbridge Extension canal, discussed below. Scale approx. 3" to the mile

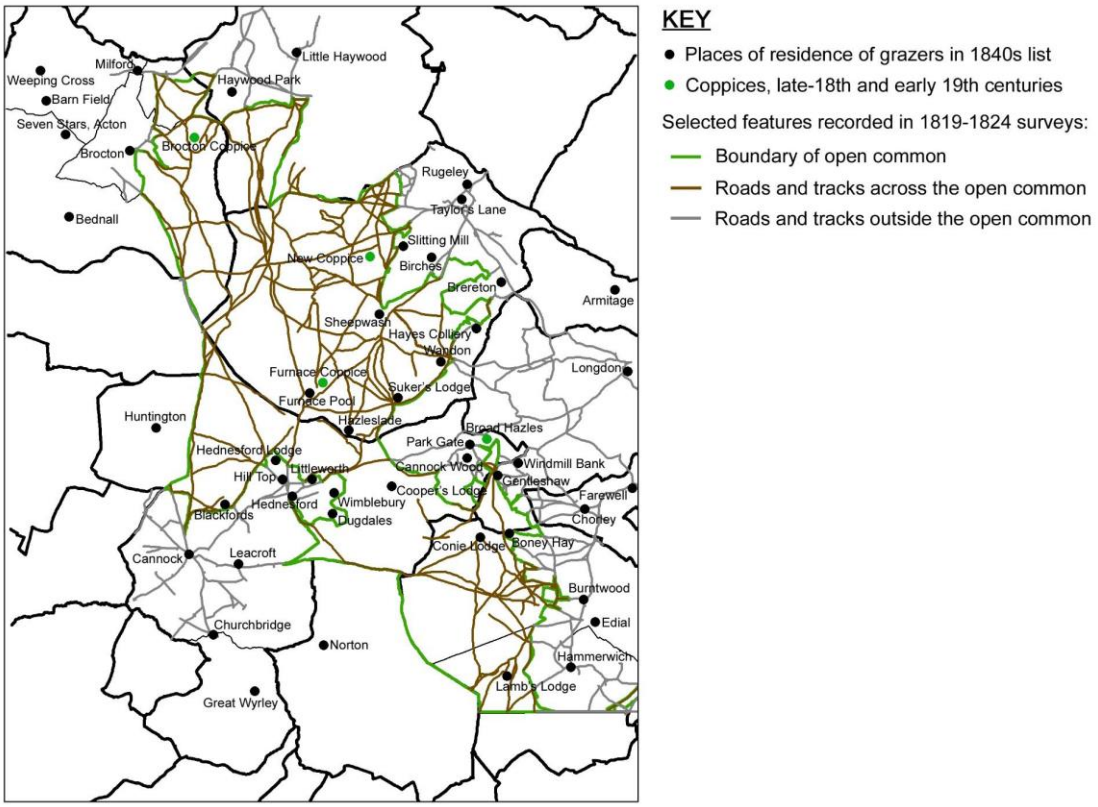
The suggestions made above for the study area contrast with the position concerning Cannock Forest. An analysis has been able to identify 19th century routes used to access the wider heath and woodland area of the remnants of Cannock Forest as shown on map 5.4.[37] Many of these routeways may well have had older origins, having been used to transport livestock on and off the common areas, but it is not possible to state this with certainty.

[37] A. Sargent, 'The Chase Through Time: Archival Research, Final Report', 2018. Unpublished document for Staffordshire County Council. https://www.cannock-chase.co.uk/publications/technical-documents/ (accessed 1 May 2023).



Map 5.4. Cannock Chase routeways. The map should be compared to map 4.6 in chapter 4 which shows the separation of wooded areas within Cannock Forest, suggesting that the gaps between could be utilised for the roads or tracks mapped here.[38]

[38] No scale is noted on this or the following map in Sargent's report (see previous footnote).



Map 5.5. Routes known to have been used by graziers seeking to use Cannock Forest common land in the 1840s.[39]

It has not proved possible to attempt a similar exercise for Kinver Forest as a whole, although such tracks did undoubtedly exist and may have survived for some time. Examination of the relevant Tithe and Enclosure maps for Kinver for example does not make identification of age clear, even though several routes are marked, which may be of considerable antiquity. Examination of LiDAR material again for Kinver and Enville, which remain mostly rural, for comparison purposes, does not show clear evidence of former routes. Other areas such as Kingswinford, Wombourne and Sedgely are affected by the impacts of quarrying, mineral excavation, and urbanisation[40] Equally, they may still exist, albeit integrated into the current road system in the area.

[39] Sargent, *'The Chase Through Time'* figure 7, p.29.
[40]SRO B/A/15/182, Kinver Tithe map, 1850; SRO Q/RDc/42, Kinver Enclosure Award, 1774.

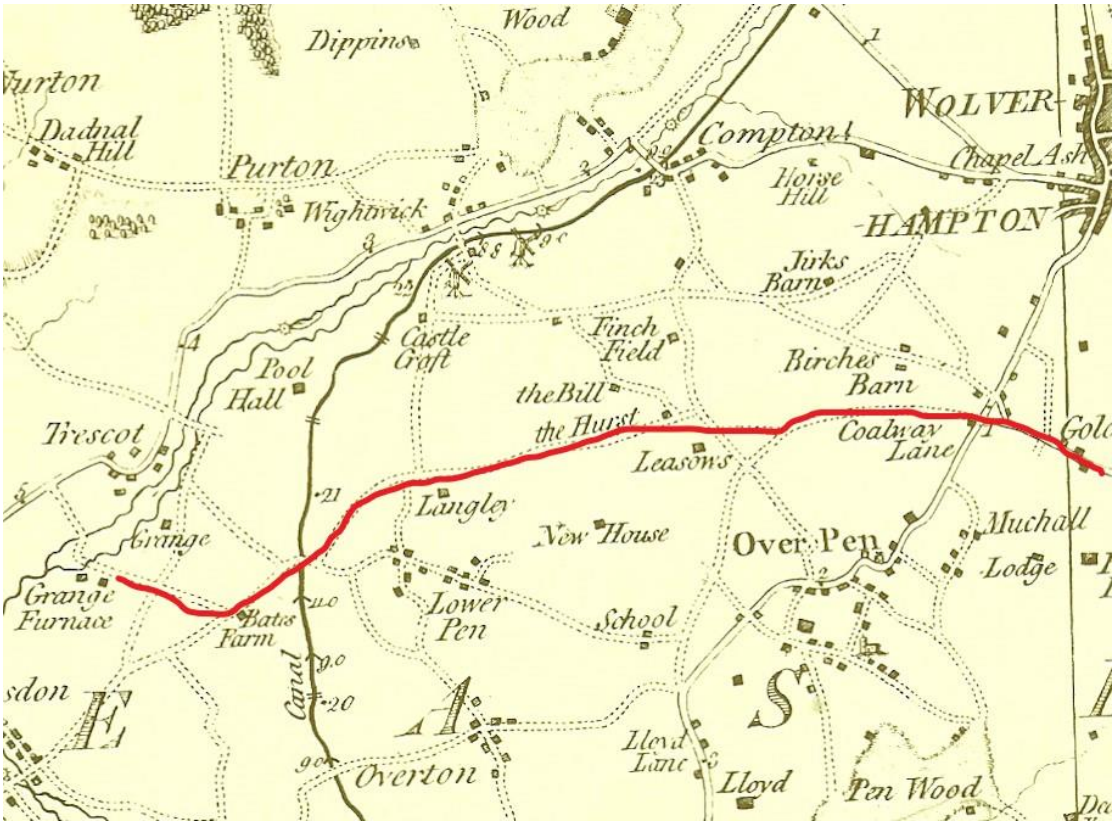
5.3.3. Aspects of iron industry influence on the road pattern.

Before the completion of the S&W canal in 1777 local roads and tracks would have been used to transport goods to and from the furnaces and forges. During the 16th and 17th centuries this would have been on long packhorse trains using local tracks.[41] Little evidence exists of these tracks, but one road can be considered here for further examination, 'the Coalway' in Penn parish.

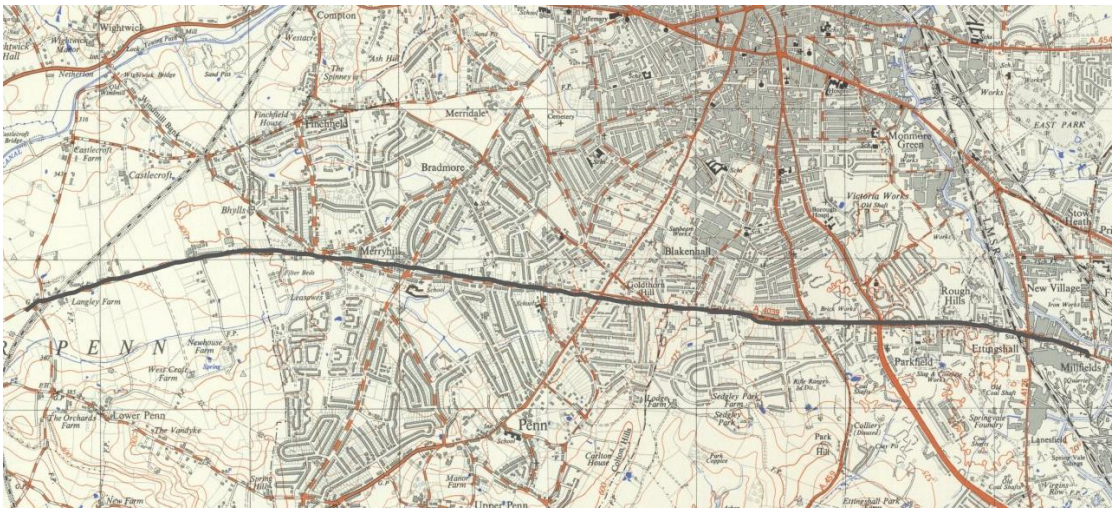
The Coalway is the name of a road across Penn that seems to run from Bilston (or even as far east as Wednesbury) through Penn parish to the north of Upper Penn, then downhill, away from the edge of Birmingham plateau, to cross the Tene brook at what is now Dimmingsdale lock and then to point, via Ebstree, to Trescott Grange and Furnace Grange (SB1). Ebstree is a hamlet in Penn parish. Horovitz suggests, with a certain amount of doubt, that the meaning may be derived from the Anglo-Saxon word for hip, giving a meaning of 'place of the (rose) hip tree'. The name is therefore a potential addition to the corpus of woodland names noted in chapter 4.[42]

The Coalway was named as such on the first editions of the OS maps at scales greater than 1" to the mile in the 1880s. It does seem to connect to the small-scale coal pits that were in existence at the time in the Bilston area, perhaps dating from the early medieval period. It also has an unusual straightness over parts of its course, apparent even today although there is no evidence of Roman origin. It is possible that it may have been developed by packhorse to facilitate the transportation of coal for secondary forging purposes to Furnace Grange (SB1), implying that the local iron industry in this area did have some influence on amending or adjusting local routes. It is the only such route that fieldwork and documentary

[41] Lewis, *Staffordshire Roads*, p.iii, in describing Wolverhampton Roads in 1726, noted the volume of iron taken on the local roads and the consequent damage to them. More generally, see D. Hey, *Packmen, Carriers and Packhorse Roads*, Ashbourne, 2nd ed. 2004, p.91.
[42] Horovitz, *Place-Names*, p.242.



Map 5.6. The Coalway (in red) as depicted on Yates' map (1776). Scale 2"=1 mile.



Map 5.7. The Coalway (in black) on the 1:25,000 OS map of 1937 at 1:50,000 scale.[43] Since the late 18th century it has become straighter than the route shown on the map above.

[43] OS map from NLS.

review has been able to ascertain to date, although it is likely that other sites such as Swindon (SB3) and Greensforge (SB5) plus those in the Straits brook area (SB10) may have had a similar influence, discussed below.

The name Coalway does suggest that charcoal, and probably also coal was carried by cart or packhorse along this route to Furnace Grange (SB1) through Penn. This gives an indication as to how the local road network was amended to enable material to arrive at what was an industrial site. The creation of the S&W canal wharf at Dimmingsdale where the road crosses the canal was unlikely to be a coincidence and may well have been deliberately planned by the canal builders to become an 'export point' for coal as well as well as bar iron. The wharf is further discussed below.

A similar change may be visible in the road network at Swindon (SB3), although this does seem to have been based on its access to the road noted on the Ogilby strip map (and discussed above) running across the south of the county from Birmingham to Bridgnorth and Shrewsbury. Heath Mill, (SB2) seems to have made use of existing routes in the Wombourne parish – although none can be specifically linked to the iron-making site. SB4, Hollow Mill, created the bridge across the Smestow as part of its contribution to the local road network. All the other sites, especially that at Gothersley (SB6) which as a result of its creation *de novo* in a location away from known roads of the period must have had an impact on the road network, cannot be easily identified or associated with specific routes. Those routes which connected Gothersley with the roads along the Smestow valley have themselves begun to disappear into the woodland growth in the area - see map 3.7, chapter 3.

A working conclusion from the discussion above is that the establishment of iron-working in the valley only resulted in minor changes to routes, and, in some cases, such changes were

short-lived and no longer traceable on the ground. Later movement of goods by canal may have accelerated the loss of dedicated road routes.

5.4. Canals.

Canal building in Britain began with Roman adjustments to the drainage system and the creation of short lengths of new water channels to aid inland navigation. There is evidence that the practice of channel adjustment may have continued into the early medieval period.[44] The subsequent development of the canal system from the 18th century onward in England when the Bridgewater Canal was built has been extensively researched.[45] The Staffordshire and Worcestershire canal (S&W) and the Trent and Mersey canal (T&M) originally entitled the Grand Trunk canal, the two key canals discussed here, were first considered as potential projects in the 1760s, even though in the case of the S&W route the possibilities of the Tettenhall gap had presented themselves to earlier proponents of a similar link between the Trent and the Severn. For example, the great 'projector' Andrew Yarranton, perhaps acting in his capacity as a part-owner of an iron forge in Worcestershire, set out a proposal in 1677 to make the lower River Stour navigable, thus allowing coal from the Dudley Estate mines at Pensnett to be more easily moved to other parts of England (as well as his forge).[46] The S&W was finally built, at a much greater cost, broadly following Yarranton's plan, in the following decade.

[44] Hadfield, *British Canals*, p.28; J. Blair (ed.), *Canals and Waterways,* p.42.
[45] Hadfield, *British Canals*, pp.29-32; Rolt, *Navigable Waterways*, pp.37-48, who noted the importance of earlier improvements to river navigation as an essential precursor to developing the surveying and earth-moving skills necessary to enable canal construction.
[46] A. Yarranton, *England's Improvement by Land and Sea*, London, 1677, pp.65-6.

5.4.1. The Staffordshire and Worcestershire canal.

Map 5.8.[47] The route of the S&W canal, noted on the western edge of the map with links to the Smestow and River Stour and River Penk (and Trent).

The S&W canal was first debated as a coherent project in January 1766. Enabling Parliamentary legislation was passed in May of the same year, along with similar legislation for the T&M.[48] Langford noted that the S&W was an afterthought to the enthusiasm

[47] *A Map Of The New Intended Canal To Join The Rivers Severn And Trent by T. Kitchin*, London, published in approximately 1765.
[48] Aris's *Birmingham Gazette*, 20 January 1766.

associated with the concept of the Grand Trunk canal.[49] The southern part of the S&W in the valley of the Smestow was finished by April 1771.[50] It was completed throughout by May 1772. Its proposers included the Clifford, Anson and Gower families as well as many Wolverhampton-based merchants.

The route of the S&W was set out in parliamentary legislation. It ran from a junction with the River Severn near Lower Mitton (later renamed Stourport) using the route provided by the valley of the River Stour through Kidderminster to Kinver where the canal route followed the Smestow valley north through to Wombourne. Here the canal left the Smestow valley climbing through the locks at Bratch (Wombourne) into the ice-cut valley of the Tene brook, re-joining the upper Smestow near Trescott. It then used the 'Tettenhall gap' through Whitwick and Compton, the summit level of the canal. After Compton the S&W canal continued through the col, underneath the Smestow's water bridge at Dunstall as noted in chapters 2 and 3, through Oxley and then Coven to the north of Wolverhampton where the canal enters the Penk valley for the first time. Apart from a minor detour over water-logged ground at Calf Heath near Coven to the north of Wolverhampton, the canal stays in the valley of the Penk through Gailey, Penkridge, and Baswich near Stafford, before its last three miles along the valley of the River Sow, which has been joined by the Penk at Baswich. The canal crosses the River Trent just before its junction with the T&M at Great Haywood.

The creation of the S&W was very much 'of a piece' with that of the Grand Trunk canal, discussed below. Both canals formed part of the suggestion for an inland 'grand cross' in

[49] Langford, *S&W Canal*, p.19.
[50] Aris's *Birmingham Gazette*, 1 April 1771: 'The Proprietors of this Undertaking hereby give Notice, that this Canal is now open from the River Severn near Stour's Mouth…to Compton near Wolverhampton…'.

England.[51] The idea was to build canals which connected, through either rivers or canals, the four principal ports of England: London, Bristol, Liverpool, and Hull. The Grand Trunk canal was designed, with a somewhat circuitous route, to connect Liverpool with Hull. The T&M never directly got to Liverpool, as it joined the Bridgewater Canal at the small settlement of Preston Brook. The Bridgewater canal itself later gave access, via Runcorn, to the River Mersey and thus finally the port of Liverpool. The eastern terminus of the T&M was with the River Trent near Shardlow, with the Rivers Trent and Humber giving access to the port of Hull.

The S&W canal, although making use of the valley of the Smestow, and the connection with the River Penk to the north, was not primarily intended as an economic artery for the study area, or even incidentally, the industries of the study area. It was, as noted in the discussion on roads, a canal which went through the study area from somewhere else on its way to somewhere else again. In this case it connected Liverpool and Hull with the River Severn inland ports such as Bewdley and Worcester, and, ultimately, coastal, and oceanic trade via Gloucester and Bristol. It only went directly through one town of any consequence, Kidderminster, and even at its nearest was still over a mile away from the more important towns of Stafford and Wolverhampton. The lack of economic focus by the canal on the areas it traversed is emphasised by the location of the S&W Canal Company offices in Wolverhampton, some small distance from the canal, and the fact that many of those who initially supported the idea of the canal, and provided the first capital to finance construction, were based elsewhere.[52] Clearly, these promoters viewed the S&W canal as a through-route with substantial long-distance import and export opportunities, rather than a

[51] Sometimes known as 'Brindley's Cross', as James Brindley was the engineer for most the canals in the scheme; Langford, *S&W Canal*, p.22. Trinder refers to this as the 'silver cross', Trinder, *The Making of the industrial Landscape*, p.58.

[52] The offices of the S&W Canal Company were in 87 Darlington Street, Wolverhampton throughout the lifetime of the company. Langford, *S&W Canal*, p.20.

route of local importance to them or their industrial concerns, including the iron-making sites that are the subject of this study.

Yet, there is no doubt that the canal offered opportunities to the owners of the iron-making sites in the Smestow valley, and the Canal Company was quick to exploit these. Two examples are illustrative – the creation of Dimmingsdale wharf, noted above, and the wharves for other specific sites. It is apparent that the effort expended on the construction of Dimmingsdale wharf, which seems to be co-incident with the construction phase of the canal (rather than an afterthought once the commercial possibilities of the canal became obvious) was substantial, and presumably equally significant revenues and profits were envisaged from its use. The site was discussed, and its uses considered, by Langford, who noted that expensive dressed stone was used for the site's construction. He also concluded that the construction of the wharf must relate to the industrial activity at Furnace Grange (SB1), despite the absence of any warehouses or stabling for horses in the vicinity, casting doubt on whether it was used in this way.[53]

[53] Langford, *S&W Canal*, pp.114-5.

Figure 5.2. Dimmingsdale Basin and wharf on the right of the photograph, July 2019.

Altogether, 11 dedicated wharves were created by the S&W Canal Company for the iron-manufacturing sites, some of these being outside the study area, albeit part of the wider Black Country industrial area. These wharves all lasted through to the demise of the S&W as a commercial enterprise in the 1960s.[54] Of these, that at Swindon (SB3) is the most instructive. At Swindon, the canal towpath changes to the left side of the canal for the unusually short distance of approximately 500 yards between Marsh and Swindon locks. Both north and south of the site of the works the towpath is on the other side of the canal for several miles in both directions. This unexpected diversion calls for comment, as it breaks the 'towpath rule' whereby the towpath is between the canal and its 'emergency overflow' of the Smestow brook. Clearly, the towpath has been deliberately moved to the other side of the canal, a change not contemporaneous with canal construction. The move apparently

[54] All are listed in the 'Bradshaw' equivalent for the canal system; H.R. de Salis, *Bradshaw's Canals and Navigable Rivers*, London, 1904, pp.364-6. The S&W Canal Company archives, now held by the Canal and Rivers Trust at the National Waterways Museum at Ellesmere Port (ref: NWM BW107/1, BW107/6/1, BW151/6, BW151/3/4) only have partial late-19th and mid-20th century financial and toll details available.

occurred in the 1920s to allow narrow boats to moor directly against the wharf Swindon Forge, without the added complication of the towpath being there with passing steady narrow boat traffic destined for elsewhere.[55] As well as the cost of the towpath change, further cost was incurred due to the need to reshape the lock gates because of the change of towpath side. Evidence of this change is still visible today, as figures 5.2 and 5.3 show. This change suggests that the Canal Company was persuaded to remove and then reconstruct the towpath because of the volume of narrow boats taking material to and from the Swindon Forge wharves, a change therefore just for the benefit of Swindon Forge owners.

Figure 5.3. Swindon lock, S&W canal, looking north to Marsh Lock showing the 500-yard towpath diversion visible on the right – the only towpath change in a 15-mile section. Photograph taken from the Swindon Road turnover bridge.

[55] Langford, *S&W canal,* pp.128 & 203. He argued that the date of the reconstruction of this section of the canal is not clear from the S&W canal company archives, but is probably dated to the early 1920s.

Figure 5.4. The S&W canal from Marsh lock, Swindon, looking south. The houses on the right occupy the site of the Swindon iron works (SB3). The 'new' towpath marked by the fence is on the left of the picture. The 'old' (pre-1920) towpath can be seen on the right continuing past the 'lock landing' area until it abruptly terminates at a modern property boundary. The edge of the canal on the right is still marked by the characteristic 'Staffordshire blue' engineering bricks between the two locks, (indicating the presence of a wharf) rather than vegetation, as is normal on the 'offside'.

Although the S&W canal was not planned as 'connecting' canal in the same way as the T&M, it quickly acquired canals joining it. The Birmingham Canal, connecting Birmingham with Wolverhampton joined at Aldersley, just north of the Tettenhall gap, in 1772. A second canal, the Stourbridge canal, joined at Stourton, using the valley of the River Stour as a routeway in 1779, supported primarily by Lord Dudley as it benefited his estates and collieries. The Birmingham and Liverpool canal, now known as the Shropshire Union canal, was joined to the system in 1835 making a connection at Autherley, just north of Aldersley. The Stourbridge Extension Canal which extended the reach of the Stourbridge canal itself, again supported by Lord Dudley was authorised in 1837 and completed in 1840. [56]

[56] VCH *Staffs*, vol. II, pp.290, 292-6.

Leaving aside the Shropshire Union canal, the Birmingham canal and the Stourbridge canal both demonstrate one of the themes discussed here. The Birmingham canal was intended to link the growing number of important manufacturing sites in the Birmingham area with the export route offered by the S&W, along with its connections to the rest of the growing canal system. In short, it was designed for materials to get to and from Birmingham from the rest of the UK rather than add to the centrality of the S&W canal. For the builders of the new canal, the S&W was simply a means to an end, but nevertheless the owners of the S&W gained increased traffic and toll revenue as a result.

The Stourbridge canal was different in purpose, but not in effect. It connected the growing industrial areas on the Birmingham plateau through many locks to the S&W canal and in turn the S&W's links elsewhere.[57] These growing industrial areas became the Black Country, and the Stourbridge canal was for a while its principal connection and the source of raw materials as well as an export route. Again, it can be seen as a canal which used its junction with the S&W canal simply as an export route. It did not really add to the usefulness of the routes outward from the S&W. Both these canals, even in miniature as they were, illustrate the principle outlined earlier in the discussion on roads, that is the routes in the study area were intended as a means of crossing it on their way to somewhere else, rather than adding to the usefulness or profusion of routes present in the study area.

5.4.2. Trent and Mersey (Grand Trunk) Canal

The Grand Trunk Canal, later known as the Trent and Mersey canal, was the canal project that, after the construction of the first part of the Bridgewater Canal in 1761, began the canal age in Britain. The Grand Trunk was intended by its promoters to act as a central line from which other canals would be dug connecting other areas and concentrating their

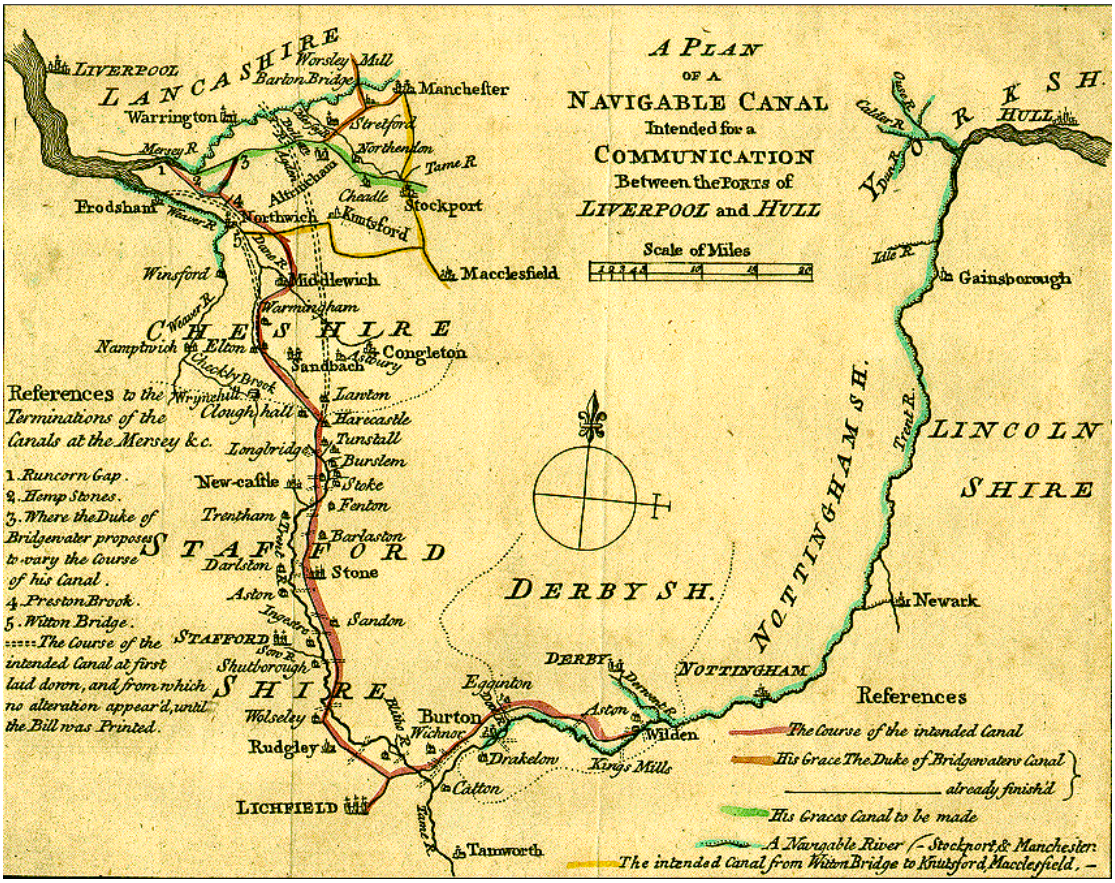
[57] J. I. Langford, *The Stourbridge Canal*, Birmingham, 1992.

revenue-earning traffic on to the Grand Trunk to the benefit of its proprietors. In this aim it was successful as several 'offshoot' canals were created, notably the S&W canal.

James Brindley, in his initial survey of the potential route for the Grand Trunk, took the canal through Rugeley, creating a wharf there. The route was an obvious outlet for the products of the iron-making sites in the Rising brook, the comparison area in this study. However, Lindsay, in her analysis of the goods carried on the canal indicated that the canal had little impact on the economic vitality of any of the Rising brook sites, as the main export market for their production was Birmingham, and the T&M lacked a direct connection with Birmingham until the completion of the Coventry canal in 1792.[58] The contrast to the wharves on the S&W canal with links to Birmingham via Aldersley junction that supported the iron works in the Smestow is marked.

In one respect, the Grand Trunk differs from the S&W canal and many of the earlier roads built across Staffordshire. As the potter Josiah Wedgewood was one of the main promoters of the Grand Trunk, he ensured that it passed as close as was possible to his pottery kilns in northern Staffordshire as it gave export opportunities to both the east and west coasts of England. Map 5.9 below shows with clarity of detail the small villages in the area later to be known as 'The Potteries', including Wedgewood's principal ceramic manufacturing sites in Burslem.

[58] Lindsay, *The Trent and Mersey Canal*, p.94-6. It would seem evident that the output of the sites in the Rising brook went via roads to the principal midlands *entrepôt* of Bewdley on the River Severn (discussed below).



Map 5.9. The planned route of the T&M Canal.[59]

In this way, the T&M canal became one of the few routes specifically designed to connect somewhere in Staffordshire with places outside the county. Even so, the T&M canal was principally intended to connect the Rivers Trent and Mersey. Overall, the T&M canal, although of some use to the comparison study area iron-manufacturing sites, was not of as much value as the S&W canal was to those sites in the Smestow.

5.4.3. Summary of canal development.

When looking at the development of the canal system at its maximum in England in the 1830s it becomes clear that Staffordshire was the centre of that system reflecting its location between centres of industry and their markets. As noted in the discussion on roads, it is again apparent that the canals in Staffordshire were designed to connect places outside the

[59] http://www.bodley.ox.ac.uk/guides/maps/canal.gif (accessed 30 September 2021)

county with other places elsewhere. The only exception to this was the Grand Trunk (later Trent and Mersey) canal, which was specifically intended to go through the Potteries, despite the construction difficulties caused by the building of the lengthy tunnel at Harecastle Hill to cross the watershed from the river Trent to the Weaver in the north of Staffordshire. Nevertheless, the route of the canal was, in the main, designed to go from Liverpool specifically via the county to Hull. The S&W canal was part of this wider design, rather than connecting anywhere with anywhere else in Staffordshire or Worcestershire. The canal connected its terminal points, the T&M canal and the River Severn, not primarily the places it went through along its route. Although roads have been noted as using the 'Tettenhall gap' earlier in this chapter, the S&W canal is the only transport route to use the valley in its entirety as part of its route between the rivers Penk (and therefore the Trent) and Severn, principally as a means to a literal end.

5.5. Railways.

The 'coming of the railway' in the 19th century had profound effects on the British landscape, economy and society which have been extensively discussed elsewhere.[60] Within the study area, the effect seems to have been of a different order of magnitude. As noted with the discussion on roads and canals, the tendency in the creation of railway routes was to build lines which crossed Staffordshire as part of a through-route. For railways, this was the routes from London or Birmingham toward the northwest of England and Scotland, notably what is now known as the west coast main line from London to Lancashire and Glasgow.

[60] For example, C. Wolmar, *Fire and Steam*, London, 2007, pp.75-86.

The railway as part of the national network of railways was a late arrival to the Smestow valley. The first route to approach the study area was the line created by the Oxford, Worcester, and Wolverhampton railway from Stourbridge via Dudley to Wolverhampton in 1854.[61] An earlier line from Wolverhampton to Shrewsbury in 1849 crossed the S&W canal just above Dunstall Water bridge to create a substantial viaduct at Oxley. All these railway lines had minimal impact on the local economy or transportation network and usage.

It was the Black Country area that gained most from the multiplicity of coal-carrying railways and mineral lines that were developed in the 19th century, as map 5.10 below illustrates.[62] Again, it should be noted, as with the discussion above on the S&W and Stourbridge canals, that the Black Country and its overlap into the study area is characterised as an upland plateau area. As with canals, such plateaux are not a 'natural' route for railways, and the relatively late introduction of railways to the area reflected the need for more powerful locomotives and better civil engineering techniques to accommodate the inclines necessitated. Railways could not precisely duplicate the effect of locks in lifting the level of the routeway up several feet in a short distance. Consequently, routes were both late in construction and typically only of local value for the movement of goods or people.

[61] VCH *Staffs*, vol. II, p.311.
[62] See also the brief discussion in VCH *Staffs*, vol. II, pp.310-12.

Map 5.10. Railways of the southern part of the Black Country.[63] This map illustrates the coverage of railways in the area at their maximum. The study area is outlined in red.

Two aspects of the 'low-level' impact of the railways system in the study area will now be considered as evidence of this effect.

5.5.1. The 'Wombourne Railway'.

The only other railway associated with what was to become known as the 'mainline' railway network was built as late as 1913 and was intended to run from Kingswinford to

[63] VCH *Staffs*, vol. II, p.310.

Wolverhampton and known as the Wombourne railway.[64] The railway at Kingswinford was itself a spur from the Stourbridge to Dudley line. The Wombourne railway's development, usage and ultimately closure in 1994 has been considered by Williams.[65] As can be seen by its position on the map, it had little to do with the iron industry in the study area – indeed apart from site SB3, Swindon (which also did not seem to make any use of the transportation method it offered) all other iron manufacturing sites had long since closed before it was built.

The 1913 GWR Act authorised construction of the Wombourne branch direct from Oxley Junction to Kingswinford Junction, including upgrading the existing Kingswinford branch. Services were discontinued in 1932 and goods services declined after the closure of Baggeridge Colliery, terminating completely in 1994. The line is now a linear nature reserve.

Figure 5.5. The bridge at Compton of the Wombourne railway showing its 1994 conversion to a nature reserve and cycle path.

[64] See map 5.16 above where it is noted with the date 1925 attached.
[65] M. Hale, *Traffic and Transport in Nineteenth Century Kingswinford*, Dudley, 2000, p.5.

5.5.2. The Pensnett Railway/Shut(t) End railway.

Earlier railways or tramways played a more significant part of the development of industry on the edge of the study area. Tracks enabling wagons to be moved to mine sites were created in the 18th century and survived to be incorporated into what was to become known as the Pensnett railway in the 19th century – a private railway linking mines and related works on the estates of the Earl of Dudley. Its impact on the study area was at best marginal as its economic focus was outside the area. It is best-known for the use of Agenoria and the Stourbridge Lion, two of the earliest-known UK-built locomotives.[66] The line, and its later extensions into the collieries and later ironworks of Lord Dudley has been the subject of some research as they offer an example of an almost entirely enclosed railway system with little connectivity to the rest of the railway network.[67]

Nevertheless, this railway, which began as a connection including an inclined plane between a colliery and the Ashwood transhipment basin on the S&W canal, makes the point that transport, especially transport innovations, tended to avoid the plateau area on which the Black Country was based until the latter part of the 19th century. Secondly, this line shows that the study area was not initially attractive, even to railways of this nature in that the railway's primary role in the study area was to enable goods to be moved in and out via the transhipment basin at Ashwood on the S&W canal. Map 5.10 reinforces this point, showing that even though there appears to be a very dense network of railways, these are primarily of a late date and used to support the Black Country coalfield and iron manufacturers and thus had little impact on the study area before 1840.

[66] Agenoria, one of the first locomotives to be built in the UK, is now in the National Railway Museum in York. The Stourbridge Lion after being built for export to the US is now displayed in the Smithsonian Museum, Washington DC.
[67] W. K. V. Gale, *A History of the Pensnett Railway*, Cambridge, 1975.

Figure 5.6. *The Pensnett railway, described as Lord Ward's private railway, visible on this extract from a map of Dudley with the extract here focussed on the Pensnett area*.[68]

Figure 5.7. The Pensnett Railway was routed through this small bridge near Wombourne.

[68] DALHC DE/16/3/123. John Bateman's 1848 map (produced in 1863) reproduced to actual size at a scale of 6 chains to the inch.

The pattern of railway development in Cannock Chase was similar. Apart from the railway connecting Rugeley with Walsall ('The Chase line') all subsequent railway development was designed to facilitate the movement of coal from collieries out of the area.

5.6. Discussion and Conclusions.

A working assumption is that physical geography and landscape development are intimately connected. A clear conclusion from this chapter is that the nature of the connection is rather more distant. By way of example, one of the chief geographical features of the study area, noted in chapter 2, the col at Tettenhall linking the Smestow with the Trent drainage basin was, with one exception, not important in terms of the development of 'routes' in the study area.

Thus, this chapter makes it possible to argue that factors other than local topography have influenced the patterns of trackways, roads, and other routeways in the Smestow valley region, and this has been a continuing phenomenon through time. Roads in the study area were created purely for local use – the only exception being the forerunners to the modern A449 which may have originated as a plateau edge or interfluve route and may thus be a candidate for being the oldest road in the area. Road routes are influenced by the topography of this small valley in that they run alongside it and rarely cross it – routes avoided the valley and did not connect riverside settlements. There is little evidence of the effect of industry on the development of roads, either before or after the development of iron-making in the valley. What documentary record there is, is associated with Furnace Grange, (SB1) Swindon, (SB3) and perhaps Gothersley, (SB6) is that all three of which made use of existing tracks, probably heavily and badly affected by the long trains of pack horses bringing in raw materials and exporting finished goods. Such evidence is confined to the

local manipulation and possible local creation of dedicated routes, which, as noted in the discussion on Gothersley, have already begun to disappear from the contemporary landscape. Thus, again counter-intuitively, one conclusion arising from this chapter is that roads and tracks did not use the valley as an easy access route – they crossed it, on their way to places not just outside the study area, but outside the county too. Minor roads rather than major ones connected settlements in the study area to each other, and they were only ever of local significance whether they were associated with droveways or access to iron-making sites.

Although early English canals, such as the S&W, have been considered as contour canals in that they followed the general 'line' of the country through which they were routed, it is also possible to apply the same argument here, in that local geographic features had little influence, in that the S&W used the valley as a through-route. Only Kidderminster, just outside the study area, was a 'port of call' for the canal. Otherwise, like the roads, the canal connected places outside the county with each other, rather than places in the county. Perhaps the only Staffordshire exception to this principle is that of the T&M canal which was routed to deliberately link Stoke-on-Trent and its industrial activities to the canal network. Despite this, as it turned out, the S&W offered, by its presence in the landscape, the iron-making sites in the study area what became a vital import and export route making the canal more important to the iron-makers than roads, almost from its inception.

Railways in the study area again reveal a similar pattern. Almost from their origin, railways had two purposes, to connect large population centres, enabling the movement of that population, and, secondly, to connect sources of raw material such as coal with their markets, again, towns, but also, increasingly, forges, furnaces, and factories. Therefore, the study area was of little interest to railway-builders. There were no large centres of

population, other than Wolverhampton on the northern edge of the study area, and the valley did not contain either sources of raw materials or large-scale markets. Even though the valley offered a low level through route, it was ignored other than for strictly local uses associated with small-scale, locally-based enterprises, epitomised by the development of the Shutt End railway – later incorporated into the Pensnett railway. The position in the comparison area was similar.

On a wider scale it is likely that physical geography did have an influence on the development of the landscape of the study area. This is demonstrated by the recognition that the study area is part of the much larger drainage basin of the River Severn, and that drainage basin, with the trading system that was developed to exploit it, did have an influence in providing import and export routes, including indirect access to the biggest market in England - London. Some elements of the landscape development of the study area may therefore be a response to the presence, outside the study area, of this major geographical feature close to it, but not part of it. Such landscape developments occasioned in this manner may make the study only one of a handful of such areas in England. This feature becomes more marked when the comparison area is considered, as the River Trent did not offer a comparable trading outlet for forges and furnaces in the Rising brook, and therefore did not have such a considerable effect on the development of the landscape in the comparison area.

A final conclusion is that the development and usage of routes in and around the study area, whether they be roads, canals or railways was not dictated by geography in a purely deterministic fashion, but by the economics of the local and wider areas, as apart from the canal, the north-south routeway is ignored as a communication artery. No major roads (or railways) make use of the ‘col’ as a through route. Thus, inter-action of geography and

history in determining the nature of landscape development is in the study area mediated by economic, that is market-related influences rather than that of individuals or industry. In this way, the study offers a potentially unique example of the interplay of these factors combined with that of technology, discussed at the end of the previous chapter, in 'opening up' and 'closing down' a landscape, and, if any one feature can be argued as being more important than any other it is neither geographic nor historic, but a combination of economic and technological. This novel finding is examined further in the following chapter's assessment of the impact of individuals and families on landscape development.

CHAPTER 6: THE INFLUENCE OF PEOPLE, FAMILIES AND THE MARKET FOR IRON ON THE DEVELOPMENT OF THE LANDSCAPE.

Man made the land.[1]

6.1. Introduction, sources used, background to the industry and a proposed typography.

6.1.1. Introduction.

The effects of the geology, geography, pedology, hydrology and climate of the study area on the development of its landscape have been the primary theme of the previous chapters. The influence of geology has been considered in terms of the location of resources such as iron ore and limestone, or the creation of landforms which enabled swiftly-flowing streams to become established and later used as a source of power for bellows. The second aspect to this analysis has considered the effect of geology combined with the effects of glaciation in creating a series of poor-quality acid soil formations which have lent themselves to the creation of extensive wooded, later heathy, landscapes. In short, the primary theme advanced through that analysis is that the development of the landscape of the area associated with these iron-production centres was powerfully influenced by the inter-action of the local geology and climate – the latter in providing enough rainfall to create regular and reliable fast-flowing streams capable of being safely harnessed to provide the power to continuously run milling equipment and then bellows in iron-making furnaces and/or forges.

By contrast, this chapter investigates the impact of a number of human factors, notably the decisions and actions of individuals, and to a lesser extent, that of their families, on the development of the landscape in the study and comparison areas. This will be a study of human choices, including the inter-action with the growing market for iron, as well as technological changes to iron-making, rather than simply human responses dictated by the natural or physical environment. The dynamic interaction of these three factors are key

[1] Title of A.R.H. Baker (ed.), *Man Made the Land*, Newton Abbot, 1973.

elements affecting landscape development, and, as will become apparent below, the relative weighting of each factor alters over the primary period of study. Most of the sources utilised here are secondary. Such sources are utilised not as general narratives or biographies, but from the specific viewpoint of the effect of individuals on the development of the landscape and whether the how the nature of this impact changed over time – emphasising the dynamic nature of landscape change in the study area.

This investigation will also examine whether individuals acted as agents of change as they managed their iron-producing sites in relation to a changing market, or as agents of 'conservatism' in preventing (or minimising) landscape change and development. Of necessity, this section will include an assessment of the development of the 'market' associated with iron production. The overall market is here defined as access to the raw materials involved in the production of iron, namely iron ore, woodland to make charcoal and limestone to act as a flux. The second aspect to the definition refers to the many uses to which iron can be put after its output from the blast furnace or chafery forge as bar iron for the creation of agricultural implements and other items, notably the production of nails, a characteristic feature of the Black Country which overlaps with the eastern edge of the study area.

Consideration will be given to why the study area continued to contain working water-powered, charcoal-fuelled forges and furnaces, despite the attractiveness with the passage of time of new technology (coal-fired smelting) in new sites outside the region such as south Wales, with which later owners had substantial familial links. This will involve scrutinising the impact of the market for bar iron and the wider issues associated with trade in iron outside the study area. The chapter will offer some new hypotheses on these issues leading to a

more wide-ranging discussion on the effects of people and the landscape on industry and industrial location in the concluding chapter.

6.1.2. The development of a market for iron goods.

The Iron industry was one of the last traditional industries to yield to coal.[2]

Appendix A gives a brief summary of the development of the iron industry with a focus on British events. Until the blast furnace arrived in Britain in the late 15th century, ironmaking was of necessity a small-scale affair and could not be considered an 'industry' with a market; rather, an activity carried on by individual producers who relied on agriculture for part of their income. The conversion of iron ore to malleable unrefined iron occurred near the source of the ore, as transport was difficult given the nature of the road system and consequently expensive. Further refining of iron blooms tended to occur locally too for the same reasons.[3]

Looking at England as a whole, the pre-1600 market for iron, if such a concept can be said to apply, was essentially local. This is true for both the study and the comparison areas. By 1700 the structure had completely changed, and both a regional and nascent national market had been created. Indeed, the activities of the Foley family from 1630 through the middle of the 18th century in creating a storehouse for iron on the River Severn at Bewdley show that the beginnings of a national market were already in place, in part created by the demands from the Navy in the south of England for nails and ordnance.[4] By 1750 the market was changing again as not only were new areas being developed by the industry such as south Wales, but the change in technology with the advent of coal smelting meant that the

[2] Bowen, 'Medieval Deer Park', p.209.
[3] Schubert, *History*. More recent works and site listings used here and in what follows are based on B. Awty, J. Hodgkinson, C. Whittick (eds.), *Adventure in Iron*, WIRG, 2019; Hayman, *Ironmaking*, P. King, A *Gazetteer of the British Iron Industry, 1490-1815,* Vols I & II, London, 2019; Osborne, *Iron, Steam & Money,* and for the later period, J. R. Harris, *The British Iron Industry 1700-1850,* London, 1988.
[4] The Bewdley warehouse has been discussed in chapter 5. The Foley family are considered below.

existing methods of production were undergoing substantial change as larger blast furnaces capable of greater outputs were able to feed the growing demand for iron.[5]

As blast furnaces were introduced, their products were refined in forges (known as chafery forges) to drive out impurities. These forges then sold the refined iron to end-users to make domestic equipment such as pots, pans, and firebacks; agricultural items such as saddle and harness gear for horses, spades, shovels, scythes and other tools; and most importantly to make nails. Of these, apart from ordnance, nail-making was the most significant and lucrative business. Domestic nail-making was already present by 1500 in the areas later to be known as the Black Country and steadily grew throughout the period 1500-1750, with almost unchanged methods of production, except that the introduction of the slitting mill to the study area in 1628 meant that the easier-to-manipulate rod iron rather than bar iron could now be used.[6]

As well as nail-making, settlements including Sedgely, Darlaston, Willenhall, Tipton, and Wolverhampton began to develop specialisms using iron, notably making chains, locks and so on. These were typically small businesses, domestically based, employing up to five people.[7] Pre-eminent amongst such locations was Birmingham. In 1500 it was a large open village – but by 1750 it was a town and dominated the west midlands due to the growth of the iron trade.[8] So great was the demand from the businesses in Birmingham for iron in the

[5] Hayman, *Ironmaking*, pp.39-41, who outlines some of the other factors behind the growing demand for iron along with the technological advancements that made such increases in production possible.
[6] Trinder, *Industrial Landscape*, p.22.
[7] T. J. Raybould, *The Economic Emergence of the Black Country*, Newton Abbott, 1973, p.135; H. Parsons, *The Black Country*, London, 1986, pp.29-31.
[8] R.A. Pelham, 'The Migration of the iron Industry toward Birmingham during the 16th century', *Transactions and Proceedings of the Birmingham Archaeological Society*, vol. 66, 1945-6, pp.142-9; Kinvig *et al*, *Birmingham and its Regional Setting*, 1951, pp.150-2; M. Hodder, *Birmingham, the Hidden History*, Stroud, 2004, p.136.

18th century that these enterprises began to 'pull in' bar iron made outside the west midlands and by 1750 this had extended to foreign-made iron, notably from Sweden.

The final aspect of 'the market' for iron over this period reflects a conservatism of approach that has been a feature of the trade investigated in this study. Although Richard Foley was accused in 1636 of trying to, in modern-day terms, 'fix' the market for iron (through the crime of engrossing – establishing a monopoly - discussed below) it is notable how open the market was, until the number of suppliers of bar iron diminished in the middle of the 17th century. This reduction allowed the creation of quarterly meetings between suppliers, usually held just to the south of the study area in Stourbridge (a location which may represent Foley influence) which acted as a price-setting or price protection arrangement. These meetings continued, under a different name, through the 19th century.[9]

The 'mature' market for iron in the study area can therefore be seen as being composed of the elements noted in the flow chart below. Items in boxes represent the key stages of iron production. The end-user market, iron manufacture, is shown in the oval. The phrase 'the market' is used here to refer to the market for the component elements in iron production as opposed to manufacture. Whilst production was showing signs of incipient industrialisation by 1650, the manufacturing part remained resolutely the domain of individuals (for nail production) or very small, often family-led, organisations.

[9] SRO D888/1 Minutes of the South Staffordshire Ironmasters Association; King, 'S. Staffs', p.63; W. A. Smith, 'Combinations of West Midland Ironmasters during the Industrial Revolution', *West Midland Studies*, vol. 11, 1978, pp.1-10. A further example of the *long durée* principle perhaps.

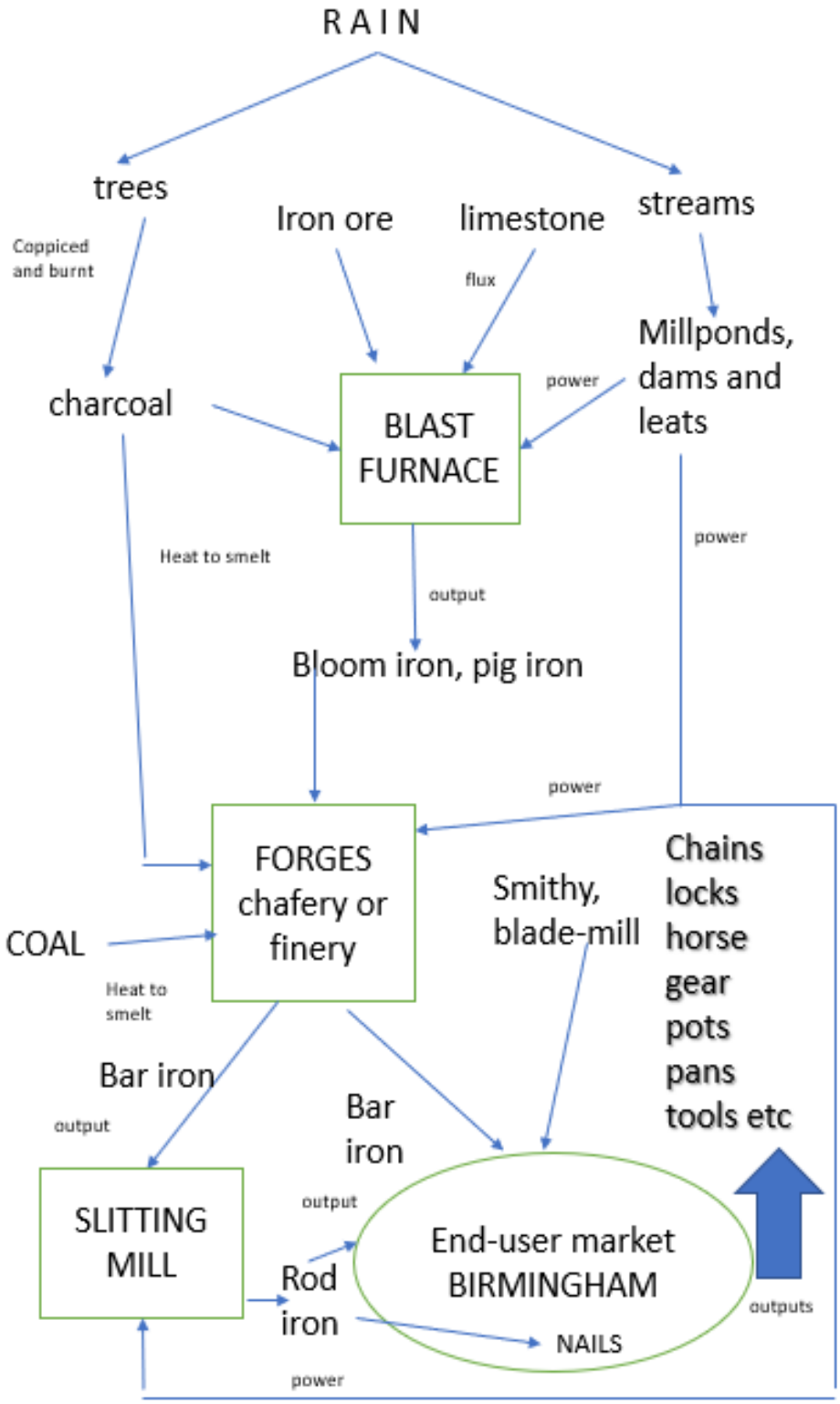


Figure 6.1. The iron production and manufacture market in the study area around 1650.

6.1.3. A proposed classification of iron manufacturers and production site ownership.

King suggested a two-fold division of those who developed the iron industry in the study area. He considered that a period of direct landowner involvement was succeeded by a more 'professional' group managing the businesses.[10] King's analysis may over-simplify a more complex picture. It is proposed here that it may be more appropriate to consider those who first exploited the charcoal-production potential of the woods on their land as 'pioneers'. As they were landowners, they must be of the 'gentry' class, and the terms pioneer and gentry are used here, along with King's use of the description 'professionals' for their successors as site utilisers, or, more accurately, managers – as they may not always have been land- or site-owners.[11]

An important point to support this distinction is that as landowners, the 'pioneers' did not have to buy timber for consumption as charcoal – typically they already owned it; therefore, its cost to them was relatively small. The professionals and their successors had to pay for wood and ensure access to a steady supply. It was therefore in the interests of the professionals to ensure that woodland was managed through a coppice system. Landowners, as noted in chapter 4, often had other priorities for the use of their woodland and may not have focussed on the need to manage woodland for charcoal to the exclusion of everything else.

It is also argued that a further distinction can be made with a later, third group of people, such as those who bought those furnaces and forges discarded by the early professionals such as the Foley family. This later group are categorised as 'seekers after profit', as they had

[10] King, 'S. Staffs', p.59.

[11] The origin of 'the gentry' in England has been, and remains, controversial. The simple definition of a land-owner, living on rental income from the land is used here, following P. Coss, *The Origins of the English Gentry*, Cambridge, 2003, p.11. An example of a county gentry society which can also apply to in part to that in other counties in England has been well described in A. Everitt, *The Community of Kent and the Great Rebellion, 1640-1660*, Leicester, 1966, pp.14-18, 37-45.

seen the profits to be made from the production of iron and sought to 'buy themselves in' to the industry by acquiring these 'cast-offs' and running them themselves. Once it became evident that any such profit was limited, a different, fourth, group of people bought and took over the ownership of the furnaces and forges. These owners ran the forges and furnaces on a more pragmatic basis, often later closing them because of the change in fuel source from charcoal to coal mid-way through the 18th century.

This four-fold division (pioneers, professionals, profiteers, pragmatists) of the different groups of furnace owners is a new classification and is tested in the discussion below. The out-of-area links of the industry pioneers, professionals, profiteers, or pragmatists with other families, notably those engaged in continuing to exploit the iron reserves of the Weald, will also be considered, where relevant, to illustrate the influence on the landscape of developments in the industry and the impact of the growing complexity of the market (in terms of acquisition of raw materials and output of finished product).

6.2. The advent of the pioneers.

In Staffordshire, the first group of people to seek to exploit the new technology of the blast furnace were landowners. In the study area these landowners included the Wrottesley family of Wrottesley Hall in Perton, part of Tettenhall parish; the Parkes family of Willingsworth Hall in Sedgely; the Whorwood family of Sandwell Hall (West Bromwich) and the Sutton family, lords of Dudley. The efforts of the Wollaston family of Tettenhall in this regard, hitherto little known, will also be considered. In the comparison area, blast furnaces were created on his own estates by William Paget, and the effect of this is reviewed.

It is argued that this pattern of early involvement by landowners related to a need for money to buttress individual fortunes, as they were either 'new men' (such as William Paget) or from relatively minor, albeit long-established, gentry families such as the Wollastons or Whorwoods, who may have had grander ambitions to social aggrandizement. The activities of the key individuals concerned with ironmaking, including the impact of family linkages are explored below.

6.2.1. The Wrottesley and Wollaston families.

The Wrottesley family history was set out in the late 19th century.[12] The family was characteristic of the medieval social structure of many English counties in that it was a landowning family that produced few members who rose to national prominence, confining its influence to the locality in which it resided. Its members occasionally took office as county sheriff, justice of the peace or local member of parliament.[13] The head of the family became a baronet in 1642 and a baron in 1838. The family was based at Wrottesley Hall, the centre of the manor of Wrottesley, from which they took their surname. The manor had been granted to Simon de Verdun by the Abbot of Evesham during the period 1160-1167. His son, William de Verdun (died 1242) is believed to have settled at Wrottesley in 1199 and adopted that location as his surname. The hall and estate stayed in the family until sold in 1963. Wrottesley was part of the township of Perton, itself part of Tettenhall parish in the north of the study area.

[12] Wrottesley, 'A History of the Family of Wrottesley'. Major-General George Wrottesley (1827-1909) retired from the British Army in 1881. In 1879 he became the Secretary of the William Salt Archaeological Society of Staffordshire, which he had co-founded, in which capacity he acted as Editor of the *Collections* until his death.

[13] For example, Sir Walter Wrottesley, died 1473, acted as captain of Calais during parts of the reigns of Henry VI and Edward IV.

The involvement of the Wrottesley family in the creation of the industry in the study area is relatively minor, but important. Hugh Wrottesley is noted as buying Heath Forge (SB2) in 1601 from William Wollaston, who himself had bought Furnace Grange (SB1) from the Crown in 1557.[14]

It is possible that William Wollaston sought to develop and then run both Grange Furnace and his newly-acquired forge at Heath Mill as one 'unit', but this clearly did not suit him in some way, hence presumably his sale of the enterprise.[15] The Wollaston family, of which William was the then head, seems to be a minor 'gentry' family as well, and, it is argued, not entirely co-incidentally, also from Perton in Tettenhall. The family was later associated with Walsall.[16] William Wollaston may well be an early example of one individual trying to make a profit from iron making, failing to do so, perhaps through lack of investment or inadequate access to resources, as seems likely, and then selling the sites on to another individual (Sir Hugh Wrottesley, a neighbour) who had similar aims. It is possible that Hugh Wrottesley had the same financially-driven ambitions as William Wollaston, perhaps using woodlands on the Wrottesley estate to produce charcoal for both sites, but probably mostly for the furnace at Grange (SB1), as this will have consumed much of the charcoal. It is not clear, due to an absence of relevant documentation, to what extent the Wollaston family had access to sufficient woodland to make charcoal, and this factor may sit behind their decision to cease involvement in the industry despite the potential for profit.

[14] The Crown acquired the site, formerly owned by Coombe Abbey, with the abbey's dissolution in 1539. See chapter 3.

[15] Relatively little is known of the Wollaston family, who, from the evidence shown here, may have been comparable with contemporary families of 'iron-masters' such as the Parkes family discussed below. They became landowners in the 16th century. J. P. Jones, *A History of the Parish of Tettenhall*, London, 1894, p.134, outlines what was then known of the family.

[16] Thomas Wollaston held land in Walsall in 1576 including a water mill, and John Wollaston, (presumably a son of the above) in 1617 held a water mill and a bloomsmithy as well as land at Rushall outside Walsall where there was a smithy, indicating a continuing involvement of this family in the business of iron production. Dilworth, *Tame Mills,* pp.79-80, 86, notes the family involvement. VCH *Staffs*, Vol. XX, pp.218-20 considers the activities of Sir John Wollaston (1595-1658) later Lord Mayor of London, describing him as of Tettenhall and Perton, suggesting that the family had moved their interests away from ironmaking to trade and enhancing their social status.

Such an aspiration on Sir Hugh's part may not have lasted beyond establishing or running the 'industrial' arrangement of Grange Furnace and Heath Mill Forge for five years as, in 1606, Richard Parkes of the Parkes family bought trees and underwood at Perton, less than two miles from the Furnace Grange site. As Grange is the nearest furnace, it is likely that he was moving the wood there, and therefore that he had already leased the site from Hugh Wrottesley.

The Wrottesley family involvement did not entirely cease. In 1721 Furnace Grange had re-opened owing to import shortages of iron from Sweden occasioned by the European trading ramifications of the 1715 Jacobite rebellion. In this year, wood was sold to the agent of Sir John Wrottesley and other partners for use at Furnace Grange, showing that the family's involvement continued, although again only for a brief duration, as by 1730 the site was in other hands.[17] During this latter period of Wrottesley family involvement in iron-making, it is more appropriate, given the circumstances, to consider their activities as more akin to that of a profiteer than a pioneer.

6.2.2. The Sutton Lords of Dudley.

The Sutton family acquired the lands and lordship of Dudley by marriage in 1324. John Sutton, 1494-1553, inherited the Dudley estates in 1531, on the death of his father, Sir Edward Sutton (c.1460-1531).[18] Sir Edward does not appear to have been a good custodian of his inheritance. Immediately upon his accession to the lordship, John had to sell-off parts of his patrimony to cover debts. In particular, he sold, sometimes through intermediaries, land, and, eventually, the base of the lordship, Dudley Castle, to his cousin, John Dudley.

[17] P. W. King, 'Grange Furnace', pp.50-1. See also below.
[18] Within the study area this included the manors of Dudley, Himley, Kingswinford and Sedgley and parts of Wombourne.

After the sale of the Castle, he became known as 'Lord Quondam'. He lived off the charity of friends until his own death in 1553. Co-incidentally, this was immediately after the execution of his cousin and nemesis, John Dudley (by then Duke of Northumberland) as a result of his failure to successfully place his daughter-in-law, Lady Jane Grey, on the throne.[19]

The Dudley estate passed to the Crown after the attainder of the Duke of Northumberland and was later restored by Mary I to John's son, another Edward Sutton (1515-86) who followed a military career. Exploitation of coal and fireclay was probably increased during his stewardship of the Dudley estate although specific documentation is lacking. It is likely that despite Edward's military career abroad much of his time and resources were spent on paying off the debts of his father. Indeed, in his will, Edward earmarked all the proceeds of his ironworks for 21 years to pay his creditors, who were given precedence over his widow and younger children, implying that by this time the profits of these works were felt to be sufficient to enable payments at the requisite levels.[20] The arrangement suggests that the estate was being substantially exploited for iron production during this period.

Edward was succeeded by his son, another Edward, who was destined to have financial problems almost immediately on his inheritance aged 19 in 1586. Like his predecessors, he sought to exploit the mineral wealth of his estate and probably allowed others to make iron forges on his estates. Gornal Wood (SB12) dates to 1595 and other known forges are those of Greensforge (SB5), Himley Forge (SB7), Himley Furnace (SB8) and Hasco Furnace (SB10).

[19] "It is reported by credible tradition of this John Lord Dudley, that being a man of weak understanding, whereby he had exposed himself to some wants, and so became entangled in the usurer's bonds, John Dudley, then Viscount Lisle and Earl of Warwick (afterwards Duke of Northumberland), thirsting after Dudley Castle, the chief seat of the family, made those money merchants his instruments to work him out of it, which by some mortgage being at length effected, this poor lord became exposed to the charity of his friends for a subsistence, and spending the remainder of his life in visits amongst them, was commonly called the Lord Quondam." W. Dugdale, *Baronage of England*, London, 1675-6, p.217.

[20] TNA PROB/11/69/41, The will of Sir Edwarde Sutton 15 July 1586.

It is possible that other forges on his estate such as those in Cradley (outside the study area) date from this period. These ironworks became essential as Edward's financial affairs were so bad and the inherited debts so large.

Figure 6.2. Edward Sutton, Baron Dudley, 1567-1643, painted by Joseph Harper.[21]

Perhaps because of his financial position, Edward sought profit through experimentation. He obtained a licence to use the patent of John Robinson (or Rovenson) for making iron by smelting it using coal in 1619, and, presumably having successfully experimented, chose in February 1622 to renew the patent in his own name. Edward was an innovator who set up

[21] CC BY-SA 4.0, *https://commons.wikimedia.org/w/index.php?curid=96180527* (accessed 20 January 2021).

an early reverberatory furnace again using coal as the heat source.[22] He also established a glassworks where coal rather than wood was used as fuel, but these activities do not seem to have been profitable.[23] Despite these efforts, his estates, which had been sequestrated since 1593, remained in this state until his death some 50 years later. Edward Sutton's only legitimate son, Ferdinando Dudley, predeceased him. Ferdinando's only child, his daughter Frances, married Humble Ward, the son of London goldsmith William Ward, who had deliberately acquired many of Edward's debts. The 'price' of this arrangement was that William Ward took care of Edward's debts (including those to him) and paid off all those remaining at Edward Sutton's death in 1643, thus ending the period of estate sequestration. Humble Ward was knighted in 1643 for services to King Charles I during the Civil War and later became Baron Ward of Birmingham and later again, *jure uxoris*, Baron of Dudley. Subsequently, one of his descendants became Earl of Dudley. A much later Earl of Dudley sold the bulk of the estate in 1947.[24]

One other Sutton family member had a substantial impact on the development of iron manufacture in the study area and the nature of the development of the landscape during this pioneering phase. This person is perhaps the most interesting figure on an individual basis, who left behind a series of claims concerning the industry which continue to excite differences of academic opinion. Edward Sutton produced a large family with his mistress, Elizabeth Tomlinson. All these children were acknowledged and brought up in an 'aristocratic' fashion. One of these children, Dud Dudley, was raised at Himley Hall, and apparently from an early age was extensively involved in the creation and running of blast

[22] A reverberatory furnace is different from a blast furnace as ore is kept in a separate compartment (sometimes a crucible) from the fuel used to smelt it. The heat source comes from reflected or radiant heat from the burning fuel, hence the term reverberatory. It is less efficient than a blast furnace. Edward Sutton's reverberatory furnace site is unknown. Equally, it is believed that the experiments in coal smelting were not successful. J. Gough, *The Rise of the Entrepreneur,* London, 1969, p.217.
[23] L. Stone, *Crisis of the Aristocracy*, Oxford, 1965, pp.352-3.
[24] Grazebrook, 'The Barons of Dudley', p.110.

furnaces on the Dudley estates.[25] Having matriculated at Balliol College, Oxford he returned to 'manage' his father's ironworks at the latter's request probably in March 1622, immediately after his father had taken out the patent on the reverberatory furnace noted above.

Dud Dudley's subsequent activities, including his claim that he successfully smelted iron using coal from the estate have been well-documented, and provide substantial material for a much wider discussion than this study allows. Opinion varies as to whether he was successful in smelting iron using coal.[26] On balance, it is possible, provided he did have access to coked coal, which, as a result of a geologically earlier volcanic episode is found in small amounts on the Dudley estates, that he did manage to produce some sort of iron using coal rather than charcoal, but not in sufficient quantity, and not reliably, either, despite Dud's own claims in his somewhat confusing and self-serving 'autobiography', *Metallum Martis*.[27]

It is possible to consider Dud Dudley's move to 'manage' these ironworks (believed to be Cradley Forge and Himley (SB8) and perhaps Greensforge (SB5)) as an early example of the recognition by landowners that ironmaking on this scale required someone who knew the intricacies of the methods of production as well as the market for both raw materials and bar iron. As noted, Dud Dudley appeared to have been familiar with his father's ironworks

[25] His first name variously appears as Dud, Dudd or Dudonious. Himley Hall, after the attempted destruction in the 1640s of Dudley castle at the end of the civil war, became the seat of the Ward family the post-1643 Lords of Dudley until their move to Witley Court, Worcestershire, in 1851, coincidentally purchased from the Foley family after the then Lord Foley's fortunes declined.

[26] Grazebrook, 'An Account of the younger branches', pp.28-38; R. A. Mott, 'Dud Dudley and the Early Coal-Iron Industry', *TNS,* vol. xv, May 1934, pp.17–37; Morton and Wanklyn, 'Dud Dudley: A New Appraisal', pp.48–65; P.W. King, 'Dud Dudley's Contribution to Metallurgy', *Historical Metallurgy,* vol.36, 2002, pp.43–53; M. White, 'Yet another side of Dud Dudley', *TB,* vol. 39 no.22, 2006, pp.70–2; King, P. (2008, January 03). Dudley, Dud (1600?–1684), ironmaster. *Oxford Dictionary of National Biography.* Retrieved 17 Mar. 2021, from https://0-www-oxforddnb.com.

[27] The debate is summarised in Shill, *Ironmasters*, pp.22-5.

from childhood, and this may well have been deliberately planned by Edward Sutton. The subsequent destruction of Dudley's iron-working sites in a flood in May 1623 led to his construction of Hasco Furnace (SB10), but by 1629, due to his Father's financial difficulties Dudley had lost access to both Himley and Hasco. Ownership of the iron-making sites with which Dud Dudley was or had been involved then moved to the Foley family.[28]

Dudley continued to experiment with innovative methods of metal production in later life, including lead smelting in Bristol in 1651 and tinplating in 1662, but all such efforts were ultimately unsuccessful. All later industrial activities of the Ward family as owners of the Dudley estate in terms of exploiting their mineral resources were handled through 'professionals'; the Ward family pursued their interest in national politics.

6.2.3. The Parkes family of Willingsworth.

The Parkes family are not well-known as iron-makers and do not figure in the major histories of the period. Attention was first drawn to their activities by Dilworth.[29] King argued that the family and their actions as ironmasters were an essential precursor to the activities of the Foley family, examined below.[30] The eventual heiress of the Parkes family, Anne Parkes, daughter of Thomas Parkes, married William Ward (known as William Ward of Willingsworth due to this inheritance from his wife) second son of Baron Ward of Birmingham in 1672. As their grandson eventually succeeded to the entire Dudley estate and the title, documentary evidence of their activities was merged with the much larger Dudley Estate archive, and subsequently, partially edited out.

[28] Dud Dudley also alleged that at this time he had had difficulties with 'riotous persons' invading his premises and destroying his equipment. Court provides a brief discussion and some evidence for such an attack. See W. Court, *The Midland Industries, 1600-1838*, Oxford, 1938, p.88 and footnote 2.
[29] Dilworth*, Tame Mills*, pp.37-41.
[30] King, 'S. Staffs', p.64.

As landowners, the Parkes family was based at Willingsworth Hall in the east of the large parish of Sedgely. Earlier, the family members are described as residents of Wednesbury and King suggests that they may have lived at the Delves.[31] The site of Willingsworth Hall was lost in the 19th century due to mining activities and was approximately half a mile to the west of Wednesbury Church. Within Staffordshire, it was perhaps second only to Wrottesley Hall in size in the 17th century, giving an indication of the family wealth, which seems to have been derived from their iron-production activities.

The first known family member was Thomas Parkes who died in 1602. Thomas, described as of Wednesbury, formed a partnership to make iron at various sites with William Whorwood of Sandwell Hall which included, amongst others, Perry Barr Furnace and Forge, West Bromwich Forge and Wednesbury Forge in the Tame valley.[32] West Bromwich and Wednesbury had been acquired by 1585. How Thomas came to have sufficient capital to purchase these sites is uncertain. He was known to have made nails, and perhaps traded in them, and this trade may have been the origin of his initial accumulation of wealth. Thomas bought Willingsworth Hall in 1598.[33] King describes him as 'an ironmaster working on a substantial scale'.[34]

Thomas's partnership with the Whorwood family did not go well. King provides a summary of the raids and counterraids carried out by their servants on each other's properties over an extended period between 1597 and 1598.[35] The dispute was eventually settled by Parkes

[31] King, 'S. Staffs', pp.64-5.
[32] Dilworth, *Tame Mills*, p.41. The Whorwood family is discussed below.
[33] Dilworth, *Tame Mills*, p.127.
[34] P.W. King, 'Wealden Ironmasters in the Midlands', *Wealden Iron*, 2nd series, Bulletin 21, 2001, p.23.
[35] P.W. King, 'Perry Barr and its watermills', *TSAHS*, 2006, pp.74-5. A similar account is in Court, *The Midland Industries*, pp.84-6, without being precise as to the cause of the dispute. Although not directly discussed, it is possible that the feud may have been over access to resources, specifically supplies of wood to produce charcoal. Whorwood sold his woodland to Parkes over the course of the next 10 years, which may give this supposition some credence. J.F. Ede, *History of Wednesbury*,

purchasing the Whorwood share of the partnership, probably as a result of a decision by William Whorwood to withdraw from the industry, perhaps in response to his lack of access to suitable woodland. Alternatively, he may have withdrawn from the partnership as his interests may have lain with other activities such as local (and national) politics and the management of his own land.

Thomas Parkes' son, Richard Parkes was involved in the production of iron as he is noted as having bought wood, presumably to make charcoal, at Perton near Furnace Grange (SB1) in 1606, and may therefore have been one of the earliest 'owners' or users (via a lease) of the site.[36] He bought the manor of Sedgley from the Earl of Arundel (Thomas Howard, 1585-1646) in 1607, which implied that the family had considerable resources, presumably derived from their iron production activities and profits. Amongst other places, Richard bought Perry Lower Wire Mill in the Tame valley from Thomas Lane in 1614 and held Rushall Mill where iron was made in 1617.[37] He controlled the family iron-making interests from 1602-1619, when these interests were sold to others, notably a partnership based in the Sussex Weald - this sale enabled Richard to pursue the interests of a 'gentleman'.

Richard was succeeded by his son, Thomas Parkes of Willingsworth.[38] Thomas, like his father, ceased to be directly involved in the production of iron after 1625 when his mills were sold to Richard Foley. However, Perry Lower Wire Mill in Perry Barr was still owned by Richard's son, John Parkes, as late as 1670, although not directly managed by him. The family stands, therefore, as another example of people who saw how to use the new technology of the blast furnace allied perhaps with some business acumen to make money by using hitherto

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Wednesbury, 1962, pp.124-5. It is possible that the Foley family, who eventually acquired most of the forges and furnaces run by the Parkes family learnt this lesson about the management of resources at an early point in their ownership of the sites.

[36] SRO D593/E/6/6 Leveson v. Parkes, Fisher, Bromefield, and Giles in the Court of Wards, May 1607.

[37] King, 'Perry Barr', p.75.

[38] Dilworth describes him as 'a gentleman'; Dilworth, *Tame Mills*, p.42.

un-valued resources before selling out in pursuit of other interests in a similar fashion to their near neighbours, the Wollaston family.

6.2.4. The Whorwood family.

The Whorwoods were a minor gentry family taking their surname from a wood called Horwood in 1268, part of Compton Hallows in Kinver where they became established, perhaps in the 14th century.[39] The family came to greater prominence (and wealth) with the career of Sir William Whorwood (c.1500-1545) Solicitor General and then Attorney General to Henry VIII. His nephew, Robert Whorwood (died 1590-1) a London mercer, bought Sandwell Hall and mill in 1569.[40] His son, another Sir William (died 1614) initiated the family's involvement in the iron industry. Dilworth notes that: 'He, like his contemporaries…the Parkes of Wednesbury and the Foleys of the Stour valley took an active part in the developing iron industry'.[41] William was associated with iron production at Perry Barr Mill and Wednesbury Mills, both in the Tame valley.[42] His partnership with the Parkes family at Perry Barr and its consequences have been discussed above. His estate passed to his son, Sir Thomas Whorwood, who continued as an ironmaster until his death in 1634. Thomas was followed by his son, Brome Whorwood, who was a less-than-successful steward of his inheritance and died almost penniless in 1684.[43] With no surviving legitimate children, Broome was succeeded by his nephew, Thomas Brome Whorwood, who sold the estate in 1701, ending the family connection with iron production.[44] All those individuals listed above,

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[39] VCH *Staffs*, vol. XX p.141.
[40] His will is at TNA PROB 11/77/553 dated 1591. A pedigree and brief description are given in Shaw, *The History and Antiquities,* vol. II pt. 1, pp.128-9. VCH *Staffs*, vol XVII, 1976, p.18 largely corroborates this account as well as giving a short sketch of the principal family members.
[41] Dilworth, *Tame Mills*, pp.37-8, 55-6.
[42] S.A.H. Burne, 'The Staffordshire Quarter Sessions Rolls. Volume 3 – 1594-1597', *CHS,* 3rd series, 1932, pp.298-9.
[43] He was married to Jane Ryder (1612-84) last mistress of Charles I and a royalist 'agent' toward the end of the Civil War. J. Fox, *The King's Smuggler: Jane Whorwood, Secret Agent to Charles I*, Cheltenham, 2010.
[44] Dilworth, *Tame Mills*, p.38.

despite at times being resident elsewhere, were extensively involved in the many forges and furnaces around Sandwell in the Tame valley leasing or renting sites to others in the industry.

Although primarily involved with mills in the Tame valley adjacent to the study area, the Whorwood family stand as another long-lasting example of 'minor' gentry who were able to successfully exploit the demand for iron in the west midlands for their own reward for almost a century.

6.2.5. The Paget family.

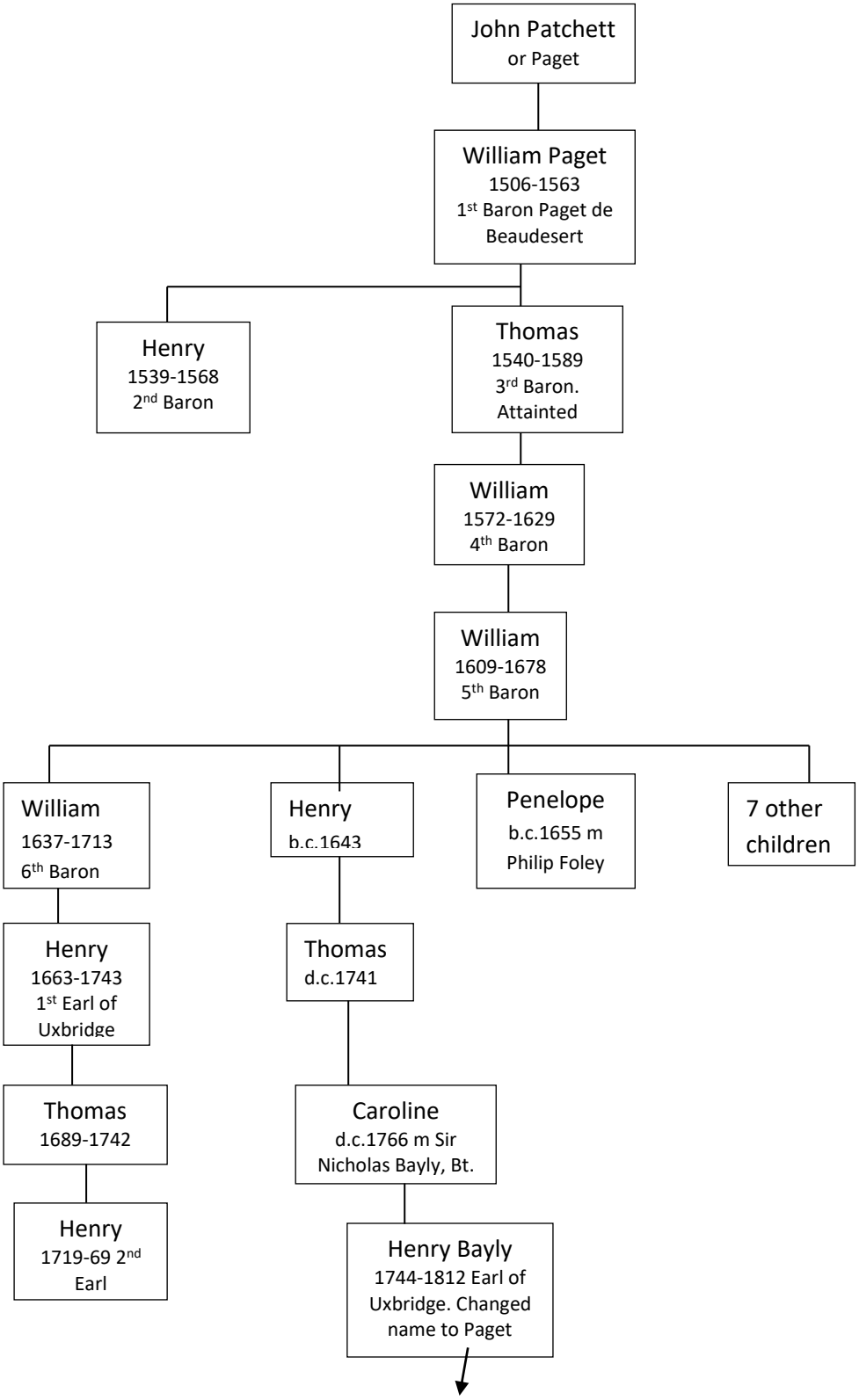
Turning to the comparison area, the activities of the Paget family stand out as worthy of further examination. William Paget (1506-63) was not born a member of the landed aristocracy. Some vagueness remains attached to his origins despite considerable research. Shaw noted that he may have been a relative of the Lewis Paget who was appointed to a Cannock Forest office in 1500. William was identified by Gannon as probably a son of John Paget, a Sergeant-at-mace of the Sheriff of the City of London. Gannon also noted potential familial links with Worcestershire and south Staffordshire. Hackwood, an eminent Victorian-era collector of Staffordshire oral histories, repeating what appears to be class-conscious denigrations of the Tudor era, identified him as the son of an un-named Wednesbury nail-maker.[45] Paget attended Trinity Hall, Cambridge and gained the confidence of Stephen Gardiner, royal administrator and Bishop of Winchester for Henry VIII, Edward VI and Mary I. The family tree is shown below.

[45] Shaw, *The History and Antiquities*, vol.1, p.213; Gannon, *Statesman and Schemer*, pp.13-15; Hackwood, *Chronicles of Cannock Chase*, p.70.

Figure 6.3. William Paget in approximately 1549.[46]

[46] National Trust, Plas Newydd collection. Artist unknown.

Figure 6.4. The Paget family. [47]



[47] Sourced from: https://www.genealogics.org Henry Paget (1663-1743) the 7th Baron and 1st Earl of Uxbridge was one of 'Harley's Dozen.' Henry Bayly, later Paget, was the Father of Field Marshal Lord Uxbridge, later Marquess of Anglesey, ancestor of the current Marquess.

Paget's own career as a member of the sovereign's 'inner circle' of trusted confidants has long been known. He survived Henry VIII's most dangerous later years and moved into the circle of Lord Protector Somerset during the early years of Edward VI's reign when he was ennobled as Baron Paget of Beaudesert in 1549. In 1546 he had acquired from Royal hands the manors of Cannock and Rugeley (amongst others) which gave him the status of landowner. It is unknown why Paget created a blast furnace on part of his land around 1560 or perhaps earlier in the previous decade when his career had had temporary eclipses under the reign of Mary I. Two inter-linked suggestions merit consideration: Paget would have known of the iron-working activities already in existence on the Chase; indeed, it is possible he may have sought to directly manage some of the forges or bloomsmithies there. Second, during his travels on behalf of Henry VIII he crossed the Low Countries to visit the Holy Roman Emperor and may well have personally observed European blast furnaces in operation in the area around Liège where they originated in continental Europe. As a counsellor to the King, and at times a conduit between the King and his army commanders in Scotland and France, he will have known of the military importance of ordnance, and, perhaps, therefore of the introduction of the blast furnace to the Weald of Sussex to produce cannon. These factors may have suggested to him that the introduction of the blast furnace to his iron-making operations offered an ideal opportunity to optimise the financial return from his otherwise economically-limited woodland in the manors of Cannock and Rugeley.

Paget continued to profit from his blast furnace sites after his retirement from public life with the accession of Queen Elizabeth I in 1558 through to his death in 1563. He spent most of his time in his house at West Drayton, Middlesex, so was probably not intimately acquainted with the iron-making activities on his estates. It is likely therefore that day-to-day management was in the hands of Beaudesert estate employees. On his death, his iron-

making sites passed to his son Henry Paget, who died in 1568 and afterwards to William Paget's second surviving son, Thomas Paget. Thomas was implicated in the Throckmorton plot and fled to France in 1583, dying in Brussels in 1590. From 1583 the crown took control of the ironmaking works which were leased to Sir Fulke Greville whose agents set about systematically felling as many trees as they could to make charcoal to feed the furnaces. The Paget family in the form of William Paget, the 4th Baron and son of Thomas, regained the estate in 1597 (and title in 1604). Greville's lease passed in 1610 to the Chetwynd family, discussed below, and direct Paget family involvement in iron-making seems to become limited from this point, perhaps because of the absence of trees on the Chase for charcoal production. The later role of the Paget family in the industry is that of a landowner, rather than innovator or entrepreneur, even with the considerable wealth at their disposal. The subsequent development of some of the blast furnaces on Cannock Chase had moved to the hands of the Chetwynd and Coleman families. Although the Chetwynd family was an example of minor gentry of the time, family members are considered below along with the Coleman family as part of the 'professional' cadre of iron-makers.

The one exception to this 'hands-off' approach from the Paget family is the creation of the slitting mill, probably at site RB5, Horns Pool – as opposed to the site in the village of the same name, discussed below. The site at RB5, Horns Pool was only the second example of a slitting mill in England – the earliest was built at Dartford in Kent in 1590. Quite why William Paget, 4th Baron, chose to build this operation, a relatively new technology at the time, is not clear.[48] King argued that it was in fact the Coleman family, by now experienced in blast furnace usage and iron manufacture, that provided the impetus for the creation of the

[48] King, 'S. Staffs', p.71, derives a date for its construction at about 1611 using evidence taken from TNA C 2/Chas. I/C5/67 and C 21/C45/18. See also below.

activity as they had leased the principal iron-making sites from Lord Paget and claimed to have visited the first site in England at Dartford, Kent.[49] The issue remains unresolved.

The later history of the Paget family was not entirely devoid of entrepreneurial flair – the 6th Baron, William Paget (1637-1713) in 1699 obtained an Act of Parliament to extend navigation on the River Trent from Nottingham (where the river was obstructed by shallows) to Burton-on-Trent (where he had considerable landed interests) although it took until 1711 for this to be effected.[50]

6.2.6. Summary of the 'pioneer' phase and families.

The initial role of gentry families in supporting iron production in the study area in the second half of the 16th Century is shown by the examples of the Wrottesley, Parkes and Sutton families. The Paget family complete the picture for the comparison area. The evidence cited demonstrates that gentry family involvement began in the later part of the 16th century, with the Paget family being active from at least 1560. The Parkes family may have had a similarly early origin, but ceased involvement by 1625 due to the combination of the need to place the day-to-day activity of iron-production on what would now be described as a sounder management footing and the channelling of their own interests elsewhere. Both the Sutton and Paget families seem to have been the initiators of the change in the landscape by building blast furnaces through harnessing streams for power. Both families seem to have been driven by financial necessity – clearly so in the case of Edward Sutton, less so perhaps in the case of William Paget. As William Paget was the initiator of the use of blast furnaces in Staffordshire, it is likely that the subsequent changes in the Staffordshire landscape may owe their origin to his introduction of it, and the blast furnace's obvious and immediate success, especially in financial terms. This example, plus

[49] King, 'S. Staffs', p.72.
[50] See chapter 5. He was also brother-in-law to Paul Foley – see below.

that of Edward Sutton in Dudley and surrounding areas, and perhaps an understanding of the potential revenue to be gained, acted as a spur to the 'lesser' gentry such as the Wollaston, Wrottesley and Parkes families to make similar investments. All those who chose to copy Sutton and/or Paget may have had their efforts founder over access to the key resources that both Sutton and Paget initially had in abundance – land containing considerable quantity of trees to make charcoal.

Initially, all these gentry-family landowners seem to have taken an active part, akin to that of a modern-day board of directors, in a family-run business utilising their own economic resources and perhaps understanding of the growing market for the uses of bar iron, their principal product, in their immediate vicinity. The structure had the effect of making, notably in Cannock Chase, substantial changes to the landscape. An alternative view, more relevant to the study area, is that these families developed the landscape in a more low-key way by converting existing mills into iron-manufacturing sites. Chapter 4 demonstrated that substantial change to the landscape by the wholesale or widespread destruction of timber was rare – the benefits of the timber coppicing system were quickly understood and practised. Chapter 5 has revealed that there were resulting additions to the landscape in the form of new routeways to mill sites, but these were minor.

As these gentry families gained a greater understanding of the practicalities of iron production, they do seem to have been exposed to the growing realisation that successful ironmaking was a full-time activity and operated in a steadily-growing market of increasing complexity. That realisation led them to seek what today would be labelled a more professional approach to the marketing of their end-product, bar iron, in the form of a managing agent. In the cases noted here, these families typically chose to sell-on the enterprise to others of a different social background. In this way, it is suggested that gentry

ownership of the means of iron production altered to be that akin to ‘rentiers’, and that their effect on landscape development was essentially conservative rather than one of radical change.

6.3. The rise of the professionals.

Once the ‘pioneer’ aspect of ironmaking passed out of the hands of the gentry families, the industry was managed by a second group of families, who brought a more ‘professional’ approach to the management of the resources, notably charcoal, necessary to produce iron through a blast furnace. Such an approach assumed a grasp of the principles of the market for the products to make cast iron, and, in turn, an understanding of the market for the produce of the furnace and forge, bar iron or pig iron. Finally, an improved awareness of the methods of day-to-day control of the work force using what would now be described as site managers was also required.

These families of professionals, in the study area, and the wider regional market of the midlands were, for over a century, dominated by the Foley family of Dudley and Stourbridge. The Foleys were active in the period 1620-1725 when their direct involvement in the iron ‘business’ waned in favour of land management and their regional and national political activities. Other families that had a lesser impact certainly existed, for example the Jennens/Jennings family based in Birmingham, and their activities overlapped with the timescale of the Foley family, but by comparison had little impact on the landscape of the study area, or, indeed, the wider region, such was the dominance of the Foley family. In the comparison area, the Chetwynd and Coleman families, rivals to the Foleys, who took over the sites initiated by the first Lord Paget, will be briefly considered.

6.3.1. The Foley family.

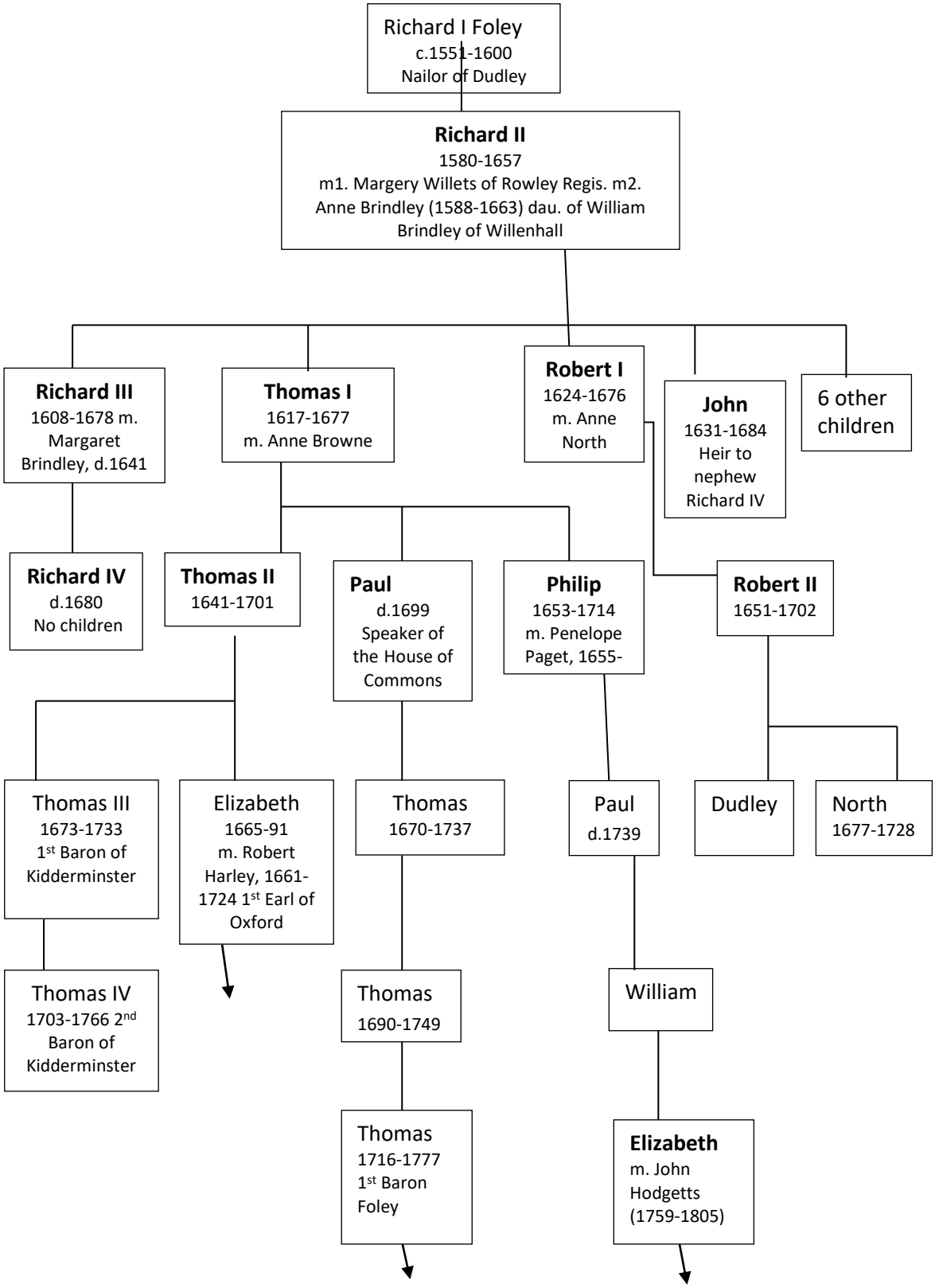
'the charcoal iron industry in Britain during the seventeenth and early eighteenth centuries was dominated by the activities of … the Foley family.' [51]

As well as considering some individual members of the Foley family, this section investigates those managers who worked with the family and how they were incorporated into a wider vision of Foley family industrial success. The family chart shows these relationships, as do the tables; both are below. The wider connections of the family in the surrounding region (including developing the industry in the north of Staffordshire) will also be discussed, incorporating attempts at what is now described as vertical integration within the market, along with their efforts to control that market through their warehouse in Bewdley and their trade links to London.[52]

As the family, both individually and collectively, began to understand the market for bar iron and its potential in terms of finished goods, especially ordnance, the family developed trading relationships with longer-established iron manufacturers from outside their immediate area, notably the Weald of Kent.[53] These linkages show how the family developed its understanding of market economics, local, and later national politics, as well as the comprehensive management of money. All these connections made by the Foley family and its members had an influence on the development of the industry, the markets in which it operated, and therefore the development of the landscape in the study area.

[51] L. Ince, *The Knight Family and the British Iron Industry*, Birmingham, 1991, p.1.
[52] The Bewdley warehouse is discussed in chapter 5.
[53] Hodgkinson, *The Wealden Iron Industry*, pp.67-77.

Figure 6.5. The Foley family[54]



[54] Simplified family tree. Sourced from Peacock, *The Seventeenth Century Foleys*. Ironmasters discussed herein are named in **bold**.

Because of the wealth of documentation generated by the several generations of the Foley family involved in the industry, the Foleys have been the subject of considerable research.[55] This section will not repeat what is already known, but utilises these reviews to concentrate on the likely impact of family members on the development of the landscape in the study area, and how, as 'professionals' under the proposed typology, they sought to modify the landscape and its communication routes to reflect their control of the growing market for iron.

Richard (I) Foley (c.1551-1600) is the first known Foley family member associated with the iron industry. He seems to have dealt or traded in nails, rather than making them himself. He was not particularly wealthy, and at the time of his death his will showed that he had the not-unexpected combination of an agricultural small-holding and a smithy.[56]

Richard II Foley, 1580-1657.

Richard's son, Richard (II) Foley was baptised in March 1580 and appears to have traded in nails from an early date. By 1616 he had become Mayor of Dudley, which, even though it was a small town by English standards at the time, indicated that a degree of social pre-eminence and financial substance had been achieved. It is from this time that his acquisition of blast furnaces and forges began. As a member of a localised small merchant community, it remains debatable how he financed these purchases – one assumption is that he was both

[55] Palfrey, 'The Foley's of Stourbridge', pp.1-7; Downes, 'The Stour Partnership, 1726-36: A Note on Landed Capital in the Iron Industry', pp.90–95; Johnson, 'The Stour Valley Iron Industry in the late Seventeenth Century', pp.35-46; Johnson, 'The Foley Partnerships; the Iron industry at the end of the Charcoal era', pp.322-40; Schafer, 'Genesis and Structure of the Foley Ironworks in partnership' of 1692', pp.19-38; M. Rowlands, 'Two Seventeenth Century Ironmongers', *WMS*, vol.7, 1974, pp.18-22; Schafer, 'A Selection from the Records of Philip Foley's Stour Valley Iron Works 1688-74, part I.' Schafer, 'A selection from the Records of Philip Foley's Stour Valley Iron works 1688-74 Part II, pp.1-42; Peacock, *The Seventeenth Century Foleys*. This vast amount of Foley family material (still only partially catalogued in Hereford Archives and Record Centre) may not represent the entirety of the family documentation. Court notes that a later Foley, HTH Foley, advised him that some papers had 'recently' (perhaps in the early 1930s) been lost in a fire at Stoke Edith, the Foley family home – Court, *The Midland Industries*, p.108.

[56] Peacock, *The Seventeenth Century Foleys*, p.9. His will shows a residue slightly more than £5.

astute in investing his profits from nail trading and an opportunist, acting when the chance of a successful acquisition was presented, perhaps in tandem with others similarly minded. It seems that Richard initially leased forges rather than buying them, thus minimising his exposure to problematic financial positions.

His first known action of this nature was the leasing of Cradley Forge (just outside the study area) from Lord Dudley in 1614, through Lord Dudley's eldest illegitimate son, Robert Dudley, elder brother of Dud Dudley. The connection continued with Dud Dudley. As a result of the 'May Day floods' of 1623 which destroyed Dud Dudley's activities, Richard also acquired Greensforge (SB5) in 1624 and Himley (SB8) the following year.[57]

Another glimpse of Richard's activities and capacity to increase his business sphere of operations is provided by King.[58] He noted that Thomas Parkes sold his iron-making businesses to a Sussex Weald-based partnership, Middleton, Goreinge and Company. The partnership survived until 1622 with Thomas Nye, also from Sussex, taking over. He was later in partnership with 'one Mr Ffolie' who cannot really be anyone other than Richard II Foley as the only person of that name in the vicinity at that time and with a knowledge of the iron business. It may be here that Richard Foley acquired more of the knowledge and skills – and perhaps capital – to steadily expand his business interests. When Thomas Nye died in 1631 this left Richard as 'last man standing' and the most important 'player' in the iron-producing 'business' in the area.

In 1626, Richard II had acquired iron-making sites from the Parkes family as noted in the discussion on them above. These developments took his trading 'sphere of influence'

[57] See above in the discussion under Dud Dudley.
[58] P. W. King, 'Management, finance and cost control in the Midlands charcoal iron industry', *Accounting, Business and Financial History*, vol.20,3, 2010, p.388.

outside the Stour/Smestow basin for the first time and marked a significant step in his control of the local production of bar iron and the beginning of a regional horizon to his ambitions. The site purchases are likely to have included Grange Furnace (SB1), although the first unambiguous reference to Foley ownership is not until 1636.[59] The purchase may have led to the beginning of the change in the road pattern in the vicinity of the furnace alluded to in chapter 5, demonstrating even at the micro-level that the family's industrial activity was altering the nature of the landscape and routes through it.

Shortly after, in a key move in 1628, Richard consolidated his control of the 'local market' by establishing a slitting mill on lands owned by his second wife's family at the Hyde, Kinver. The mill was the first of its type in the study area, and the second in the midlands outside site RB5 in the comparison area. Apart from access to iron ore, Richard Foley now controlled the smelting of ore, with appropriate access to ongoing and regular supplies of charcoal, the creation of bar iron and due to the slitting mill, the ability to sell-on cut bar iron for use in nail manufacture. He had integrated input and output from his works and begun to dominate the regional market by controlling the supply of bar iron from which all finished iron goods were made.

The construction of the slitting mill, and the relationship with the Brindley family is likely to be the basis of the 'fiddler Foley' legend current in the late 19th century which suggested that Richard II Foley disguised as a wandering fiddler of simple mind, travelled to Sweden, and stole the knowledge of the mechanism and operational techniques of a slitting mill. King has comprehensively debunked this myth, suggesting the relationship between the Foley and Brindley families is the origin of the story. Both Court and Peacock speculate, without offering any evidence other than co-incidence of timing, that it is this "Brindley connection",

[59] King, 'Grange Furnace', p.45.

beginning with Richard's marriage to Anne Brindley around 1610, that enabled Richard II Foley to make the transition from nail manufacturer and dealer to ironmaster through the social and financial support of the Brindley family. An alternative to the 'Brindley hypothesis' is that Richard II Foley was working as a professional clerk (or manager) for other iron manufacturers, perhaps the Parkes family, or their short-lived successors, and crucially, trading on his own account. Unfortunately, the Foley family archives do not provide any evidence to support or contradict this view. Both families also seem to have been Puritans in this era, emphasising their common social and religious interests. At the Hyde, Kinver, the family also began to change the landscape with the creation of watercourses to help power the slitting mill as well as finding themselves in trouble with their neighbours for excessive use of the roads with traffic in iron goods. [60]

An insight into Foley's methods comes from his appearance before Star Chamber some years later in April 1636. Although only a partial record of the case survives, Foley's rivals alleged that he was engrossing, seeking to monopolise the market by acquiring all the bar iron output from blast furnaces in the study area and beyond.[61] These activities would have enabled him to set his own price for his products. As King noted, the evidence such as it is, does tend to confirm that Richard Foley was guilty of this practice, which may go some way to accounting for his business success.

The Foley 'empire' survived the vicissitudes of the Civil War, even though Richard II Foley was forced to provide iron and ordnance for the King as Royalist forces occupied the west midlands. After 1646 he began a period of cautious re-consolidation and trading under what

[60] King, 'S. Staffs', p,63. Court, *The Midland Industries,* p.108; Peacock, *The Seventeenth century Foleys*, p.11.

[61] The case is briefly discussed in King, 'S. Staffs' p.74 who takes the view that the bulk of the evidence against Richard Foley came from Walter Coleman through his son John as the principal witness who was by now, perhaps because of these Foley activities, having difficulty in running his own forges profitably. The Coleman family is discussed below.

was to become the Commonwealth, providing much iron for the government and its subsequent wars, notably against the Dutch (see also Thomas I Foley, below). This enabled him to keep all his forges and furnaces working and, as chapter 4 demonstrated, he used this period to ensure ongoing supplies of charcoal. His actions can be seen to have perpetuated the *status quo* in terms of landscape development, as it was to his advantage to ensure that as much land as possible remained wooded, and under active woodland management, despite the market pressures for change, partly generated by the additional provision of iron tools and materials to a growing market, made with Foley iron.

Throughout his long life, Richard II Foley (d. 1657, aged 77) made astute use of the opportunities presented by his large family to profitably manage his business in the wider commercial world. These linkages are set out in the table below. In the following section the careers of three of his sons are examined, Richard (III), Thomas (I) and Robert (I). The careers of key individuals in the subsequent generation (Richard's grandchildren) will then be considered, along with the impact of key managers employed by the Foleys, to cast light on the development of the market and their impact, singular and collective, on the landscape.

Table 6.1. Immediate family connections of Richard (II) Foley, 1580-1657.[62]

Name	Relationship to Richard	Marriage	Notes
Margery Willetts (1581-1609)	First wife		From Rowley Regis, adjacent parish to Dudley.
Alice Brindley (1588-1663)	Second wife. Married c.1610.		Daughter of William Brindley, ironmaster, Willenhall, Staffs.[63]
Margery Foley Born 1604	Daughter by Margery	Married William Whyte	
Katherine Foley Born 1606	Daughter by Margery	Married Thomas Cumberlege	
Richard (III) Foley (1608-78)	Eldest son and last child of Margery.	Married Margaret Brindley, younger sister to his stepmother, Alice, c.1628.	Moved to Longton (near Stoke) in North Staffordshire and practised as an ironmaster utilising the local ironstone and workforce skills in the vicinity.
Anne Foley (born 1611)	First of 10 children by Alice	Married William Normansell of Wolverhampton.	The Normansells were a significant locally-based iron-dealing family who had dealings with Richard II and later Thomas I (see below) through to the end of the century.[64]
Edward Foley (1613-1656)	Son		Fought in civil war. Not involved in iron trade.
Priscilla Foley (1615-1687)	Daughter	Married Ezekiel Wallis of Bristol, 1635. Married secondly Henry Glover.	Ezekiel and his father (also Ezekiel) represented the Foleys in Bristol regarding trade on the River Severn for a large period in the 17th century. Henry is discussed below.
Thomas (I) Foley (1617-1677)	Son	Married Anne Browne, daughter of John Browne of Spelmonden, Kent. Date of marriage before 1641, possibly 1638.	Thomas was the eventual principal heir to his father. Both Thomas and Anne's family are discussed below. John Browne was gunfounder to Charles I and this marriage enabled Richard (and Thomas) to understand how iron was used to produce ordnance and how to work in the London iron market.

[62] Details of the relationships are taken mostly from Peacock, *The Seventeenth Century Foleys*, as is the discussion on Richard II's children, Richard III, Thomas I and Robert I.

[63] Alice's younger sister, Margaret married Richard (III) Foley, son of Richard (II) Foley by his first wife Margery. Joanna, the third daughter married an Edward Foley of Bristol (who may have been the Edward known to be the younger brother of Richard (II)). George Brindley, Alice, and Margaret's brother, worked extensively with Richard (II) Foley. George was based at The Hyde, Kinver and it is likely that this relationship influenced the creation of the Foley's slitting mill there.

[64] Peacock asserts, without citing specific evidence, that the Normansells took over, for some period in the 1630s, on a temporary basis, the Stour and Smestow complex of Foley-owned furnaces and forges; Peacock, *The Seventeenth Century Foleys*, p.50.

Honor Foley (1619-?)	Daughter	Married Henry Prittie (died 1671)	Henry served in the civil war for parliament. Later settled in Ireland.
Margaret Foley (1622-?)	Daughter	Married Edward Dyson	Edward was a lawyer and presumably much used in land and other legal dealings.
Robert (I) Foley (1624-1676)	Son	Married Anne Blurton. Married secondly Elizabeth Ackworth	Became an iron dealer (ironmonger) developing links with Worcester, Bristol, and in the acquisition of government contracts in London. His connections are noted below.
Samuel Foley (1626-1678)	Son	Married Elizabeth Richards	Fought for parliament in the civil war. Later moved to Ireland.
Sarah Foley (1629-?)	Daughter	Married John Baker	Lived in Stourbridge close to Richard (II) Foley's house. Married twice.
John Foley (1631-1684)	Son		Became a 'turkey merchant' specialising in trade with the Levant. Inherited Longton ironworks from his nephew, Richard IV Foley.

Table 6.1 shows that three of Richard's six sons were involved in supporting his business interests, and a fourth, John, acted as a merchant with a more tangential involvement.

Richard III Foley (1608-78).

Richard III as his father's eldest son was involved in the industry from an early date, and nearly thirty years of their active adult lives overlapped. Although Richard's impact on the study area is believed to be marginal, his career is worth consideration for the light it shines on the Foley family approach to the iron business.

When Richard II moved from Dudley to Stourbridge, Richard III remained behind, focussed on the family interests there. Although affected by the economic dislocation of the early part of the Civil War, the subsequent peace enabled Richard III to acquire Longton manor in north Staffordshire, conveniently sited to access the growing iron industry there.[65] Richard III

[65] Richard also bought Netherton Hall from the financially-hard-pressed Robert Dudley, elder brother of Dud Dudley (see above).

established forges and furnaces in the area which became the base for the later 'Staffordshire Partnership' of other Foley family members (discussed below).[66] He died in 1678 and was succeeded by his own son, another Richard (IV) who died without direct heirs in 1680, when the estate passed to his uncle John Foley (see table 7.1).

Thomas I Foley (c.1617-77).

'He had a horror of laziness in others and rejected it in himself completely'.[67]

Thomas was Richard II Foley's third son and the person who had the most impact in terms of his activities in the iron market on the study area, and, by extension, the development of the landscape. He also introduced, through his marriage and the connections that it provided, influences from other iron manufacturing areas, notably the Weald. His wealth also initiated what was to become a political and landowning career that ultimately resulted in the family in subsequent generations concentrating on land management and politics rather than iron production.

In 1637, probably aged 20, Thomas took responsibility from his father for Whittington Forge on the River Stour in Kinver, just outside the study area, but sufficiently close to it to give Thomas an interest in the maintenance of the local tree cover in the remnants of Kinver Forest to produce charcoal. He subsequently acquired the family storehouses at Wribbenhall and Bewdley and then, with his brother-in-law, William Normansell, created a partnership, a legal and financial device which was used extensively by Foley family members to maximise their impact on the supply of bar iron for the growing midlands market. The first known action of the partnership was to lease Furnace Grange (SB1), in 1639. Richard had had access

[66] Dr. Plot provides an excellent description of the workings of these forges – Plot, *A Natural History,* pp.160-4.
[67] From Thomas' memorial in Great Witley church, Worcs. The Protestant Divine Richard Baxter (1615-91) also appreciated his qualities – 'a religious, faithful man of unquestioned fidelity and honesty' - M. Sylvester, *Reliquiae Baxterianae*, pt. 2, London, 1696, p.93.

to the site for some years previously as noted above but this move enabled him to spread some of the risk associated with access to the site. Swindon (SB3) was acquired by 1644, and with the end of the Civil War (at least in military terms) Greensforge (SB5) by 1646. Both latter sites were either bought or transferred from his father, Richard's businesses.

Thomas continued to expand his business after the end of the civil war. Schaffer notes that for the period 1648-75 the Foley accounts show the purchase or lease of 97 separate properties or rights of way varying from mills and manors to forges and iron works across a wide spread of the midlands from Tintern in the Forest of Dean (Gloucestershire) through to Meir Heath in north Staffordshire.[68] The acquisition of forges and woodland in the Forest of Dean gave Thomas a virtual monopoly in the area and allowed him to 'export' the bar iron to 'feed' the demands of his slitting mill at The Hyde and midlands iron market more generally. Purchases had added to the Stour/Smestow and Tame valley complexes of forges and furnaces inherited from Richard II to give Thomas a controlling interest in the landscape there. This makes Thomas, aside from the earlier barons of Dudley and the royal household officials, probably the most influential individual to have had 'oversight' of the development of the landscape in the study area. He was perhaps also the wealthiest individual – certainly he was the wealthiest Foley family member, and until the exploitation of the coalfields on the Dudley estates in the 19th century, the wealthiest ironmaster or proto-industrialist - to affect the landscape.

[68] Schaffer, 'Genesis and Structure of the Foley 'Ironworks in Partnership' of 1692', p.20. For rights of way, see chapter 5.

Figure 6.6. Thomas Foley, 1618-77 by William Trabute, c.1670.[69]

[69] National Portrait Gallery. Used with permission.

Thomas I was active in the 1650s and especially the 1660s in buying or leasing woodland to ensure the regular supply of charcoal for what had become an extensive business organisation across several counties and into Wales. These actions demonstrate an individual seeking to control and manage aspects of the landscape not for pleasure, as with the example of aristocratic game parks, but for his own economic ends. However, like aristocratic landowners, his interests were essentially conservative as he sought to retain the *status quo* in terms of woodland cover rather than destroy it for short-sighted immediate economic gain. His purchases of estates in the 1650s was also with an eye to their woodland, such as the Herefordshire manors of Norton, Tedstone Delamere and Gateley.[70] These complemented extensive purchases in Worcestershire which had the same aim.

Thomas's marriage to Anne Browne, daughter of John Browne of Spelmonden in the Weald of Kent was outside the 'local linkages' pattern set by his father Richard II in terms of the marriages of his siblings - see table 6.1.[71] However, this marriage marked a connection between the Foley family and the long-established iron businesses of the Weald of Kent and Sussex as John Browne was a gunfounder and supplier of cannon to the naval dockyard at Chatham. Thomas in effect acted as his father-in-law's junior partner from the point of his marriage although remaining in the midlands until it was felt sensible to move to London in 1645, to judge from the baptismal locations of his children.[72] In 1645 Thomas oversaw his father-in-law's iron works at Brenchley in Kent and won several contracts in 1646 and 1647 for Parliament to provision the Navy with ordnance. He became indispensable to his father-in-law (until John Browne's death in 1651) in running the business and continued to use it to establish connections with the London 'end' of the iron trade as well as making relationships with the Navy commissioners, doubtless used later by his brother Robert (see below).

[70] See chapter 4, table 4.3 for the details.
[71] The precise date of the marriage is unknown but may well have been in 1638 when Thomas attained his majority or shortly afterwards.
[72] Peacock, *Seventeenth Century Foleys*, p.53.

Thomas' direct role in the ordnance business ceased in 1658 when he handed his share to his brother-in-law, George Browne. He shared out his business amongst his three surviving sons in 1669.

It is appropriate to finish this section on the career of Thomas I Foley by briefly considering his role in local and national politics as this was the precursor to the family's change of direction in the 18th century. Thomas had invested much of the profits of his activities in land – there being no other suitable place to deposit them during this period.[73] These purchases brought with them other responsibilities. Thomas, perhaps initially against his will, was elected Sherriff of Worcestershire in 1653 and became an MP in 1658 and again after the Restoration in 1660. Local office and political involvement gave him another outlet, which took much of his time and energy, and set a pattern for his descendants. By the 1690s five Foleys were MPs, his son Paul being Speaker of the House of Commons, and the history of parliament shows 25 Foleys in total have been members, all relatives of Thomas. The activities of Thomas' children are discussed below.[74]

Robert I Foley (1624-76).

Robert was Richard II Foley's fourth son, and although not as dominant in the industry as his older brother Thomas, was also a successful iron industry 'operator'. Robert managed to win Government contracts, by methods unknown. Rowlands notes, "by 1661 the largest single 'plum' in the ironware trade had fallen…From 1661 the principal contractor for nails, locks and [hull] scrapers needed by the Royal Navy was Robert Foley of Stourbridge,

[73] Thomas bought land from families who needed to sell through financial distress, not from those who had had their land confiscated by Parliament. In this way he was able to retain his purchases after the Restoration. Amongst his earliest purchases was the manor (and, significantly, woodland, remnants of Kinver Forest) of Compton Hallows, home of the Whorwood family (see discussion above). Thomas's most significant purchase was Witley Court, Worcestershire, in 1655.

[74] During this period Thomas established his major charitable activity, the creation of the Hospital School, Oldswinford, Worcestershire. This is probably his most long-lasting social legacy.

ironmonger".[75] This contract was held by Robert throughout his life and inherited by his son (Robert II) until some point in 1690 when it was lost, and transferred to Ambrose Crowley. Flinn noted that the earliest Crowley family government contract seems to be dated to 1694 and suggests that Robert II Foley may have been 'ousted' from his position on political grounds associated with his Presbyterianism (and the arrival of William III and Mary II) by 1690 when mentions of Robert II cease.[76] Robert II's death in 1702 marked the cessation of Foley family members acting as ironmongers or dealers. It is possible that the political dimension, noted further below in the discussion on Thomas I Foley's children may have contributed to the otherwise difficult-to-establish reason for the decline of interest by Foley family members in the iron industry, which began in this period.

Both Robert I and Robert II had links with another Stourbridge ironmonger family, the Winchursts, and used a Winchurst family member as their London agent, including dealing with the Navy contract, enabling both Roberts to spend more of their time dealing in iron in Stourbridge and Bristol.[77]

[75] Rowlands, *Masters and Men*, pp.13, 88. Robert I Foley took the contract from Robert Ingram who tried to win it back several times using price reductions. The transfer of the contract to the Foley family may be principally connected with changes brought about by the restoration of the monarchy.
[76] Flinn, *Men of Iron*, p.149.
[77] Rowlands, *Masters and Men*, pp.13,87. At one point Robert Foley owed William Winchurst £7,100 for iron rods slit at the Hyde slitting mill. It is noteworthy that the Foleys, perhaps along with other families from the area sought to establish their own 'allies' in London rather than seek to enter business relationships with London citizens. Thomas I's marriage is the only clear exception.

Table 6.2. Selected relationships of Robert I Foley and descendants.[78]

Name	Relationship to Robert	Occupation and career	Notes
Anne Blurton	1st wife	Died in 1673. Family connections unknown.	
Elizabeth Ackworth	2nd wife	Widow of William Ackworth, a Royal Navy commissioner.	Widow of a key Navy contact.
Anne (born 1648)	Daughter with Anne.		Married Edward Bentley. No connection with iron industry.
Robert II (1652-1702)	Son with Anne.	Succeeded his father as an Ironmonger (dealer).	Married Anne North, daughter of Sir Dudley North (later Lord North). No known iron industry connection but linked to the Royal Navy.
Honora (b.1656)	Daughter with Anne.	Married John Master.	The Masters were a family of London-based merchants known to be connected with sales of iron. John worked with both Robert I and Robert II.
North	Son of Robert II and Anne North, grandson of Robert I.		
Dudley	As above. 2nd son.		

Robert I Foley's death, aged 53 in 1677 was unexpected, and his will showed that he was owed over £10,000 in uncollected debts from his customers, indicating the large amount of money the iron trade could offer to those engaged in it.[79]

[78] Sourced from Peacock, *Seventeenth Century Foleys*, pp.85-95.
[79] Rowlands, *Masters and Men*, p.90.

Thomas I Foley's children.

Thomas I Foley had three children (out of six in total) who took an active role in iron industry. These were Thomas II (1641-1701) Paul (1645-99) and Philip (1648-1716). The career of Philip is examined here in more detail, as it had the most influence on the development of the landscape in the study area.

Thomas II Foley, 1641-1701.

Thomas II, as the eldest son, inherited the Great Witley estate, the primary family holding from Thomas I. From around 1669, following Thomas I's decision to re-organise his business, Thomas II became an 'independent' ironmaster. He took control of the Forest of Dean businesses which Thomas I had acquired. These forges and furnaces, other than as a source of pig or bar iron for the midlands centres of production owned by his brothers, had little to do with the study area, so Thomas II's career is not followed further.

Paul Foley, 1645-99.

Paul Foley is better known as a politician than an ironmaster as he was speaker of the House of Commons, 1695-8. Like his brothers Thomas II and Philip, he benefited from the division of his father's business interests in 1669 and took over responsibility for the former Royal ironworks in the Forest of Dean, buying the sites still left in Royal hands in 1674. He leased additional works in the area to expand his business. The principal output from his ironworks was high-quality pig iron which was sent to the forges in the study area under the control of his younger brother Philip. His real interest seems to have been politics, entering Parliament in 1674, only five years after taking ownership of the iron-making sites presented to him by Thomas I and remaining for most of the year in London – a practice which he continued, with few exceptions, up to his death. This habit led to him making greater use of managers for his works. Because of political difficulties with the ministers of Charles II and later James

II, Paul Foley withdrew from the ironmaking business for a while, leasing his works in the Forest of Dean to his managers.

Philip Foley, 1648-1716.

'…the leading ironmaster of his time'.[80]

Like his father, Thomas I Foley, Philip had a profound impact on the development of the landscape of the study area, perhaps second in scale to him. Like his brothers, Philip received his third of his father's business in 1669, having been 'trained' by his father from perhaps as early as his 14th year. His portion comprised the furnaces and forges of the Stour and Tame valleys, including those in the study area, a relatively geographically- and economically-coherent unit, although his forges were reliant on his brothers Paul and, to a lesser extent, Thomas II, for a regular supply of pig iron from their Forest of Dean furnaces.[81]

Philip's marriage in 1669-70 to Penelope Paget, youngest daughter of William, 6th Lord Paget (1609-78) brought him, as part of her dowry, access to iron-making sites in the comparison area. These included RB1, RB3 and RB5 and probably led to the development of the site at the village of Slitting Mill (RB7) to handle the flow of bar iron from these furnaces and forges and other works in North Staffordshire into it. Philip bought the manors of Kinver and Stourton, adjacent to Prestwood Hall where he lived with Penelope, from the by now highly-impoverished Whorwood family. Sensibly, he included access to all timber in his arrangements. Ultimately, and probably because of these purchases, he also, with Lord Dudley, sponsored the enclosure of much of Ashwood Hay, acting again to shape the development of the landscape. This purchase may also have included the site of Wall Heath Forge (SB9), which, given that little is known of its earlier history, may have been developed

[80] Schafer, 'Stour Valley ironworks, Part II', p.xi.
[81] I. Oliver, 'Philip Foley', *TB,* vol.35,1, 2001, p.61, who argued that Philip was the more effective businessman when compared to his father and grandfather.

at this time to exploit the steep fall of the stream in the area as noted in the stream profile in chapter 2.

Schaffer used the Foley archives to illustrate the novelty, for the time, of the very effective and concise method of accounting that Philip is believed to have developed.[82] This system enabled Philip to assess the value, in terms now described as profit and loss, of his forges and furnaces. The analysis enabled Philip to identify under-performing sites in his organisation, and it is not a surprise that the relatively small sites in the study area came under close examination. It is likely that this scrutiny accounts for Philip's offer for sale of Furnace Grange and Heath Forge (SB1 and SB2). The subsequent sale of these sites for £6,000 to a partnership of Sir Clement Clerke and Alderman John Foorth of the City of London is discussed below. The Tame Valley section of his ironworks were sold the following year to Humphrey Jennens of Birmingham. Peacock suggests that a subsidiary motive for these sales was Philip's Parliamentary ambitions, supporting the case for a protestant succession to Charles II after 1679.[83]

Such a change in operational management was only possible by Philip, like his brother Paul, placing more reliance on others to run the day-to-day management of his sites, thus enabling him to be at a distance from such matters. Philip, like his father and grandfather before him, made extensive use of his family and social networks to enable his business operations to work effectively. The relationship with Lord Paget, his father-in-law, primarily political in nature, has already been touched on. Other examples, more operationally focussed, can be summarised in the following table.

[82] Schafer, 'A Selection from the Records of Philip Foley's Stour Valley Iron Works 1668-74 Part I', pp.1-128; Schafer, 'A Selection from the Records of Philip Foley's Stour Valley Iron Works 1668-74 Part II', pp.1-42.
[83] Peacock, *Foleys*, p.165.

Table 6.3. Selected working relationships of Philip Foley.[84]

Name	Relationship to Philip	Occupation and career	Notes
Hester Brindley	Richard, Hester's late husband was probably a nephew of Philip's grandmother.	In 1668 was a tenant of the Foleys at Compton (see above) and a partner at the slitting mill at the Hyde, Kinver succeeding Richard.	Sometimes known as Esther.
Richard Brindley	Probably Richard son of Hester (above) and her husband Richard, thus a 2nd cousin.	Associated with the slitting mill at The Hyde.	Referred to as 'Cozen' Brindley in Philip's accounts.
Anne Foley	Mother		
Edward Foley	Possibly eldest son of late great uncle John Foley (d.1648) and thus a second cousin.	Role not clear. May have been an iron trader.	
John Foley (1631-74)	Uncle	Traded with the Levant, but also had an interest in ironworks in north Staffordshire.	North Staffordshire works became 'the Moorlands partnership'.
Paul Foley (1650-99)	Older brother	Operated Forest of Dean ironworks after 1669 providing pig iron to Philip. See above.	Speaker of the House of Commons 1695-9.
Richard III Foley (1608-74)	Uncle	Based at Longton and initial owner of ironworks in North Staffs. See above.	
Richard IV Foley (1632-80)	Cousin	Partner with Philip in working the Meer Heath Furnace (N. Staffs). See above	Son of Richard III.
Robert I Foley (d. 1676)	Uncle	Ironmonger and contractor to Royal navy. See above.	Was used as an outlet for Philip's iron production.
Robert II Foley (d. 1702)	Cousin	Contractor until 1688 to Royal Navy. See above.	Son of above.
Thomas II Foley	Older brother	Operated Tintern works in the Forest of Dean.	Eldest son of Thomas I.

[84] Relationships derived from Schafer's reading of the accounts (Schafer, 'A Selection from the Records… Part I', pp.xvii-xviii) and amended partially on the discussion above.

Henry Glover (d.1689)	Uncle by marriage to Aunt Priscilla (below)	Operated as 'managing director' for Thomas I Foley and may have had a similar role with Philip.	Mentioned in Philip's accounts as 'uncle Glover'. See below.
Priscilla Glover (1615-67)	Aunt	Married as her second husband Henry Glover.	Clearly provided help and advice being noted in the accounts as 'Aunt Glover'.
William Joliffe	Brother-in-law. Married Philip's older sister Martha.	London trader	
John Normansell	Cousin, being son of Aunt Anne Foley.	Wolverhampton-based iron trader.	
Samuel Wallis	Cousin, being son of Priscilla (see above).	Based in Bristol and ran the 'Bristol end' of the Foley export trade.	

The last significant move of Philip which had an impact on the development of the study area's landscape concerns his creation of business partnerships to run the geographically diverse iron-making sites he had inherited. He already had had several arrangements with his brother Paul concerning the supply of bar iron from 1679 and 1684, but the 1692 'Ironworks in Partnership' agreement with Paul, John Wheeler, Richard Wheeler (his brother) and Richard Avenant marked a step change in the Foley management of their enterprises. The agreement created a business with forges and furnaces spread from Gloucestershire to Cheshire and for a time into Derbyshire and Nottinghamshire and, in a separate move, reunited the moorlands works of Richard III Foley as 'the Staffordshire works' partnership. By 1707, 15 years after its creation, the shareholders were Philip Foley, John Wheeler, Daniel Cotton, Thomas Hall and Edward Hall and the executors of the late Obadiah Lane. As can be seen, these two partnerships showed a tendency to want to share risk as well as a growing dependence on non-family members for management purposes. This element will be briefly touched on, in the final section on the Foley family, below.

With the political changes associated with the latter years of the reign of Charles II plus those associated with James II and the subsequent advent of the joint monarchy of William III and Mary II, Paul and Philip were required to 'conform' to the Church of England to be effective in Parliament. Once this 'conforming' had happened, the overt Presbyterianism of the family appeared to wane. It had become apparent to them that their religious beliefs had ceased to be of particular significance in barring them from either political activity or landownership. As a consequence, their energies were subsequently aimed in that direction.

With Philip's death in 1716 the entrepreneurial spirit of the Foley family began to dissipate as the next generation was more concerned with politics, especially, from their perspective, coping with what was the 'disaster' of 1714 - the change of government associated with the arrival of George I. Although not technical innovators, the family were clearly very financially-focussed on their approach to business. This focus changed in the 1680s, as noted above. Leadership in the sector passed to a different group of people, themselves more orientated to profit, perhaps using the Foley family experience as an exemplar.[85] These 'seekers after profit' are discussed below.

Foley family managers.

Of the individuals whose tasks could now be described as general managers or even Directors, the role undertaken by Henry Glover (c.1615-1689) for at least two members of the Foley family stands out, and is the principal individual discussed in this short section. The name and activities of Henry occur frequently in the records of the family, for Philip Foley in particular.

[85] Philip expected an annual profit from each site of at least 6%. If he did not achieve this, he tried to sell these sites. Schafer, 'A Selection… Part II,' p.xvii.

It has already been mentioned that the burgeoning other interests of Thomas I Foley and his sons, along with the steadily increasing size and scale of their ironworks meant that additional operational support at a senior level was required. As part of his organisational management, Richard II Foley appointed clerks to his works or groups of works from probably the 1620s onward, although they do not definitively appear in the records until the 1630s. It is possible that Henry Glover began his association with the Foley family in this way and because of Richard's actions, although there is no direct evidence.[86] He was working for Thomas I Foley in the 1650s when Thomas was primarily engaged in his father-in-law's gun-founding business, acting as Thomas's agent for transport and sales of bar iron in Bristol with Ezekiel Wallis. This must have led to much contact between them, as when Ezekiel died in 1654 at the latest, he married Ezekiel's widow, Priscilla, Thomas's sister, in 1655, whilst keeping cordial relations with Ezekiel's business successor, his stepson, Samuel Wallis.

The marriage increased Henry's involvement with Thomas's business, and, as Peacock suggests, he acted in effect as Thomas's 'Chief Executive' (to use an anachronistic term) through to Thomas's 'retirement' in 1669.[87] Henry traded in iron (amongst other products) on his own account, giving him an indirect interest in preserving the landscape of the study area through the need for coppiced timber management. He continued trading after Thomas's cessation of direct involvement in the family businesses whilst subsequently assisting all three of Thomas's sons at various periods - he figured prominently in Philip's accounts as 'uncle Glover'. It is possible, as Schaffer speculates, that Glover had some input into the design of the accounting system utilised to maximum effect by Philip Foley.[88] He even inherited part of the family business, the Moorland Works, in North Staffordshire from John Foley in 1684, again, managing through clerks, one of whom was Obadiah Lane.

[86] King, 'Management, finance and cost control', p.390.
[87] Peacock, *Foleys*, p.111.
[88] Schaffer, 'A Selection from the Records… Part I', pp.xviii-xix.

Obadiah Lane of Normacote Grange, Stoke-on-Trent eventually became managing partner of the Foley family Staffordshire partnership.[89] His connection with the Foley family businesses may have been long-lasting, as a child of that name was a pupil at the Hospital School in Oldswinford (Thomas Foley's creation), and he may have been apprenticed to Thomas Foley on leaving the school. He was certainly a clerk to Henry Glover from 1686 and may have worked as a clerk at other sites within the Foley operation. His subsequent career, along with the activities of others who began their work in the Foley family iron-making business this way, such as John Wheeler, his brother Richard Wheeler, Richard Avenant and William Rea, are considered below.

6.3.2. Coleman and Chetwynd families – the comparison area.

The greatest rivals of the Parkes and then of the Foley families as ironmasters were the Chetwynd and Coleman families.[90]

Although the Chetwynd family belonged to the gentry class, as they were landowners, the Coleman family were not. Nonetheless, both are briefly considered here as they followed the Paget family in working the iron-making sites in tandem for several years in the comparison area. As well as being linked by marriage, the two families were partners before arguments between them led to the cessation of the partnership.

The Chetwynd family were located at Ingestre, a small settlement just to the north of Cannock Chase, from as early as the mid-13th century. Members represented Stafford or Newcastle-under-Lyme as MPs from the 16th to the 19th century. They were also Justices of the Peace and county Sheriffs. A branch was ennobled as Viscount Chetwynd, inheriting an

[89] Rowlands, *Masters and men*, p.68.
[90] King, 'South Staffs', p.68 and pp.69-71. King used Chancery evidence to establish the history of both families through various lawsuits associated with ironmaking outside the study and comparison areas. Much of what follows is derived from King, 'S. Staffs'.

estate at Grendon in Warwickshire, and another branch inherited the Earldom of Shrewsbury in the late 19th century.[91]

Rather less is known about the origins of the Coleman family, other than that they were based in Cannock.[92] Walter Coleman is the first member of the family with any prominence. He bought a forge at Saredon, in Deepmore, outside the study area in 1598 (from Thomas Parkes – see above) indicating an early association with the iron trade. The source of his capital is unknown. This site was run by Walter until 1606. Also, again about 1598, Walter built an iron furnace on land he owned at Cannock, entirely separate from the Paget estate. He formed a partnership with Richard Almond, otherwise unknown, to use forges in Abbots Bromley to the north of Cannock Chase. He was associated with a forge at Beaudesert Park and renting a site at Wolseley, both on the edge of Lord Paget's lands.[93] By 1604, partners in Coleman's enterprise included his son-in-law Thomas Chetwynd, who had earlier married his daughter Dorothy, the arrangement which joined the two families together.

In 1610, following the final departure of Fulke Greville from his estates, Lord Paget let his works (sites RB1, RB2, and RB3) to this partnership which included Thomas Chetwynd and Walter Coleman. Perhaps in conjunction with Lord Paget, Coleman introduced a slitting mill into the business at site RB5, the first of its kind in the midlands.[94] This gave the partnership some of the aspects later known as vertical integration in the nascent iron industry whereby they controlled the smelting of iron, its re-forging or chafing into a useable product and then its slitting into rods or nails for the nail trade (the most lucrative part) as well as other uses.

[91] H. E. Chetwynd-Stapylton, *The Chetwynds of Ingestre*, London, 1892, covers the family history.
[92] VCH *Staffs*, vol. V, pp.56,61, outlines what is known of the family.
[93] Welch, 'Elizabethan Ironworking and the Woodlands of Cannock Chase and the Churnet Valley', p.66. SRO D603/E/5/2, Records of the Paget Family, Confirmation and ratification of two iron furnaces and two iron forges on Cannock Chase with watercourse, 1597; Wolseley is noted in King, 'S. Staffs', p.68.
[94] The date of construction could be as early as 1611 – it was certainly running in 1619, under the control of Walter's son, John Coleman.

This enabled them, along with the Foley family who by 1630 had their own slitting mill, to almost set their own prices. It is therefore no surprise that when a subsequent member of the Foley family was offered the opportunity to acquire the original Cannock Chase slitting mill, they promptly did so. The purchase was used as a springboard by Philip Foley to create a new slitting mill in the same area to handle the finished products of the Cannock Chase and North Staffordshire iron-making sites at site RB7 in 1692.

Walter Coleman was expansionist, buying forges in other counties, even as far away as Ireland. Using the typology proposed, it is suggested that it is this activity, along with the successful operation of the sites listed above in the study area, that indicates that the activities of the Coleman/Chetwynd partnerships merit consideration as 'professional', succeeding the Paget family identified as pioneers. The analogy with the actions of Richard II and later Thomas I Foley in expansionist acquisition of businesses is evident. The Coleman/Chetwynd partnership eventually dissolved in litigation over Hales Furnace (in Halesowen, outside the study area) during the 1620s.[95] The Coleman family continued to try to work as iron-manufacturers, but the growing success of Richard II Foley caused them substantial problems. Walter Coleman may well have been the architect of a Star Chamber case against Richard II – certainly his son John Coleman was one of the witnesses. Despite this high-level attempt to drive out their principal competitor in the midlands the Coleman family ultimately failed to establish an industrial dynasty in the mould of the Foleys, and John seems to be the last member of the Coleman family directly involved in iron manufacture (at Brewood) which ceased around 1640.[96]

[95] King, 'S Staffs', p.70.
[96] Brewood furnace was bought by Richard II Foley, which in view of John Coleman's evidence against him in Star Chamber may have been a particularly pleasant outcome for Richard.

Thomas Chetwynd died in 1633 aged 72. His ironworking interest passed to his second son, Walter Chetwynd (named for his father-in-law, Walter Coleman) who ran the Cannock Chase sites listed above until his death in 1653, despite earlier sequestration as a Royalist. On his death his iron-working sites passed to his heir, his nephew William Chetwynd who had moved to Grendon in Warwickshire. He added to his interests by buying Oakamoor Furnace in north Staffordshire. He died in 1691 when his estate passed to a cousin, Walter Chetwynd (1680-1731). His successors were less interested in ironmaking and like the Foleys more focussed on land management and local politics. The Chetwynd estates in the comparison area were sold to Thomas Anson (ancestor of the earls of Lichfield) in 1768 ending the family's association with iron-working.

6.3.3. Summary of the professionals phase.

In summary, throughout the 17th century, as the epitome of the 'professional' approach, the Foley family taken as a unit were leaders in the production and sale of cast and wrought iron, notably Richard II and Thomas I. Both of them developed systems of management which enabled them to co-ordinate a variety of units of production spread over a wide geographical area, thus having a direct impact on the development of the landscape. The impetus provided by the linkages with other families, initially the Brindley family, but also the Winchursts and Normansells, was a marked feature of their *modus operandi*.

The approach to the overall market they developed was based on identifying and running, often through others, geographically distinct units of production. In tandem with this they developed, notably in the case of Philip Foley, a sophisticated system of central controls, and an elaborate unified accounting system, which may have been amongst the best in Britain at that time, enabling him to identify, and sell, forges which he felt were unprofitable.

Foley family members made extensive use of their familial links, bringing experienced managers such as Henry Glover into the family orbit, as tables 6.1-6.3 show. Such a move indicated a sophisticated understanding of the control needed over the wider market. The use of money, credit, and capital as well as aspects of people management seems to have been well understood. Bonds to establish capital were widely traded, and as noted a sophisticated form of Italian origin double-entry booking was utilised, most effectively by Philip Foley. The financial astuteness of the family was substantially ahead of the wider societal changes in the use of finance, for example. Lloyds of London did not begin dealing in insurance until 1688 and the Bank of England was not formed until 1694.

As they began to invest the profits of the iron production market in land, family members, as landowners, became active in local and county government. Their political aspirations developed in the second half of the 17th century, including moves into the House of Commons. Some marriages became an overt linking of political aims and ambitions, notably with the Harley family. Such arrangements signalled, in common with other families of this type, a move from industry toward a shared political focus with landed wealthy members of society.[97] As noted, this linkage of politics and religion, prevalent during this period, may have had contractual repercussions in the career of Robert I. The rise to the peerage in 1712 of the senior family member (Thomas III Foley, eldest son of Thomas II) as one of 'Harley's dozen' exemplifies this trend and accounts for some of the reasons why the Foley family moved away from the iron production and trading businesses as the 18th century progressed.

The summary of the Foleys to an extent acts as an outline of the other groups of professionals mentioned. In all cases their direct involvement in iron-manufacturing ceased

[97] Robert Harley was Queen Anne's Lord High Treasurer over the period 1711-14 and effective Prime Minister, although his later successor Robert Walpole is universally considered as the first such, being acknowledged *de facto* Prime Minister over the period 1721-42. Harley was Thomas II's son-in-law.

once alternative investment opportunities opened, or as is the case with the Chetwynds from the comparison area, enhanced social aspirations, including, as with the Foley family, politics, both national and local, followed by elevation to the peerage, took over their ambitions. Like the pioneers, the professionals created 'family' businesses, which worked in the industry for three generations or more. The contrast with the 'profiteers' is discussed below.

It is evident, as the 'professionals' remained successful in their management of the iron production business largely throughout their direct involvement and/or ownership of sites, that they had a direct impact on the development of the landscape. This impact was achieved by ensuring the continuing presence of iron-making sites and their related water features, as well as routes to and from such sites, and the effective management of woodland in the landscape to provide charcoal for iron production. As such, this suggests that the landscape can be considered as man-made; or a human response to the environmental factors of the study area, and that because of a stable market for goods, this human response remained relatively unchanged until superseded by changes in the market brought about by technological innovation. This point is further examined in the following sections.

6.4. The seekers after profit.

Iron production was a profitable business.[98]

The 'seekers', like their predecessors, the 'Professionals', can be described as members of the middle or lower classes in 17th and 18th century English society who did not own land, but often had access to capital which they were prepared to invest in industrial activity. Typically, the 'seekers' did not own any of the resources necessary to make iron. They worked on the principle that through the application of their own industry and talents they

[98] King, 'Management, Finance and Cost Control', p.406.

could enjoy similar riches from the iron industry to those gained by the Foley family, amongst others. Some 'profiteers', to use the term proposed here, seem to have bought sites directly from the Foleys without apparently considering why they were for sale and how they fitted into the business 'organisation' that the Foley family had created. Therefore, profiteers often held or leased sites for much shorter periods than their predecessors as it became evident that sites could not be run profitably or without a substantial infrastructure such as that created by the Foleys.

Few profiteers made a success of their ownership of sites in the study and comparison areas – one exception is the Knight family, who from the 1720s onward, like the Foley family some 50 years earlier, made effective use of partnerships to spread their own financial risk. This family is not considered here as the bulk of their Iron-working sites were outside the study area.[99] The 'profiteers' are not easily categorised, as some individuals were associated with the Foley family or with other early iron-makers; some seem newly-arrived having tried to operate in other sectors of the economy. Others may be examples of gentry families seeking new ways of wealth creation – the term 'gentleman-entrepreneur' may be appropriate in these cases. In discussing the pioneers and professionals above, the 'dynastic' element stands out. This is less of a feature of the profiteers, but where relevant is outlined below.

6.4.1. Foley family 'successors'.

This section will cover the careers of several individuals who originally had links with the Foley family in the earlier part of their careers before directly taking-on forges and furnaces. These individuals are relevant to this discussion as Thomas I Foley seems to have made it a practice that certain of the site clerks he employed could trade in charcoal or bar iron on their own account. This exposure to the market seems to have encouraged members of this

[99] Ince, *The Knight Family*, covers their history in detail.

group to believe that they were capable of trading successfully without the Foley 'umbrella'. It is this second part to their activities that merits the description of profiteer, and this group of individuals, sometimes acting together, sometimes individually, were also responsible for the ongoing development of the landscape in the study area.

Success…depended on John Wheeler.[100]

John Wheeler may have been born in 1645, although this is uncertain and the location unknown. He had become a clerk at Cradley in the Foley business by 1668 and steadily gained experience of the Foley sites. He may have been trained by Thomas I Foley. John worked closely with another clerk, at Shelsey Forge in the Forest of Dean, Richard Avenant of Monmouth.

Wheeler and **Richard Avenant**, probably also trained by Thomas I Foley, bought what Byard-Jones describes as a 'failing' ironworks from Philip Foley.[101] These were Shelsey and Wilden forges, outside the study area.[102] Wheeler and Avenant brought in John Downing when they took over Hales Furnace (in Halesowen) in 1680 and then, following the increased involvement of Philip Foley in parliament, leased Furnace Grange (SB1), Swindon (SB3) and Greensforge (SB5). Whilst Hollow Mill (SB4) the blade mill located between Swindon and Greensforge is not directly evidenced as having been leased by them, it may also have been part of this group, and may therefore offer a context for the creation of the large excavation for the water channel at the site which appears to date from this period.[103] Such an acquisition and enlargement fits in with a certain amount of logic to the activities of Wheeler.

[100] Peacock, *Seventeenth Century Foleys*, p.177.
[101] J. Byard-Jones, 'The Kendall family - Stourbridge Ironmasters', *TB*, vol.42, pt.2, 2009, p.38.
[102] These two sites later returned to Foley family ownership and were almost the last to be given up in the face of competition from coal-based iron production in the 1770s.
[103] See chapter 3, figure 3.11.

Wheeler's relationship with the Foleys changed in 1692 when he became an equal partner in the 'Ironworks in Partnership' enterprise. John was joined by his brother Richard Wheeler - each held a sixth share. Richard Knight, founder of the Knight 'dynasty' of iron manufacturers referred to above also held a share. They employed Obadiah Lane (see below**)** as their principal clerk. The relationships did not last. Richard Wheeler was bankrupt by 1703. Richard Avenant died in 1707, enabling Richard Knight to learn more aspects of the business before leaving to work elsewhere. John died in 1708, passing on his interests to his children, who did not make a success of them. Eventually his assets were bought by his clerk, Edward Kendall, who founded another 'dynasty' of iron makers (based outside the study area).

William Rea, who had begun as a clerk to John Wheeler at Wilden Forge in the 1690s, also became, in 1705, a senior manager for the Foley family Forest partnership. This was designed to exploit the potential of the Forest of Dean sites. Rea may be considered as a classic 'profiteer'. He is known to have been a partner in the Cunsey company (which exploited iron ore in Furness in Lancashire) through to 1726. He was a partner in the Cheshire ironworks, the successor partnership for the Foley interest in North Staffordshire and Cheshire through to 1719. He married one of John Wheeler's daughters, giving him an interest in that aspect of Wheeler's business noted above. In 1725, along with Edward Kendall he bought out the other sons of John Wheeler to acquire all the business.[104]

As noted in chapter 4, William Rea also tried dealing in charcoal and timber on his own account. This led to his eventual bankruptcy as he bought the cordwood (for charcoal) and

[104] Edward Kendall continued to run the Cradley works after William Rea withdrew due to his bankruptcy. Kendall also invested in the Cunsey company and the Cheshire ironworks partnership, where he married a daughter of another shareholder. Kendall's sons were still partners in the Cheshire business in the 1770s.

timber perhaps at what turned out to be too high a price, as he needed Thomas Foley (son of Paul) to support him financially. When the price of timber fell after the ending of the trade embargo associated with the 1715 Jacobite rising, Rea and Foley found themselves with a substantial quantity of timber that was heavily over-priced. Rea could not meet his obligations to Foley and was subsequently bankrupted bringing his career to an effective end. He was dismissed from the Forest Partnership in 1725.

Obadiah Lane has already been mentioned. By the mid-1680s he was married and living in Oldswinford in Worcestershire. He was based at Oakamoor Forge, part of the moorlands in partnership business in the north of Staffordshire. After Henry Glover's death he took charge of the partnership and expanded his operational ambit into the middle of Staffordshire including the comparison area, notably becoming manager of sites RB3 and RB7.

Trading on his own account in addition to his salary allowed him to accumulate considerable capital, which in 1699 he invested by becoming a shareholder in the main Foley business of that era, the Ironworks in Partnership. He also bought land, purchasing the manor of Hagley near Rugeley, extending into Cannock Chase. Obadiah's successors remained owners of Hagley (and Longton) until the 1780s. Ultimately, he remains an example of a 'poor boy made good' who died a landed gentleman with an estate to bequeath to his heirs.

6.4.2. Sir Clement Clerke.

Sir Clement Clerke is in a separate category to those considered above. He is, however, in some respects, a Foley 'successor', and can be seen as a profiteer using the classification system proposed above. Clerke had supported a sometime competitor of Philip Foley, John Finch, to run what was a unique furnace at Dudley, built by Dud Dudley and using men and horses to provide power rather than water, and using some sort of coal for fuel. This was not

successful, and Finch sold out to Sir Clement and John Foorth, an Alderman of the City of London. As noted above, in 1674, Philip Foley then sold to Sir Clement Furnace Grange (SB1) along with Greensforge (SB5), Swindon Forge (SB3), Heath Forge (SB2) and Cradley Forge. Clearly Clerke sought to run all these sites as one economic unit, in competition with the Foleys. In trying to raise money for capital for investment, Clerke created a partnership, but, as King notes, this quickly ran into trouble and Clerke sold out in under two years to a new partnership.[105] The replacement group could not make the sites as profitable as they would like, and as Furnace Grange was still owned by Philip Foley, he received their notice to quit the lease in 1681. Sir Clement continued other ventures in the iron-making business, but none met with success.

6.4.3. The Jordan family.

Unlike the individuals (and their families) identified earlier in this section, the Jordan family did not have any direct involvement with the main 'dynasties' of iron-manufacturers associated with the professional phase of iron production. Also, they did not have any involvement with the immediate successors of the Foley family as listed above. Instead, they stand as an example of a local family seeking to make a profit from the iron-manufacturing 'industry'.

The Jordan family in the person of Richard Jordan first appear as running Furnace Grange (SB1) in 1748 producing pig iron. King notes that Richard Jordan was also at Heath Mill (SB2) in 1754 making iron from pigs from Grange.[106] Richard along with his brother John tried to expand by buying a forge in Shropshire, but this was not successful. Richard's sons, William, and Thomas Jordan, in association with the Homfray family, tried to expand into south

[105] King, 'Grange', pp.49-50.
[106] *Ibid*., p.51. King also notes that other members of the Jordan family were probably based at Grange during the 1730s, when they may have acquired it from the Wrottesley family (see above).

Wales by leasing a forge outside Cardiff, but this was not successful either, as the brothers were bankrupt in 1767, having run the site for less than ten years. Grange itself was advertised for sale in 1772, and this probably marks its end as a furnace, having been overtaken by new technology in the form of iron made by coal, despite the chance of survival offered by the newly-arrived S&W canal and associated Dimmingsdale Wharf in the 1770s.[107] Notwithstanding this setback, the Jordan family continued to produce iron at Heath Mill until 1814 when it reverted to milling corn having been largely rebuilt.

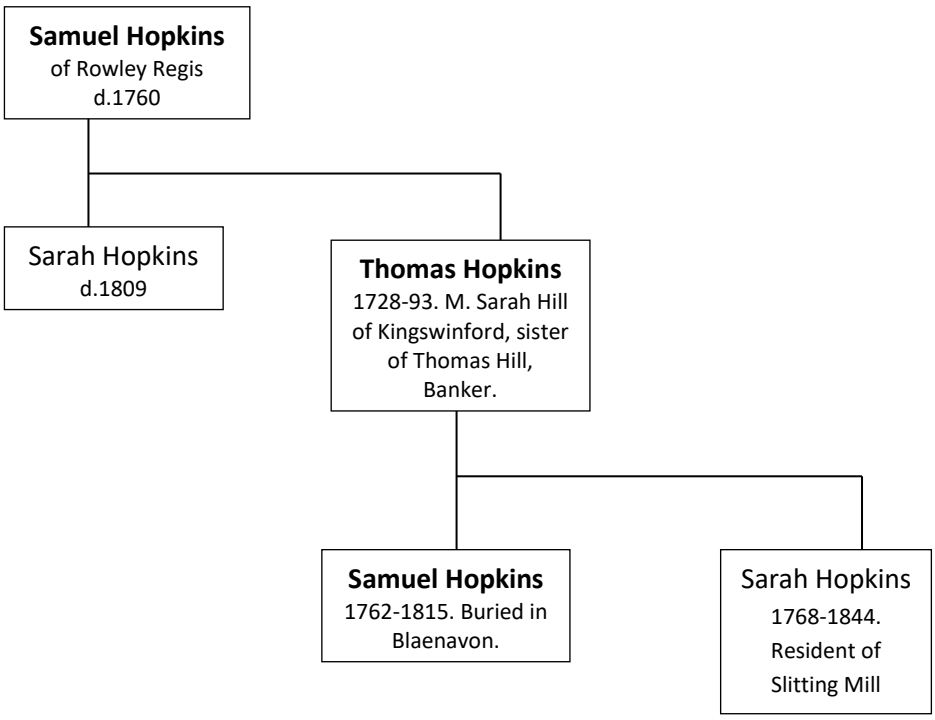
The Jordan family can be seen as a locally based family (a large number were buried at St. Bartholomew's Church in Upper Penn) who sought to exploit the opportunities offered by the iron-production business. However, even though there were attempts at expansion, they were caught out by the gradual change in technology as charcoal-based iron became more expensive than that produced by coal. Their activities were broadly paralleled by that of the Homfray family, who owned Swindon (SB3) and Gothersley (SB6) for a time in the 18th century before also recognising the inevitable. This is discussed in the next section under pragmatists where the fate of Gothersley and Swindon is outlined.

6.4.4. The Hopkins family.

Relatively little is known of the Hopkins family, but their involvement in iron manufacture in the study area can stand as an example of the profiteering element in site ownership discussed here.

[107] See chapter 5.

Figure 6.7. The Hopkins family[108]



Samuel Hopkins was first noted in 1754 when he appeared as the 'manager' of Cankwood Forge (RB3) and its slitting mill (RB5). Thornton notes that he may have his origins in Kingswinford, perhaps where he began to work in the iron-production business for Philip Foley or one of his successors discussed above.[109]

Samuel died, age unknown, in 1760, and was succeeded as manager of both sites by his son Thomas Hopkins. Thomas expanded the business by making a forge at the papermill site in Rugeley (RB11) to which he added a second millpool in 1768 indicating that it was successful. In 1761 Thomas married Sarah Hill at Kingswinford. She was the daughter of Waldron Hill, a scythe maker and glassmaker. Sarah's brother, Thomas Hill, was a banker based in

[108] Sourced from Thornton, 'Bygone Ironmasters', p.82. Ironmasters are named in bold.

[109] Thornton, *Ironworks of the Rising Brook Valley*, p.14, which is the source for the following paragraphs. Samuel Hopkins's marriage shows him to be from Rowley Regis, a nearby parish to Kingswinford. The marriage was in 1723. Assuming that Samuel was just of age, he was therefore born around 1702 at the latest, making him at least 58 when he died. He was certainly an employee of Edward Kendall at one point in his early career.

Stourbridge, later of Dennis Hall in Amblecote. Thomas Hopkins later took over the lease for the 'new' slitting mill in the comparison area (RB7) as well as sites RB3 and RB5 in 1775.

Thomas Hopkins was successful, and unlike his predecessors such as the Foleys did not invest in land but in industry. Using in part the resources provided by his banker brother-in-law Thomas, along with other partners he invested in a brand-new coke-fired blast furnace in south Wales in 1789. With three furnaces, later expanded to five, using the new technology of coke, the successful basis of the new town of Blaenavon in Monmouthshire was evident.

Thomas died unexpectedly in 1791 and was succeeded by his son, Samuel II, who managed both the businesses in south Wales and Cannock Chase for a while. He later sold his Cannock Chase interests to a new partnership headed by Edward Baker who ran sites RB7 and RB11.[110] Samuel II concentrated on his business in Blaenavon, dying there in 1815. His sister, Sarah Hopkins, however, moved to Stone House, the principal house in the village later to become known as Slitting Mill in Staffordshire.

The short-lived involvement of Samuel II Hopkins in iron production stands as an example of a successful profiteer who realised that technological change required a different approach if profits were to be continued. His expansion into a totally new geographic area, neither the comparison area nor the study area, despite his connections with both, is in marked contrast to the approach adopted by other profiteers such as the Jordans. His realisation that the sites in Cannock Chase did not fit into the newly emerging coke-produced iron business also

[110] Edward Barker and his successors were the last major iron-makers in the comparison area and initiated the early site closures that resulted in the complete cessation of iron working in the Rising brook valley at the end of the 19th century.

stands out, including his clear-sighted decision, despite emotional family connections, to sell them.

6.4.5. Summary of 'profiteers'.

Many of those individuals described here as profiteers did indeed see an opportunity with the move away from the iron sector of the Foley family to take over their works and run them as profitably as they could. This included careful management of woodland resources, and therefore ensuring the 'status quo' in the landscape of coppices and other woodland. As such, these profiteers were in effect conservators of the landscape, recognising the need to ensure supplies of charcoal required regular access to properly managed woodland. The lesson of the woodland destruction in the 1590s of a very early profiteer, Fulke Greville, with Lord Paget's furnaces and forges on Cannock Chase seems to have been learnt.

Profiteers came from a different stratum of English society to pioneers and professionals. Although Obadiah Lane was able to buy land and acquire an estate, most of the others including the Jordan and Hopkins family did not. The Hopkins example in particular marks a clear difference from the other two groups as they chose to invest further in the industry in which they operated by effectively creating the new town of Blaenavon. Success was not guaranteed – members of the Jordan family went bankrupt, as did others associated with the Foley family, who, even though they had access to much of the same resources and accounting and management methods, were unable to emulate them. Profiteers therefore can be seen as marking a step change in the industry and how it was run, but not in the way in which the landscape was perceived as a source of power and wealth.

6.5. The coming of the pragmatists.

It is contended here that the move toward pragmatism in the production of iron from the furnaces and forges of the study area is one where the influence of a single individual, rather than that of families, began to predominate. Secondly, it is argued that owners began to consider lower profit margins as acceptable, rather than the larger rates of return enjoyed by Foley family members and some of their successors. The era of pragmatism may well have begun at different dates at different sites, but it is marked in all of them by an apparent recognition on the part of the site operator, normally a lessee, that whilst profits could be made, that they would be limited, and potentially constrained by the specific economic circumstances (such as war, imports from overseas and the impact of new technology in the industry) that pertained at the time. Major changes in any of these factors may well have meant that iron production at a specific site ceased to be viable. Certainly, changes in technology acted as a catalyst, notably the steady introduction of coal and later steam power during the latter half of the 18th century combined with periods of warfare. This resulted in the closure or change of use of sites that had by now become unsuccessful.

It is instructive to consider these changes on a site-by-site basis for examples of these pressures. The ownership of the Gothersley site, (SB6) which aside from that at Swindon (SB3) was the longest-lasting iron-producing site in the study area demonstrates precisely how pragmatic ownership was, and how quickly it could change, during the later years of the life of water-powered sites. Until around 1730, with Homfray family running the site, Gothersley can still be considered as profitable. After this, the nature of the owners clearly changed, and they ran the site only for as long as they could make some sort of profit. Once losses occurred, owners changed. This can be seen in the following table.

Table 6.4. Later users of Gothersley Mill.[111]

Dates	Owner(s)	Notes
By the mid-1730s	Francis Homfray (of Oldswinford, Worcs). Died 1737	Enabled a rebuilding of the site. Ran as a slitting mill.
Post-1737	Mary Homfray	Widow of above and ran the site after Francis' death
1788	Francis Homfray, son of Francis and Mary	Leased by John Hodgetts, Philip Foley's successor, along with Swindon (SB3) to Francis and his two sons (Francis III and Jeston)
1793	Francis (III) Homfray	Ends lease and moves to the Hyde, Kinver.
1798	John Hodgetts	Nephew of John Hodgetts (above)
1799	John Hodgetts (above) and partners. Hodgetts died in 1800.	Partners were John Thompson and John Scale
1800	Elizabeth Hodgetts	Widow of John; ran the ironworks, buying out the other two partners in 1802.
1812	John Bradley and Co.	Sublet by Elizabeth Hodgetts as a rolling and slitting mill operation. New lease in 1821. Peak production in 1806.
1830	George and Edward Thorneycroft	Transition from previous arrangements is not clear.
1833	Leased to John Hunt and William Brown	Used only as a rolling mill.
1836	Leased to Joseph Maybury of Bilston	Took a further lease in 1840 and remained until 1849.
1849	E. B. Dimock and John Thompson of Bilston.[112]	Held on a 21-year lease. In 1856 joined by William Hatton, also of Bilston.
1861	Site worked by S. W. Bunn	Lived at Gothersley House.
1870	S. W. Bunn and William Hatton, now of Kidderminster.[113]	21-year lease signed. In the next year the workforce was only 15 men and 9 boys.
1876	Works run by William Finnemore of Small Heath, Birmingham, and Richard Titley of Sutton Coldfield.	Finnemore alone from the following year.
1890		Mill closed and contents sold in 1891

[111] Data taken from, *inter alia*, VCH *Staffs*, vol. XX, pp.146-7; Davies, 'Gothersley Mill', pp.39-43; WSL Th.46 - M. V. Cooksley, Iron Industry of Kinver c.1978, p.70; Dunphy, *Smestow*, pp.147-8. The site was owned (but not directly used) by the Foley family, notably Philip Foley and his successors, the Hodgetts.

[112] Probably not the identically-named individual as previously mentioned under the entry for 1799.

[113] This is believed to be the same individual as previously mentioned under the entry for 1849.

The above table indicates that pragmatism, especially in the face of much more successful and very much larger iron making sites nearby, using the much more effective (and cheaper) coal-based technology, eventually was simply not enough to keep the site going. The key date for this change seems to be in 1812, coincidentally when Britain was at war and needed all manner of iron goods. Nonetheless, it is interesting to speculate as to why the site was able to keep going to 1890 – clearly there was a market for its products amongst Black Country and Birmingham-based end-users of their products. At some level at least 'the market' retained a 'conservative' preference for bar iron produced either through waterpower, or, more likely, produced using charcoal as opposed to coal. It may be a long-lasting memory of the issues in producing merchandisable quality iron when the experiments with coal began over 200 years beforehand.

The development of other study area sites shows a similar pattern. At Swindon, Francis Homfray worked the site in the 1730s as he did at Gothersley. The family ran the site until 1811, when the site became subject to a similar high turnover of operators. Again, as with Gothersley, the Thorneycroft family, ironmongers of Wolverhampton, took over the running in the 1830s. In the 1850s it was run by an Eli Richards, then Joshua Shaw and finally Richard Brown. One J. Watkins had taken over by 1859, giving way to a William Watkins and Company from 1862. The final change in ownership was the crucial one for the survival of the site. Unlike the other sites in the study area investment took place including modernisation with the use of coal and steam to replace waterpower. This company further invested in the site including increasing its capacity before the lease was taken over by E.P. and W. Baldwin in 1866 who finally bought the site in 1899 and in various guises including nationalisation, ran it until closure in 1976.

Grange Furnace (SB1) has a more chequered and shorter later history. Philip Foley put it up for sale (see above) along with Heath and Greensforge. He eventually sold it in 1708 for conversion to a corn mill. Although the Wrottesley family later made use of the site to produce iron by 1740 it was operated by the Jordan family of Penn. The site was still in action in the 1770s as Dimmingsdale wharf on the S&W canal may have been built with the transport needs of Grange Furnace in mind, as noted in chapter 5. Nevertheless, not long after, the site began to decay and by 1814 had become a corn mill with the Jordan family members based at the site turning to farming. [114]

Heath Forge (SB2) has a slightly different later history, but again one where pragmatism came to dominate. In the late 18th century, the site was managed by Richard Jordan, who also ran Grange Furnace, as noted above. It was certainly still in operation by 1814, but by 1825 was producing rods only, and within two years had reverted to corn milling, bringing its iron-making history to a close. Greensforge had a similar if shorter history as an iron-making centre. As noted above by 1675 the site had been leased by Philip Foley to Sir Clement Clerke, and later to Messrs Wheeler and Avenant – 'seekers after profit', although evidently little was to be had. The site did not come under the control of anyone who could be described as a pragmatist, as it was closed as an iron-making venue by 1686. Any 'pragmatist' phase may well have begun later, in 1707, when it was let to Francis Patchett to use as a blade mill in which use (and family ownership) it continued as late as 1841.[115] It also seems to have milled corn, and the surviving corn mill building on the site dates from 1890.

Hollow Forge, SB4, shows a similar and equally condensed 18th century history as table 2.1 in chapter 2 shows, moving from iron production via a scythe-making operation to corn – signs of a clear recognition that a pragmatic use of the site was the only practical option

[114] King, 'Grange', p.50.
[115] VCH *Staffs*, vol. XX, p.214.

available to the owners, despite the prodigious labour (and therefore cost) involved earlier in creating and then maintaining the mill channel.

In summary, the previous brief discussion does suggest that there was a fourth, pragmatic, phase in the ownership and usage of the iron-making sites in the study area, a phase which followed on from that of the 'seekers after profit'. It is argued here that this fourth phase reflects attempts to continue to run iron-making businesses in the face of technological and scale change, and accepting a reduced profit. This phase lasted for varying periods at each site, but was characterised by a relatively rapid turnover of individuals acting as site lessees, and, much less evidence of ongoing family involvement in site operations as the discussion of Gothersley's operators makes clear. As is shown at Greensforge, the pragmatic phase of iron-production could be short, and, focussed on a different aspect of the market away from the production of bar iron if economic necessity moved individuals in this direction – the production of agricultural implements such as scythes from a blade mill being the obvious example. The pragmatic phase is much more a response to market forces than any of the preceding three discussed here, even more marked when the impact of technology is considered. The move of the 'industry' as a whole to coalfield locations during the second half of the 18th century as the full impact of the coal-fired blast furnace began to be felt was a major problem for the iron-making sites in the study area. Market forces meant that iron could now be produced in considerably larger quantities, and therefore far more cheaply, than iron from the water-powered and charcoal-using sites. Conversion to blade milling or a reversion to corn milling is not therefore a surprise. It remains a testament to the ability of the pragmatists that they were able to find a market for charcoal-forged bar iron from Gothersley and Swindon for as long as they did. It is only the introduction of coal-based steam-power, not exactly new technology when it was brought to Swindon in the middle of

the 19th century, that enabled that site, as the exception in the study area, to survive a further hundred years.

6.6. Conclusions.

From the foregoing discussion, two new primary conclusions emerge which allow the development of the landscape in the study area to be considered in an entirely different way from the simple 'geography or history' debate posed earlier. The first conclusion is that the four-fold classification of site owners or users proposed at the beginning of this chapter has some validity when applied to the study and comparison areas. It may also have an applicability to the wider region. The brief discussion of families who operated regionally such as the Parkes and Whorwood families as well as rivals of the Foley family such as the Jennens family of Birmingham indicates that this is likely. Confirmation will only come from further research. It is recognised, as with all typologies of this nature, that there is some blurring between the groups, and that it is possible to consider some individuals as belonging or working in a fashion which enables them to be considered as both professionals and profiteers, for example. The successors to the Foley family in the study area stand out in this regard.

Given that the typology as proposed is of value for the study area, it is then possible to draw further original conclusions as to how each group was able to maintain or manipulate the landscape of the Smestow basin. The response to the landscape of the pioneers was to use the resources provided by the climate and soils in the form of water-power and substantial tree cover for their own ends, which resulted in a loss of woodland, but, the creation of new routes across it. It is argued that this was a radical change to consider the landscape in economic terms.

The professionals recognised that their role in terms of the development of the landscape was one of conservatism, to ensure that they had access to a resource, charcoal, that they did not own, but needed. In effect, they became agents of landscape conservation in a similar fashion to their Tudor-era forebears in ensuring access to wooded landscapes for hunting purposes. Here, it can be contended, as outlined in chapter 4, that the landscape shows that 'homo ludens' had been usurped by 'homo economicus', and that the landscape effect is broadly the same. The professionals used their manipulation of the market to ensure that they could get charcoal at a price which enabled them to make a profit from the sale of iron – acting as a further brake on landscape development by ensuring the economic basis of coppicing was established and maintained. Undoubtedly the Foley family are the best example of this tendency as they bought tree-covered lands for exactly this purpose. Despite this, they also took part in conversion of heathy or partly-wooded landscapes to arable crops, as their support for enclosure at Ashwood and Iverley in the last quarter of the 17th century indicated.

The profiteers, despite their title, also adopted the same approach to landscape development, again recognising the need for the areas they exploited to provide a key resource which required careful management. The pragmatists of necessity had to do the same, although they were in most cases finally overtaken by changes to the market for their product inspired by the application of new technology outside the study area.

The second novel conclusion that can be drawn is that the iron manufacturers at the sites in the Smestow were able to respond to their natural environment and the market - indicating a mix of geographic and economic factors appeared to dictate these responses. The weighting of each individual factor altered by period (and perhaps by owner/user)

underlining the dynamic changes to landscape development. As the market encouraged manufacturers to produce iron from 1550 until the beginnings of the Civil War, and again from 1660, they needed to ensure that the landscape continued to provide sufficient resources to enable them to meet the demands of their end-customers. When the market changed from 1709 as an 'outside agency' in the form of the new technology of coal-based steam-driven blast furnaces arrived, the iron-making businesses began to leave the locations in the study area and move to the coalfields creating the 'Black Country'. Consequently, demand for timber was lessened from around 1750, which allowed a relatively unchanged, or deliberately conserved landscape to begin once again to slowly lose its woodland cover in favour of agricultural change, as the enclosure of parishes, especially in the south of the study area suggests.

Chapter 4 demonstrated that early medieval woodland removal was driven by the economic necessity of bringing more arable land into cultivation. By contrast, the research undertaken for this chapter has demonstrated that the human response to the introduction of the blast furnace and related large increase in manufactured iron available to the market to produce iron goods was to preserve (if not extend) that tree cover, after an initial attempt at destruction, epitomised by Fulke Greville in Cannock Chase. It is only when further technological change occurred that the medieval-period approach of small-scale woodland loss re-asserted itself as woodland was no longer needed in quite the quantity for industry. Thus, the change in the use, and therefore nature of the landscape was a response not only to geological or geographic factors, but also human choices themselves driven by market changes, and technological advances. This study for the first time brings these relationships clearly into focus for the study area and beyond.

CHAPTER 7. DISCUSSIONS AND CONCLUSIONS.

Geography is about maps – biography is about chaps.[1]

7.1. An industrial landscape – approaches and questions.

7.1.1. The study area in context

This thesis has examined the development of the landscape of the Smestow basin in terms of its physical geography, geology, pedology, hydrography and climate, including climatic regimes prevalent in the past, against the growing iron industry (both its market and technological changes) present in the valley over the period 1500-1750.

Additionally, there has been an analysis focussed on the specific impact on the landscape of individuals and families as they introduced and developed the iron industry through the creation of furnaces and forges over the same time frame. This scrutiny has shown that the study area became an industrial landscape just as much as an agricultural one, and the examination has made evident the effect of technological change on the development of the landscape by the introduction of the blast furnace, the slitting mill and later the move from smelting iron ore with charcoal to smelting it with coal. The first change allowed the development of the industry and the third marked its decline and subsequent move elsewhere. The introduction of the slitting mill radically altered the nature of the market in the wider region for iron as it enabled bar iron, the output from the study areas furnaces and forges to be more easily moulded into a variety of different of products in the nascent workshops in the area. These statements offer an original insight into landscape development in the study area by arguing that more weight should be given to the dynamic

[1] Attributed to E. C. Bentley, and often, inaccurately, written as 'geography is about maps, history is about chaps'.

interactions of the effects of technology and the market rather than just those factors relating to people or the underlying geography.

7.1.2. Approach and models.

The purpose of the analyses in the preceding chapters has been to consider to what extent the clerihew quoted at the opening of this chapter, simplistic though it may be, has any validity for assessing the relative importance of these factors in creating the landscape of the study area. In effect, can the principles of determinism, when used as a model for the development of the landscape in this valley, offer a sensible framework for understanding? Or, as noted at the beginning of chapter 1, are all landscapes created, that is they are formed, changed, and adapted over time because of the human response to them? And, to what extent are industrial landscapes equally affected by technological change and the changing nature of the market for industrial outputs? The answers to these questions, discussed below, offer a new and original approach to the understanding of the study area, and have a much wider applicability in the consideration of the development of industrial landscapes.

7.1.3. Methods

Several methods of historical and topographical enquiry have been used to gather evidence that can assist in demonstrating the likelihood (or not) of particular frameworks of enquiry being valuable in describing the landscape and the phenomena in the landscape associated with its evolution. Examples include place-names, potential mill sites and routeways in the landscape. Such a type of enquiry was popularised by Hoskins and has been regularly practised by those intent on developing an understanding of landscapes and their

development, both large and small.[2] As a consequence, through the steady usage by others, this method of historical and topographical enquiry in terms of understanding the origin, development, and demise of features in the landscape in terms of their geographical base and human use can be seen to be a valid approach. The use of such source material, including secondary works which may have been published for other purposes, to investigate industrial landscape development, has also proved fruitful. All these techniques have been utilised in the previous chapters.

Secondly, the *long durée* method has been of considerable value as it has effectively highlighted the cross-generational approach to the management of the resources in the landscape, and thus its development, by families such as the Foleys and Sutton and Ward families who held the Dudley estate. Even where families had a shorter impact, for example the Wollastons, Parkes and Wrottesley families, the approach has been of value in enabling a long-term appreciation of their activities and the development of the landscape.

7.1.4. Questions to be answered.

The original questions posed in Chapter 1 can be grouped into four broad areas for investigation, namely:

A. A set of questions connected with the development and longevity of the iron industry and evaluations between the study and comparison areas as well as other iron-producing areas. This includes investigating why iron-making occurred in these areas and not others, and, if the existing pattern of water-powered mills was relevant to the establishment of that industry. Additional questions include considering, once the 'creation' phase ended, how and why the day-to-day running

[2] Hoskins, *The Making*, p.14 where the landscape is described as 'the richest historical record we possess', a phrase repeated by Jones and Page, *Medieval Villages*, p.16.

of furnaces was handed over to managers and to what extent such managers specialised in the operation of blast furnaces. The final group of questions for investigation are concerned with the longevity of sites in the Smestow basin in contrast to those sites in the Rising brook valley – the comparison area.

B. The second set of questions for which conclusions are required are specifically associated with woodland. These include examining to what extent the local provision of woodland was an, or the, most important factor in the development of the iron industry. Secondly, to consider to what extent, if any, was the impact of the presence of Royal forest-law land relevant? Related to this, it is necessary to ask why landowners decided to exploit their woodlands for charcoal production rather than for more leisure activities such as hunting, and, what they gained from this choice.

C. A further set of questions are concerned with the effects of the communication routes and linkages with the Severn basin, and if such routes along or around the Smestow directly affected the development of an industrial landscape either by encouraging the iron industry to form in the area, or, assisting it in terms of enabling access to markets once the industry was established.

D. Consideration also needs to be given to the impact and long-term growth of the local, regional, and national market for items connected with the smelting of iron and selling bar iron, and, to what extent market considerations either directly, or mediated through individuals, acted on the development of the valley's industrial landscape through time.

Overall, the conclusions to the above questions should enable a discussion as to whether the industrial landscape and its development, including the creation of a long-lasting iron industry, is primarily a function of the actions of individuals, a response to the ready availability of minerals, woodland, and stream power, or, affected more directly by changes in technology and the impact of adjustments to the market for the products of industry. From such a discussion, two other areas are examined in these concluding remarks:

- what general conclusions about industrial landscape use, development, change and exploitation can be drawn?
- what more wide-ranging conclusions can be derived concerning the efficacy of historical and topographical methods of enquiry in charting the development of industrial landscape development?

7.2. The development and longevity of the iron industry in the study and comparison areas.

From the evidence assembled here, it is possible to conclude that the origins of iron-making in the study area were initially directly linked to the availability of iron ore in the Sedgley area associated with the outcropping coal seams, notably the 'thirty-foot' seam, one of the thickest coal seams in the exposed coal measures.[3] The earliest production of iron was in bloomeries which used woodland in the study area for the generation of charcoal. Despite the abundance of water-power in the area, streams were not harnessed for water-power to drive bellows until around a century after the introduction of the blast furnace technology to England in the last decade of the 15th century; the first known water-powered blast furnace site in the area, Gornal Wood Furnace (SB12) would seem to date from *c.*1595. Therefore, it was only toward the close of the 16th century that the geographical relationships between

[3] Whitehead and Pocock, *Geology*, pp.16, 36-7.

iron ore, woodland to create charcoal and water-power became relevant to the development of the landscape, and this in turn was based on the technological change of the introduction of the blast furnace that enabled the landscape and its resources to be utilised in this way. The other furnaces and then forges (required as part of the iron production process) followed on quite quickly.

These new iron-making sites were then able to produce pig iron for forges to hammer into bar iron, and, from 1628 in a further technological change in the study area, to slit bar iron into rods suitable for iron-making in the area's first slitting mill at The Hyde, Kinver. Although nail-making was the dominant 'industrial' usage of the products of iron manufacture, iron was used for the creation of a multitude of other domestic and agricultural products for sale in the immediate area. Demand for these products from both domestic and agricultural 'sectors' seems to have been considerable, implying the existence of a functioning market. Richard I Foley, in his evidence to the Court of Star Chamber in 1636 claimed that he was responsible for the employment of upwards of 1,000 people in the Dudley and Stourbridge areas through his production of iron, giving some indication of the large numbers of people employed.[4]

The iron-making sites were able to have, in most cases, a productive lifetime well in excess of a hundred years. It has been argued that this is because most of the sites discussed were, at one point, owned by members of the Foley family, who, from the evidence outlined earlier carefully managed the supply of charcoal to ensure that enough fuel was available for all their sites on an ongoing basis - thus stabilising and maintaining an industrial landscape. A second reason for site longevity was a wider expansion of the market for iron. The Foley family provided iron for naval purposes and increased production to meet growing domestic

[4] Peacock, *Foleys*, p.21.

needs. Expanding production was managed through adding to the number of iron-making sites the family owned across the midlands and the Forest of Dean. By using local iron ore and woodland for charcoal from their own land acquisitions the family was able to practice what would today be labelled 'supply chain management'.

Ultimately technological change brought about by the successful smelting of iron using coal (coke) apparently 'doomed' the early water-powered iron-making sites to failure, as the locative factor requiring a fixed place for the blast furnace was no longer needed. The change to coke smelting took some years to become widespread. Once this 'new technology' prevailed, the sites in the study area rapidly closed as they could not match the production levels of the coke-smelters, thus ending the industrial nature of the landscape.

The technological change left only Swindon (SB3) and Gothersley (SB6) in active production at the start of the 19th century, undoubtedly helped by the helpful nearby location of the S&W canal, as it allowed easy transportation of goods in and out. The survival of Gothersley to 1890, which is otherwise difficult to explain, may owe something to sentiment – a lingering preference by 'the market' for charcoal-smelted iron as being of inherently 'better quality' than the mass-production material from sites in the 'Black Country' such as the Round Oak works.[5] The survival of Swindon as an iron-making site through to 1976 is entirely due to a decision taken to modernise the plant and introduce coal-smelting and replace water-power with steam under the aegis of a different group of owners from the 1860s.

Other than this exception (Swindon) the fate of the sites in the study area was matched by those in the comparison area which had also ceased to produce iron in the 19th century, as they were not on any coalfield or within a close distance (under a mile) of a suitable colliery.

[5] From 1850 through to its closure in 1982 'the Oak' was the largest iron and steel works in the Black Country and, when it was built, in the UK.

The cessation of flour milling, which followed the abandonment of ironmaking, at the other water-powered sites in the study area mirrored these economic imperatives as it too was phased-out as more efficient mass-production of flour was concentrated in more 'industrial' venues, leaving only Wodehouse Mill (SB24) to last until 1976.

The loss of the iron-making sites in the study area can be contrasted with the Sheffield region, an equally early iron-making district based on local supplies of iron ore, water-power from fast-running streams flowing down from the Pennines and local woodland to produce charcoal. Here, the industry quickly utilised all available sites for mill location and began a specialisation, similar to that of several villages in the study area – in this case it was the production of cutlery. Unlike the study area however, the Sheffield iron industry survived the transition to coke-based smelting as it was straightforward to bring in coal supplies from the nearby south Yorkshire coalfield.[6] Comparison has been made throughout this study with the iron-making activities in the weald of Kent and Sussex, and these sites were similarly affected, with the last site at Ashburnham closing in 1813.[7]

The salt production industry at Droitwich in Worcestershire offers a useful comparison in that it too held to highly-localised and long-established patterns of production associated with an inherent conservatism of approach until the introduction of mass-production methods associated with the advent of John Corbett in the mid-19th century. After this time the industry was effectively superseded by producers based elsewhere, notably Cheshire.[8] The salt industry stands, like the iron industry of the Smestow basin, as an example of continuous success which resulted in a 'mind-set', or *mentalité,* on the part of

[6] Hey, *Packmen*, pp.90-1.
[7] Hodgkinson, *Wealden Iron Industry*, p.89.
[8] L. Gittins, 'Salt, Salt-making and the rise of Cheshire', *TNS*, vol. 75, 2005, pp.139-59.

manufacturers ill-disposed toward change. Such reluctance was a factor in the loss of the industry from the study area.

There are several issues that would benefit from additional research to strengthen these working conclusions. Such themes include further work to confirm locations of all the mill sites in the study area, including those known from medieval documentation but currently not traceable on the ground. Reference has already been made to potential mill sites identified here which are otherwise unknown. A second area requiring further work is the validity of the four-fold categorisation of iron-making site owners/users proposed in chapter 6, and whether this model can be transferred to other iron-producing areas.

7.3. The importance of woodland in the development of the landscape.

It has been demonstrated that woodland was an important characteristic of the study area, and that the amount of land under woodland cover varied through time. Clearance of woodland for agricultural purposes was a feature of its early development. By 1086 the evidence of the Domesday Book shows that enough woodland still existed to form two Royal Forests. One was based around Kinver and the second, on the northern edge of the study area, become the southern edge of Cannock Forest along with the detached part of Kinver Forest, Tettenhall Wood.

Woodland from which charcoal could be produced therefore existed in sufficient quantity to support peripatetic bloomsmiths during the post-Norman era. The woodland existed as, in the main, the royal forests and other woodland on the eastern edge of the study area that later entered the written record as Pensnett Chase. There is, however, no evidence of systematic coppicing or other forms of management in any of these woods other than that

which may have been practised by the Royal foresters, and is occasionally glimpsed in the records contained in the 'pleas of the forest' from the reign of Edward I. With the advent of the blast furnace in the study area from 1595, this type of careful woodland management became essential, as was relatively quickly learned by those who owned or managed them. Examination of, for example, some of the woodland purchases of the Foley family in the late 17th century shows that they understood this principle, and had to seek supplies from an ever-widening area away from their midlands bases to meet their growing demand as their businesses expanded.

Those who chose to exploit their woods for charcoal for blast furnace fuel rather than the traditional usage of the land by landowners for hunting present an interesting aspect of how the concerns of the upper levels of English society were subject to change in the 16th-17th centuries. The concept of the 'new man' in Tudor government is well-established, and represents the tendency of monarchs to employ individuals who owed their prosperity to the King directly, rather than through inherited wealth. An example from this area was Edmund Dudley, a key money-gathering official of Henry VII, who along with his colleague Sir Richard Empson, was executed by Henry VIII in 1509, primarily to court popular acclaim on his accession.[9] Another such 'new man' was Sir Thomas Paget who acquired Cannock Chase and was the first known person in Staffordshire to have used his woods in a large-scale manner for charcoal rather than for hunting (or sometimes as a reserve of timber for building purposes). It was the constant need for money that drove the two Edward Suttons, 4th and 5th barons Dudley, to use their woodland for similar purposes, even though they were members of the 'old' landowning class rather than 'new men'. It can be concluded that 'new' men drove part of the change in woodland use, but this change was not confined to

[9] Edmund Dudley was the grandson of John Sutton, 1st Baron Dudley (by writ) who was the first known member of the Sutton family to use the alternative surname of Dudley. Edmund was the father of John Dudley, Duke of Northumberland, executed in 1554.

them, as the activities of the Sutton family and lesser gentry such as the Wrottesley and Wollaston families also indicate. The 'landed' interest in iron production did not last much beyond a generation, as management of furnaces passed to different people, referred to here as 'the rise of the professionals'. Nevertheless, this new understanding of the complex interplay of the factors associated with the physical geography of the study area, the application of new technology, the growth of the market combined with the changing needs of landowners, offers a new way of thinking about landscape development, as has been demonstrated here.

As such, it can be concluded that access to woodland in the form of the Kinver and Cannock Forests in the study and comparison areas was very helpful to the growing iron industry, but the presence of woodland, whether Royal forest or otherwise did not make the study area 'special'. Instead, water-power was the most valuable resource for blast-furnace using iron-makers. As water-powered sites could not be easily moved, iron ore and charcoal had of necessity to come to those sites. The presence of the iron industry in its more advanced form for the period c.1580-1720 meant that there was continuous tension over access to, and utilisation of, these resources of the study area. On the one hand, retention of woodland for charcoal was essential for the iron industry. Equally, other developing industries, for example glass manufacturing in and around Stourbridge on the southern edge of the study area became a source of competition, perhaps equally strong as that between ironmasters themselves. Then there were other uses, agricultural, domestic, and 'national' in relation to the demand for timber to make ships. It is only during the period under study, which extended until coke-smelting became dominant in the iron industry, that the more traditional uses of woodland, especially by more aristocratic owners, was eclipsed by the tendency to see woodland as an exclusively economic resource for the landowner, rather

than a space for leisured pursuits such as hunting, and providing subsistence fuel for the local peasantry.

The uses and extent of woodland in the period 1320 to 1580 can only be occasionally glimpsed in surviving documentation. Certainly, it is likely that after the Black Death and until the early 16th century the lowered population meant that demand for land and assarting fell away from its mid-14th century peak.[10] An investigation would be advantageous concerning whether the control of local gentry, in the form of the Lords of Dudley in particular, was effective in inhibiting peasant trespass and 'squatter' settlement formation and the creation of 'traditional' access and use of the woodland, or heathland, such as those actions which can be seen in the neighbouring Cannock Chase.[11]

7.4. The effect of communications and transport on the development of the landscape.

Apart from being the location of iron ore, one of the principal geographical characteristics of the study area is that it offers, at its northern end, a narrow but usable 'through-route' in the form of a col of glacial origin between the drainage basin of the River Severn and that of the River Trent. The col is located just to the west of modern-day Wolverhampton and is known as the Tettenhall or Aldersley gap. As has been demonstrated however, this col did not substantially affect local routeways until the advent of the S&W canal in 1772 which made use of it. Roads, apart from one Roman road, now, significantly, lost, did not use the col, preferring to keep to higher ground to the east, or ignore it altogether as did the later railways until the 20th century, and then only for a minor route.

[10] See for example C. Dyer, *Making a Living in the Middle Ages*, London, 2002, pp.357-8.
[11] Harrison, 'Fire on the Chase', pp.124-6.

It can be concluded that the routeway provided by the col was of little impact in affecting the development of the industrial landscape. Only the canal had a positive impact by assisting the longer-term survival of some, but not all, of the iron industry in the Smestow. The canal itself did not add to the development of the area; it may have helped preserve what was already there, rather than act as an agent of change. The impact of the canal in any case did not begin until the last quarter of the 18th century by which time, as has been demonstrated, the iron-making activities in the study area had begun to decline due to the technological change associated with smelting with coke. It can be concluded that the canal had more of an impact on the local and regional market for iron products and only a minor role on the development or preservation of the industrial landscape.

All other aspects of the communication and transport routes offered by the valley can be seen to be minor. The valley was by-passed by long-distance routes. Its own network of roads and tracks was only of local importance. Routes such as the Chester Road to the east through Kinver and Pattingham had ceased to be of anything more than local value by 1700. An early route across the valley, creating the minor bridge-side settlement of Smestow may have been the only contribution of the route first noted by Ogilby.

What can be seen as one of the major geographic distinguishing features of the study area, its access to the col and thus the creation of a through-route between two of the three principal drainage basins in England, was therefore only of minor consideration in the development of Smestow's industrial landscape. This point suggests that determinism is not, on its own, an appropriate framework for assessing the historical development of the valley as an industrial landscape in the period under review.

Further research would be helpful in some areas, notably in trying to establish the framework of routes into and out of the royal forests in the early medieval era. Such a map has been created for Cannock forest, and, despite later industrialisation in the east of the study area it may also be possible to identify these routes. Additional work on the carrying capacity of the S&W canal in connection with traffic making use of the many wharves in the study area, notably Dimmingsdale basin, may also shed further light on the economic basis of some of the iron-making sites.[12]

7.5. The effect on the local landscape of the growth of the local, regional, and national market for bar iron.

The development and expansion of regionalised industrial or productive specialisations within England is a feature of the period under study.[13] The growth of the iron-manufacturing industry in west midlands is another such example, placing the study area as another example of an England-wide set of changes associated with the growth of urban society and the concomitant increase in the amount of material goods owned by a much greater segment of society. In this way, a market can be said to have developed at local, regional, and national levels for 'end-product' items as varied as clothing, glassware and iron goods.

The effect of the influence of such a local market for iron has been specifically discussed with reference to the longevity of the sites at Gothersley and Swindon, but the principle can

[12] The records of the S&W canal are shared between The National Archives and the National Waterways Museum. Neither repository has these records.
[13] F. Pryor, *The Making of the British Landscape*, London, 2010, pp.432-51, especially the discussion of the textile industry.

be extended to the development of the industry in the study area from its origins in the late 16th century.

The market for iron goods, which is still not well understood, does seem to have been behind the steady expansion in the numbers of furnaces and forges in the study area. The explanation may be found in the 16th-17th century steady urban growth and an increasing 'middle class' who required goods made from iron for house construction, kitchen ware, horse trappings, agricultural equipment and so on. Despite these more domestic needs, the chief use of the bar iron product of the forges was for nails. The growth of nail manufacturing in the study area and those areas adjacent to it, whilst outside the remit if this thesis, is relevant to the consideration of the effect of the market economy for iron over this period.[14] This steady growth in the number of nailers implied an ever-increasing demand for bar iron, slit or otherwise, and that this constant demand was more than sufficient to encourage the growth in the number of forges and furnaces, and, to inspire more individuals to enter into iron manufacturing as a business because of the wealth-making opportunities it offered. This does suggest that the four-fold categorisation proposed in chapter 6 of iron manufacturers may have some validity, certainly in identifying, and separating out the 'profiteers' from their predecessors, the 'professionals', as well as the subsequent group of 'pragmatists'.

A further impact of the market on the development of the industrial landscape concerns the adoption by the iron industry of new technology in the form of coke-based iron smelting. The change led to the transfer of blast furnaces onto coalfields and thus away from the study area, helping return the valley to a more agricultural landscape and ensuring that there was little post-1750 expansion of settlement size. The latter type of change instead

[14] See for example, A. Willetts, *The Black Country Nail Trade,* Dudley, 1987.

happened to the east, creating what by the 1840s had become known as the Black Country.[15] Nonetheless, for some furnace owners, water-derived power, and, to some extent, charcoal continued to be available (freely so in the case of water-power). These resources resulted in an element of locational inertia, especially for the owners of Gothersley. Given that they were still able to find a market for their product, it is possible to conclude that some aspects of the 'end-user' market for bar iron may have retained a preference for the charcoal-smelted product as it was a 'known' commodity.

There are several areas for further research which would help in definitively establishing these conclusions on the effect of the market for bar iron. The market was probably responsible for the growth in the number of iron-making sites, and perhaps for their longevity in some cases, despite rivals from other parts of the region, and, later, cheaper iron produced through coal-smelting. It would be helpful to identify, outside the records of the Foley family, how much iron went to particular uses in the wider west midlands economy and secondly whether there was a preference for iron from either certain areas or manufacturers. A final area that has not benefitted from much research concerns the specific reasons for individual site abandonment, and to what extent abandonment was a response to the local market or other pressures.

7.6. The case for a deterministic framework for landscape development with reference to the study area.

If the principle of determinism can be said to apply to the development of landscapes in England, then it follows that landscapes with similar geographic features will develop in a similar way. Such a proposition has been tested here with the industrial landscape created in

[15] The first recorded use of the term Black Country dates from this period, and its context suggests that the term was already in common use, and pejorative. See Jones, *Industrial Enlightenment,* p.22.

the Smestow basin. It has been proposed, following the analysis and conclusions presented above, that the iron industry developed in the study area as a consequence of the local availability of iron ore combined with plentiful supplies of charcoal derived from the wooded nature of the area. To this beneficial mixture the local rainfall and topography combined to produce reliably-flowing streams in steep valleys, making them ideal to dam to create water-powered bellows and hammers to use in blast furnaces and forges.

The Smestow was certainly not unique in this regard. This thesis has already demonstrated that the Rising brook in the same county is broadly comparable, with a similar industrial history. Widening the field of view demonstrates additional similarities. As discussed above and in chapter 4, the Sheffield area of Yorkshire has analogous geographical features, notably swiftly-flowing streams descending from a high edge, in this case the edge of the Pennine *massif*. Local woodland was also plentiful in the medieval era. Turning to the other side of the Pennines similar streams exist, and these were also used to produce mill sites, creating in the 18th century and later the Lancashire cotton industry. Indeed, similar streams in widely different parts of England were dammed to create water-power. In many cases, not just the study area, the pre-coal-smelting iron industry was located on those streams – as well as the adjacent Tame valley in the west midlands but also other sites of iron ore, notably the Weald of Kent and Sussex, which presents a different geology and geography but a similar history of mineral exploitation based on availability combined with substantial amounts of woodland, and, crucially, a ready market.[16]

Yet this proposition does not explain the growth and decline of the industry by itself. This thesis has demonstrated that a further set of explanatory factors is required. The study area did not develop its more commercially-orientated iron industry any earlier than the late 16th

[16] See Crossley**,** 'Water power in the landscape: The Rivers of the Sheffield area', pp.79-88; Hodgkinson, *The Wealden Iron Industry*, pp.89-92.

century as it required the introduction of new technology in the form of the blast furnace, which needed a continuous stream of air blown across its fuel to generate sufficient heat. This stream of air was produced by water-powered bellows. Although water, and water-power had always been a feature in the landscape it could not be used effectively until this period - there was nothing 'industrial' to use it for, except fulling. Nevertheless, it was the invention of the blast furnace that made the latent combination of local water power, iron ore and coal into an economic possibility which changed the landscape into one where industry could flourish. These factors enabled an iron industry, as opposed to small-scale iron manufacture for purely local needs, to become established. However, a further element was required, as chapter 6 demonstrates, the presence of a number of individuals such as Sir Thomas Paget, the Wrottesley and Wolseley families as well as the Sutton Lords of Dudley who for slightly differing reasons were prepared to invest time and their resources into iron-making. The history of the industry represents the interplay of all these elements along with the influence of the market as outlined above, and as the dynamic between the four factors m changed through time, including a 'turnover' of individuals involved in iron-making, the effect on the landscape was evident, notably in terms of woodland exploitation, then conservation, then attrition.

Water has certainly contributed significantly to landscape development, first as a source of power to be harnessed and secondly, as demonstrated above as the medium of transport for iron ore from outside the area and then the export of finished goods through the canal and the River Severn. The provision of water power is the dominant factor in the placing of iron industry sites until the technological changes brought about by using coked coal, which had the effect of freeing locations of manufacture, especially new enterprises, from these controlling elements. This domination of water-based locations, coupled with the need for vast quantities of charcoal by the industry can be seen as the major factors in the steady

movement of ironmasters to exploit new sites characterised by access to large areas of woodland combined with water power, such as the 17th-18th century development of the industry in South Wales, Yorkshire, and Furness in Cumbria.[17]

Once these two dominant factors, water, and charcoal, had determined the sites of industry, that they acted as a powerful incentive for industry to remain in those sites, rather than move. However, the influence of the market and technological change ultimately proved more powerful, albeit a change that was delayed until the post-1750 period with the widespread introduction of coked coal as a smelting agent as part of a further technological change which effectively overcame these inertial factors.

A further, final conclusion is that the evolved landscape is essentially a function of the dynamic interplay of the four factors discussed here, the underlying geography, the impact of the market, technological change and the human response to these elements. This represents a new paradigm for the understanding of the industrial history of the study area, and one that can be used in the consideration of other industrial landscapes. In the case of the iron industry in the Smestow, it is the financial needs of the people involved as landowners, later iron manufacturers, and a changing market combined with the impact of technological innovation, not the environment *per se* that acted as the key agent of landscape change during the study period. It was the economic effects of the market for iron goods that made the largest contribution to the nature of the landscape in the study period and afterward too as it steadily disappeared. By extension, it is argued that across the other areas in Britain where iron-making was the dominant industry, the market can 'open-up' areas where the right combinations of materials exist, and, when market circumstances change, through an introduction of new technology for example or a requirement for

[17] See Schubert, *History*, p.193 and map XI.

additional resources, the market can 'close' the industry. Although the model of geographic determinism in terms of industrial landscape development retains some validity, it must always be used in conjunction with an analysis of technological change, the financial motivations affecting the early pioneers in the industry and the effects of the market, whether that landscape is one of industrial or agricultural exploitation.

Know most of the rooms of thy own country before thou goest over the threshold thereof.

Especially seeing England presents thee with so many observables.[18]

[18] T. Fuller, *The Holy State and the Profane State*, London, 1642, p.171.

APPENDIX A: The iron industry, methods, materials and terminology.

1. Iron and its methods of production.

In iron 'lay(s) coiled up a thousand conveniences of mankind...the steam engines, the tramways, the popular and universal metal that in peace and war should keep pace with, and contribute to, the highest triumphs of the world'.[19]

Iron is a metallic element, symbol Fe[20] occurring as iron ore, the most well-known type of which is haematite, a ferric oxide.[21] Iron is found in several different geological rock strata often in combination with other mineral deposits. In the Weald it is found in Jurassic-era rocks, while in the west midlands in the Carboniferous series, often in association with mineral coal in the Coal Measures. Iron ore must undergo several chemical processes before it can be used for manufacture.

Some terms widely used to describe various processes in the production of iron are set out below, followed by a summary of the development of the industry in the study area.

Smelting describes the application of heat to small lumps of iron ore to separate out, usually in liquid form, the metal from the surrounding impurities. A considerable heat is required to smelt iron, as the melting point is 1540°C. Fuel derived from timber is not sufficient to reliably reach and maintain this temperature. Alternative methods were required; the earliest known is the bloomery. Here, iron ore was laid on a bed of charcoal, that is, burnt

[19] Hayman, *Ironmaking,* p.7, quoting Shropshire Ironmaster William Reynolds (1758-1803).
[20] Derived from the Latin *ferrum*.
[21] Iron ore is an oxide, containing oxygen in a chemical bond. Other elements, silica, phosphorous, carbon, sulphur and other minerals such as clay and sand can be included. These need to be removed by chemical and manual processes before iron can be usable.

wood from which all traces of moisture had been removed, which enabled the ore to melt at around 1200°C as a chemical process is initiated at that temperature which releases the metal from the ore. This process occurred in a hearth, in a building called a smithy.

The bloomery was improved by the creation of a furnace, usually built of fire-resistant clay into which lumps of iron ore could be placed. Later, the positive effect of a stream of air onto the charcoal, increasing the efficiency of melting, was noted, which was standardised into the projection of air by leather bellows, which directed a pressurized narrow jet onto the charcoal. Bellows were hand operated, then by foot. After some hours of this process, the larger lumps of iron ore became smaller lumps, or blooms, of purer iron and slag - ore remnants and unused charcoal. The process is believed to have reached the British Isles around 450 BC.[22]

Once the iron bloom was removed from the bloomery it was then hammered by hand (called forging, which required additional heat) to finish the separation of the purer iron from the slag. The main product of the bloomery was wrought iron, as the iron had been 'wrought' in the furnace by the smith.[23]

Innovations resulted in the creation of the blast furnace, sometimes called the indirect process.[24] This was first used in the UK in the Sussex Weald around 1500 AD. A blast furnace is a tall chimney-like structure, often over 15' in height. This could be an unsupported building, or, usually, built into the side of a slope to enable access to the top of the furnace. The iron ore, interleaved with charcoal and limestone, which experiment had shown was an

[22] Hayman, *Ironmaking*, p.13.
[23] Wrought is the past participle of the verb 'to work'. There is a clear link to the occupational term (and surname) wright, 'a maker of things'.
[24] Hayman, *Ironmaking*, p.19

effective agent in removing impurities from iron ore, would then sit in the main body of the furnace, see Figure A1 below.

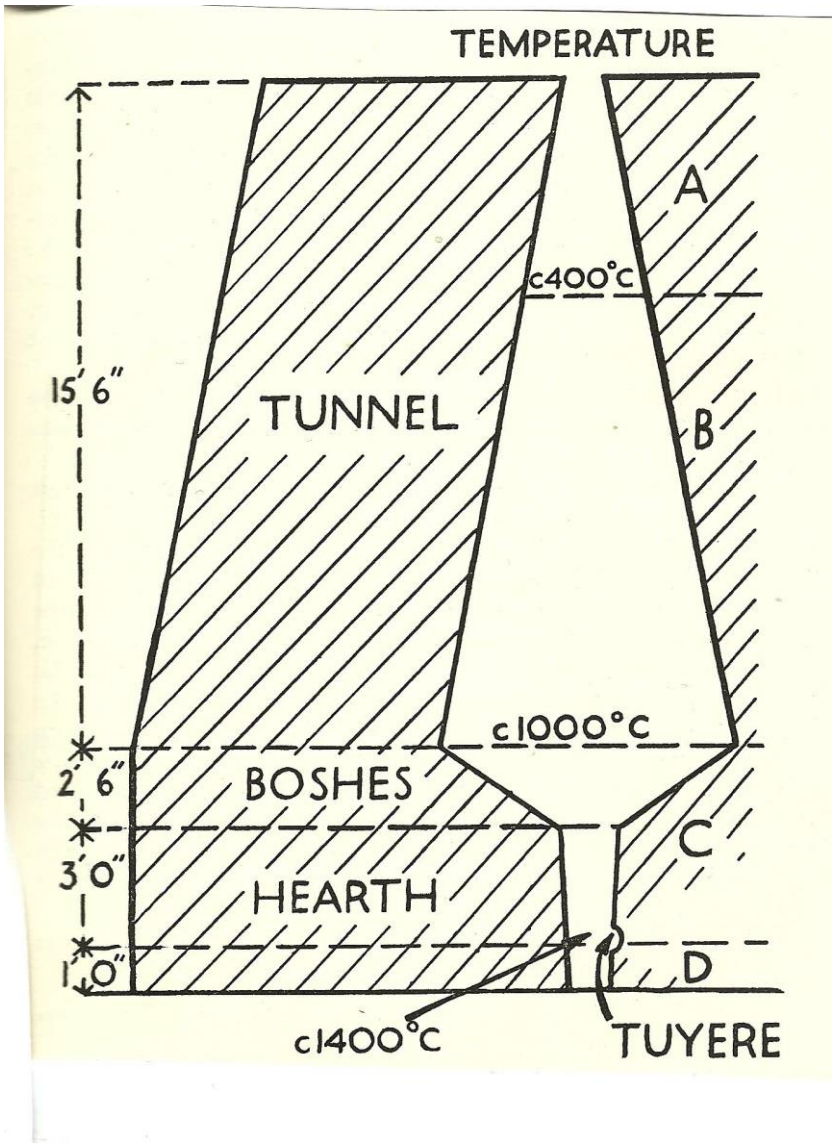


Figure A1: Cross section through a blast furnace. After Schubert, A History*, p.237. The figures on the left refer to the height of each section on average, in feet and inches.*

The molten iron was run into a series of chambers in the furnace floor, which, from a fancied resemblance to a sow with a litter of piglets, resulted in the end-product becoming known as pig-iron, or, because it could then be used in a cast, as cast iron. Pig-iron was relatively easy to transport as each ingot (pig) was quite small.

Unlike a bloomery, a furnace could be run for much longer as it could be regularly topped-up with ore, limestone, and charcoal, with slag, and molten iron run off as required. Furnaces could be 'run' for extensive periods and eventually kept in continuous production from autumn through to spring (called a campaign), allowing the furnace to be repaired in the summer as the fireclay forming the furnace interior lining was usually exhausted.

Cast iron produced in a blast furnace contains impurities, perhaps 5% of the total. It needed to be further treated by a separate melting process which removed the impurities in a forge known as finery or chafery, requiring water power for the bellows in the subsequent reworking (into bars – hence bar iron) with hammers. The hammers also became water-powered. As technology improved, these bars could be cut (slit) into rods of varying dimensions in a slitting mill using shears, which could also be water-powered. A blade mill was a variant, where bar iron would be hammered and honed into blades, typically for agricultural uses, such as a scythe.

This system of production lasted for nearly 70 years relatively unchanged over the period 1640-1709 which forms the centre of this study. After this, several developments to the process began to be applied. The first was the replacement of charcoal in the process by prepared coal, known as coke[25]. This was successfully achieved by Abraham Darby in Coalbrookdale in Shropshire in 1709. It took time to be widely accepted; as late as 1806 there were still 11 furnaces using charcoal, albeit with 162 using coke.[26] This change to coke minimised dependency by ironmasters on access to ready supplies of charcoal (or timber).

[25] Coke is prepared by baking coal in specially sealed chambers which enable the coal to lose its impurities such as tar and gas. The resultant product is very high in carbon.
[26] M. W. Flinn, *The History of the British Coal Industry, Vol 2, The Industrial Revolution,* Oxford, 1984, p.242.

Later, John Smeaton perfected a steam engine, powered by coal, which could work bellows in directing air, and powering hammers, thus diminishing the need for access to water-power and in conjunction with Darby's invention, freeing iron manufacturing to move into many different sites throughout Britain.[27] Later still, the puddling process was invented by Henry Cort,[28] and later still in the middle of the 19th century the perfection of the Bessemer furnace by William Siemens enabled steel, the most useful type of smelted iron, to be cheaply and widely made.

In summary, five distinct phases of technological development within the UK can be identified:

1. The direct process. Iron ore was smelted in a hearth or bloomery. Charcoal is the fuel, and water-powered bellows were used. Output was wrought iron, which required more melting and reforging before it finally became an end-user product.
2. The indirect process. Iron ore was smelted in a blast furnace producing pig-iron (or cast iron). Limestone was used as a reductive agent. Bellows were used. Charcoal and water-power were needed. Complex items were made using casts or moulds. Re-smelting was needed in finery forges. The slitting forge was invented and applied. Output and product variety was increased.
3. Coke replaced charcoal. The industry was freed from reliance on timber for charcoal (and water water-power). Output was massively increased.
4. Henry Cort invented the puddling process to refine pig-iron made by coke, reducing the need for finery forges. Output and speed of production was further increased.
5. Steelmaking using the Bessemer process began, becoming widespread by the 1870s, resulting in the decline of wrought iron and the creation of the modern steel-making process.

[27] Osborne, *Iron, Steam & Money*, pp.238-9.
[28] Making bar iron (see above) from coal.

Figure A2. The Iron Forge by Joseph Wright of Derby. Used by permission, Tate Museum.

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E12/VI/DAc/10	Sale document, dated 8 March 1667.
E12/VI/DAc/12	Sale document, dated 25 August 1671.
E12/VI/DBc/10	Lease document, dated 1 July 1673.
E12/VI/DBc/11	Sale document, dated 30 November 1672.
E12/VI/DCc/7	Sale document, dated 6 August 1682.
E12/VI/DCc/8	Sale document, dated 30 October 1683.
E12/VI/DCc/31	Lease document, dated 20 May 1675.
E12/VI/DDc/5	Sale document, dated 12 May 1685.
E12/VI/DDc/8	Sale document, dated 12 August 1685.
E12/VI/DDc/14	Sale document dated 5 October 1685.
E12/VI/DEc/18	Sale document dated 13 March 1709.
E12/VI/DGd/1-39	Legal documentation, 1719-1729.
E12/VI/KAc/1	Agreement concerning Swyn Forge dated 31 May 1644.
E12/VI/KAc/8	Sale document dated 28 October 1650.
E12/VI/KAc/14	Sale document dated 25 February 1653.
E12/VI/KAc/16	Form of receipt dated 2 February 1653.
E12/VI/KAc/18	Sale document dated 5 April 1654.
E12/VI/KAc/20	Sale document dated 12 April 1654.
E12/VI/KAc/21	Sale document dated 5 March 1655.
E12/VI/KAc/23	Sale to Thomas Foley of wood from Bordsley Park. Undated.
E12/VI/KAc/24	Sale document, 26 February 1656.

E12/VI/KAc/28	Sale document, dated 17 February 1657.
E12/VI/KAc/41	Sale document, dated 20 August 1660.
E12/VI/KAc/44	Sale document, dated 20 May 1662.
E12/VI/KAc/46	Sale document, 9 July 1660.
E12/VI/KAc/51	Sale document, dated 12 March 1665.
E12/VI/KAc/97	Summary of transactions, 1647-61
E12/VI/KAc/114	Sale document dated 4 February 1650.
E12/VI/KC/1	Transactions with Sir William Wrottesley for cordwood, 1668-9.
E12/VI/KC/2-10	Transactions with John Shaw for the purchase of wood. Undated.
E12/VI/KC/11-13	Transactions with Sir William Wrottesley for wood, 1669-70.
E12/VI/KC/14	Sale document, dated 26 March 1668.
E12/VI/KC/15-18	Sale document of 2,000 cords to Philip Foley, from Claverley, Stockton, Bobbington and Quatford. Undated.
E12/VI/KC/28	Sale by Lord Mazarine (probably Sir John Clotworthy, 1st Viscount Massereene) of 4,000 cords, undated.
E12/VI/KC/33-45	Miscellaneous documents covering period 1672-9.
E12/VI/KC/76	Sale document, dated 25 February 1679.

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C3240	Demise and Quitclaim dated 10 July 1633.

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B/A/15/178	Kingswinford Tithe map, 1839.
B/A/15/182	Kinver Tithe map, 1850
B/A/15/246	Penn Tithe map, dated 1843.
B/A/15/271	Sedgley Tithe Map, 1850.

B/A/15/529	Himley Tithe Award and Map, 1839.
B/A/15/553	Kinver Tithe Award, 1850.
B/A/15/651	Sedgely Tithe Award, 1845.
B/A/15/698	Trysull Tithe Award, 1832.
D548/A/PD/1	Trysull Enclosure award, 1778.
D548/A/PD/2	Trysull Enclosure Map, 1778.
D593/A/2/16/4	Grant of common of pasture in Kyngsleye wood, manor of Tettenhall, 1346.
D593/C/14/4	Release of agreement to provide wood – Leveson/Foley. 1641.
D593/C/21/6/6	Agreement for provision of wood – Leveson/Foley, 1641.
D593/E/6/6	Leveson v. Parkes, Fisher, Bromefield, and Giles in the Court of Wards, May 1607.
D603/E/5/2	Records of the Paget Family, Confirmation and ratification of two iron furnaces and two iron forges on Cannock Chase with watercourse, 1597.
D888/1	Minutes of the South Staffordshire Ironmasters Association (various dates).
D1235/4/2	Properties allotted under the Tettenhall Wood Enclosure Act, 1815-54.
D3186/1/1/1	Minute Books of the S&W Canal Company, 1766-1845.
D3363/6/1	Traced copy of Tettenhall Wood enclosure award plan (no date).
D(W)1734/2/3/43	Survey for Lord Paget of two bailiwicks on Cannock Chase. 17th century
D(W)1734/3/3/35	A list of accounts for Lord Paget's iron-making activities. (Dated 1590-1600)

D888/1 Minutes of the South Staffordshire Ironmasters Association (various dates).

Q/RDc/36 Kinver Enclosure Act, 1779.

Q/RDc/53 Wombourne Enclosure Act, Swindon township, 1796.

Q/RDc/59 Kinver Enclosure Award, 1804.

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