CONTENTS

1.0 INTRODUCTION
1.1 Purpose of Report 5
1.2 Location 5
1.3 Origin of Name 6

2.0 OVERVIEW OF SOURCE MATERIAL 6

3.0 HISTORICAL CONTEXT
3.1 Ironmaking in the Forest of Dean 1612-1751 9
3.2 Papermaking 12

4.0 SITE HISTORY
4.1 Introduction 14
4.2 The Corn and Fulling Mills c1435-c1625 15
4.3 The Iron Furnace c1625-170 17
4.4 The Foley Furnace 1701-1738 23
4.5 The Paper Mills 1738-1880 24
4.6 The Farm 1881-1982 31
4.7 1982-2001 31

5.0 THE BUILDINGS
5.1.1 Gunns Mills I, The Furnace c1625-1738 32
5.1.2 Gunns Mills I, Paper Mill, Lower Mill 1738-1880 45
5.2 Gunns Mills II (Middle Mill) 51
5.3 Gunns Mills IIIa, IIIb (Middle Mill) 52
5.4 Gunns Mills IVa, IVb, IVc, (Upper Mill) 54
5.5 Gunns Mills House 57

6.0 WATERWORKS 59

7.0 PHASES
7.1 Phase 1 pre 1682-3 63
7.2 Phase 2 1682-3 to 1701 63
7.3 Phase 3 1701-1738 64
7.4 Phase 4 1738-1850 64
7.5 Phase 5 1851-1881 65
7.6 Phase 6 1881-1982 65
7.7 Phase 7 1982-2001 66

8.0 SIGNIFICANCE
8.1 Local and Regional 66
8.2 National (by David Crossley)

9.0 CHRONOLOGY 68

10.0 BIBLIOGRAPHY 70
LIST OF TABLES

1 The King’s Furnaces 1635
2 Cost of Producing Pig Iron 1684
3 Gunns Mills Furnace Production and Raw Materials 1705-1732
4 Summary Account 1710-11
5 New Hearth 1704
6 New Hearth 1728-9
7 Additional Repairs 1729-30
8 Annual Valuation of Stock and Tools 1705-1742
9 Furnace Inventory 1710-11

LIST OF FIGURES

1 Location plans
2 Forest of Dean furnaces
3 The medieval environs
4 Brayne family tree
5 Sketch plan of Gunns Mills in 16th and 17th centuries
6 Extract from c.1710 plan of Forest of Dean
7 Plan of boundary perambulation of Abenhall 1743
8 Foley estate plan of Gunns Mills 1774-5
9 Extract from T Blunt’s map of the Forest of Dean 1782
10 Extract from A & W Driver’s 1788 map of the Forest of Dean
11 Extract from 1834 map of the Forest of Dean
12 Extract (redrawn) from 1838 Abenhall tithe map
13 Extract (redrawn) from 1856 map of Forest of Dean
14 OS 1:2500 1st edition 1878-9, published 1884 (not to scale)
15 OS 1:2500 1st edition 1878-9, published 1884 (Glouc XXXI/8)
16 Gunns Mills estate 1890 based on OS 1st edition
17 OS 1:2500 2nd edition 1901, published 1903
18 OS 1:2500 edition 1924
19 OS 1:2500 1959, published 1960-1
20 Current OS 1:2500
21 Gunns Mills I-IV location plan
22 Plan of furnace c1625-1738
23 Detail from fireback, dated 1636, showing timber reinforced furnace
24 Section through furnace after Henry Powle 1677-8
25 Abraham Rees’ cross-sections, 1820, of Parkend furnace
26 Gunns Mills I, plan of paper mill c1740-1850
27 Gunns Mills I, plan of paper mill 1850-1880
28 Engraving of a Hollander engine from Rees’ Cyclopaedia
29 Sketch plan of Gunns Mills I, 1964 (Gloucs Council for Ind Arch)
30 Sketch plan of Gunns Mills II, 1964 (Gloucs Council for Ind Arch)
31 Sketch plan of Gunns Mills III, 1964 (Gloucs Council for Ind Arch)
32 Gunns Mills furnace and paper mill – phases
33 Gunns Mills watercourses 1878-9
34 Gunns Mills furnace – Brian Cave’s plan and cross-sections, 1974
35 Gunns Mills furnace - Brian Cave’s cross-sections, 1974
Gunns Mills furnace - Hereford Archaeological Unit - plan, 1988
Gunns Mills furnace - Hereford Archaeological Unit - cross-sections, 1988
Gunns Mills furnace - south elevation, WS Atkins survey, 2000
Gunns Mills furnace - interior elevations WS Atkins survey, 2000
Gunns Mills furnace - photo from south-east 1993 (NMR)
Gunns Mills furnace - photo from south-west 1993 (NMR)
Gunns Mills furnace - photo of vertical joint 1993 (NMR)
Photo (detail) c1890-1900 of Gunns Mills House and former paper mill
Photo c1900-10 of Gunns Mills House and former paper mill
Photo c1910 of Gunns Mills House and former paper mill
Photo c1930 of Gunns Mills House and former paper mill
Photo early 1970s? Gunns Mills IIIa (Middle Mill) with William Townley
Photo early 1970s? Gunns Mills IVa and IVb (Upper Mill)
Photo c1990 - aerial view of Gunns Mills
Photo 2001 - view of Gunns Mills furnace from south
Photo 2001 - scaffolded furnace from east
Photo 2001 - ledge on east elevation of furnace
Photo 2001 - cast iron lintel dated 1682 in tuyere arch
Photo 2001 - cast iron lintel dated 1683 in tapping arch
Photo 2001 - stack interior showing losses of fabric to passages
Photo 2001 - stack interior showing ashlar face and hole in east elevation
Photo 2001 - modified tapping hole showing sliced-off cast iron lintel
Photo 2001 - truss showing weathered tie beam
Photo 2001 - support for paper drying rack
Photo 2001 - wheel pit showing cast iron wheel and ashlar masonry
Photo 2001 - Gunns Mill House from west
Photo 2001 - Gunns Mill House apsidal bay
Photo 2001 - Gunns Mill furnace (I) site of drained pool
Photo 2001 - Gunns Mill II remains
Photo 2001 - Gunns Mills III site
Photo 2001 - site of pool, Gunns Mills III and Gunns Mills IV in middle distance
Photo 2001 - Gunns Mills IV from south-east
Photo 2001 - Gunns Mills IVb site of water wheel and rag beating shed
Photo 2001 - Gunns Mills IVb roof truss in paper drying loft
Photo 2001 - Gunns Mills IVc standing remains
Photo 2001 - Gunns Mills IVa west elevation
Photo 2001 - Gunns Mills IVa showing 'moat' on east elevation
1.0 INTRODUCTION

1.1 PURPOSE OF REPORT

This report provides the first detailed history of the former charcoal blast furnace site at Gunns Mills in Gloucestershire. It combines documentary research based on primary and secondary sources with fieldwork. The report is intended to inform further archaeological recording of the site and to guide future repair work.

Four specific objectives were defined in the brief provided by English Heritage -

1.1.1 To provide a detailed account of the building’s development sequence.
1.1.2 To place the furnace in a wider context in relation to the history of iron production in the 17th and 18th centuries in the Forest of Dean.
1.1.3 To place the furnace in the context of its local environs, with special reference to the identification of any structure related to the iron industry.
1.1.4 To establish the significance of the site’s subsequent use as a paper mill, and the impact of this on the site.

1.2 LOCATION (Fig 1)

Gunns Mills furnace is situated on the eastern edge of the Forest of Dean in Gloucestershire, about 2.75km (1.5 miles) south of Mitcheldean and about 5km (3 miles) north west of Westbury-on-Severn. The site lies at the confluence of the short stream (St. Anthony’s well stream) (PRO T1/314) which flows from St Anthony’s well with the Westbury brook. Immediately below this confluence another stream joins the Westbury brook, creating a junction of three valleys, each followed by a minor road. The valleys are steep-sided, narrow and wooded except where the Westbury brook flows through enclosed fields just north of Gunns Mills.

The former blast furnace has been scaffolded since late 2000 (Fig 51). It forms part of a group of buildings which includes Gunns Mills House, now a guesthouse (Figs 50, 61). Near the head of St. Anthony’s well stream is the former site of the Lloyds’ Upper Mill, where one of a smaller group of buildings is in use as a dwelling (Figs 71-2).

There are four separate mill sites at Gunns Mills and for convenience they have been identified as Gunns Mills I, II, III and IV (Fig 21). These identifications will be cross-referenced with past names for the sites in the report. The furnace (Gunns Mills I) is orientated north-west/south-east. For the purpose of the present report this orientation has been simplified to north/south so that the gable facing the upper yard is north and the gable and furnace opening at the lower yard is south (Fig 22). The lower yard is approximately 81.4m (267ft) OD and the upper yard lies at approximately 88.7m (291ft) OD.

Although the location of Gunns Mills is now given as Spout Lane or Lower Spout Lane, Abenhall, this is a very recent development. To avoid confusion this study usually refers to (Lower) Spout Lane as the road to the Forest or the Forest road, the earliest name found for it in the documentary source material.
1.3 ORIGIN OF NAME

There is no connection between the name 'Gunns' and the production of guns or cannon at Gunns Mills. H. G. Nicholls first asserted in 1858 that 610 guns were cast at the furnace in 1621 and this error has been repeated many times since (Nicholls 1858, 219). There can be little doubt that Gunns Mills takes its name from the clothier William Gunn(e) who occupied the corn and fulling mills on St. Anthony’s well stream in the late sixteenth and early seventeenth century. Gunn(e)’s mills lay about 290m above the site where John Winter established his blast furnace about 1625 (see below 4.1, 4.2). The name was transferred to the ironworks.

In 1620, when it was held by William Gunn(e), the mill site was also known as ‘Cunes Mill’. The Cones or Connes had founded the mill about 1435 and held it from 1485 up to 1540 (see below 4.1). Brian Cave was the first to identify the connection between Cunes Mill and Gunns Mills using the seventeenth century perambulations of Abenhall parish (Cave 1981, 2, quoting GRO D36 M2, M17). The only other recorded name for the mill dates from 1485 when it was referred to as ‘le Newmyll’ (CPR 1485-1494, 48).

2.0 OVERVIEW OF SOURCE MATERIALS

Most of the primary source material used in this study was found in Gloucestershire Record Office (GRO), Herefordshire Record Office (HRO), and the Public Record Office (PRO). Additional material was available from the Gloucestershire Collection held at Gloucester Library and from Worcestershire Record Office (WRO). Ms Judith Barrington of The Bungalow, Lower Spout Lane lent her private deed collection and Mr and Mrs Anderson of Gunns Mills House lent photographs of their property. Mr Trevor Roach of the Wilderness Field Study Centre, Mitcheldean gave access to material including photographs held there. The Forest of Dean District Council produced the relevant files for examination. Ms Judith Barrington, Mrs Patricia Haines and Mr Alfred Beard were all interviewed.

Any study of the development of Gunns Mills is complicated by shifting administrative boundaries. Situated on the eastern edge of the Forest of Dean, the site was originally part of the Crown’s Forest demesne and is shown located just within the boundary on the earliest reliable (seventeenth century) plans. In the same period it appears in the boundary perambulations of neighbouring Abenhall parish. The property remained within the Forest for most of the eighteenth century but during the early nineteenth century part of the Gunns Mills estate was formed into three separate outliers of Abenhall parish. The Upper Mill and two small enclosures on the south side of Spout Lane were then taken into the extra parochial Township of East Dean, formed in 1835. In 1885 the whole of the Gunns Mills estate was included within East Dean civil parish and in 1953 within Littledean parish (VCH V 1996, 93).

Evidence for the early history of Gunns Mills was found over a wide range of primary source material. The seventeenth century perambulations of Abenhall parish gave important evidence for the identification of the fifteenth and sixteenth century mill site. Court records provided valuable information for the ownership of the site and its occupation at various times from the fifteenth to the seventeenth centuries. Wills, particularly that of Richard Brayne (died 1572) and William Brayne (died 1692), proved
to be essential in understanding its ownership and development during the seventeenth century.

For the later history the Foley collection held in Herefordshire Record Office proved extremely useful, providing a detailed record of production at Gunns Mills during the Foley period. The account books also contain lists of stock, repairs and building works. Estate rentals provided information on building and repair work during the early part of the Lloyds' tenancy. The Lloyd material (GRO D2172/1/75) deposited in Gloucestershire Record Office is a valuable collection of deeds and other documents with particular relevance to the ownership and development of the site in the eighteenth and nineteenth centuries. Ms Barrington's private deed collection was useful in establishing the ownership of the site during the late nineteenth and twentieth centuries. Wills and inventories helped in documenting the eighteenth century ownership and development of the site and census records provided information on ownership and occupation in the mid- and late nineteenth century. Newspaper advertisements contained some important details of the disposition of the paper mills, and of the machinery and plant they contained, particularly in the nineteenth century. For the twentieth century oral evidence was valuable in establishing the history of the site from the 1940s onwards.

The Public Record Office holds the largest collection of map evidence for the Gunns Mills. The Forest map of c.1710, which clearly shows the watercourses supplying the mill site, is the first to be of any real use (Fig 6). The Forest surveys of the late eighteenth and early nineteenth centuries were especially important in establishing the extent of the property at various times. The survey of East Dean Walk, produced in 1856, provided significant information on the buildings. Ordnance Survey plans record the decay of the industrial premises and the waterworks although the length of time between the pre- and post war plans (1924-1960) limits their particular value.

All the early illustrations of the site are of Gunns Mills House viewed from the southwest across the mill pool and the former Lower Mill (Gunns Mills I) only appears incidentally (Figs 43-46). The first of these is a photograph taken during the 1890s, which at least shows an extensive part of the mill to the right of the house (Fig 43). There are no early views of the mill from any other direction. Most of the later photographs available are of the derelict furnace (Gunns Mills I) and again of Gunns Mills House although a few show the sites of the Upper Mill (Gunns Mills IV) and the upper Middle Mill (Gunns Mills III) (Figs 47-48). Of the photographs of the furnace the collection taken by the RCHME (now English Heritage) in 1993 is the most comprehensive and the most useful (Figs 40-42).

Although the Bristol and Gloucester Archaeological Society visited the furnace as long ago as 1881, their serious interest in the site did not begin until the 1960s. In 1964 Warren Marsh, assisted by others of the Gloucestershire Council for Industrial Archaeology, produced the first set of useful measured drawings and levels not only of the furnace but also of the Middle Mills (Gunns Mills II and III)(Figs 29-31). In 1974 Brian Cave produced a series of cross-sections and plans of the furnace, which for the first time showed the furnace and the later paper mill phases (Figs 34-5). Some of his original drawings are kept at the Wilderness Field Study Centre. With one important exception the general conclusions reached by Brian Cave on these two phases are
supported in this study. William Townley's work, produced at about the same time, provides useful information on all of the Gunns Mills buildings and the waterworks. Unfortunately parts of the published account are confusing and the drawings considerably distort the local topography.

In 1988 Ron Shoesmith and his team from the City of Hereford were commissioned by English Heritage to produce measured drawings of the furnace at Gunns Mills in order to help in 'consolidation and repair work' (Figs 36–7). His excellent report provides the first stone-by-stone large-scale drawings of the furnace and a more detailed analysis of the phases of development, which is still generally acceptable. There are also some useful 'archival' photographs of the state of the furnace in 1988. The site history and the information on the other mill sites are less reliable.

The report supplied in May 2000 by Louise Bashford of the Gloucestershire Archaeological Service provided a useful summary of the current state of knowledge of the furnace, based on a rapid SMR and documentary search. Trenches dug for scaffolding supports were archaeologically recorded together with any necessary dismantling of fabric and a report submitted in December 2000. The results of these excavations were not particularly revealing. Between June 2000 and January 2001 WS Atkins carried out a photogrammetric survey at 1:50 scale of all the exterior elevations of the furnace, including the for the first time the sides of the tapping and tuyere arches (Figs 38–9). The interiors of both the furnace and the rag beating/bellows room were also recorded. The report on the dendrochronological survey undertaken by the University of Sheffield had not been made available at the time of writing.

Of the range of secondary sources consulted in the course of the study the works of Cyril Hart were invaluable, providing both general context and specific information. His books were an excellent starting point and saved time in the search for basic facts and useful sources. His extensive notes and copy documents are deposited in Gloucester Record Office. Of the other secondary sources consulted it is worth mentioning those that are specific to Gunns Mills. There is no article or book which deals exclusively with the mill as a furnace, and general articles have to be searched for specific references. Considerably more has been written on Gunns Mills as a paper mill and in particular by F J T Harris (1974). Gunns Mills also appears in his more general article on Gloucestershire (Harris 1976). Brian Cave wrote generally on the mills of the Westbury brook and in dealing with Gunns Mills provided some useful information on all its phases and sites together with the drawings mentioned above (Cave 1974). R T Mansfield recorded the memories of William Townley as part of community project in which Gunns Mills figured prominently (Townley 1974). The material has to be treated with care but contains much which is useful. The unreliability of the accompanying maps has been mentioned above.
3.0 HISTORICAL CONTEXT

3.1 IRONMAKING IN THE FOREST OF DEAN 1612-1751

Ironmaking was introduced into Britain during the fifth century BC but was not undertaken on any appreciable scale until the Roman occupation when the Forest of Dean, with its rich deposits of ore and plentiful woodland, was a significant area of production. During the medieval period Gloucestershire and the Forest formed the focus of an important regional centre of ironmaking, which extended westwards into Herefordshire and Monmouthshire. The Crown used large quantities of iron produced in the Forest and despatched from Gloucester in the manufacture of arms and in building work (Schubert 1957). Gerald of Wales, writing of his journey through Wales in 1188, noted ‘...the great Forest of Dean...which supplies Gloucester with venison and iron ore’ (Thorpe 1978, 114). The industry in Britain reached a peak in the thirteenth century and then declined as part of the general downturn in the economy, which lasted throughout the fourteenth and into the fifteenth century.

Up to the close of the Middle Ages iron was produced by the direct (bloomery) method. Ore was smelted in a charcoal furnace and the resulting bloom or lump of iron hammered into shape. The indirect method was introduced into Britain from the Continent at the end of the fifteenth century. The water powered charcoal blast furnace was much more efficient than the bloomery but the iron produced had a high carbon content and was very brittle. There was some direct casting, particularly in the Weald, (Hammersley 1973, 600) but most of the metal had to be refined, that is smelted to remove the carbon, at a finery forge before being worked.

The vertical blast furnace was generally built against a bank or slope so that it could be fed from above with a mix of iron ore, flux and charcoal carried to the top of the stack from the bridge house via the bridge. The blast, which passed through the blowing hole, was provided by a pair of bellows worked by a water wheel so that much higher temperatures were attained than by the manpowered direct (bloomery) method. The smelted iron was drawn off through the tapping hole in the fore hearth onto the casting floor. The sand mould usually took the shape of a central furrow or sow, with a number of smaller furrows or pigs leading off at either side. Because of the need for a good fall of water and a steady and plentiful supply of charcoal blast furnaces in the ironmaking districts were situated on fast flowing streams in or close to wooded areas.

The first recorded blast furnace in England was built at Newbridge in the Weald in 1496 (Cleere and Crossley 1995, 111-112) and during the following century the indirect method of iron production spread throughout the ironworking districts in England and Wales. Gilbert, Earl of Shrewsbury, established the earliest furnace in the Dean area at Whitchurch before 1575. By the early 1590s the Earl of Essex had two furnaces at Bishopwood and a forge at Lydbrook, and by 1604 Sir Edward Winter had built a furnace on his estate at Lydney, to which he had added a forge before 1606 (Schubert 1957, 184-5; Hart 1971a, 8-9) (Fig. 2).

Blast furnaces were not established in the Forest of Dean until the early seventeenth century. This late arrival in such an important area of iron production is explained by the privileged position of the Free Miners of Dean, which allowed them a virtual monopoly
of mining and ironmaking within the Forest bounds. The bloomery consumed far less charcoal than the hungry blast furnace so the hiatus can also be ascribed to the efforts of the Crown, recorded from the thirteenth century onwards, to conserve the resources in its woodland demesne for other uses, such as shipbuilding. The purity of the Forest ore, the abundance of cinders (slag) and of cordwood for charcoal led the ironmasters to press increasingly for concessions. In 1610 it was proposed that the King should erect his own ironworks in the Forest but the huge capital outlay that would have been involved was considered too great.

In 1612 James I granted William Herbert, Earl of Pembroke, the right to erect furnaces and forges in the Forest of Dean, to take wood there for charcoal and to dig for ore and cinders. The wealthy Herbert had significant interests in ironworking on his lands and possessions in Monmouthshire and South Wales and an interest in the Forest since the lords of Pembroke had held the office of Constable of St. Briavels with responsibility for the woods and venison since the mid-sixteenth century. In 1612-13 the King’s Ironworks, four furnaces and three forges, were erected in Dean - Lydbrook furnace and forge, Cannop furnace, Park (Parkend) furnace and forge and Soudley furnace and forge (Fig 2). Two more forges at Whitecroft and at Bradley were erected in 1628-9. There was growing concern over the despoilation of Dean’s woodland for charcoal at this period since, by 1633, in addition to the King’s Ironworks, there were seven furnaces and eight forges in private hands lying on the outskirts of the Forest (Hart 1971a, 13) (Fig 2). The Crown was urged to manage its own ironworks directly and to suppress the private works. These were allowed to remain however and the King’s Ironworks continued to be leased out. In 1640 Sir John Winter of Lydney was granted about 18,000 acres of the Crown demesne with the soil, underwood and game (VCH V, 363; Hart 1966, 124-5; Hart 1995I, 13-14). The grant included the King’s Ironworks and ore, cinders and coal, although two furnaces (Park End and Soudley) and four forges (Soudley, Bradley, Park End, Whitecroft) were to be underleased to Sir Baynham Throckmorton and his partners for six years.

John Winter was the grandson of Sir William Winter, who had bought the manor of Lydney in the 1560s. An admiral in Elizabeth’s navy, William was later granted the manor as a reward for his services during the Battle of the Armada in 1588. He died in 1589 and was succeeded by his son Edward. Sir Edward Winter inherited extensive lands in Gloucestershire, but suffered a major loss of fortune during the campaigns against the Spanish. He sought to restore his loss through iron production and built the furnace and forge at Lydney (see above). On his father’s death about 1619 John Winter inherited a considerable fortune and from 1624-5 he began to extend his iron production (Hart 1971a, 9). By 1634 in addition to the furnace and two forges at Lydney, he owned a furnace at Gunns Mills and a furnace at Rodmore (Hart 1971a, 13) (Fig 2). A Catholic, Winter gained favour at the court of Charles I and in 1638 was appointed secretary to the Queen. With the Forest grant in 1640 he became the most powerful ironmaster in Dean.

Winter and his assigns felled large numbers of trees and enclosed extensively within the Forest to allow the woodland to regenerate. This proved unpopular with Dean’s commoners and in 1642 the Long Parliament revoked his grant. At the outbreak of the Civil War Winter threw himself vigorously into the Royalist cause. The Forest of Dean
was the scene of a great deal of military action and the ironworks produced shot for both sides (Hart 1971a, 17). Much of this production was fired locally in a bitterly fought campaign when John Winter’s ‘iron mills and furnaces were the main strength of his estate and garrison’ (Hart 1971a, 17 quoting Corbet ‘Military History of Gloucester’ in Bibliotheca Gloucestrensis, 1825 89). The Royalists were defeated in 1644 and the ironworks at Cannop, Parkend, Whitecroft and Lydney were destroyed. Sir John Winter lost most of his property and the surviving ironworks in and around the Forest were shared out among the local parliamentary officers.

The despoilation of Dean’s woodlands, which had gathered pace throughout the early part of the century, intensified under the Commonwealth ironmasters. In 1650, concerned at the increasing devastation, Parliament ordered the destruction of all the ironworks in the Forest. It is not clear to what extent this instruction was carried out but there is no evidence of any Forest iron production from 1650 until 1653. In September that year Major John Wade, Commonwealth administrator of Dean, was instructed to build a new furnace at Parkend and to rebuild Sir John Winter’s Lydney furnace to make shot and ordnance for the navy (CSPD 1653-4, 39 no 82 107). As he began work Wade reported that ‘there are no forges now in the forest’ (CSPD 1653-4, 40 no 73 151). It seems that demolition was not confined to the Forest. There is evidence that the ironworks at Lydbrook were destroyed although they lay outside its boundaries (Hart 1971a, 18).

At the Restoration Wade resigned and the administration of the Forest works was taken over by a Royal Commission. Private ironworks on the fringes of the forest, such as the furnaces at Redbrook and at Rodmore and Thomas Foley’s works at Elmbridge are known to have been working at this time (Fig 2). Sir John Winter was again given a grant of the Forest but this time the King’s Ironworks were not included. In 1662 the King’s works consisted of Parkend furnace and forge and the forge at Whitecroft (Hart 1966, Appendix XI 289). These were leased with the furnace at Lydbrook (Howland) to Winter’s nominees, Francis Finch and Robert Clayton, for a term of eleven years. The Crown’s woodlands were again despoiled for charcoal and in 1667 Winter’s grant was revoked. The Dean Forest Reafforestation Act was passed in 1668 and as a result Whitecroft Forge was stopped and Lydbrook and Parkend Furnaces were denied cordwood from the Forest. Clayton’s lease expired in 1673 and in the following year the Treasury recommended that the King’s Ironworks should be suppressed ‘as they are conceived to be the destruction of the wood and timber’ (quoted in Hart 1995, 163). In February 1674 the ironmaster Paul Foley was sold all the materials at the furnaces of Lydbrook (Howland) and Parkend, and the forges at Parkend and Whitecroft for £500. These and the remains of all the other ironworks within the Crown’s Forest demesne were to be demolished before May 1674 and to be removed before the end of September.

Paul Foley was descended from the Stourbridge ironmaster, Richard Foley, who moved from the nail trade into ironmaking in the 1620s. His son Thomas Foley of Witley expanded the business beyond the Stour Valley throughout the West Midlands counties and into Wales. He married Anne Browne, the daughter of a Dean ironmaster, and on his death in 1676, had interests in the ironworks at Elmbridge, Longhope and Bishopswood (Fig 2).
In 1668 Foley divided his business between his three sons. His second son Paul held the works in Dean and entered into a number of more or less short-lived partnerships with local ironmasters until he let his works to Richard Avenant and John Wheeler in 1685. In 1692 Paul Foley, his brother Philip and Richard Wheeler joined Avenant and Wheeler to form the Ironworks in Partnership under the management of John Wheeler. The partnership sent the high-grade malleable ‘tough’ pig iron made from Dean ore to be blended with inferior coldshort iron in the Stour valley fineries. This produced an intermediate grade of bar iron supplied to the Midland trade. On Paul Foley’s death in 1699 his son Thomas I succeeded to his interest. In 1704 the forgemaster William Rea became a partner and assistant to John Wheeler.

The Foleys relinquished direct control of the Stour works in 1705 and the business was then known as the Forest Partnership. At that time their ironworks included the furnaces at Elmbridge, Bishopwood, Blakeney, Redbrook and Gunns Mills, the forges at Blackpool, Barnedge and Monmouth and the storehouses at Bewdley and Monmouth (HRO E12/DDF/1)(Fig 2). They retained their hold on the Midland iron trade, shipping their high-grade pig iron along the River Severn.

On John Wheeler’s death in 1709 William Rea became the managing partner and after Philip Foley’s death in 1716 only he, John Wheeler II and Thomas Foley I remained within the partnership. Rea was sacked for mismanagement in 1725. From 1728, when Thomas Foley I and II became the sole partners, trade began to be wound down. By the mid-1740s just Elmbridge and Bishopwood furnaces remained. The partnership accounts end in 1751 and it seems that what remained of the business closed shortly afterwards (HRO E12/VI/DGf accounts 1723-1751).

The Foley partnerships dominated the iron trade in Dean during the first half of the eighteenth century. After 1750 the remaining local ironmasters presided over a decline in the industry to which the mid-century wars, foreign competition and the rising price of cordwood were major contributors. Redbrook was the last charcoal blast furnace to be worked in Dean in this period (Fig 2). It was blown out in 1816 (Hart 1971a, 70).

3.2 PAPERMAKING

Papemaking came later to England than to her Continental neighbours. There is no evidence for paper manufacture in this country before John Tate opened his works in Hertfordshire in the 1490s and the trade did not become truly established until the first half of the seventeenth century. The early industry was dominated by the production of brown paper, made from coarse hempen rags, since the linen rags required for the production of fine white paper were not easily available in England and had to be imported. Most English paper mills at this time were to be found around London with the remainder widely dispersed throughout the rest of the country.

The location of water-powered paper mills could be determined by several factors, most of which demanded a rural setting. Of these water quality was particularly important, especially in the manufacture of white paper. Papemakers sought to establish their vat mills on streams of pure spring water with a strong even flow, taking it from as near the source as possible. The narrow steep sided valleys through which these streams often ran were favoured locations since the strong draughts they created speeded the drying
process. Access to a market and the supply of raw materials were other significant factors. Most paper mills were set up near the large towns, which provided their market, or close to sea or river ports so that both raw materials and finished products could be easily transported.

Papermaking in the rural vat mill was a relatively simple yet skilled process. First the rags were sorted or picked then dusted, washed and left to ferment. They were then placed in a trough of water and reduced to a pulp by a set of hammers powered by the water wheel. The pulp was put into a vat with more water and the mixture constantly agitated by a pole or paddle. Pulp was taken from the vat in a fine wire mould and shaken until the water drained away and the pulp knitted together on the wire to form a sheet of paper. The paper was lifted from the mould and put between two pieces of felt. This continued until a ‘post’ containing six quires (one quire equals 24 or 25 sheets) was formed. The post was placed in the vat press, which squeezed out any remaining water and compressed the paper. The sheets were then removed from the vat press and the felts and placed in a screw press. After pressing the paper was dried in the drying loft on lines covered with horse or cow hair to prevent staining. Writing paper was sized, pressed and then dried again (printing paper was treated during the rag beating process). The sheets were finished, examined for faults and then pressed again. This final pressing, known as parting, was carried out two or three times for the best papers. The paper was then counted into quires, folded and packed ready for sale (Rees 1819-20, 73-4).

From 1700 the English paper industry began to expand although it was still limited in size by the relative shortage of rags available from the domestic market and a consequent reliance on frequently erratic foreign imports. In addition the superiority of Continental papermakers, particularly the French, in the production of white papers combined with reasonably light import duties to confine the English trade to the manufacture of the cheaper browns. Despite this however, there is some evidence for the growth of the white paper trade during the early eighteenth century. In Gloucestershire in particular Postlip Mills (see below 4.5) may have been producing white paper as early as 1707 (Shorter 1971, 52). The outbreak of the Spanish Wars in 1739 and the consequent difficulties in importing foreign papers led to a more rapid advance in the English trade. By the close of the century it had effectively secured the home market.

From the mid-nineteenth century onwards trade began to pass from the hands of the small papermakers in their rural or semi-rural vat mills. Steam powered machinery and the growth of a new transport infrastructure tended towards the establishment of larger manufactories on more extensive sites. The increasing use of wood pulp and esparto grass rather than rags as raw materials and the range of chemical treatments available meant that water quality was no longer a primary concern. Rural paper mills closed as the industry began to move into the towns and cities. Although there were still 104 vats in England in 1900 (Shorter 1971, 149) the rural industry was moribund and did not last beyond the first years of the twentieth century.
4.0 SITE HISTORY

4.1 INTRODUCTION

By 1228 the Forest of Dean had been extended to cover those parts of Gloucestershire and Herefordshire between the river Wye to the east and the river Severn to the south east and between Newent to the north and Gloucester to the east (VCH V, 354; Hart 1966, 13) (Fig 1). By the thirteenth century the site later occupied by Gunns Mills was located well within the area subject to Forest law but was actually on the margins of the forest proper since a great tract of land from here eastwards had been cleared of much of its woodland in the preceding centuries. The boundaries of the ten bailiwicks recorded in 1281-1282 roughly define the extent of the forest as an ecological and topographical entity at this time (MacLean 1889-90, 359-361, 367-368; Grundy 1936, 115-119, 144-6; Hart 1966, 18). Gunns Mills was founded on the eastern edge of the Forest of Dean, within the bailiwick of Abenhall on the boundary with the bailiwick of Parva Dean (Hart 1966, Map IV 19) (Fig 3). This is not the place to dispute the accepted solutions to the bailiwick boundaries. It should be said however, that Grundy’s solution, which would include the site of Gunns Mills within the bailiwick of Parva Dean, is almost certainly incorrect since he has to postulate that a long ditch belonging to Flaxley Abbey stretched for two miles as far as Plump Hill near Mitcheldean (Grundy 1936, 144-6). This makes no sense in view of the known tenurial history of this area of Abenhall.

In the area immediately surrounding Gunns Mills deforestation had centred around Abenhall and to a lesser degree Flaxley and Littledean. The open fields of Abenhall (VCH V, 96) had expanded at the expense of the forest and after 1280 the eastern fringe of Abenhall bailiwick was absorbed into the manor of Abenhall (Fig 3). The clearance of land for cultivation was not the prime motivation for felling the trees and removing the undergrowth. There was much depredation of the woodland as a resource in its own right for timber and charcoal. Between 1271 and 1282 over a thousand stumps of trees (1221) and nearly a thousand charcoal hearths (959) were recorded in the bailiwick of Abenhall (Hart 1966, Appendix II 257). In the same period Henry of Dene was granted a grove in Little Dean, which he had felled and made into charcoal (Hart 1966, Appendix III 261) and, again in Little Dean bailiwick, twenty-five charcoal hearths were confiscated from Ralph of Abenhall (Hart 1966, Appendix II 259). What is remarkable is the fact that this activity did not result in a relentless forcing back of the forest edge. It is clear that regeneration took place despite the pressure for woodland resources and the mismanagement, neglect and the corruption of Forest officials in the centuries that followed. The boundary of the living forest in the late thirteenth century does not appear to be radically different from its limits today.

It is not known when the boundaries of the manors of Abenhall and Flaxley Abbey estate were finally established but it was likely to have been after 1280. By the time of the earliest reliable maps of the Forest of Dean c.1710 (PRO F17/7; Hart 1995I, Map VIII 206-7) (Fig 6), it is clear that a salient of the Crown demesne pushed out north-eastwards between the two manors. It is not certain whether this salient was created by default, as a chance survival of Royal Forest after all the grants were made and assarts and clearances allowed or deliberately retained for its woodland and water resources.
These included St Anthony's well and stream, a section of the Westbury brook and Shapridge (Fig 3).

The Flaxley Abbey estate lay on the eastern border of this Forest salient and had probably expanded in this direction through the generosity of the Crown. Amongst many royal gifts to the monastery was the right granted in 1227 to gather firewood in Tinbridge (later Flaxley) wood, Welshbury wood and Castiard (Chestnut, later Flaxley) wood. This last lay to the north of the Westbury brook and should not be confused with Castiard wood (The Chestnuts) to the south of the Westbury brook which remained with the Crown (Hart 1966, 31) (Fig 3). By 1258 the Abbey was despoiling the Forest through taking wood for its forge. This depredation may have created the new wastes that were granted to the Abbey between 1271 and 1282 in the woods of Castiard, Tinbridge, Welshbury and Little Dean (Hart 1966, Appendix III 261). In this case the waste of Castiard was probably the eastern extremity of the King’s wood south of the Westbury brook, a tract of land lying immediately south of Flaxley Abbey. Tinbridge and Welshbury woods were eventually included within the Flaxley Abbey estate. The woodland character of this part of Flaxley was retained however, in contrast to the cultivated landscape of the Abenhall fields, enclosed by at least the sixteenth century (GRO D36/E1) and lying on the other side of the Forest salient to the north.

4.2 THE CORN AND FULLING MILLS c.1435-c.1625

The first certain reference to Gunns Mills dates from December 6th 1485 when the King granted Thomas Cun [Conne] of Littledean, a yeoman (PRO C1/940/1-2),

...the office of being one of the serjeants of the castle of St. Briavels, in the forest of Dean, co. Glouc., with a rent of 13s 4d which the abbot of St. Mary, Flaxley is bound to pay to the King at the castle for a watermyll called ‘le Newmyll’ in the said forest and all other fees heretofore received by Robert Hyett in that office... (PRO C66/562; CPR 1485-1494, 48)

By 1540 the watermill was known as Connes Mill (PRO C1/940/1-2) and it can thus be identified with the watermill erected within the Forest by John Cone of Mitcheldean before 1435 for which he paid a fine of 12d for encroachment on the royal demesne (PRO SC6/850/20)(Fig 5).

The background to Cone’s foundation remains unclear but what was a considerable investment would not have been made unless there were a readily identifiable market. The adverse economic conditions of the preceding century during which the Black Death had decimated England’s population must have had some effect on the Forest of Dean but by the 1430s there had been a local recovery with an increasing exploitation of woodland resources. If a choice were possible, a corn mill would always be established in preference to any other mill. (Holt 1988, 155-6). Given that it was described as such in the mid-sixteenth century while still held by the Cone family (CP 25/2/14/3IHenVIIIIEaster), it can be assumed that John Cone founded his mill to grind corn. The new mill is unlikely to have been built to serve the tenants of Abenhall since at that time there was at least one corn mill and possibly two on the Longhope Brook in the extreme north of the manor (VCH V, 97). In addition it lay not in Abenhall but within the Forest, the royal demesne. It is more probable therefore that the mill was built
to serve the denizens of the forest – wood cutters, charcoal burners, miners, ironworkers and squatters with an animal or two to feed on the woodland pastures. It is impossible to estimate the extent of such a population at this time but it may have been sufficient to provide a local market.

For whatever market John Cone had originally founded his corn mill, by 1485 it was rented by the Crown to the Abbey of Flaxley for 13s 4d per annum (CPR 1485-1494 48). The Abbey might have used it to grind its own corn. In 1291 a water mill with a fulling mill formed part of the grange next to the abbey (VCH V, 145) but there is no information as to whether these mills were still in use in 1485. Cone’s corn mill may also have continued to serve the local population, providing the abbey with an additional income. The yearly rent of 13s 4d seems low for a corn mill but may be a further indication of the Crown’s continuing generosity towards this impoverished foundation (VCH V, 94 95).

It is clear from the 1485 grant that the rent from ‘le Newmyll’ was given to Thomas Cun [Conne] in addition to the usual perquisites for life of the serjeant’s office, presumably because he and John Cone were related. Sometime before his death (date unknown) however, he was given the hereditary office of forestership of fee with ‘Connes mylne’ and other property attached. (PRO C1/940/1-2) His estate descended to his eldest son and heir, John Conne, (PRO C1/940/1-2), described in 1538 as a yeoman of the Crown (Letter and Papers Henry VIII 1538 XIII pt I no 246/6 241).

On John Conne’s death in 1538 the forestership of fee with the attached land and property passed to his daughter Margaret (PRO CP 25/2/14/31HenVIII Easter). In 1540 she and her husband, John Counteys, sold the corn mill and some land, described as being in ‘Habenhale [Abenhall] and parva magna [Mitcheldean]’, together with the forestership to Richard Brayne of Littledean (CP 25/2/14/31HenVIII Easter). Margaret’s inheritance was contested by her uncle, Thomas a Conne, brother to John Conne and a sergeant plumber in the King’s household (PRO C1/940/1-2). Thomas claimed that his father Thomas Conne’s estate was already held in fee tail ‘to him and to his male heirs’ when the forestership with the mill and the other premises was given to him. The gifted property should therefore by right descend to him, the younger Thomas, as next male heir of his brother John and his father, the elder Thomas. He also sued Margaret, her husband and Richard Brayne for the return of the deeds relating to the property. The Court of Chancery confirmed his niece’s inheritance (PRO C1/940/1-2).

In the dispute over the Conne inheritance a considerable amount of land is recorded as attached to the mill:

<table>
<thead>
<tr>
<th>Description</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>one pasture or myne called Connes Myne messuage with garden land</td>
<td>c100 acres</td>
</tr>
<tr>
<td>pasture</td>
<td>60 acres</td>
</tr>
<tr>
<td>meadow</td>
<td>20 acres</td>
</tr>
<tr>
<td>(PRO C1/940/1-2)</td>
<td>10 acres</td>
</tr>
</tbody>
</table>
This property was described as being in Little Dean parish, the nearest boundary of which lay about one mile (1.5km) to the south, and was therefore detached from the mill. It probably became an important constituent of the Brayne’s Hayward or Courthouse estate in Little Dean (VCH V, 163) and may have been the principal reason for Richard Brayne’s purchase of the Conne property.

It is not known whether the Braynes leased out Connes mill before it is next recorded in 1597 (PRO CP 25/2/146/1906/39Eliz IHilary; GRO D2172/1/75). Flaxley Abbey was dissolved by March 1537 (VCH V, 95) but may have ceased in any case to rent the corn mill before that date. Richard Brayne died in 1572, leaving his estate to his grandson Thomas Brayne, the son of his heir Thomas the elder, by then deceased, with successive reversion to each of his three remaining sons, John, George and William and their male heirs (Fig 4). Richard’s wife, Jane Brayne, was bequeathed a life interest (PRO Prob 11/54).

In 1597 Thomas Brayne, his grandmother Jane and his uncles John and William Brayne quitclaimed a messuage, two mills and land in Abenhall to William Gunn(e), a clothier (PRO CP25/2/146/1906/39Eliz IHilary; GRO D2172/1/75). In 1601 William Brayne, probably George Brayne’s eldest son who had inherited his father’s interest in Richard’s estate (Fig 4), quitclaimed the same property, again to William Gunn. On this occasion it was described as belonging to the office of forestership of fee and included two fulling mills (PRO CP25/2/147/1923/43Eliz IEaster) (see below 5.3).

Gunn lived in Mitcheldean (Men and Armour for Gloucestershire 1608), in 1608 the largest of the four small centres of the woollen industry in the Forest of Dean, (Hart1971a, 370-71) and the local trade was certainly sufficient to support water powered fulling. There were three clothiers, fourteen broad weavers, four weavers and three tuckers or fullers in Mitcheldean itself and a clothier, a few weavers and a fuller in neighbouring Abenhall (Perry 1945, 99–100).

In 1620 the property was described as ‘a mill of William Gunnes aunciently called cunes mill’, (GRO D36 M2) the existing Gunns Mills can thus be firmly identified with the Conne property.

4.3 THE IRON FURNACE c.1625-1738

The immediate circumstances surrounding the establishment of Sir John Winter’s furnace at Gunns Mills are unknown but it was probably built in 1625 (‘infra Annos novem’ – within nine years [of 1634]) (GRO D421 E4; BL, MS Gough Glouc I). It was almost certainly in existence by 1628 when Winter was said to own two furnaces (Hart 1995I, 9), one of which must have been his father’s earlier works at Lydney, the other presumably that at Gunns Mills.

The establishment of the iron furnace on the stream directly below William Gunn’s fulling mill (see below, 5.3) implies that the clothier’s operation had ceased (Fig 5). It would not have been practicable for Winter to build his furnace with a working mill directly above it. The tributary of the Westbury brook on which both were situated was small and the pool upstream would have taken some time to refill after working its mill causing a break in the supply of water to the furnace pool below (Fig 5). Once a furnace
was fired a failure in the power to the bellows could cause considerable damage. A 1637 revision of fines imposed by the Justice Court of Eyr in 1634 (GRO D421 E4) makes it clear that John Winter held the earlier mill site, describing him as having ‘now taken (nunc cepit) the issues and profits thereof’. The document records fines for two separate encroachments within the Royal Forest; the first, the enlargement of the pool at his mill ‘vocat Gunns Mill’ by William Gunn senior (deceased by 1634) in 1610 (see below 6.0), the second, Winter’s iron furnace built in the Royal Forest at Gunns Mills in [1625]. Winter was fined £3 for Gunn’s encroachment and ordered to pay the Crown a rent of 12d a year.

William Gunn or his successors probably sold their mill site to John Winter about 1624-5 when he first became active in the iron industry and was seeking to establish a second furnace. The collapse of the West Country cloth trade following the ill-judged Cockayne experiment of 1614 to 1617 may have forced the closure of Gunn’s fulling mill and it seems that the family quitted Mitcheldean during this period. Winter’s occupation of the earlier site would also ensure that the corn mill stayed idle. He could then build his furnace downstream to take advantage of the convenient slope by the road from Abenhall to Flaxley and Littledean without fear of interruption to its power supply (Fig 5).

The earliest direct reference to the furnace was made in 1632 when Sir John Broughton of Ruardean wrote to Sir John Coke, the Secretary of State (quoted in Hart 1995, 10, 40; original British Library Add MS69909, Coke Papers (Series II) 57/7/3):

Sir John Winter has a furnace at Gunns Mill near Mitcheldean, built by the King’s timber, and chiefly maintained by His Majesty’s wood. Because Sir John has wood of his own to obtain this furnace he may refuse to give the rate of £1,300 set down by me in the notes. But then he should have none of the King’s woods to that furnace. The sooner that order is sent for stay of cutting wood in the Forest of Deane for ironworks, the sooner the rent will begin

Obviously an attempt was being made to impose a considerable rent on John Winter for the furnace at Gunns Mills. It is not recorded whether the threat to withhold supplies of fuel from the King’s woods impelled him to pay it.

In July 1634 (GRO D421 E4) (see above) Winter was fined £400 for building an iron furnace in the King’s forest (VCH V, 364; GRO D1667 GG1220). The court decreed further that the furnace should be pulled down (GRO D1667 GG1220). In 1637 however (see above) Winter was pardoned and his fine reduced to £40 (GRO D421 E4). It appears that he continued to work the furnace for it is next recorded in the 1642 perambulation of Abenhall parish (GRO D36 M10, M17). In copying an older boundary description the clerk updated the reference to ‘Cunnes’ Mill describing it as ‘the Iron worke of Sir John Winter aunciently called Cunnes Mill’. The first letter of ‘Cunnes’ was then altered to read ‘Gunnes’ (Cave 1981, 2).

A small but intriguing piece of evidence may link Winter’s furnace to the ironmasters, William Dunning and Thomas, his son. The younger Dunning was possibly Winter’s agent at some time before 1644 (Hart 1995, 30 quoting PRO LRRO 5/7/a). Both the 1743 plan of the manor of Abenhall (PRO T1/314 f39) (Fig 7) and the 1774/5 Foley
estate plan of Gunns Mills (HRO E12/G/30; copy GRO 2528) (Fig 8) identify a small enclosure on the road from Abenhall to Flaxley opposite the furnace as Donnings or Dunnings Pleck. On the later map this small flat field is included within the estate. The 1743 plan of the manor clearly shows that it is not a new 'inclosure'. It is also shown as an early freehold on the 1787 and 1834 surveys of forest encroachments (PRO F/17/5 1-2; PRO F/17/122). It may not be unreasonable to suppose that one or both of the Dunnings may have played some part in the history of the ironworks. The pleck, which lies on a stream, may have been enclosed for ore washing, to provide an area of flat ground for a mine kiln or for charcoal burning or storage (see below 5.1.1) since there was very little suitable space on the site of the furnace itself.

There is little evidence for the history of the furnace at Gunns Mills amid the confusion of the Civil War. An ardent Royalist Winter's ironworks were confiscated in 1644 (see above 3.1). By 1645 the Parliamentarian Captain John Brayne of Littledean occupied Winter's works at Gunns Mills, for in September that year John Knight, a charcoal burner working for the captain, confirmed that he

  doth now use 3 forges and one furnace 2 of which forges are the kings the one called Bradley forge the other Lidbrooke forge the 3rd forge which is likewise at Lidbrook he conceives it belongs to Mr Vaughn and the furnace is called gunsmill was Sir John Wintours owne inheritance (PRO LRRO 5/7/1, 13; copy in GRO D3921).

It is probable that, since it lay within the Forest, Gunns Mills was one of the ironworks destroyed by order of Parliament in 1650, (VCH V, 340; Hart 1971a, 18) an operation apparently completed by September 1653 (CSPD 1653-4, 40 no 73 151). In October that year the Court Leet of Abenhall ordered 'Sir John Winter Kn or the owner of the furnace...to remove those that inhabit there by the first of May next' (GRO D36 M11). It is claimed that this indicates that Winter had regained possession (VCH V, 97) but there was clearly some uncertainty regarding the actual ownership of the site. Winter did not regain his estates until after the Restoration. Following their confiscation in 1644 moreover, he had spent some time in exile and in October 1653, the month of the court order, was given permission to remain in England only on condition that he stayed within thirty miles of London (CSPD 1653-4, 41 no 45 202). The inhabitants which the Abenhall Court were anxious to have evicted were probably squatters on the abandoned site, some of the hundreds described by John Wade as living on the forest 'spoil' (CSPD 1653-4, 40 no 73 151).

The furnace at Gunns Mills was not among the three ironworks held by Captain John Brayne in 1660 since these were all to the south east of the Forest along the Cone. (Hart 1971a, 19) There is no evidence either that Sir John Winter successfully reclaimed it following the Restoration. The furnace was certainly derelict in 1680 when the miners and colliers of Dean, claiming impoverishment, attempted to fix the price of iron ore and coal delivered to individual furnaces. Delivery to Gunns Mills, 'if the same be rebuilt again', was set at 7s a dozen i.e. 12 bushels (Hart 1953, 103 quoting Mine Law Court order no 4, 27 April 1680).

It appears from the dates on the lintels in the existing remains that the furnace at Gunns Mills was rebuilt about 1682-3 (Figs 53-4). Documentary evidence indicates that the
rebuilding was carried out by George Scudamore in partnership with one of the sons of Benedict Hall of Highmeadow in Gloucestershire. 'G. Scudamore' was given as a former occupant of the property in 1701 when the site was sold to Thomas Foley (GRO D2172/1/75) (see below 4.4). In his county history of Gloucestershire produced in 1686 and updated in 1714 Abel Wantner related that 'Mr Hall and Mr Scudamore are (or were) partners in a new forge at Gunns Mills (BL, MS Top Glouc. c.3 f137; Currie and Lewis 1997, 153-4).

The Halls of Highmeadow had land and ironworks in Gloucestershire, Monmouthshire and Herefordshire, an estate largely built up by Benedict Hall after he succeeded his father William in 1615. He married Anne, the sister of his fellow Catholic, John Winter, and by 1540 had five sons and seven daughters. Following Hall's sequestration as a Catholic recusant in 1645, his works were taken over by four Commonwealth ironmasters, among them Captain John Brayne, but he had recovered possession by 1657 (Hart 1995, 38). In the same year Hall settled most of his Gloucestershire estates on his eldest son Henry Benedict (Hart 1995, 36). In 1660 he settled most of those in Herefordshire on his second son, John Hall of Grays Inn, Middlesex (HRO AW28/29/1). The estates left to John Hall included property in Ganarew, Llangarren, Welsh Newton, St. Weonard's and Whitchurch (HRO AW28/29/1). A third son, William Hall, was left, with other land and property, a group of ironworks in south-west Herefordshire which, by 1671, consisted of a furnace at St. Weonard's and three forges, at Pontrilas, at Llanclllo and at Peterchurch, his freehold (von Laun 1979, 55). Benedict Hall died in 1668.

The Halls had been associated with the Scudamore family since Benedict Hall began to acquire land and property in Herefordshire and Monmouthshire in the 1620s. They had held the lease of Pontrilas Forge from the Baskervilles, neighbours of the Kentchurch Scudamores, since 1623 (von Laun 1979, 55) and before 1656 Benedict Hall held land in Monmouth of John Scudamore of Kentchurch (HRO M26/16/39). (It is possible that this was the site of Monmouth Forge, which Hall built about 1628). In 1670 William Hall leased Llancillo Forge from the Kentchurch family (HRO E12/VI/DBc/3). All three branches of the Scudamores had interests in ironworking on or around their estates in Herefordshire and Monmouthshire. The junior branch, the Scudamores of Treworgan, had, like the Halls, remained true to the Roman Catholic faith. This family had estates in Llangarren, Ganarew, Welsh Newton and St. Weonard's which George Scudamore and his brother Milborne augmented in 1678 with land and premises bought from John and William Hall (HRO AW28/29/2). Between 1665 and 1669 George Scudamore acquired the newly rebuilt furnace at Whitchurch (Fig 2) (Rees 1968, 275).

Henry Somerset, Lord Herbert of Raglan and Marquis of Worcester, created Duke of Beaufort in 1682, may also have had a part in the 1682-3 rebuilding of the furnace, for in 1692 Gunns Mills was described as 'now or late in the possession of his Grace ye Duke of Beaufort' (GRO Wills 1693/144). Henry Herbert was a descendant of William Herbert, second Earl of Pembroke, who was created Constable of Briavels in 1608 and erected the King's Ironworks in Dean in 1612-13 (see above 3.1). His vast family estates included the freeholds of a number of ironworks. The most significant of these were the wireworks at Tintern. From 1647 these were leased by the Foley's and between 1669 and 1677 Herbert himself was a partner in the concern (HRO E12/VI/A). He was related both to the Winters and to the Scudamores and was sympathetic to his Catholic
tenants and allies although he himself had renounced the faith in the 1650s. In June 1660 he was appointed Keeper of the Forest of Dean and Constable of Briavels and in July, Lord Lieutenant of Gloucestershire, Herefordshire and Monmouthshire.

In the context of the circumstances outlined above it would seem that following his appointment as Constable of Briavels in 1660 Henry Herbert held Gunns Mills for the Crown and might already have considered rebuilding the furnace around 1680 (Hart 1953, 103 quoting Mine Law Court order no 4, 27 April 1680). About 1682-3 he probably assigned the site to George Scudamore. Scudamore might then have rebuilt the furnace in partnership with William Hall of Peterchurch Forge to supply iron into Herefordshire. There is evidence that at this time neither St Weonard's Furnace nor the furnace at Whitchurch was used by the partners. William Hall had gone into partnership with the Foleys in 1672 but had retained direct control of his freehold forge at Peterchurch (HRO E12/VI/DBc/3). In 1683 a draft agreement was drawn up under which the Foleys returned the forges at Pontrillas and Llancillo to Hall and his brother (von Laun 1979, 56) but not the furnace at St. Weonard's which remained within the partnership (HRO E12/VI/DEc/1). There is no record either of Scudamore's occupation of Whitchurch furnace after 1680 (Rees 1968, 276) and it was apparently disused by 1695 (Riden 1992, 53).

The abundance of cordwood from the Forest of Dean following the Reafforestation Act of 1668 may have been the major factor in the decision to rebuild Gunns Mills furnace. Coppice, underwood and old and decaying trees, unsuitable for naval use, ensured a steady supply of charcoal to the furnaces on the fringes of the Forest. In November 1683 a commission was established to consider an offer which had been made in August 1682 for the weeds in the Forest of Dean, meaning the orle (alder), holly, crooked beech, hawthorn, sally (willow) and hazel, the proposer to take as many thousand cords as will amount to £1500 at 4s a cord for 21 years, out of which His Majesty never yet made any advantages (Hart 1966, 180, quoting CTB VII pt I 569)

The commission consisted of twelve members, among whom, perhaps significantly, were Henry Herbert, now Duke of Beaufort, and Henry Hall of Highmeadow (Hart 1966, 180). It was proposed that the Crown should build a furnace and two forges to use the cordwood in ironmaking thus providing itself with a profit of £1200 a year (CTB VII pt II 962). The proposal was not taken up and it was decided instead to sell the wood to the Herefordshire and Monmouthshire ironmasters (Hart 1966, 181). The Herefordshire furnaces took raw materials from the Forest and both St. Weonard's and Whitchurch furnaces had received ore and cinders from Dean in the period up to 1680 (Hart 1953, 103 quoting Miners Law order no 4, 27 April 1680; Hart 1971a, 61). With a ready supply of cordwood now also available to them, Scudamore and Hall, supported by their ally the Duke of Beaufort, may have hoped to make iron for the forges in Herefordshire and Monmouthshire more cheaply at Gunns Mills by eliminating the costs of transporting raw materials to the local furnaces.

It appears that the Scudamore/Hall venture was short-lived for by October 1685 the furnace had been offered to the Foley partnership, probably by Beaufort. The October
addendum to an agreement made by the partners in May that year states ‘that Mr Glover shall have the liberty to have Flaxley furnace & Gunns Mills…’ (HRO E12/VI/Ac/6); the words ‘Gunns Mills’ are clearly a later addition to the text. The ironmaster Henry Glover was the brother-in-law of Thomas Foley I and general manager of the Tintern wireworks under Thomas Foley II from 1682 to 1687 (HRO E12/VI/A). There is no evidence that he took either of the furnaces over. Neither is recorded in the list of his ironworks drawn up in March 1689 (HRO E12/IV/19/5) or in the account of his estate made after his death the following November (HRO E12/IV/19/8). Flaxley Furnace was held by the partnership at this time but by 1695 had been acquired by the Shropshire ironmaster Richard Knight (Ince 1991, 2-3). William Hall continued to work Peterchurch Forge (von Laun 1979, 56). George Scudamore and his brother Milborne took over Monmouth Forge from George White in 1686-7 (HRO AW28/18/13; Rees 1968, 276). Both Hall and Scudamore later took pig iron from the Foley furnaces at Bishopwood and Redbrook (HRO E12/VI/DE/10). George Scudamore sold Monmouth Forge to Richard Avenant and John Wheeler of the Foley Partnership in 1703 (HRO E12/DE/11).

By 1692 and probably after the retirement of the Duke of Beaufort from public life in 1688, the earlier mill site containing the corn and fulling mills had passed to William Brayne of Littledean, a descendant of Richard Brayne who had bought Connes corn mill in 1540 (see above 4.2). In his will dated 30th January 1692 William bequeathed ‘ye Land wth all ye Rent and proffit of that part of my estate called Guns-mills now or late in ye Possession of his Grace ye Duke of Beaufort’ to his two daughters Margaret Maddox and Rebecca Brayne (Fig 4) (GRO Wills 1693/144). A conveyance to his trustee William Morwent dated 30 and 31st January 1692 describes the property as

All yt his antient meesplace whereupon was heretofore one messuage 2 grist Mills & a fulling Mill called Guns Mills cont by estim 5 acres of meadow and pasture in the psh of Abenhall in Gloucestersc (HRO E12/G/32; GRO D2172/1/75)

There is no specific mention of the rebuilt furnace. That site after all was a later encroachment by Sir John Winter and never originally part of the Braynes’ property. The deed does however include the usual clause claiming all the land, property and profits

thereunto belonging or in any wise appertaining or to or with the same at any time theretofore within 60 years [from 1632] leased used, occupied or enjoyed as part parcel or member thereof in Abenhall aforesaid or elsewhere then in the possession of the sd Wm Brayne etc (GRO D2172/1/75).

This is standard but the inclusion of a period of time, in this case sixty years, is unusual. To make quite certain of the rebuilt ironworks Brayne must have been guessing at the date of Winter’s encroachment.

William Brayne’s claim to the possession of the Gunns Mills property is not obvious. The conveyances to William Gunn in 1597 and 1601 (see above 4.2) were fines. These documents almost invariably record a sale or a mortgage (Alcock 1986, 63-4), very rarely a lease (pers comm, N W Alcock). The 1701 deed moreover records the site as
formerly in Gunn’s possession and not, as with Scudamore, in his occupation (GRO D2172/1/75). In any case, even if the site had been leased or mortgaged to the Gunns, Connes/Gunn’s mill(s) had belonged to Richard Brayne’s estate, which had been left in reversion to his sons and their male heirs (PRO Prob 11/54). By 1641 this had reverted to William’s cousin Ketford Brayne (VCH V, 164) (Fig 4). On Ketford’s death in 1682 the estate passed to John Brayne. William Brayne might, of course, simply have bought the mill site but it may be significant that he did not leave it, as he did the rest of his property, to his son and heir, Ketford Brayne, but to his daughters. Such a bequest would virtually ensure that the site would not remain part of the family estate.

William Brayne’s will was proved in 1693 and it seems that from that year (GRO Q/R NC1) and up to its sale to Thomas Foley in 1701 Gunns Mills was rented by a Mr Lloyd (HRO E12/VI/DE 8/12). In 1704 the accounts of the Foley partnership record £7 10s ‘recd of Mr Lloyd for rent of Guns mill in arear before Mr Foley purchased...’ (HRO E12/VI/DE 8/12). Mr Lloyd can possibly be identified with George Lloyd the elder of Wheathenhurst in Gloucestershire (died 1703) or more probably with his son George the younger (died 1712) (VCH 10, 292). The Lloyd family may have been acquainted with Brayne’s trustee William Morwent of Stears in Newnham parish (Atkyns 1712, 57). In addition to their principal estate at Wheathenhurst they held interests in the manors of Fretherne and Saul in which the Morwents owned property (VCH 10, 161-162). The Lloyd family owned or leased a number of water mills in the area at the close of the seventeenth century including two corn mills and a fulling mill at Wheathenhurst, two corn mills in Saul and two corn mills and a forge in Walmore on the boundary with Flaxley (VCH 10, 91 164, 295/6; GRO Q/R NC1). There is no indication of the use to which Mr Lloyd put the site.

4.4 THE FOLEY FURNACE 1701-1738

In January 1701 Margaret Maddox, now Halsey, her husband Joseph Halsey and Rebecca Brayne sold Gunns Mills to Thomas Foley of Stoke Court in Herefordshire for £600 (GRO D2172/1/75). The sale included the derelict grist mills and fulling mill and also

...all the Ironworks & furnacehouses & other buildings thereupon erected & then being & all implements thereto belonging ...(GRO D2172/1/75).

William Gunn and George Scudamore were given as the previous owner and occupier respectively but interestingly there is no mention of Sir John Winter. The earlier mill site still carried a yearly rent of 12d payable to the Crown (GRO D2172/1/75) and still obviously belonged to the office of forester in fee. Foley’s surviving estate rentals show that in 1707 he paid Philip Hatton £5 ‘a years wages as for performing the forester of fees place for Guns Mill furnace’ (HRO E12/G/27) and this arrangement is recorded up to 1738 with Philip and Thomas Hatton and then John Worgan as forester in fee (HRO E12/G/27; HRO E12/G/25). Thomas Foley retained £200 of the purchase money for Gunns Mills until January 1706 to secure the title against any claim by Ketford Brayne, William Brayne’s heir (GRO D295/7/1/1).

In the articles of agreement drawn up by the Foley partnership in February 1701 Gunns Mills was added to the list of ironworks belonging to Paul Foley (deceased 1699) and to
his son and heir Thomas Foley and described as ‘lately purchased by...Thomas Foley’ (HRO E12/VI/DEc/10). The 1703 inventory of ironworks managed by the partnership lists Gunns Mills, with the furnaces at Elmbridge, Blakeney, and Bishopswood, as the property of Thomas Foley (HRO E12/IV/166/10), which was to ‘be held and enjoyed in partnership’ at a yearly rent of £340 (HRO E12/VI/DEc/11). In addition Philip Foley appears to have paid his nephew an ‘earnest’ or rent of five shillings for Gunns Mills at regular intervals from at least 1703 to 1705 (HRO E12/II/19/12/15; HRO E12/II/19/12/16). In 1710 and again in 1723 ‘Gunsmills’ appears with the furnaces belonging to Thomas Foley granted to the partners at an annual rent of £340 (HRO E12/IV/166/10; HRO E12/VI/DGr/1-5). In the year from Michaelmas 1710 to Michaelmas 1711 the rent for Gunns Mills furnace is recorded separately at £40 (HRO E12/VI/DEc/49). Elmbridge, Blakeney, and Bishopswood each commanded a rent of £100 (HRO E12/VI/DEc/49). These furnaces were brought to the partnership in 1692 by Thomas Foley’s father Paul. They stood on larger sites with more extensive ancillary premises. The lower rent paid for Gunns Mills and the later date of purchase suggest that the furnace was perhaps bought as a reserve to provide extra capacity when it was needed.

Gunns Mills furnace was brought into production in 1704 (HRO E12/VI/DF/1) and surviving partnership accounts show that there were at least four firing campaigns there over a total of seven years during its occupation by the Foley partnership. There is, however, very little evidence for what other buildings or structures might have been on the site besides the furnace. From 1710-11 there was possibly a storehouse there with office space for a clerk and containing a bed (HRO E12/VI/DF/6; HRO E12/VI/DF/8). In 1730-1, the year before the furnace was blown out, the ironworks accounts record payments of £49 13s for building a ‘house at Gunsmills’ (HRO E12/VI/DGr/5). This may have been domestic accommodation (see below 5.5). The partnership last paid the £40 rent for Gunns Mills furnace in the year from Michaelmas 1736 to Michaelmas 1737 (HRO E12/VI/DGr/11). Thomas Foley I of Stoke Court died in December 1737.

By at least c.1710 (GRO D3921/IV/5) a Forest stream had been diverted from its original course above Green Bottom to run through Gunns Mills (Fig 6). There is no evidence to relate exactly when this might have been done and any conclusion can only be speculative. It is not listed as an encroachment by either William Gunn or Sir John Winter but might possibly have been carried out in the 1680s under Henry Herbert (created Duke of Beaufort in 1682). As Constable of St Briavels Herbert would have had the necessary authority (see above 4.3).

4.5 THE PAPER MILLS 1738-1880

The furnace at Gunns Mills appears to have been blown out in 1732 (see below 5.1.1). By 1738-9 the property had been let to the papermaker Joseph Lloyd (HRO E12/G/25). Lloyd was born in Weston-under-Penyard in Herefordshire in 1708 (GRO 2172/1/78) and is first recorded in Flaxley and Abenhall in 1739 (GRO 2172/1/78). He may have been connected with the Lloyd family of Wheathurst. Their fulling mill in Wheathurst had been converted to a paper mill by 1764 (Shorter 1957; VCH 10, 296, Harris 1976,130). It is unclear however whether this was done through the Lloyds since they sold the Wheathurst estate in 1721 (VCH 10, 292). Joseph Lloyd’s brother John Lloyd also migrated to Gloucestershire, settling first in Mitcheldean and then at Gunns
Mills (GRO D2172/1/43). Both John and another brother Nathaniel, a yeoman of Weston-under-Penyard, appear to have invested in Lloyd’s business (GRO D2172/1/78; GRO D2172/1/75). The Herefordshire Lloyds had been associated with Bill Mill in Weston-under-Penyard from before 1638 (Harris and Angel, 1975). This property had been converted to a paper mill by 1698 (HRO AK100/1) and it may have been there that Joseph learnt his trade.

Joseph Lloyd first appears in the estate rentals of the Foleys of Stoke Court in 1738-9 when an expenditure of £52 12s is recorded as ‘paid to Joseph Lloyd towards building’ (HRO E12/G/25). Separate payments were also made in that year for the preparation and carriage of timber for Gunns Mills (see below 5.1.2) (HRO E12/G/25). In 1740 Lloyd paid £18 for a half-year’s rent for Gunns Mills and was £16 in arrears (HRO E12/G/25). He was in production by that time since he was paid £1 14s 6d for paper delivered to Thomas Foley (HRO E12/G/25). In 1741-2 Lloyd paid a yearly rent of £36, the same sum as was by then paid for John Overton’s paper mill in Bishopwood, established by 1707 (HRO E12/G/25). In 1742-3 the rent was increased to £41 and remained at this rate until at least 1752-3, the date of the last available estate rental (HRO E12/G/25).

In May 1743 Lloyd’s new works were described as

[the] ancient ironwork called Gunsmills (now lately converted to a paper mill)....surrounded on every side by the fforest....not withstanding taxed with and reported as part of the parish of Abinghall (Cave 1974, 18 quoting GRO D36 E50).

The mill was established for the production of white paper. In July 1743 Joseph Lloyd advertised for a ‘Paper-Man... capable of undertaking a White Vat...’ (Gloucester Journal, July 16th 1743) (see below 5.1.2).

The small size of the typical eighteenth century paper mill necessarily limited production and it was quite usual for a papermaker to establish other sources of income. It may have been for this purpose that Lloyd built a corn mill in 1739-40 (HRO E12/G/25) (see below 5.3). The extra waterpower required to run both this and the paper mill on the furnace site would have been supplied by the diversion of the stream above Green Bottom. The Foley estate paid him £58 16s for building the mill (HRO E12/G/25).

There is no evidence however that the mill was ever put into commercial production. In 1742-3 Lloyd was paid for building a stable (HRO E12/G/25). Various expenses for repairs, including work to the ‘house and kitchen chimney’ are recorded up to 1750 (HRO E12/G/25) (see below 5.5).

A plan of the parish of Abinghall (PRO T1/314 f39), drawn in 1743 and produced in the course of a manorial dispute (CTB 1744, no 90 483-4), provides the first illustrative evidence for Gunns Mills (Fig 7). Lloyd’s newly built corn mill and the pool extended by William Gunn in 1610 are shown upstream of the furnace (now a ‘paper work’) with its separate pool. The property lies on ‘St Anthonys well stream’ (see below 6.0) on the road into the Forest. The plan shows ‘Donnings Pleck’ (see above 4.3) but the fields marked on the 1774-5 Foley estate plan as Long Meadow and the Upper Orchard (Fig 8 and below) are described as new enclosures. These were presumably encroachments
made by the Foley estate in the early eighteenth century. The flat expanse of Long Meadow was probably enclosed to provide more space to service the furnace but the Upper Orchard lies on a fairly steep slope. It is possible that this was purposely taken in for an orchard, perhaps when the Lloyds began their tenancy. A building is shown to the north west of the paper mill. This must be the dwelling house repaired in 1746 and perhaps built in 1730-1 (HRO E12/VI/G/25) (see below 5.5).

Joseph Lloyd died intestate in November 1761 and the papermaking business was carried on by his wife Hannah with their son Joseph Lloyd II (Gloucester Journal, December 6th 1761). The inventory of the older Joseph’s personal goods and chattels taken in December 1761 gives evidence both of agricultural activity and of substantial domestic premises on the Gunns Mills estate (GRO D2172/1/75) (see below 5.5). In July 1762 Hannah Lloyd was granted administration (GRO D2172/1/75) and in July 1763 she bought out her daughter Mary Hardwick’s share of the business for £553 (GRO D2172/1/43).

Thomas Foley of Witley in Worcestershire, the last of the senior branch of the Foley family, died unmarried in 1766 and the Witley estate passed to his second cousin Thomas Foley III of Stoke Edith. The family estates in Gloucestershire were surveyed in 1774 and 1775 (HRO E12/G/30) (Fig 7). The survey of Gunns Mills shows the extent of the Foley property to be much the same as in 1743. Long Meadow and the Upper Orchard, new enclosures in 1743, are now clearly shown as part of the estate, as is Dunnings Pleck. Corn Mill Pleck lies downstream of Lloyd’s corn mill. Both the industrial and the domestic premises on the site have clearly been extended.

Thomas Foley was created Lord Foley, Baron of Kidderminster in 1776 and died in November 1777. His will, made in June 1777 with a codicil added in September, charged his brother Robert Foley and his son Andrew Foley to sell all the family property in Gloucestershire not otherwise devised (WRO 2407/3(ii)). The profit from the sales was to be expended in the payment of legacies and debts. The Reverend Robert Foley sold Gunns Mills to Joseph Lloyd II in 1780 (GRO D2172/1/75).

The sale deed dated May 1780 describes the property as


At the time he purchased the property Lloyd was paying a yearly rent of £44 (GRO D2172/1/75). The sale deed indicates that in 1780 paper production was still limited to the former furnace site with the corn mill built in 1739-40 located on the pool upstream.

In July 1780, as the ‘now’ owner, Joseph Lloyd insured his recent purchase for the total sum of £1000 (Harris 1974, 39). The property listed in the schedule of insurance included a dwelling house, a paper mill, service buildings, (see below 5.1.2, 5.5) and a water corn mill (see below 5.3). The comparatively small sum of £40 for which the corn mill was insured is evidence that the premises were not used for commercial production.
On Blunt's map of the Forest of Dean, dated 1782, only the paper mill, 'Gun's Paper Mill', is marked (PRO F17/4' copy GRO D3921/IV/7) (Fig 9).

On the maps accompanying the Land Revenue survey of Crown lands in 1787 and 1788 (PRO F16/59/3; F16/47; F17/6, copy GRO D3921/IV/8) (Fig 10) the Lloyd property at Gunns Mills is more extensive than that outlined on the Foley estate plan of 1774-5 (Fig 8). Although only the two pre-eighteenth century mill pools are shown, Lloyd's freehold land appears to take in the site where the Upper Mill was later built. This is not included on the earlier plan where the banks of the pool for the corn mill constituted the boundary of the Foley estate. This suggests that Lloyd had extended his property upstream of the corn mill and its pool, encroaching on the Forest. Long Meadow and the Upper Orchard, new enclosures in 1743, are also shown as freehold. Since only Forest land enclosed before the 1668 Reafforestation Act could rightly be claimed as such (GRO D2172/1/75) at least two later enclosures were being wrongly presented as freehold. The same claim must have been made in respect of the ground Lloyd had taken in upstream of the earlier Foley property. The Lloys had enclosed various parcels of land on White Hill to the north of Gunns Mills and on Tanners Hill to the south (PRO F17/6; F16/59/3; F16/47) (Fig 10).

Some time between 1788 and 1803 (CKS, Notes of William Balston, 1803) Joseph Lloyd II extended paper production at Gunns Mills (Fig 21). By January 1805, when he assigned the business to his eldest son Joseph III (GRO D2172/1/75), the papermaking premises included the Upper, Middle and Lower Mills. These were leased to Joseph the younger for fifty years 'if... Joseph the Elder so long shall live...' at an annual rent of £100 (GRO D2172/1/75). Joseph II had taken the lease of William Durham's paper mills at Postlip and Sudeley in 1803 and these were run by his three younger sons, Nathaniel, Edward and Thomas Lloyd (GRO D2172/1/75). It is probable that he would have invested in the extension of the paper making operation at Gunns Mills well before taking over Durham's business. All three of the Gunns Mills premises appear in the earliest surviving excise list of papermakers, drawn up in 1816; numbered as 143 (Lower Mill), 144 (Middle Mill) and 145 (Upper Mill) (BCL MS 2092). In the same year Joseph Lloyd and Son, the partnership between Joseph II and Joseph III, was dissolved (BCL MS 2092), presumably on the retirement of Joseph II to Mount Craig in Herefordshire (GRO D/2172/75).

Joseph Lloyd II died in 1828 and his property in Abenhall and the Forest of Dean passed to his eldest son, Joseph Lloyd III (GRO D2172/1/44). All three mills appear to have been still in use at this time. Greenwood's map of Gloucestershire (GRO D3921/IV/11), published in 1831, places the symbol for a mill on each site and each of the three premises appears in the excise list for 1832 (BCL MS2092). Mills 144 and 145 do not appear in the excise lists after this date (BCL MS2092). This does not necessarily mean that they were not working since the next entry for Gunns Mills is in 1844 (BCL MS2092). From 1839 two or three mills in one ownership and not more than one mile apart, as was the case with Gunns Mills, could be worked under a single excise licence (Shorter 1971 129).

The plans of encroachments surveyed for the Dean Forest Commissioners in 1833-4 (PRO F17/122; PRO F17/123; GRO Q/RG F1/7) show that Lloyd had extended the land claimed as freehold to the north of the Lower Mill and its associated premises.

27
There was some dispute over the extent of the freehold at the upper end of the property since

Richard Lowe [aged 75] deposed that there was always land 30 or 40 yards beyond the Upper Mill and he could swear no increase had been made he worked for Mr Lloyd and for his father the drying house was there before he could remember (PRO F20/5).

Lowe’s evidence must have been accepted for the encroachment was discharged. Four mill sites each with a pool are shown on the plans (PRO F17/122; PRO F17/123; GRO Q/RG F1/7) (Fig 11) and four small ponds, three of which are connected to the water system serving the mills (see below 6.0). Two narrow encroachments take the boundaries of the Lloyds’ eighteenth century enclosures on Tanners Hill down to the road leading into the Forest (Fig 11, coloured blue on plan). These two strips of land were conveyed to Joseph Lloyd in 1842 (PRO F20/18).

The tithe plan of Abenhall produced in 1838 (GRO GDR/T/1) shows four mill sites at Gunns Mills (Fig 12). The tithe apportionment (GRO TRS 224/1) however only lists two, 208 on the plan, a ‘Paper Mill Building’ together with a house and garden, the Lower Mill, and 212 on the plan, ‘washing mills’, the upper Middle Mills. The Upper Mill and the enclosures on Tanners Hill lay within the extra-parochial township of East Dean (PRO F16/69) so were not subject to tithe payments. The plan also shows that the Lloyds owned Bearfields, a small agricultural holding in Abenhall, which they had bought in 1813 (GRO D2172/1/43), and other parcels of land. Most of these were kept in hand (GRO TRS 224/1).

Joseph Lloyd III died in August 1842 and under the terms of his will (GRO D2172/1/75) and their 1809 marriage settlement (GRO D2172/1/75) Gunns Mills was vested in his wife, Penelope Skipp Lloyd, for life with reversion in fee to his eldest son, Joseph Skipp Lloyd. In 1844 George Lloyd, a papermaker and Joseph III’s second son, is recorded at Gunns Mills (BCL MS 2092) but he may have stayed only briefly since Penelope Lloyd appears in the 1845 excise list (BCL MS 2092). Edward Lloyd James, a nephew of Nathaniel Lloyd (see above Postlip Mills), moved from Sudeley Mill in 1842. He is recorded at Gunns Mills with George Turner in 1847 (BCL MS 2092).

Paper making at Gunns Mills ceased between 1848 (BCL MS2092) and 1851 (GRO D2172/1/75). In March 1851 Penelope Lloyd and her eldest son Joseph Skipp Lloyd leased part of the estate to John Birt and his brother James for 21 years at a yearly rent of £150 (GRO D2172/1/75; Gloucester Journal, May 5th 1855). Their lease included the dwelling house, gardens and orchards, a cottage and four paper mills with watercourses and seven ponds. John Birt is listed at the house at Gunns Mills in the 1851 census for Abenhall and described as a papermaker. Birt invested heavily in the works, adding a new steam driven workshop to the Lower Mill (Gunns Mills I), and laying out between £5000 and £6000 on renovation and new machinery (see below 5.1.2) (GRO D2172/1/75; Gloucester Journal, May 5th 1855). He also appears to have moved the washing process to the smaller site just upstream of the Lower Mill (Gunns Mills II) (Gloucester Journal May 5th 1855) (see below, 5.2). By January 1855 (BCL MS 2092) his efforts had bankrupted him and in May 1855 the residue of his lease was sold by
Gunns Mills

auction (Gloucester Journal, May 5th 1855). Birt continued his career as a papermaker at a number of mills in Gloucestershire (Harris 1976, 127-8; Hart 1971a, 388).

Birt’s lease of Gunns Mills was bought by Aaron Goold of Newnham in September 1855 (GRO D2172/1/75). A report on the boundaries of East Dean Township presented in 1856 established that the estate lay within two administrative areas

Abinghall claims about 7 acres of the property [Gunns Mills] including the dwelling house and principal part of the Factory Buildings and the remainder of the estate about 17 [and a half] acres is in East Dean (PRO F16/69).

The map (PRO F16/63 pt. 1) (Fig 13) and terrier (PRO F16/70) which accompany the 1856 report show Aaron Goold as the owner (leaseholder) and occupier of the land and buildings in East Dean. These include the Upper Mill (IV) and the pool which had served the Lloyd’s corn mill (HRO E12/G/30) and by 1838 worked the washing mills (II)(GRO GDR/T/1; GRO TRS 224/1). Two small houses are shown, one, included in the 1851 lease, in the enclosures or gardens on Tanners Hill, the other, which must have been converted by Birt, at the Upper Mill (PRO F16/63 pt. 1; PRO F16/70; Gloucester Journal May 5th 1855) (see below 5.4). Goold may have been living in the house at Gunns Mills in 1856 since he is listed among the Abenhall gentry in the directory for that year (Kelly’s Directory 1856). By 1860 he was resident at Belle Vue House near Newnham but still proprietor at Gunns Mills (BCL MS 2092).

It seems that from the late 1850s until after its sale in 1890 the dwelling house at Gunns Mills was called Abenhall House (GRO D2172/1/75) (see below 5.5). It can easily be confused with the Abenhall House occupied by the Robinson family and owned by the Teagues. By 1861 Goold appears to have installed the paper manufacturer James Bennett as tenant since he is listed at Abenhall House in the census for that year. John Golden, a paper maker occupies the Lloyd’s small property at Ladygrove and Joseph Crawford, a farmer and papermaker, is also resident in Abenhall.

Aaron Goold died in June 1862 (BCL MS 2092). In December 1863 his three sons and his widow Sarah, the executors of his will, surrendered Birt’s lease. They then took out a new 31 year lease at a yearly rent of £195 on the whole of the Gunns Mills estate in Abenhall and East Dean from Penelope Lloyd and Joseph Skipp Lloyd (GRO D2172/1/75). The Lloyds’ farmlands and orchards in Abenhall were included in the new lease, having previously been separately let to the paper manufacturer, James Bennett (GRO D2172/1/75). Alfred Goold, Frederick William Goold and Tom Goold (GRO D2172/1/75) established the ‘Guns Mills Paper Company’ (Kelly’s Directory 1870; BCL MS 2092). Henry Affleck was installed as their manager (GRO D2172/1/75). In 1864 Penelope Lloyd died (GRO D2172/1/78) and the Gunns Mills estate passed to Joseph Skipp Lloyd (GRO D2172/1/75).

Frederick Goold died in 1866 and in 1871 the remaining partners, Alfred and Tom Goold (GRO D2172/1/75), advertised the lease of Gunns Mills for sale or to let (BCL MS 2092). Their manager Henry Affleck took on a tenancy (GRO D2172/1/75). He is listed at ‘Guns Mills Paper Mills’ in the 1871 census for Abenhall with his wife and seven children, including his eldest son William, also a paper maker. The small cottage converted by Birt at the Upper Mill (IV) (PRO F16/63 pt. I; PRO F16/70) is occupied
by Samuel Pritchard, an agricultural labourer. The paper maker John Golden meanwhile had moved into another cottage at the Upper Mill (IV), (PRO F16/63 part 1; Barrington Deeds) (see below 5.4). Affleck was declared bankrupt in July 1877 (BCL MS 2092). He is not listed in the Paper Mills Directory for 1878 but appears at Gunns Mills in 1879-80 (BCL MS 2092).

In 1877 Westbury on Severn Union Rural Sanitary Authority established a pumping station at Green Bottom to supply water to Cinderford (Pearce 1997, 38; GRO D2172/1/75). This severely disrupted the supply of water, which had been diverted from the ‘level of the Iron Mine’ to Gunns Mills (GRO DA40/100/1) (see below 6.0). By March 1878, after the pumping station was opened, this had slowed to a trickle (GRO D2172/1/75). Tom Goold, to whom the property had passed as sole surviving lessee, called upon Joseph Skipp Lloyd to protect his interests, refusing meanwhile to pay any rent. It is clear that Goold hoped to use the difficulties with the water supply as an excuse to surrender the lease of what had long been an uneconomic property. Lloyd was unable to prove any right to the water and, in September 1878, offered to sell the property for £4,300 (GRO D2172/1/75).

Tom Goold died in January 1879 and in March the Gunns Mills estate was offered for sale to his representatives with a request for payment of the rent in arrears (GRO D2172/1/75). In June however, Goold’s wife, as executrix of his will, and her eldest son offered £1000 together with the rent arrears and all the machinery if Lloyd would accept the surrender of the ‘valueless’ lease (GRO D2172/1/75). Mrs Goold agreed to pay a large sum of money to induce Mr Lloyd to accept the surrender so that instead of the lease being of value it is a very heavy continuous loss to the estate of Tom Goold (GRO D2172/1/75).

In January 1880 Joseph Skipp Lloyd took surrender of the lease for a total payment of £1,231 8s 8d plus the papermaking plant and machinery (GRO D2172/1/75).

Henry Affleck’s tenancy at Gunns Mills had expired in September 1879 but he remained at the site until January 1880 ‘for the accommodation of Mr Goold’. He then took on the house and mills from Lloyd at a weekly rent of £1 for the three months from January to March 1880 (GRO D2172/1/75). During this period he entered into negotiations for the purchase or lease of the site, subject to the diversion of water from the Forest to supply power (GRO D2172/1/75). These negotiations came to nothing however, and Affleck seems to have abandoned the premises at the end of March leaving the £10 rent unpaid. As he departed he removed various machine parts and fixtures from the paper mills, including the wire from the papermaking machine. The mills apparently were left ‘in a fearful state and also the house’ (GRO D2172/1/75).

Various repairs were carried out at Gunns Mills during the remainder of 1880 and the land was rented out to Thomas Palmer, a local farmer (GRO D2172/1/75). In April that year the papermaker John Golden still occupied a house or cottage on the estate (GRO D2172/1/75) but does not appear in the census for 1881. During the early part of 1881 at least two individuals were asked to purchase the property for the sum of £2000. Without success however, for in June that year it was decided to advertise the Gunns Mills estate for sale (GRO D2172/1/75).
The Gunns Mill estate was sold to the Abenhall farmer William Ryder in March 1890 for the sum of £880 (Barrington Deeds) (Fig 16). The deed plan shows the extent of the estate to be virtually the same as that claimed by the Lloyds in 1834 (PRO F17/122; PROF17/123; GRO Q/RG F1/7) (Fig 11). A small piece of land south-west of the Upper Mill (IV) has been returned to the Forest. The house, now described as ‘Guns’ Mills House and four cottages were occupied by tenants, the rag house at the Upper Mill having been converted to housing during the Goold brothers’ partnership (BCL MS 2092) (see below 5.4). William Colwell Grindon, who occupied Gunns Mills House farmed the land (Barrington Deeds). The Lower and Middle Mills (Gunns Mills I, Gunns Mills II, Gunns Mills III) were ‘dismantled’ (Barrington Deeds). In the 1891 census William Ryder’s son John, a farmer, occupies Gunns Mills and is also listed there in the 1894 Directory entry for Abenhall (Kelly’s Directory 1894).

The freehold property, including seventeen and a half acres of land, is described as in the ownership and occupation of John Ryder in the Land Tax survey of 1910 (PRO IR58/32773/1442). Only the four cottages are in good repair. The remainder of the buildings, now converted to agricultural use, and part of Gunns Mills house (see below 5.5) are in poor repair and ‘in many cases tumbling in’ (PRO IR58/32773/1442).

John Ryder is listed as the owner of the farm at Gunns Mills in the local valuation lists from 1916 to 1927 (GRO DA500/1) and in 1933 (GRO DA24/505). In 1935 he converted a barn on his land to a bungalow (GRO DA24/712) and retired there, leaving the farm to his son, Alfred Ryder (pers. comm. Mrs P. Haines). In September 1955 the former blast furnace at Gunns Mills was statutorily listed Grade II* and Gunns Mills House Grade II.

Alfred Ryder retired in 1960 and sold Gunns Mills Farm to Albert Barrington (pers.comm. Ms J. Barrington). By this time the buildings of the former Middle Mills (Gunns Mills II and Gunns Mills III) were derelict and the pools filled in or silting up (see below 6.0) (Fig 19). In 1973 Barrington sold part of the site of the former Upper Mill (Gunns Mills IV) to the Harris family. The sale included the buildings and the upper half of the former corn mill pond (Barrington Deeds). It is now occupied by Mr and Mrs Howes.

In 1982 Albert Barrington sold 2.08 acres including the farmhouse (Gunns Mills House) and buildings, the site of the former furnace (Gunns Mills I), to Alfred and Leslie Beard. At about the same time David Brain of Collafiel in Littledean bought the site formerly occupied by the Middle Mills (Gunns Mills II and III) and the lower part of the former corn mill pool (pers. comm. Ms J. Barrington) (see below 6.0). The Barringtons retained the cottage, now replaced by a bungalow, and the gardens between the road to the Forest and the road to Littledean (Barrington Deeds) (the land on Tanners Hill enclosed by the Lloyds). The former furnace was scheduled in June 1986. Alfred Beard sold his property at Gunns Mills in 1992 (pers comm. Mrs C. Anderson). Gunns Mills House with land and other premises passed to Mr David and Mrs Caroline Anderson. The former blast furnace/paper mill is now owned by Mr William Parker.
5.0 THE BUILDINGS (Fig 21)

5.1 GUNNS MILLS I

5.1.1 The Iron Furnace c1625-1738 (SO 67521595) (Fig 22)

Sir John Winter built his furnace on St. Anthony's well stream below the corn and fulling mills formerly occupied by William Gunn (see above 4.2) and close to the road from Abenhall to Flaxley and Little Dean (Fig 5). The slope on the north side of the valley here was ideal for working a furnace since it allowed easy access for both charging from above and tapping from below. Great care seems to have been taken in siting the furnace and the furnace pool. Winter dug a mill pool approximately 0.3ha (0.8acres) in size and 150m (164yd) in length. The widening of the valley where St Anthony's well stream meets the Westbury brook provided the space necessary to work the furnace but to place the pool dam too close to this point would have made it considerably longer and more expensive to build. Perhaps for this reason the mill pool dam is situated about 32m (29.2yd) upstream of the furnace leaving an over-generous space between for the water wheel and the bellows room. A timber trough would have been necessary to conduct the water from the pool to the wheel. After working the wheel, the water flowed through a tail race, either open or culverted, under the furnace bridge (Fig 22). At Gunns Mills the tapping arch was situated on the south side of the furnace, the blowing arch on the west (pool dam) side. The water wheel turned a long axle to which were fixed two sets of cams, each tripping a set of bellows so that they worked alternately to give as continuous a blast as possible. This general layout was common in the Weald (Cleere and Crossley 1995, 232).

The first definite reference to the furnace dates from 1632 and contains some significant evidence - 'Sir John Winter has a furnace at Gunns Mill near Micheldean, built by the King's timber, and chiefly maintained by his Majesty's wood' (quoted in Hart 1995i, 10, 40; original BL Add MS69909, Coke Papers (Series II) 57/7/3).

John Broughton of Ruardean, later Deputy Surveyor, claimed that Sir John Winter had used the King's timber to build the furnace at Gunns Mills. Timber would have been used in constructing the water wheel, the trough to the wheel, the sluices and the furnace bridge. At this time however, a timber-framed structure could also have braced the furnace itself. Although it shows a Wealden furnace, the fireback cast by Richard Lenard in 1636 demonstrates how this timber reinforcement might have worked. Apart from Lenard's furnace at Brede, Cleere and Crossley have identified timber frames by excavation at Batsford, Chingley and Maynards Gate and from documentary evidence at Panningridge (Cleere and Crossley 1995, Fig 35a, 244, 320) (Fig 23). There is no evidence in the existing structure of a reinforcing timber frame.

There is no surviving description or inventory for Winter's furnace at Gunns Mills. Contemporary descriptions of other Dean furnaces are available however and can provide a useful comparison. In 1635 the King's Ironworks which included four furnaces were surveyed for a new lease (Fig 2).
Table 1 The King’s Furnaces 1635

<table>
<thead>
<tr>
<th></th>
<th>Lydbrook</th>
<th>Cannop</th>
<th>Park End</th>
<th>Soudley</th>
</tr>
</thead>
<tbody>
<tr>
<td>furnace base</td>
<td>23ft x 23ft</td>
<td>22ft x 22ft</td>
<td>22ft x 22ft</td>
<td>28ft x 28ft</td>
</tr>
<tr>
<td>furnace top</td>
<td></td>
<td></td>
<td></td>
<td>24ft x 24ft</td>
</tr>
<tr>
<td>height</td>
<td>23ft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>casting house</td>
<td>92ft perim</td>
<td></td>
<td>22ft x 22ft</td>
<td>186ft* perim</td>
</tr>
<tr>
<td>bridge house</td>
<td>21ft x 21ft</td>
<td>21ft x 48-ft</td>
<td>22ft x 22ft</td>
<td>decayed</td>
</tr>
<tr>
<td>water wheel</td>
<td>23ft diameter</td>
<td>22ft</td>
<td>22ft</td>
<td>22ft</td>
</tr>
<tr>
<td>cast iron lintels</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tapping arch</td>
<td></td>
<td>4</td>
<td>2 broken</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(one on ground)</td>
<td></td>
</tr>
<tr>
<td>tuyere arch</td>
<td>2</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>*with penthouse</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


The King’s furnaces were erected 1612-13. Cannop was rebuilt in 1631 and Lydbrook in 1632 as part of an extensive campaign of reconstruction between 1631 and 1634. Park End and Soudley were in some state of disrepair in 1635 (Hart 1971a, 14). It seems from this evidence that furnaces wore out fairly quickly with use and that the furnace at Gunns Mills may have been rebuilt during the time it was worked by Sir John Winter. It is also interesting that two of the furnaces, Park End (‘binding beames crackt’) and Soudley (‘fourne longe bars of wrought iron to keep the corner posts’) appear to have a timber framed structure. All the furnaces belonging to the King’s Ironworks had cast iron sows reinforcing the tapping arch and the tuyere arch. These iron reinforcements can be seen in the existing furnace remains at Gunns Mills, although they are of a later date (see below).

The surviving furnace remains at Gunns Mills measure about 8m (c26.2ft) square, smaller than Soudley (8.5m) but larger than Cannop, Lydbrook and Parkend (6.7m). Gunns Mills furnace may not of course be the same now as when it was originally built, but it is suggested that some fabric from the period of Sir John Winter’s occupation may survive (see below 7.1). The furnace is the same height today as Lydbrook in 1635 and the diameter of the water wheel, estimated from the size of the surviving wheel pit (6.5m), was very close to the diameters of the wheels belonging to the four King’s furnaces (6.7-7.0m). There is no information on the construction of their water wheel pits. The pentroghs (trowes) which carried water to the wheels were invariably made of wood, but the tail race channels (hutches) were built either of stone or timber and were planked over. The bridge houses at the King’s works generally had stone walls and timber floors and roofs. They were the same width as the furnace and either the same or
twice the length. The dimensions of the casting floors usually matched the footprint of the furnace. Their walls were more commonly of stone than of timber. It likely that the casting area at Gunns Mills was also contained within its own building, but it is less certain that the bellows were roofed over. No bellows rooms are mentioned in the survey of the King’s furnaces.

It is clear that the charcoal fired furnaces of the Forest of Dean were constructed within limited parameters, too small and they would be inefficient, too large and the weight of the charge would crush the charcoal. The greatest variation was in the manner in which water was dammed and carried to the water wheel along pentroughs of varying length, at Soudley as long as 2,635ft (803m).

In 1633 Sir John Coke, Secretary of State, received a report on Sir John Winter’s ironworks in the Forest of Dean from the ironmaster Charles Powell of Ruardean.

Sir John Winter hath by Micheldeane another furnace [Gunns Mill] in which if the year be not very dry (as this is) he makes about 800 tons of raw iron, but this dry year he hath made but 600 tons. You may guess by the former accompt what coales he may spend in making this quantity of iron at this second furnace. He hath no woods for those works at Lidney, but what he hath out of the Forest; it is true he hath large woods and coppice of his own but they are all to long to cut. But he cutteth for his second furnace [Gunns Mill] some quantities of wood in his wood at Newent, and he doth buy some quantities up and down the country, but the main cometh from the Forest of Dean to serve that furnace also (quoted in Hart 1995, 11; BL Add MS69909, Coke Papers (Series II) XLII, 57/7/9).

The account referred to in this revealing quote relates to an earlier passage concerning Winter’s furnace at Lydney. This furnace also cast 800 tons of iron a year, consuming 2,000 cords of charcoal which ‘with the best husbandry possible [could] not be made with less than 4,000 cords of wood’ (quoted in Hart 1995, 11). 800 tons of pig iron was converted into 600 tons of bar iron at the finery, a process which used up 1,800 loads of charcoal made out of 3,600 cords of wood. A cord was a stack of sticks or billets of wood usually containing about 128 cubic feet and measuring about 8ft 4in long by 4ft 3in wide and 4ft 3in high, sometimes referred to as a ‘long’ cord. The amount of wood was about 75 to 100 cubic ft according to quality. A ‘short’ cord was half a cord, usually of 2ft 2in billets. A ‘long’ cord produced about 5cwt or 30 bushels of charcoal. A load of charcoal contained twelve sacks, each of eight bushels (Hart 1966, 294).

Charles Powell claimed that Winter’s new furnace at Gunns Mills was able to produce 800 tons of pig iron in a good year and 600 tons in a dry year. The cordwood used in the process came in the main from the Forest of Dean, although some was brought from Winter’s own woods at Newent and some from farther afield. Winter’s other woods were apparently immature at this period. The cordwood from Dean was obtained under fifteen years contract with the Crown. Sir John Coke noted about 1633 that Sir John Winter could cut 2,500 cords per annum under the Crown contract. These fuelled
2 Furnaces which spent 8,000 cords
2 Double Forges which spent 4,000 cords
12,000 cords = £4,000

Of this quantity he cuts out of his own woods at Newent about 2,000 cords. Besides these 12,000 cords Sir John imployleth upon his colepits and his slitting mill, 1,000 cords (Hart 1995, 11 quoting BL Add MS 69909, Coke Papers, 57/7/17, c1633).

In 1637 John Broughton, Deputy Surveyor of Dean, reported to Sir John Coke on the production of the Forest of Dean ironworks and cast doubt on Powell’s figures.

Sir John Winter with his 2,500 cords which he hath yearly granted unto him by Patent cannot possibly make above 500 tons of raw and [500 tons of] bar iron (Hart 1995, 46-47, quoting BL Add MS 69909, Coke Papers (Series II) 57/7/12).

500 tons of raw (pig) iron was less than Powell’s estimation of Gunns Mills production in a dry year. Since however Broughton was proposing to take over the King’s Ironworks he might have deliberately underestimated the output from Dean’s furnaces and forges to gain the King’s works on more favourable terms.

The furnace remains contain five cast iron lintels, two dated 1682 and one dated 1683 in the tapping arch and two dated 1682 in the tuyere arch (front cover and Figs 53-4). Such dating evidence could be treated as absolute or relative, in other words as the date of construction itself or as a terminus post quem, a date after which the furnace was built. The 1635 survey of the King’s Ironworks (see above) shows that it was usual to build cast iron sows, as they were called, into the structure of the furnace. Unfortunately the survey does not indicate whether these sows were marked with a date and there are no other surviving charcoal fired furnaces in the Dean area with which to make a comparison. Comparative evidence has to be obtained from much farther afield and at a later period. At Bonawe furnace in Argyllshire, the furnace openings have lintels inscribed ‘Bunaw. F. 1753’. Bonawe was established in 1752-3 by Richard Ford and Company. Cralecken also in Argyllshire has an indistinct inscription on the lintel over the tuyere arch, ‘C(G?) F 1775’. This probably dates a rebuilding, as the furnace here was originally constructed in 1755 (Hay and Stell, 1986 112-115). At the upper furnace at Coalbrookdale there are three dated lintels, one of 1638, and two of 1777. The inscriptions are so eroded that they are now painted white (Hayman, Horton and White 1999, 26 and Fig 23). It appears from this admittedly slim evidence that cast-iron lintels were marked with the date of building campaigns. The dated lintels at Gunns Mills must have been cast elsewhere and incorporated into the construction of the furnace. They are large castings, triangular in section; the one highest in the tapping arch shows ends which are square in section so that they might be more easily set in the masonry. The same can be seen at the upper Furnace, Coalbrookdale. In view of the dates inscribed on the lintels and the square ends, it is probable that the sows were specifically commissioned for Gunns Mills.

Additional evidence for major reconstruction in the early 1680s is provided by the recent tree ring survey (Howard, Laxton and Litton 2001). A felling date of 1681 or early 1682
has been obtained from the roof trusses and a purlin in the three northern bays of the building, which are assumed to have formed the bridge house. It is likely that they were used to make the roof structure within a year or two of felling in order to take advantage of workable ‘green’ timber (1683-4?). The roof of the bridge house is supported by a stone wall, presumably of a similar date, which is positioned above the tail race culvert. This wall lies vertically against and partly over the furnace masonry (Fig 42). The bridge house wall is composed of a soft, red sandstone in contrast to the harder grey-green stone of the furnace. The dated cast iron lintels in the tuyere and tapping openings of the furnace suggest a major reconstruction of the furnace itself in or soon after 1682-3. The only sensible conclusion that can be drawn is that these two building fabrics were erected as part of one major reconstruction of the furnace, the construction of the bridge house with its timber roof structure immediately following that of the furnace, perhaps in 1683-4. There is no evidence for any timber frame structure over the furnace itself at this period. The existing three bays of timber-framing over the furnace have windows for paper drying and date from 1738 (see below 5.1.2).

Documentary evidence indicates who might have rebuilt the furnace at Gunns Mills in the 1680s (see above 4.3), but there is no written record of its actual construction. Comparative documentary evidence can be used however, to set the standing remains in a broader context. The 1635 survey of the King’s furnaces has been discussed above. Sometime in the early nineteenth century the ironmaster David Mushet recorded one of these seventeenth century sites, believed by Schubert to be Parkend furnace (Schubert 1953, 159-161 and Fig 1, quoting Mushet 1840, 387 and Encyclopaedia Britannica 1820 and 1824). Abraham Rees provided the drawings in the Britannica for Mushet’s account (Fig 25). These show a square section furnace with a hearth about 1.2 m (4ft) high surrounded by walls with a vertical exterior face. Above the hearth the bosh (about 750mm high (2.5ft)) flares out to support the main stack, the walls of which gradually converge to form a steep four-sided truncated pyramid. The inner and outer walls of each of the four sides are parallel. The furnace at Gunns Mills appears to have shared one important characteristic, the square main stack, with Parkend and Rees notes ‘the quadrangular form of the interior which was common to charcoal furnaces at the time’ (Encyclopaedia Britannica 1820). Otherwise there are notable difference between the two furnaces. At Gunns Mills the outside walls are roughly vertical and the interior volume relatively small in relation to the masonry mass. The hearth at Gunns Mills is considerably broader and as a consequence the bosh is much less pronounced as a feature. It is probable though that the lining to the hearth at Gunns Mills has been lost. Both the tapping and the tuyere arches reached 85% of the height of the furnace at Gunns Mills, while at Parkend the arches were only 40% of the furnace height.

The square furnace has been regarded as an earlier form of the charcoal-fired furnace (Schubert 1953, 162) for in 1677-8 Henry Powle described a circular furnace in the Forest of Dean

> From the kilns they carry the ore to their furnaces, which are built in brick or stone, about 24ft square on the outside, and near 30ft in height; within, not above 8 or 10ft, where it is the widest, which is about the middle; the top and bottom having a narrower compass, much like the shape of an egg, as in my Figure... (Hart 1971a, 51-2, quoting Philosophical Transactions of the Royal Society (1677-78) 12/137, 31-5) (Fig 24).
This is a very different furnace to the one drawn by Abraham Rees and it is not known how widely the circular section furnace had spread through the Forest of Dean by the 1670s. Citing Sir John Winter’s scientific mind and his search for technological improvement in support of his supposition, Schubert suggests that the furnace described by Powle was Winter’s construction and was either Lydney or Lydbrook (Schubert 1953, 162). Gunns Mills, as reconstructed after Winter’s occupation, is quadrangular however and reconstruction was often determined by the ground plan of the earlier furnace. It is unlikely that the furnace design would have regressed to the quadrangular shape, so it appears that at least at Gunns Mills Winter employed the conventional furnace design for that period. By the end of the eighteenth century the circular section furnace had superseded the quadrangular shape. By this time too coal had replaced charcoal as the major fuel.

In 1684 a Commission was established to determine, among other matters, whether the Crown should again produce iron in the Forest of Dean. The idea was not pursued (see above 4.3) but the data collected provides some useful information on furnace costs at the time.

Table 2  
Cost of Producing Pig Iron 1684

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charcoaling of 5400 cords annually</td>
<td></td>
</tr>
<tr>
<td>would maintain the furnace while</td>
<td></td>
</tr>
<tr>
<td>making about 1200 tons of raw iron,</td>
<td></td>
</tr>
<tr>
<td>costing as follows:</td>
<td></td>
</tr>
<tr>
<td><strong>A ton of raw iron</strong></td>
<td></td>
</tr>
<tr>
<td>4 1/2 cords of wood will make a</td>
<td>£1 16s 0d</td>
</tr>
<tr>
<td>a ton of iron and will cost, at 8s</td>
<td></td>
</tr>
<tr>
<td>a cord</td>
<td>12s 0d</td>
</tr>
<tr>
<td>Cutting and cording</td>
<td>6s 8d</td>
</tr>
<tr>
<td>Charcoaling</td>
<td>8s 0d</td>
</tr>
<tr>
<td>Carriage to works</td>
<td>18s 8d</td>
</tr>
<tr>
<td>Ore and cinders</td>
<td>2s 6d</td>
</tr>
<tr>
<td>Workmanship per ton</td>
<td>4s 0d</td>
</tr>
<tr>
<td>Salary of clerk for the wood, a</td>
<td></td>
</tr>
<tr>
<td>clerk for iron and stocktaker</td>
<td></td>
</tr>
<tr>
<td>Repairs, and sacks to carry the</td>
<td></td>
</tr>
<tr>
<td>charcoal etc</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>£4 9s 10d</strong></td>
</tr>
</tbody>
</table>

The value of the iron would be £5. 10. 10d., a profit to the King of about £1, or £1200 annually.

Twenty-six hundredweight of pig iron would convert into a ton of bar iron at a cost of £12 15s 0d per ton. The value of bar iron was £15 10s, making a profit of £2 15s per ton.

Source: Hart 1966, 180-1, quoting from CTB 1684

In January 1701 Gunns Mills was sold to Thomas Foley (see above 4.4). It is not known how many times the rebuilt furnace had been fired before the sale or what condition it was in when Foley purchased it. Furnaces quickly wore out at this period as heat made the masonry and mortar friable and porous (CLEERE and CROSSLEY 1995, 248-9). The 1635 survey of the King’s Ironworks and other contemporary documentation from Dean and farther afield in the Weald demonstrate how often furnaces had to be repaired and even rebuilt. These sources and the documentary evidence specifically relating to Gunns Mills
indicate that the furnace here was not often fired between 1683 and 1701. The great tapping and tuyere arches containing the dated 1682 and 1683 cast iron lintels which are presumably in their original positions, still form a substantial proportion of the whole furnace structure both in depth and height. There were to be at least four firing campaigns spread over seven years between 1704-5 and 1731-2.

Furnace accounts for Gunns Mills survive for the years 1705-6, 1706-7, 1710-11, 1711-12, 1723-4 and 1730-1, 1731-2, indicating at least four firing campaigns. Accounts do not survive for the period 1717-18 to 1723, but it was clear that preparations were being made in 1716-17 for another firing. Independent evidence suggests that 200 tons of iron were produced in 1717 and 620 tons in 1717-18 at a rate of 2 tons 1 1/3 cwt per hour (Schubert 1957, Table 350-1; Hart 1971a, 64-5; Hulme 1928-9, Appendix I List A). Hart incorrectly attributes 353 3/4 tons in 1718 to Gunns Mills when it should belong to Redbrook Forge.

Although the Foleys bought the furnace at Gunns Mills in 1701 it was not brought into production until 1705. It appears to have been used as a standby up to about 1728 and only fired with the other Foley furnaces at Blakeney, Bishopsworth, Elmbridge, Redbrook and St Weonard’s in years of high production. The Foley accounts indicate that Gunns Mills furnace stood almost alone at the site with few ancillary premises. This underlines its reserve status with the Foley partnership perhaps unwilling to invest in buildings or permanent staff. The picture is more complicated after 1727 for both Blakeney and Bishopsworth had been given up by this time, although Bishopsworth was fired again for a short period between 1748 and 1751. Gunns Mills, St Weonard’s and Redbrook were all fired for the last time between 1730 and 1733 (Johnson 1951-2, 322-40, 1970, 173-191).

The basic production data for the furnace at Gunns Mills has been presented in Table 3. There may have been other campaigns, as Schubert suggests, but the records for the years 1717-18 to 1723 do not survive. The 709 tons of iron produced between September 1704 and September 1705 is the highest recorded annual total. This is a rate of over two tons per day for every day of the year. The other firings produced between 72 tons and 554 tons per annum (average 393 tons per annum) (Hart 1971a, 64; Johnson, 1970, 189). This annual level of production was lower than the other Foley furnaces and this factor, coupled with intermittent firing, may explain how the furnace at Gunns Mills survived to be converted into a paper mill in 1738-9.

In the first two firing campaigns at Gunns Mills a few additional tons of iron were cast in the form of ‘bowkes’ (baulks props or beams) and [fire] ‘backs’, but the main product was ‘sowe iron,’ worth on average £6 5s per ton. The sow iron was sold directly to a number of customers, but some was delivered to other Foley establishments, Lydbrook forge, Bewdley ‘Storehouse,’ and Broadoak (river wharf) near Newnham in particular.
### Table 3  
Gunns Mill Furnace Production and Raw Materials 1705-1732

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>1705-6</th>
<th>1706-7</th>
<th>1710-11</th>
<th>1711-12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sow iron</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Balance</td>
<td>001.12</td>
<td>037.02</td>
<td>002.04</td>
<td>156.11</td>
</tr>
<tr>
<td><strong>Pigs cast</strong></td>
<td>709.09</td>
<td>072.11</td>
<td>554.00</td>
<td>153.00</td>
</tr>
<tr>
<td>Bowkes cast</td>
<td>009.09</td>
<td>000.02</td>
<td>006.04</td>
<td>000.09</td>
</tr>
<tr>
<td>Backs cast</td>
<td>001.02</td>
<td>000.03</td>
<td>000.13</td>
<td>--------</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>781.03</td>
<td>109.19</td>
<td>564.09</td>
<td>309.19</td>
</tr>
<tr>
<td><strong>Sow iron</strong></td>
<td>744.01</td>
<td>106.09</td>
<td>407.18</td>
<td>306.15</td>
</tr>
<tr>
<td><strong>Sold/delivered</strong></td>
<td><strong>elsewhere</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Balance</td>
<td>037.02</td>
<td>003.10</td>
<td>156.11</td>
<td>003.04</td>
</tr>
</tbody>
</table>

**Charcoal**  
loads/sacks

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
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<td>0394.04</td>
<td>0066.00</td>
<td>--------</td>
<td>100.00</td>
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<tr>
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<tr>
<td></td>
<td>1765.07</td>
<td>0204.00</td>
<td>1440.05</td>
<td>380.00</td>
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<tr>
<td>Spent</td>
<td>1699.07</td>
<td>0181.00</td>
<td>1340.05</td>
<td>380.00</td>
</tr>
<tr>
<td>Balance</td>
<td>0066.00</td>
<td>0022.02</td>
<td>0100.00</td>
<td>--------</td>
</tr>
</tbody>
</table>

**Cinders**  
dozens/bushels

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Balance</td>
<td>0647.10</td>
<td>0300.00</td>
<td>0652.00</td>
<td>1050.00</td>
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<tr>
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<td>1223.05</td>
<td>0068.06</td>
<td>1672.00</td>
<td>0010.00</td>
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<tr>
<td></td>
<td>1871.0</td>
<td>3</td>
<td>0368.06</td>
<td>2324.11</td>
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<td></td>
<td></td>
<td></td>
<td>1060.00</td>
<td>1106.00</td>
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<tr>
<td>Spent</td>
<td>1571.03</td>
<td>0158.06</td>
<td>1274.11</td>
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<tr>
<td>Balance</td>
<td>0300.00</td>
<td>210.06</td>
<td>1050.00</td>
<td>720.00</td>
</tr>
</tbody>
</table>

**Iron Ore**  
dozens/bushels

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Balance</td>
<td>--------</td>
<td>0457.0</td>
<td>0203.11</td>
<td>010.00</td>
</tr>
<tr>
<td>Delivered</td>
<td>1142.09</td>
<td>0002.00</td>
<td>0499.05</td>
<td>142.00</td>
</tr>
<tr>
<td></td>
<td>1142.09</td>
<td>0459.00</td>
<td>703.04</td>
<td>152.04</td>
</tr>
<tr>
<td>Spent</td>
<td>0685.09</td>
<td>0070.00</td>
<td>562.00</td>
<td>142.04</td>
</tr>
<tr>
<td>Balance</td>
<td>0457.00</td>
<td>0300.00</td>
<td>010.00</td>
<td>010.00</td>
</tr>
<tr>
<td></td>
<td>(89.00</td>
<td>131.04</td>
<td>131.04 to Bishopwood)</td>
<td></td>
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**Inventory**  
£518.19.00  £196.15.9  £1604.7.4  £320.17.9
<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>1723-4</th>
<th>1730-1</th>
<th>1731-2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sow iron</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tons/cwts/qts/lbs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Balance</strong></td>
<td>023.00</td>
<td>001.15</td>
<td>174.00</td>
</tr>
<tr>
<td><strong>Pigs cast</strong></td>
<td>405.00</td>
<td>466.17</td>
<td>401.07</td>
</tr>
<tr>
<td><strong>Bowkes cast</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Backs cast</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>28.00</td>
<td>468.12</td>
<td>575.07</td>
</tr>
<tr>
<td><strong>Sow iron</strong></td>
<td>385.00</td>
<td>294.12</td>
<td>518.02</td>
</tr>
<tr>
<td><strong>Sold/delivered elsewhere</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Balance</strong></td>
<td>011.00</td>
<td>174.00</td>
<td>057.00</td>
</tr>
</tbody>
</table>

*August 1724

<table>
<thead>
<tr>
<th>Charcoal</th>
<th>loads/sacks</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Balance</strong></td>
<td>684.05</td>
<td>470.00</td>
<td></td>
</tr>
<tr>
<td><strong>Delivered</strong></td>
<td>913.07</td>
<td>815.02</td>
<td>406.04</td>
</tr>
<tr>
<td></td>
<td>913.07</td>
<td>1499.07</td>
<td>876.04</td>
</tr>
<tr>
<td><strong>Spent</strong></td>
<td>913.07</td>
<td>1029.07</td>
<td>876.04</td>
</tr>
<tr>
<td><strong>Balance</strong></td>
<td>0470.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cinders</th>
<th>dozens/bushels</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Balance</strong></td>
<td>998.09</td>
<td>1000.00</td>
<td></td>
</tr>
<tr>
<td><strong>Delivered</strong></td>
<td>0012.06</td>
<td>630.04</td>
<td>0039.09</td>
</tr>
<tr>
<td></td>
<td>0012.06</td>
<td>1629.01</td>
<td>1039.09</td>
</tr>
<tr>
<td><strong>Spent</strong></td>
<td>0012.06</td>
<td>0629.00</td>
<td>0999.09</td>
</tr>
<tr>
<td><strong>Balance</strong></td>
<td>1000.00</td>
<td>0040.00</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Iron Ore</th>
<th>dozens/bushels</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Balance</strong></td>
<td>0020.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Delivered</strong></td>
<td>450.05</td>
<td>0955.04</td>
<td>0490.08</td>
</tr>
<tr>
<td></td>
<td>450.05</td>
<td>0975.04</td>
<td>0490.08</td>
</tr>
<tr>
<td><strong>Spent</strong></td>
<td>450.05</td>
<td>0975.04</td>
<td>0450.08</td>
</tr>
<tr>
<td><strong>Balance</strong></td>
<td></td>
<td></td>
<td>0040.08</td>
</tr>
</tbody>
</table>

| Inventory       | £2433.50 | £469.00 |

Years run from Michaelmas to Michaelmas, except 1723-4 – Jan 1723 to Sept 1724 with six months missing

*Error in account

Source: HRO E12/VI/DFf/1; E12/VI/DFf/2; E12/VI/Dec/49; E12/VI/DFf/7; E12/VI/DF/Gf/36/6-9; E12/VI/DF/Gf/4-10.
In the casting of pig iron charcoal, cinders and iron ore (then called myne) were the principal components. Charcoal was an expensive material, converted from cordwood, and costing between 32s and 40s per load. Each ton of pig iron required over two loads of charcoal. Cinders and iron ore were used in all the Gunns Mills firing campaigns, but in 1705-7, 1710-12 and 1731-2 cinders accounted for most of the mix, 68% - 70% of cinders to 32% - 30% of iron ore. In 1723-4 the percentage of cinders was insignificant (2.5%) and in 1730-1 the proportion used was 39%. There was no great difference in price between cinders (5s 7d to 7s 4d per dozen in 1710-12) and iron ore (5s 6d per dozen in 1710-12) to explain the preference for cinders. David Bick suggests that it was the high purity of the ore that caused the low ratio of ore to cinders, in the case of Newent Furnace only 24% and sometimes as low as 12% (Bick 1992, 61-2). There is no evidence from the Foley partnership accounts for Gunns Mills to show whether cinders or ore yielded most iron. The production of each ton of pig iron consumed between 3.1 and 3.6 dozens of iron ore or cinders.

In 1710-11 the charcoal for Gunns Mills furnace came from Newent wood, Hopewood, Thomas Wadd, Jonathon Wintel, Puttendge (Blakeney), Mr Young’s wood, Nighbrook’s and John Collman (HRO E12/VI/DFr77). The price of a cord of wood was about 6s 6d and between three and four cords were converted into one load of charcoal at a cost of between 3s 2d and 3s 4d a load. Charcoal transport costs from Newent wood to Gunns Mills were 6d a load (5 miles) and 3d a load from Hopewood (1.5 miles). Most of the charcoal was delivered from these two woods, which lay to the north and north-east of the furnace. The only evidence for the profits made by the furnace comes from the accounts for 1710. A profit of £435 4s 2½ was made on the production of 554 tons of pigs iron and nearly seven tons of castings. The summary account is provided below:

<table>
<thead>
<tr>
<th>Table 4</th>
<th>Summary Account 1710-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr</td>
<td></td>
</tr>
<tr>
<td>Stock Michaelmas 1710</td>
<td>£0309 00 10¼</td>
</tr>
<tr>
<td>Whitmores account charcoal</td>
<td>£2629 15 09½</td>
</tr>
<tr>
<td>Ditto cinders</td>
<td>£0466 18 07</td>
</tr>
<tr>
<td>Ditto mine</td>
<td>£0137 06 09½</td>
</tr>
<tr>
<td>For Common charges</td>
<td>£0371 03 08½</td>
</tr>
<tr>
<td>Cash for sackcloth</td>
<td>£0039 17 00</td>
</tr>
<tr>
<td>Bars to Lidbrook</td>
<td>£0002 00 08</td>
</tr>
<tr>
<td>To Mr Foley rent for furnace</td>
<td>£0040 00 00</td>
</tr>
<tr>
<td>To Interest, Stock and General charges gained this year</td>
<td>£0435 00 00 00</td>
</tr>
<tr>
<td></td>
<td>£4431 07 04½</td>
</tr>
<tr>
<td>Cr</td>
<td></td>
</tr>
<tr>
<td>pig iron to Bewdley</td>
<td>£0513 00 00</td>
</tr>
<tr>
<td>ditto to Thos Foley</td>
<td>£1464 07 06</td>
</tr>
<tr>
<td>ditto sevr’l customers</td>
<td>£0801 17 09</td>
</tr>
<tr>
<td>ditto Elmbridge furn’</td>
<td>£0007 00 00</td>
</tr>
<tr>
<td>Whitmore for coals</td>
<td>£0000 05 00</td>
</tr>
<tr>
<td>Stock remaining</td>
<td></td>
</tr>
<tr>
<td>Michaelmas 1711</td>
<td>£1604 07 04½</td>
</tr>
<tr>
<td></td>
<td>£4431 07 04½</td>
</tr>
</tbody>
</table>

Source: HRO E12/VI/DEc49

The Foley accounts provide a considerable level of detail on building and repair costs but there appears to be less of this kind of activity at Gunns Mills than at the other furnaces, probably for the reasons outlined above. In 1704 Samuel Whitmore submitted an account ‘for Wood and Materials in order for Blowing there’ amounting to £918 0s
3d. Most of this was for charcoal and cinders delivered to the site but there were some construction costs.

Table 5     New Hearth 1704

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Getting hearth</td>
<td>£1.05.00</td>
</tr>
<tr>
<td>Carrying [hearth]</td>
<td>£1.10.00</td>
</tr>
<tr>
<td>Getting 20 tons of bosh stone</td>
<td>£2.06.08</td>
</tr>
<tr>
<td>Carrying 20 tons of bosh stone</td>
<td>£3.10.00</td>
</tr>
<tr>
<td>Getting out hearth</td>
<td>£0.08.00</td>
</tr>
<tr>
<td>Richard Hawkins putting in hearth and in wall</td>
<td>£5.10.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>£14.09.08</strong></td>
</tr>
</tbody>
</table>

Source: HRO E1/VI/DEf13

In addition Whitmore was paid £5 2s10d for ‘cleansing ditch,’ probably the tail race, and £18 for nine hides, presumably for the bellows.

In 1705-6 the pigs cast at Gunns Mills furnace were delivered to Mr Trig(g) at Newnham, who was paid £1 1os for the use of his ‘storehouse and landing place’ (HRO E12/VI/DEf1). It would appear from this that there was little if any storage space on the furnace site. In 1706-7 the material for a new hearth was obtained and transported to the furnace for £7 3s but not installed. It had been decided not to fire the furnace in 1707-8 (HRO E12/VI/DEf12-3). The hearth was eventually built at a cost of £7 in 1709-10 in preparation for the firing campaign of the following year. In 1709-10 some tiling was carried out perhaps over the bridge house (£5 5s 0d) and the tail race channel (the ‘witch’) was repaired (£9 6s 8d) (HRO E12/VI/DEf15).

Samuel Whitmore’s accounts for the year from Michaelmas 1710 to Michaelmas 1711 are the most extensive in the series (HRO E12/VI/DEf16). Whitmore appears to have charged twice for building the hearth and more work was done by labourers in the ‘witch ditch’ and around the furnace (£25 19s 2d). The work in the ‘witch’ was unpleasant and dark, the workmen needed brandy for fortification and candles for illumination (14s 9½d). It can be concluded that the ‘witch’ was already culverted, running from the wheel under the furnace bridge or even beyond (Fig 22). Masons, carpenters and sawyers were also employed in this year. The bridge was paved for £2 16s 0d to carry the cinders that were being brought from the local ‘picking’ and washing place. A map of c1710 shows a ‘Picking Place’ on White Hill north of the furnace (Hart 1995] 206-7; original at PRO F17/17) (Fig 6). £1 5s 0d was paid for a cast gudgeon (the spindle on the water wheel axle) from Flaxley. The timber bellows were dressed (13s 4d) to take new leather hides (8s 6d). Altogether about £100 was spent on building repairs. Building work perhaps included a store and, since windows were glazed (6s), a room for the clerk, Thomas Boyle, to keep his ‘paper and books’ (7s 0d). From 1712 a bedstead is listed with a rake and a lantern among the ‘odd things’ in stock at Gunns Mills (HRO E12/VI/DEf18). In the year from 1711 to 1712 most of the costs were for running the furnace (HRO E12/VI/DEf17). The operation attracted thieves in 1712-13 when Mr Duffield was paid £1 12s 6d for ‘looking after thieves at Gunns mill furnace’ (HRO E12/VI/DEf18).
In 1716-17 preparations were made for a new firing campaign. 27 loads of charcoal were delivered and Samuel Whitmore paid carpenters 3s for ‘taking up Shaft,’ presumably to be repaired or replaced with a new water wheel shaft (HRO E12/VI/DF/F/13). Unfortunately no further building or repair accounts survive until after 1727-8 when expenditure was negligible (HRO E12/VI/DGF/2). A year later in 1728-9 preparation for blowing was once more underway with the construction of a new hearth.

Table 6 New Hearth 1728-9

for putting in Inn (sic) Walles & Hearth £42 10s for bosh stones £13 6s 8d
for Lime £4 19s Getting Stones 11s Labourers £5 13s 6d
for cleansing the Ditch £5...Stone cole 13s 3d Nailes 17s 6d

Source: HRO E12/VI/DGF/3

The regular replacement of the hearth is only to be expected and accords with evidence from another reasonably well preserved charcoal blast furnace at Tintern (Pickin 1982, 14). The accounts however, do not suggest that that the ‘facing of the shaft was also repaired and rebuilt on fairly frequent basis,’ as at Tintern, perhaps because Gunns Mills was not used so intensively.

During the next year 1729-30 the largest amount recorded in the extant accounts, £168 17s 0d, was spent ‘for Repairing Gunsmills Furnace’(HRO E12/VI/DGF/4). The investment was in preparation for another firing campaign. The account for the repair is unfortunately amalgamated and listed as work carried out by Richard Constance, although he did not in fact undertake all the repair work and other items are listed.

Table 7 Additional Repairs 1729-30

For a Shaft £8 15s Nailes £5 3s pitch and Tarr £2 10s
For Halling Hearth £2 5s Halling Earth and Stones £5 19s 10d
Mason Worke £2 8s Labourers £2 13s Smith Worke £11 5s 6d
For Stone Cole and Lime £1 7s 8d Oyle and Tallow £3 11s

Source: HRO E12/VI/DGF/4

It is clear that the state of the furnace at Gunns Mills had deteriorated since it was last fired in 1723-4. A new water wheel shaft was installed and some extra material for the hearth was needed but no other details of the work carried out at the site are recorded.

In 1730-1 when production at the furnace was fully underway £42 10s was spent on materials for ‘building a house’ with £7 3s paid for labourers costs (HRO E12/VI/DGF/5. In the same year a clerk, Henry Burgum, was paid £33 15 1d for stock taking at Gunns Mills. In 1731-2 another new hearth and bosh was fitted at a cost of £14 13s 9d (HRO E12/VI/DGF/6)

The Foley accounts include a yearly inventory of materials, tools and equipment at each furnace whether active or not. This stocktaking provides another indication of production levels as raw materials were delivered to the site in anticipation of firing and
reduced considerably between campaigns. Most of the total value is taken up by the stocks of pigs, charcoal, cinders and iron ore. Fixtures at the furnaces, such as the waterwheels, were not included in the inventories since they belonged to Thomas Foley, although the bellows were regarded as the property of the partnership. After the pigs and the raw materials these were the most expensive item in stock and were usually valued at £20.

Table 8  
Annual Valuation of Stock and Tools 1705-1742

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1705-6</td>
<td>£ 518 19 00</td>
</tr>
<tr>
<td>1706-7</td>
<td>£ 196 15 09</td>
</tr>
<tr>
<td>1707-8</td>
<td>£ 262 03 04 1/2</td>
</tr>
<tr>
<td>1708-9</td>
<td>£253 04 07 1/2</td>
</tr>
<tr>
<td>1709-10</td>
<td>£309 00 10 1/4</td>
</tr>
<tr>
<td>1710-11</td>
<td>£1604 07 04 1/2</td>
</tr>
<tr>
<td>1711-12</td>
<td>£ 320 17 09</td>
</tr>
<tr>
<td>1712-13</td>
<td>£ 260 02 09</td>
</tr>
<tr>
<td>1713-14</td>
<td>£ 258 10 06</td>
</tr>
<tr>
<td>1714-15</td>
<td>£ 258 10 06</td>
</tr>
<tr>
<td>1715-16</td>
<td>£ 258 10 06</td>
</tr>
<tr>
<td>1716-17</td>
<td>£ 308 12 11 1/2</td>
</tr>
<tr>
<td>1718-1726</td>
<td>no data</td>
</tr>
<tr>
<td>1727-8</td>
<td>£ 104 16 04 (bellows not valued)</td>
</tr>
<tr>
<td>1728-9</td>
<td>£ 795 12 06</td>
</tr>
<tr>
<td>1729-30</td>
<td>£1778 07 00</td>
</tr>
<tr>
<td>1730-1</td>
<td>£2433 05 00</td>
</tr>
<tr>
<td>1731-2</td>
<td>£ 469 08 00</td>
</tr>
<tr>
<td>1732-3</td>
<td>£112 02 00</td>
</tr>
<tr>
<td>1733-4</td>
<td>£ 60 00 00</td>
</tr>
<tr>
<td>1734-5</td>
<td>£ 60 00 00</td>
</tr>
<tr>
<td>1735-6</td>
<td>£ 55 10 00</td>
</tr>
<tr>
<td>1736-7</td>
<td>£ 55 10. 00</td>
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<tr>
<td>1737-8</td>
<td>£ 55 10 00</td>
</tr>
<tr>
<td>1738-9</td>
<td>£ 55 10 00</td>
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<tr>
<td>1739-40</td>
<td>£ 55 10 00</td>
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<tr>
<td>1740-41</td>
<td>£ 55 10 00</td>
</tr>
<tr>
<td>1741-2</td>
<td>£ 55 10 00</td>
</tr>
</tbody>
</table>

Production years: **bold**

Source: HRO E12/VI/DF8/1-13; E12/VI/DG8/2-16

There is a considerable increase in the number of tools and other items kept in stock at Gunn's Mills after 1710-11. As suggested above, it is possible that a storeroom and clerk's office were built in this year. The account is extracted in full below:
### Table 9  Furnace Inventory 1710-11

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Price per Unit</th>
<th>Total Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sow iron at furnace</td>
<td>25 tons 11 cwt 2 qts 21 lb</td>
<td>@ £6 15s a ton</td>
<td>£172 13 10 1/2</td>
<td></td>
</tr>
<tr>
<td>ditto at Newnham</td>
<td>131 tons 00 cwt 0 qt 00 lb</td>
<td>@ £6 17 6 a ton</td>
<td>£900 12 06</td>
<td></td>
</tr>
<tr>
<td>Charcoal by estimation</td>
<td>100 loads @ 36s 6d a load</td>
<td></td>
<td>£182 10 00</td>
<td></td>
</tr>
<tr>
<td>Cinders ditto</td>
<td>1050 dozen @ 5s 7d per dozen</td>
<td></td>
<td>£293 02 06</td>
<td></td>
</tr>
<tr>
<td>Myne ditto</td>
<td>10 dozen @ 5s 6d per dozen</td>
<td></td>
<td>£90 15 00</td>
<td></td>
</tr>
<tr>
<td>Bellows with appurtenances as last year</td>
<td></td>
<td></td>
<td>£020 00 00</td>
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Source: HRO E12/VI/DF/6

Stocktaking at Gunns Mills continued for a few years after Joseph Lloyd took over the tenancy from the Foley Partnership in 1738. The small stock of sows, cinders and iron ore must then have been removed from the site.

#### 5.1.2  **Gunns Mills I, The Paper Mill, 1738-1880** (Fig 26)

When the papermaker Joseph Lloyd took over Gunns Mills in 1738 the furnace had not been fired for six years and only a small stock of sows iron, cinders and iron ore remained on the site. In his conversion of the premises to papermaking Lloyd did not waste the earlier investment in the waterworks or the buildings. The bellows room on the west side of the furnace was converted without much difficulty into a water-powered rag beating room and the casting shop on the south side turned into the vat room. At the upper level the covered bridge house and the now redundant stack were ideally placed for conversion to a drying loft. All that was needed was a connection between the upper and lower part of the mill and to this end the lower part of the furnace was adapted to provide space and support for a staircase. This modification entailed punching holes in the tapping and tuyere arches and shaving off the 'pillar' between them. In 1738-9 Thomas Foley paid Joseph Lloyd £52 12s 'towards building' which must have covered some of this reconstruction work (HRO E12/G/25). In addition the Foley's paid 18s 3d for 'squaring 12 tun 12 foot of Timber to be sent to Guns Mill.' This length of about 612ft (c186m) (a ton being about 50ft) was sufficient to build the timber frame for the drying loft over the furnace stack and for any roof trusses required in the rag beating
and vat rooms (see below) (Neve 1726, 262-3). The timber was newly felled in 1738-9 and 'ways' had to be made 'for carr[iage],’ which, with the sum for 'cross cutting it,’ cost £1 13s 11d (HRO E12/G/25). A dendrochronological date could not be obtained from these timbers because too few rings were available. This suggests trees growing quickly in a relatively open environment. They are squarer, cleaner and better-jointed than the timbers in the earlier bridge house (Howard, Laxton and Litton, 2001).

The works to convert the furnace at Gunns Mills for the production of paper are summarised below (Fig 26):

1. Conversion of bellows room into rag beating house; removal of two bellows and modification of extended axle on water wheel with its cams to work rag beating hammers; installation of rag beating troughs; raising of walls to create extra storey, with access from furnace staircase (see below); function of first floor room unknown. It is possible that a Hollander rag beating machine was introduced from the outset (Angerstein 1753-4, 169)(see below).

2. Conversion/rebuilding of casting room to vat room; installation of vat and paper press; provision of water supply to vat.

3. At upper level three bays to the north with timber roof structure and stone walls represent former furnace bridge house; enclosure of originally open-ended bridge house with connecting doorway to the new drying loft south and to exterior north.

4. Construction of new three-bay timber-framed drying loft over stack; possible removal of upper part of stack; flagging over of remaining opening at upper level; raising of stone wall on outside edge of furnace wall to support timber frame; drying loft trusses in style of existing bridge house trusses; installation of drying racks at upper 'collar' level and at tie beam level (Fig 59).

5. Installation of staircase into stack; cutting and part removal of two highest cast-iron lintels in the tapping opening; complete removal of highest cast iron lintel in tuyere opening and replacement with a new timber lintel; cutting and part removal of cast iron lintel immediately below; these modifications to enable creation of a doorway in each of the furnace openings to accommodate a staircase and landings; insertion of new iron lintels above new doorways within the stack (Fig 55); construction of small section of stone spiral at upper level of stairs; blocking of bellows opening to hearth; removal of hearth lining; cutting and removal of lowest cast-iron lintel in tapping opening at the forehearth (Fig 57); timber lintel to support new higher doorway into hearth from the forehearth and the remainder of the opening blocked.

6. Plastering and limewashing wall surfaces to maintain cleanliness.

The alterations to the water wheel pit are less well understood. It is not known if the wheel itself was replaced, but the south side of the wheel pit was likely to have been substantially rebuilt in order to support part of the new rag beating house and the storey over. This wall is constructed of fine coursed ashlar blocks lining the pit and rougher coursed stone facing into the interior of the rag beating room to take a plaster finish (Fig 60). The ashlar finish on the south wall of the wheel pit contrasts with the stonework of the wheel bearing chamber on the north side. The culvert that took water from the wheel under the furnace and beyond is now blocked; this may have been done by Joseph Lloyd for the paper mill conversion. Water now leaves the pit at right angles through a culvert situated in the south wall below the wheel bearing opening. The culvert is now almost completely obstructed by debris so that the course of the water at the present time is
unknown. Scratches left on the wheelpit wall are evidence of large water wheel with a diameter (c7m) that would have filled most of the pit. There is also evidence that the pit was narrowed on the north side, perhaps to take another wheel. The scaffolding which now covers the building unfortunately prevents the viewing of the pit as a whole and makes it difficult to ascribe any more of the structure here to the paper milling phase.

It was assumed that when Joseph Lloyd began his paper mill the only mechanised process would have been the beating or macerating of rags in troughs, the hammers (stampers) activated by cams on the water wheel axle. The Hollander beating engine had been introduced into England by 1740 (Fig 28)(Shorter 1971, 38-9) but early versions of this machine were not as efficient as rag beaters in the production of good quality white papers. The recent publication of the Swede, R R Angerstein’s, travel diaries however, confirms that a Hollander engine had been installed at the paper mill by 1754.

On the way from Mitcheldean to Flaxley on 29 June [1754] I came across a paper mill, driven by water, and a beating engine constructed in the Dutch way, and owned by Mr Foley. Here a quire is considered to be 24 sheets of paper and there are 20 quires to a ream which, according to the quality of paper, is sold for 6, 8, 10, 12, 14 shillings to 21 or 25 shillings (Angerstein 1753-4, 169).

It is also clear from the account that Joseph Lloyd was making several grades of paper.

The first map to show the mill is dated 1743 (see above 4.5) but provides no reliable information on the building other than that it was a paper mill (Fig 7). More repair work was done at 'Gunns mills paper mile' in 1746 at a cost of £37 9s 5d and in 1748 for £14 7s 6d (HRO E12/G/25). In March 1749 Henry Hall was paid 10s for hauling 'Coggs to Gunnsmills' (HRO E12/G/25), which may have been for the new Hollander engine that Angerstein observed (see above). There are bills for repairs submitted by Joseph Lloyd in 1750 and 1753, but there is no indication of what these repairs might have been (HRO E12/G/25).

There is little information on the paper mill during the rest of the eighteenth century. The first reliable map of Gunns Mills was produced in 1774-5 as part of a survey of the Foley estates (Fig 8) (HRO E12/G/30, negative copy GRO 2528). The paper mill is shown as a rectangle with an extension on the west (mill dam side). If the furnace bellows had been contained in a roofed room, as seems likely, this footprint might have changed very little in the conversion of the building to a paper mill. Starting at the north end and at the upper level the main mill building would have contained the former bridge house, the drying loft on the former furnace stack, reached by a staircase from below, and the vat and press room. The rag beating room was contained in the extension. The function to which the Lloyds put the bridge house at this time is unknown. In 1780 Joseph Lloyd II bought Gunns Mills and insured his new property at a value of £1000. Of this sum £400 was assigned to 'his Paper Mill only separate' (quoted in Harris 1974, 39).

It is not until 1803 that we have any details of the paper mill buildings when William Balston visited Gunns Mills and noted that there were two vats (Harris 1974, 34; CKS, Notes of William Balston 1803). Some time before Balston’s visit Lloyd had built two new mills upstream of the converted furnace. One of these, Upper Mill (Gunns Mills
IV), lay above and the other, Middle Mills (Gunns Mills II), below the corn mill, also then known as Middle Mills (Gunns Mills IIIa), built in 1739-40 (see above 4.5). Two plans from the 1830s show the Lloyds’ original paperworks at the furnace, now known as Lower Mill, in some detail, but they are small in scale and their evidence is not reliable (PRO F/17/122; GRO Q/RG fl/7, GRO GDR/T11) (Figs 11 and 12). The 1834 plan of Forest encroachments (Fig 11) represents the mill as a broad rectangle with two short, narrow projections on the west and a shallow centrally placed extension on the east. The blocked doorway on this elevation in the building today may relate to the eastern extension. The 1838 tithe map (Fig 12) shows an additional extension, south of the rag beating room (the former bellows room) and west of the vat and press room (the former casting shop).

Evidence from the 1850s provides more detailed evidence for the layout and content of the converted furnace (Gunns Mills I). In January 1855 John Birt, the Lloyds’ tenant at Gunns Mills went bankrupt (see above 4.5) and in May that year the residue of his lease was advertised for sale. The advertisement lists the buildings and plant at the mills.

The large mill [Gunns Mill I] contains one paper-making and drying machine (by B Donkin and Co., London); cutting machines (by Bertram and Co., Edinburgh; knotters, sand-strainers, vacuum pumps, vats, chests, and driving gear complete. Also TWO STEAM ENGINES, with three large steam boilers; four rag engines, driven by water and steam, with boiling and bleaching chests, &c. (The whole erected new since 1851.) Also rag rooms, finishing rooms, glazing-rolls, presses &c, &c (Gloucester Journal, May 5th 1855).

John Birt had clearly transformed the operation at the Lower Mill (Gunns Mill I) and in the process overreached himself. The 1856 map of East Dean Township (PRO F16/63, pt 1) (Fig 13) shows how he had extended the premises southwards down to the road leading to the Forest and to the Middle and Upper Mills. It is possible that the existing retaining wall along the Forest road was constructed as part of this extension since it contains a vertical joint and quoins. The old vat room and this new building probably accommodated the Donkin paper making and drying machine as the steam engines and boilers must have occupied the extension built to the east of these premises. Coal was delivered to the mill from Pit’s Mouth, three miles away, at a cost of 3s a ton (Gloucester Journal, 5th May 1855). The south-east corner of the site, nearest to the road, was therefore the ideal position for the boiler house. The boiler chimney was erected in the gardens (see above 4.5) on the south side of the lane, some distance from the works so as not to mark the paper in the drying room with smuts from the smoke. The stone built chimney flue was 4ft 6in high and 2ft 6 in wide with a low arch soffit. It is presumed to have led directly to the boilers (Fig 29). The chimney was taken down between 1885 and 1890. Recent road widening by the Forestry Commission and the construction of a drive to the bungalow built on the gardens (see above 4.7) caused sections of the flue to be exposed and removed (pers com Ms J Barrington; Townley 1974, 8).

It is interesting that at least one of the rag engines (for rag beating) was still run by the water wheel, perhaps this was the engine seen by Angerstein in 1754 (Angerstein 1753-4, 169) (see above). The paper making machine was 48 to 52 inches wide (1.22 - 1.35m), producing white and coloured printing papers as well as brown papers and
blotting papers (Harris 1974, 35, 39). In 1871 it was claimed that the machine could make six tons a week of any class of paper (The Stationer, 5 Jan 1871).

Some of the alterations visible in the present fabric of Lower Mill (Gunns Mills I) may date from Birt’s modernisation of the works. The spiral stairway leading to the drying loft was abandoned and a new door cut higher and nearer to the south west corner of the eighteenth century timber frame. It is less easy to date an ‘office’ inserted into the roof space of the former furnace bridge house and lit by both a dormer window in the west pitch of the roof and a vertically sliding sash window in the north gable. It was reached by a staircase, now entirely removed, which rose from the north east corner of the bridge house. The room was lined with lath and plaster laid against the seventeenth century roof trusses (see above 5.1.1.) and a new partition. The dormer window once stretched across the three bays in the north of the building (Fig 43) but in recent times it was reduced to one bay and this in turn has entirely collapsed.

Between 1855 and 1871 Aaron Goold and his sons considerably extended the Lower Mill, but all these buildings have now been demolished (see below) (Fig 27). Papermaking at Gunns Mills ceased about 1879 and the whole estate was put up for sale in 1881. The particulars include a schedule of machinery at the Lower Mill (Gunns Mills I) (GRO D2172/1/75).

Outside Lower Mill
Two steam boilers with fittings

Inside Lower Mill
Three cast iron Rag engines with rolls and pinions complete
One revolving Rag boiler with driving shaft &c complete
One horizontal Steam engine with spur wheel
One beam condensing engine
One wooden rag engine with driving tackle roller and pinions complete
One paper making machine complete, with steam engine for driving same
One paper cutting machine

The papermaking machine was not in fact complete, since Henry Affleck, the last tenant, had removed various parts from it, including the wire (see above 4.5). The machine appears from the inventory to have had a third steam engine attached. The old fashioned beam engine probably ran the rag engines and may have been conveniently located close to the rag beating rooms. It would have needed a taller engine house than the horizontal steam engine. The possible disposition of the rest of the machinery cannot easily be discerned in the extensive premises that had been built by the end of the 1870s (see below) (Fig 27). There are no extant plans or photographs of the interiors.

There are few illustrations showing the exterior of the Lower Mill (Gunns Mills I) as a paper mill. An early photograph, taken after paper making had ceased, shows a building immediately south of the former drying loft; it was three storeys in height, with the upper storey used as a drying room (Fig 43). By the time of the photograph (c1890-1900) the drying room was roofless. The first edition Ordnance Survey plan (Figs 14 and 15), surveyed in 1878-79, shows that the premises had been considerably extended.
since 1856, most significantly to the west towards the mill pool dam (Fig 27). Here, as shown on the photograph referred to above (Fig 43), three parallel gabled buildings, perhaps two-storeys in height, are connected to the former furnace structure and the three-storey building with the by then derelict drying loft. The gabled building to the left (north) must have incorporated the two-storey rag beating shop built by Joseph Lloyd I. What was probably an internal wall belonging to these three workshops has been mistaken by some authors for the wall of the mill pool dam. This stood in fact farther to the west, roughly in line with the two-storey bay window on the existing Gunns Mills House. None of the other early photographs, which are all taken from across the mill pool towards the front of Gunns Mills House, show these three, gabled buildings (Figs 44-6).

There were other minor alterations to the buildings at the Lower Mill (Gunns Mills I). The extension on the east side was extended slightly southwards, perhaps to take the boilers for the three steam engines (Fig 27). The small extension to the original vat and pressing rooms against the retaining wall on the Forest road was demolished. The first edition Ordnance Survey plan makes the north end of the former furnace too narrow but corrects this distortion in later editions. A small extension had been added to the north west side of this building by 1856 and the 1878-8 Ordnance Survey plan shows that a larger extension had been added on the east side, but that another extension on this side has been demolished (Figs 14-15, 32). It is possible that the existing hole high on the eastern side of the former furnace stack was broken through in the late paper mill phase, either for a steam pipe or for shafting to run machinery.

In 1890 William Ryder, a farmer, purchased the whole of the Gunns Mills estate and the former furnace and paper mill was converted for agricultural use. This involved considerable demolition so that by the second edition Ordnance Survey plan, surveyed in 1901 (Fig 17), only the structure of the former furnace, the drying loft and minor upper yard extensions survived (Fig 32). The paper mill phase had contributed to the preservation of the furnace by incorporating it within the core of the operation. The twentieth century agricultural use continued the act of preservation by re-using the structure once again. On the third edition Ordnance Survey plan (Fig 18), published in 1924, a sheep wash is marked in the lower yard, (formed through the clearance of earlier buildings) against a new retaining wall, which had been built eastwards of the dam, well within the footprint of the demolished paper mill sheds. The recently formed lower yard was reduced in size as result (Figs 18, 32). By the 1940s new buildings had been erected in the yard. A barn used to thresh wheat and barley had been built against the south side of the furnace. Mangles were also kept in store there (pers. comm. Mrs P Haines). Alfred Ryder (see above 4.6) may have installed the existing cast-iron water wheel (Fig 60). This was connected by leather belts to cider milling machinery located immediately to the south of the wheel pit in the area of the former rag beating shop. Wheat and barley were kept in the building immediately to the west. The west side of the former furnace bridge house was used for milking and a chaffer was kept on the east side. The former drying loft was not used. The buildings, now demolished, on the south side of the upper yard were used a dairy and milk cooling room. The buildings on the north side of this yard, almost certainly former rag sheds and other premises built for the paper mill, were occupied by between sixteen and twenty milking cows (pers. comm. Mrs P. Haines). These buildings have now been converted for guesthouse accommodation.
From about 1950 to 1982 the former furnace building was used to keep pigs and chickens (pers. comm. Ms J. Barrington). The dairy and milk cooling range in the upper yard was converted into cattle sheds and the cattle sheds on the north side were occupied by a milking parlour, a feed shed and a calf raising shed. The lower yard was eventually almost completely roofed over in corrugated iron but has now been cleared of buildings (Fig 49). While the former furnace was used for agricultural purposes, it was at least maintained on a patch and mend basis. By the mid-1970s however, ivy had begun to cover the south gable of the mill (Cave 1974, 19) and from then the process of decay accelerated (Fig 49). The most obvious signs of deterioration are the complete loss of the dormer roof on the west side, exposing the 'office', and on the east side the parting of some of the principal rafters from the tie beams so that the wall here has been pushed out.

Alfred Beard purchased Gunns Mills in 1982 and in 1986 submitted an application for Listed Building Consent (Forest of Dean District Council DF7240) to convert the furnace to a bungalow. This was refused in July 1986 on the grounds that the proposal was detrimental to the listed building and would prejudice the setting of the newly scheduled monument. In 1989 Beard submitted a new set of more detailed plans for the conversion of the furnace (Forest of Dean District Council DF7240/A). On this occasion his proposal was given consent but not implemented. In 2000 English Heritage directed and funded the erection of scaffolding and a covering to afford some protection to the structure.

5.2 GUNNS MILLS II (MIDDLE MILLS) (SO 67351586)

The lower of the Middle Mills (Gunns Mills II) is situated 95m above the furnace and was built along with pool of its own between 1778 and 1803 (see above 4.5). The building is first shown on the 1834 plan of Forest encroachments (GRO Q/RG F1/7) (Fig 11) and then on the 1838 tithe map (GRO GDR/T/1) (Fig 12) as roughly square with a small rectangular projection on the east side. The tithe apportionment (GRO TRS 224/1) unfortunately does not identify its function. In 1855 in the sale that followed the bankruptcy of John Birt (see above 4.5) the building is described as a 'Washing Mill...within 150 yards [of Gunns Mill I and containing] an engine driven by water' (Gloucester Journal 5 May 1855; BCL MS2092). Here rags were washed in troughs to open the fibres and produce 'half fluff' (Rees 1890-20, 77). It is not known how the rags were agitated but at this time a Hollander roll worked off the water wheel would have been the likely mechanism (Fig 28). In the list of machinery drawn up in 1881 'one rag chopper and duster with water wheel &c complete' was all that was listed at the 'Middle Mill' (GRO D2172/1/75). The omission of rag washing equipment cannot be explained, but it may have been removed by the Goolds, who took on the lease of Gunns Mills in 1855 (see above 4.5). Both the rag chopper and duster were probably worked by the water wheel. The duster was a cylinder, perhaps four feet in diameter and five feet in length, made of wire mesh and enclosed in a box. The rags to be dusted were placed in the cylinder, driven off the water wheel, as it turned the dust was thrown out through a mesh into the dustbox (Rees 1890-20, 74-75).

After 1881 the papermaking plant was probably removed and the building then gradually decayed. By 1901 (2nd edition OS 1:2500) the building was roofless (Fig 17). The undershot wheel, 'possibly 16ft by 4ft' was apparently 'cleared' for use as timber by the
forces during the Second World War (Townley 1974, 6). The Gloucestershire Council for Industrial Archaeology surveyed the site in 1964 and produced a plan of a building measuring approximately 8.5m by 10.1m (28ft by 33ft) (Fig 30) (GRO D3921/II/29). A small hole in the north wall facing the stream and near the north-west corner of the building was presumed to be the water wheel axle position (Fig 64, just to the left of the tree). This implies that the wheel projected westwards beyond the building and only partly covered the great arch that can still be seen in the surviving remains. The north wall also contains the blocked-in axle hole and is built of red/purple, roughly-coursed sandstone. The head of the arch is composed of contrasting red brick, but the reveal of the arch and the corner voussoirs are constructed of sandstone ashlars. The plan of the building can still be more or less picked out (Fig 64). There was a much smaller separate building situated tight against the road to the Forest, which survived for longer as a standing structure, but there is no trace of it today. The pool itself was drained between 1901 and 1924 (OS 1:2500 2nd and 3rd editions) (Figs 17 and 18).

5.3 GUNNS MILLS IIIa IIIb (MIDDLE MILLS) (SO 67271582)

The site of the upper Middle Mill (Gunns Mills IIIa, IIIb) lies approximately 280m above the former blast furnace and paper mill and 100m from the lower Middle Mill (Gunns Mills II). This is the probable site of the fifteenth century corn mill and of William Gunn’s late sixteenth and early seventeenth century fulling mills (Fig 5) (see above 4.2). There is no direct evidence for the location of these early mills, but it is likely that they were situated immediately below the mill pool where the 1743 plan of Abenhall parish shows Joseph Lloyd’s corn mill built in 1739-40 (Fig 7) (PRO T1/314 f39) (see above 4.5). The 1774-5 plan of the Foley estate at Gunns Mills places ‘Corn Mill Pleck’ directly below the higher of the two mill pools recorded at this time, the lower pool now serving the paper mill established in the former furnace (HRO E12/G/30; copy GRO 2528) (Fig 8). There are two separate buildings immediately below the pool upstream lying on the mill race leading to the former furnace pool downstream. The building closest to the higher pool is probably Lloyd’s corn mill, perhaps constructed on the site of the earlier corn and fulling mills.

In 1540 ‘Connes Mylne’ (PRO C1/940/1-2 [1538-1544]) was acquired by Richard Brayne of Littledean. Contemporary documents identify it as a corn mill but give no indication of its physical layout (see above 4.2). The 1597 conveyance of the mill from the Brayne family to William Gunn is a fine and the description of the property as a messuage and two mills is therefore unreliable (GRO D2172/1/75; PRO CP 25/2/146/1906/39ElizII). If there were in fact two mills, this would not necessarily mean two buildings, but probably two wheels or two sets of machinery ‘under one roof.’ The final Brayne quitclaim, dated 1601, mentions not only the two corn mills but also two fulling mills (PRO CP 25/2/147/1923/43ElizI Easter). Again this description of the property should be interpreted cautiously, but it is possible that between 1597 and 1601 William Gunn had constructed a building for his fulling mill beside the corn mill. If there were indeed two fulling mills they were probably located in this one building.

It seems that neither the corn nor the fulling mills were worked following the establishment of the furnace at Gunns Mills about 1625. The buildings were derelict by 1701 (see above 4.4) and may have all but disappeared by 1738 when Joseph Lloyd took on the tenancy of Gunns Mills from the Foley family (see above 4.5). Between 1740 and 1742
Joseph Lloyd was paid four separate sums totalling £58 16s ‘on account of building a corn mill’ (HRO E12/G/25). The function of the smaller rectangular building shown straddling the channel below the corn mill on the 1774-5 estate plan is unknown. Beyond it the tail race from the corn mill appears to enter a culvert running through ‘Corn Mill Pleck’.

It does not appear that the Lloyd family ever worked the new corn mill (Gunns Mills IIIa) on a commercial basis. By the 1830s another building (Gunns Mills IIIb) had been constructed against the mill pool between the corn mill and the road to the Forest and to the Upper and Lower Mills (GRO Q/RG F1/7; GRO GDR/T/1). Both this building and the corn mill were described as ‘washing mills’ in the 1838 tithe apportionment (GRO TRS 224/1), the newer building perhaps used as rag store. By 1855 the buildings had been converted yet again, since they were described in the advertisement for the sale of the property that year as

A Vat Mill close to the Washing Mill [Gunns Mill II] [which] contains an engine driven by water; one vat, with chests, presses &c., and drying rooms and rag rooms (Gloucester Journal May 5th 1855)

This last change in function probably occurred after 1851 when John Birt had taken on the tenancy of Gunns Mills (see above 4.5). During his modernisation of the Lower Mill (Gunns Mills I) (see above 5.1.2) he might have removed the old papermaking plant and installed it in the washing mills. The water wheel here could have run the rag beating machinery, the description of which as an ‘engine’ suggests that it was a Hollander type roll or drum (Fig 28). The drying rooms might have been established in the upper storey of the actual washing mill (formerly the corn mill built by Lloyd) and the rag room probably remained where it had always been, in the smaller building by the road. There is no further evidence of papermaking in these two buildings or in fact of any other use. The former corn mill/paper mill was roofless by 1901 (Fig 17).

In the post-war period William Townley described the two buildings in some detail (Townley 1974, 6). The single storey rag house (Gunns Mills IIIb) was approximately 18.9m long (62ft) and 6.7m in width (22ft) and the side against the mill pool was open. The walls were of grey sandstone and the floor of pitched stone, (i.e. laid on edge). The rag house was dismantled in the 1930s and the roof slates were re-used on a ‘new building at Gunns Mills’ (Townley 1974, 6). Some of the details Townley gives for the construction of the larger building (Gunns Mills IIIa) must relate to the eighteenth century corn mill from which it was converted (Townley 1974 6). The building was situated hard against the mill pool dam and had once had an overshot wheel on the north side, 4.5m (15ft) diameter and 0.9m (3ft) wide. The size of the wheel was estimated by the wear marks on the wall of the wheel pit and the width of the pit itself. Water was carried to the wheel from the pool through a 420mm (15in) iron pipe with no obvious sign of any means to control the flow. It is likely that the pipe was installed after the mill ceased to operate. Fig 47 shows William Townley standing in the wheel pit with the axle hole and wheel scratches just in front of him and the pipe from the pool above and behind him.

The mill building itself was two storeys in height, approximately 15.2m (50ft) long by 6.1m (20ft) wide and 'L'-shaped. A slab in the floor, 1.67m (5ft 6in) by 1.62m (5ft 4in)
wide, had formed part of a vat. Another 'L'-shaped extension measured 4.3m (14ft) by 4.9m (16ft) and the whole building was roofed in slate. Townley's description of this building cannot however be reconciled with map evidence nor with the survey undertaken by the Gloucestershire Council for Industrial Archaeology in 1964 (Fig 31) (GRO D3921/III/1). Mid-nineteenth-century plans show a square building enlarged on the east side by an extension with the same footprint (GRO GDR/T/1; PRO F16/63 part 1) (Figs 12 and 13). The first edition Ordnance Survey plan, surveyed in 1878-9, shows the same outline but with two small extensions centrally placed on the north and south elevations. The plan cannot be construed as the two 'L'-shaped buildings described by Townley. The western half of the building, as shown on the 1838 tithe map (Fig 12), with the wheel on the north side, was probably Joseph Lloyd's corn mill. The eastwards extension, shown on the 1856 plan of East Dean, was almost certainly constructed by the papermaker John Birt in the early 1850s. The papermaking plant listed in 1855 was located in the extended and converted corn mill with a drying room on the floor above (Gloucester Journal, 5 May 1855).

The 1964 survey provides useful information on the measurements of the building and confirms that it was roofless and without any of the first floor timbers except for a spine beam (Fig 31). The walls were stone, 480mm (1ft 7in) thick and 5.2m (17ft) to eaves height with the ground storey approximately 3.1m (10ft 4in) high. The diameter of the wheel was confirmed as 4.5m (15ft). The small extension on the north side and immediately east of the wheel pit had been demolished.

Following the 1964 survey Albert Barrington demolished the former mill and drained the mill pool. This had silted up since papermaking had ceased on the site and had been shallow and marshy for some time. In 1965 Barrington entered into an agreement with the North West Gloucestershire Water Board which allowed the construction of underground water pumping plant in the area between the Middle Mills (Gunns Mills II and Gunns Mills III) (Barrington Deeds, 1966).

The mill site (Gunns Mills IIIa) is now difficult to detect on the ground since it lies beneath a re-contoured field (Fig 65). Demolition rubble from the building has been spread beneath the ground into both the area of the pool and the area below the mill site itself. A steep bank at the eastern end of the field marks the edge of this material and emphasises the difference in level between the field and the ruins of the lower Middle Mill (Gunns Mills II). The former mill stream now runs in a deep channel between the field and the Forest road. The road betrays the position of the mill dam by a sudden steepness in its slope. In the field a scatter of masonry fragments bears witness to the former existence of the mill.

5.4 GUNNS MILLS IVa IVb and IVc (UPPER MILL) (SO 67171579)

This buildings of the Upper Mill are situated about 390m from the Lower Mill (the converted furnace) (Gunns Mills I) and about 100m from the Middle Mills (Gunns Mill IIIa, IIIb). Some, if not all of them, must have been in existence by 1803 (see above 4.5). Although the buildings are shown on the 1838 tithe map of Abenhall, they were actually located within the Township of East Dean and so their uses are not identified (Fig 12). The first extant record of their function comes from the 1855 advertisement for the sale of John Birt's lease-
...another Mill, with two engines driven by water; one vat, chests, &c, with drying rooms, rag rooms, sizing-coppers, presses. &c (Gloucester Journal, 5 May 1855).

These buildings are still standing in the main so the functions described in the sale particulars can be more confidently ascribed to them. For ease of identification they have been designated Gunns Mill IVa, b and c (Fig 21). Building IVa lies nearest to the Forest road and was situated at the higher end of the mill pool belonging to the upper Middle Mill (Gunns Mills III). Building IVb lies a few metres to the north of IVa and has derelict extension to the west and a completely demolished extension to the east. Building IVc, the smallest of the three, stands to the east of IVb and is derelict.

Building IVa was probably the rag house at the Upper Mill. With the plentiful supply of water the rags could have been washed here as well as picked and sorted. There is no evidence of mechanisation. The building was extended after it ceased to be used for papermaking (see below) and now measures approximately 12.6m by 5m (Harris 1974, 38). It is still surrounded by water despite the fact that the mill pool was drained in the 1960s (Fig 72) (see above 5.3).

Building IVb was the paper mill and measures 10m by 6.7m (Harris 1974, 37) (Fig 67). The vat and presses were situated on the ground storey and the drying room on the first storey. The two rag masticating engines were contained in a single-storey extension on the east, now demolished. The scar left by this extension can still be seen on the east gable end of the standing building, against which the water wheel once turned (Fig 68). Townley gives the diameter and width of the water wheel as 5.4m (18ft) and 1.0m (3ft 4in) respectively (Townley 1974, 4), although it had been removed by the time of his survey. The wheel pit had been filled in to ground level, as it remains today. The wheel was located between the vat room in the main mill building and the rag engines in the single storey extension. The paper mill had its own mill pool, now drained, orientated in a north-west south-east direction. The wall of the pool dam can still be seen at the rear of the building. Water was carried into the single storey extension from the pool to turn the wheel. The function of the roofless and floorless two-storey extension on the west gable end of the main building is less certain. It measures 4.9m by 5.8m (Harris 1974, 37) and was built between 1856 and 1878 (Figs 13 and 14) in a rougher, coursed sandstone than that used in the earlier main building. The first floor did not extend across the whole building since joist holes are only visible on the interior of the south wall. Building IVc is contemporary with the paper mill IVb and its eastern extension. It is two storeys in height and measures 5.3m long by 6.5m wide (Harris 1974, 38). It may have contained the paper sizing coppers but this is not certain. The building is now roofless and the first floor structure has collapsed.

Harris suggests, on the basis that it was later called the 'Grass House,' that the mill building (Building IVb) was converted for the production of paper from esparto grass, (Harris 1974 37-8) but there is no evidence for this. Townley also identifies the building as a ‘Grass House’ (Townley 1974, 5). Harris and Townley may here have confused Gunns Mills House, which was known as Abenhall House in the late nineteenth century (see above 4.5), with the Abenhall House owned by the Teague family where a ‘Grass House’ is recorded in 1910 (PRO IR58/32590).
Between 1851 and 1855 Building IVc was converted to a cottage (GRO D2172/1/75; Glouc Journal 5\textsuperscript{th} May 1855). The building is coloured red on the 1856 plan of East Dean Township (PRO F16/63 part 1) indicating a dwelling house (Fig 13). Between 1863 and 1871 the rag house, Building IVa, was extended to form two cottages, (1863 lease D2172/1/75; 1871 census, The Stationer, 6 Feb 1871) (see above 4.5). The former paper mill (IVb) was not converted and by 1878-9 the single storey extension attached to the east was roofless (Figs 14 and 15).

In 1910 the three cottages were 'in Fair repair' and contained the accommodation listed below:-

1. 2 bedrooms, kitchen, pantry [Building IVc]
2. similar [Building IVa]
3. similar and back kitchen shared by 2 and 3 [Building IVa] (PRO IR58/32773/1442)

By 1901 the mill pool at the rear of the former mill (Building IVb) was beginning to silt up and by 1924 it had disappeared (Figs 17 and 18). In the 1940s the three cottages on the Upper Mill site were tenanted by the Frewens (Frewing) (Building IVa from at least 1871), the Morgans (Building IVa) and the Roberts family (IVc) (1871 Census; pers. comm Mrs P. Haines). The Roberts left in the late 1950s and the cottage has remained unoccupied since, hence its present derelict condition. The Frewens and the Morgans moved away some time in the late 1960s and the cottage (IVa) and paper mill (IVb) were derelict in the early 1970s (Fig 48). The two linked cottages (IVa) were restored and converted to a single dwelling by the Harris family, who purchased them in 1973 (Figs 71-2) (see above 4.6).

Building IVb deteriorated through lack of a use so that Townley was able to recall that its timber first floor had fallen in (Townley 1974, 4) (see also photograph, Vol IL5, Wilderness Centre). This neglect helped to preserve some of the paper mill features however, including two large stone slabs where the 'wheel [axle] came through the wall.' These measured 1.5m square (5ft) and 0.9m (3ft) high and may have supported the axle bearing of the wheel. Townley also suggests that they could have supported a vat. Another interesting feature that had survived was 200mm by 200mm horizontal channel in the wall above the axle hole. Townley's account is confusing here but this channel appears to have been connected to a similar channel in the back wall which was fed by an external water source. Townley noted that the channel crossed an arched recess by means of a wooden trough, by then removed, but likely to have been lined with lead. His conclusion that this channel fed water to the paper making process seems sensible. The arched recess in the rear wall of the mill still survives with the channel connections to left and right now blocked.

The former paper mill (Building IVb) is now used as a summer house and for storage (Figs 66-7). New floors have been inserted and the 100m (4in) vertical slats which made up the external walls of the former drying room have been replaced by series of multi-pane windows and by horizontal timber boarding. This is the finest of the group of buildings at the Upper Mill. The front elevation is built of carefully faced random-coursed sandstone. The windows and doorheads have ashlar voussoirs with keystones. The timber structure of the drying room is poor however, since the two king post
trusses do not rest on posts of an equivalent bulk in the walls (Fig 69). The nine oak posts between the windows on this floor provide insufficient support for the trusses and as a consequence the wall plates are deflecting alarmingly. The drying room over the former furnace at the Lower Mill (Gunns Mills I) is by contrast properly constructed for the weight of its roof structure.

The buildings at Upper Mill have survived to a greater or lesser degree as a result of their conversion to housing. The paper mill (Building IVb) is a significant structure and re-occupation and repair works have ensured its continuing survival. The extension on the west side of this building and Building IVc are however in a state of continuing dereliction (Fig 70).

5.5 GUNNS MILLS HOUSE (Figs 61-2)

Although Gunns Mills House is not strictly speaking within the scope of this study, a brief summary of its development is outlined here for the sake of completeness.

The first evidence of a house at Gunns Mills which can perhaps be identified with part of the existing building is found in 1730-1 when the accounts of the Foley Partnership record a payment of £49 13s for building a ‘house at Gunsmills’ (HRO E12/VI/DGf/5). Of this £42 10s was for materials and £7 3s for labour. There is nothing to indicate that the new building was a dwelling house but this would seem likely. The Foley estate rentals list a whole variety of building work carried out at Gunns Mills when Joseph Lloyd took on the tenancy in 1738, including the construction of a corn mill and stables (see above 4.5), but no reference is made to building a house. In 1746 however, the estate ‘paid Mr Lloyd ….a Bill for Repairs done to the House and Kitchen Chimney ‘ amounting to £6 11s 0d (HRO E12/G/25). This would suggest that a dwelling house was built on the site before 1738.

The 1743 plan of the parish of Abenhall (PRO T1/314 f39) shows a rectangular construction north of the mill pool dam and above the former furnace, lying close to an enclosed garden (Fig 7). By 1774-5, the date of the Foley estate plan, a long thin south range has been added (HRO E12/G/30) (Fig 8). From this and later map evidence the earlier building can probably be identified with the existing north-east south-west range (described below as east-west) of Gunns Mills House. The inventory of the goods and chattels belonging to Joseph Lloyd I taken after his death in 1761 suggests that this building was originally two storeys in height (GRO D2172/1/75). Although both physical and illustrative evidence indicate that a third storey was added later it seems that this was never accessible from within the house since the internal staircase only rose to the first floor (pers. comm. Mrs P. Haines). The east-west range was used as domestic accommodation until about 1950 (pers. comm. Mrs P Haines) after which time it fell into decay and the staircase and floors collapsed. During the 1980s the building was repaired and altered to form a single internal space. The windows on the south elevation were reconfigured and the stonework rendered (Forest of Dean DC DF/ED/LBC/34, 34A 1982). At the same time the small extension on the north elevation, shown on the 1856 map of East Dean Township (PRO F16/63/ pt. 1) (Fig 13) and the later maps and plans of the site, was demolished and the ground level raised.
The three-storey wing with a vaulted cellar beneath which lies between the east-west range and the upper yard was probably once a cider mill. This appears in eighteenth and nineteenth century documentary evidence as part of the Gunns Mills estate (Fig 62). It has a distinct apsidal north end (Fig 62) and now contains the back kitchen and a first floor bedroom within Gunns Mills House.

A relatively common feature in the west Gloucestershire ‘cider district’ (Penny Cyclopaedia 1837, 161), cider mills were frequently placed at the service end of a house, sometimes beneath a granary. The purpose-built mill house was constructed so that the fruit could be delivered by a chute or spout to the circular mill or press below. Fermentation casks and casks containing the finished cider were kept in the cool frost free cellar.

At Gunns Mills a ‘mill house’ is first recorded in the 1761 inventory of Joseph Lloyd I containing ‘one Sider Mill, one Press, and 12 Hare Cloths………2 Em[pl]ty Hoggsets, one Pipe and 2 Small Casks’ (GRO D2172/1/75). A ‘Cyder house[.contained] under one roof’ with a granary and stables is included in the insurance policy taken out by Joseph Lloyd II in 1780 (Harris 1974, 39). A ‘Cider Mill House’ is also listed in the nineteenth century lease documents for the estate (GRO D2172/1/75).

The first clear map evidence for the building is found on the 1856 map of East Dean Township (PRO F16/63/ pt. 1) (Fig 13), where the curved north wall is shown. There is no mention of a cider mill in the sale deed of 1890 (Barrington Deeds) and it is likely that it fell out of use after 1851 when the Lloyds began to lease out the estate. By 1910 the ground floor room had been converted to a back kitchen and the upper floor, formerly the granary, was disused (PRO IR58/32733). The granary could be entered from the level of the upper yard but there was no internal access until the construction of a staircase at the rear of the house (see below) allowed its conversion into a bedroom between 1950 and 1982 (pers. comm. Ms J Barrington).

The brick-fronted north-south range, which contains the principal elevation to Gunns Mills House, post dates the east-west range and the former cider mill house (Figs 44, 45). Since the insurance policy taken out by Joseph Lloyd II in 1780 describes the buildings at Gunns Mills as ‘all stone [and] tiled’ (Harris 1974, 39), it must have been built after that year and is first clearly shown on the 1856 map of East Dean Township (PRO F16/63/ pt. 1) (Fig 13). The building absorbed the narrower north-south range shown on the Foley estate plan of 1774-5 (HRO E12/G/30) (Fig 8) which must have been partly demolished. Part of its stone-built north wall connects the former cider mill house to the east-west range and the windows here look out over a small area. Here there have been considerable changes in the ground levels here over the years (Figs 26, 27). The north-south range was originally three storeys in height (Figs 44, 45) but the attic storey was taken down in 1921 without, apparently, removing the roof (Townley 1974, 9) (Fig 46).

The brick addition to the rear of the north-south range was built in the 1930s (Townley 1974, 9), probably in 1933-5 (GRO DA24/712) and first appears on a drawing of the furnace dated 1945 (Wilderness Centre nd.). It replaced a three-storey, two-bay building erected on the site of the rectangular premises shown to the east of the north-south range on the 1774-5 Foley estate plan (HRO E12/G/30) (Figs 8, 26) and which can be
seen behind the principal range on the earliest available photograph of Gunns Mills House taken in the 1890s (Fig 43). This three storey range was derelict soon after the photograph was taken (Fig 44) and described in the 1910 valuation of the Gunns Mills estate as ‘[t]he other half of the house containing 8 rooms...disused & tumbling in & of no value’ (PRO IR58/32733). The two storey range which replaced it had no access to the upper floors of the house until after 1950 when Albert Barrington inserted a stairwell (pers. comm. Ms J Barrington). The existing staircase was recently installed by the Andersons (pers comm Mr and Mrs Anderson).

6.0 WATERWORKS (Figs 21 and 33)

John Cone founded his mill about 1435 (see above 4.2) on a small west bank tributary of the Westbury brook, which flowed from a spring known by the eighteenth century as St Anthony's well (see below). From the well to its confluence with the Westbury brook the tiny Forest stream was only about 570m (623yd) long. In 1281-2 the Westbury brook was known as the Vastbach (MacLean 1889-90, 359; Grundy 1936, 114-5). The mill stream does not appear to have had a name at this time, but the Westbury brook tributary immediately downstream was possibly called Bronstonesbrok (Fig 3). Cone probably chose the site because the steep stream course provided the head of water needed to power his mill. The construction of dam would have created the reservoir of water necessary on such a small stream.

In 1610 the clothier William Gunn (see above 4.2) increased the size of the medieval mill pool (ampliand' stagn[u]m molendinariu[m]) (GRO D421 E4) by a seventh of an acre, presumably to help run his fulling stocks. This would have been most easily accomplished by raising the height of the dam, thereby extending the margins of the pool. As shown on the Foley estate plan of 1774-5 (HRO E12/G/30), the earliest accurate representation, this pool covered approximately 0.2ha. (0.5 acres) (Fig 8).

About 1625 John Winter built his furnace below Gunns Mills (see above 4.3), damming the stream yet again form a pool, which is shown on the 1774-5 plan (HRO E12/G/30) as approximately 0.3ha (0.8 acres) in extent (Fig 8). The steep sides and narrowing of the valley here were exploited to build a short high dam, creating a good head of water for the wheel at relatively little expense. The dam was roughly 20m (21.8yds) long.

St Anthony's well lies in the Forest about 65m above the present Forest road (Spout Lane). It remains much as described by Samuel Rudder, who observed in 1779, that the works at Gunns Mills were

 driven by a fine spring of water rising out of a rock in the forest on the side of a hill just above the mill......the spring in this place...is called St. Anthony's Well. At the head the water runs into a square basin (with steps on one side) made for the purpose of bathing (Rudder 1779, 209)

Rudder noted the usual curative properties associated with holy wells, these waters were apparently an 'infallible cure for the itch and other cutaneous disorders'. St. Anthony was a fourth century Egyptian Christian hermit who used water to perform healing miracles. It is not known when his name became attached to the well but it is recorded in 1669 as 'Anthonyes' (Gloucestershire SMR 5165 quoting, A H Smith The Place Names
of Gloucestershire: Part III 1964). The stone well and bathing pool were probably constructed about 1800 (Gloucestershire SMR 5165). St. Anthony’s well is statutorily listed Grade II.

By the turn of the eighteenth century the works at Gunns Mills were powered not only by St Anthony’s well stream (PRO T1/314 f39) but also by the upper reaches of a brook which had its source above Green Bottom in the Forest. This is possibly the Bronstonsbrok mentioned in the medieval sources (MacLean 1888-90, 367; Grundy 1936, 145) (Fig 3). Such is the narrowness of the col between Tanners Hill and Edgehill that this stream could easily be made to flow northwards to join St Anthony’s well stream just above Gunns Mills. Its natural course otherwise was eastwards to Green Bottom and northwards between Tanners Hill and Welshbury Hill to join the Westbury brook below Gunns Mills. In 1877 Tom Goold’s ‘predecessors in title’ were said to have appropriated or diverted the stream to flow towards Gunns Mills ‘145 years’ previously (GRO DA40/100/1). This gives a date of 1732 for the diversion and would appear to be an estimation of the number of years since the Lloyds had first occupied Gunns Mills. Map evidence suggests however, that the brook had been diverted before Joseph Lloyd leased the mill site in 1738 since a plan of the Forest of Dean of c.1710 (GRO D3921/IV/5) first shows it running down to Gunns Mills from the Forest (Fig 6) (see above 4.4). It can also be seen on the maps of Forest encroachments surveyed in the 1780s (Fig 10) (PRO F11/7; F16/47; F16/59/3; F17/5/1-2; F17/6).

It is not clear whether Joseph Lloyd II or Joseph Lloyd III was the

late Mr Lloyd [who] diverted [a stream] from Green bottom to the Mills and made a well at Green bottom for the people to keep them quiet (GRO D2172/1/75).

By 1803 however the Lloyds had established two more mills with pools at Gunns Mills (Gunns Mills II and IV) and it seems that the stream was diverted once again to feed the pool dug for the Upper Mill (Gunns Mills IV) (Fig 33). It is possible to follow this same stream course today, above the original diversion, which is now dry, in the valley bottom. A spring of water ‘with the house over the same’ on the road to Littenleas is included in the nineteenth century leases of Gunns Mills (GRO D2172/1/75). The ‘Boarden’ Well on the Littenleas road also supplied pure spring water to the Lower Mill (Gunns Mills I) (Townley 1974, 8).

The pool for the lower Middle Mill (Gunns Mills II) was about 0.08ha (0.2 acres) in extent and was constructed upstream of the furnace pool to intercept the tail water from the corn mill built by the Lloyds (Gunns Mills IIIA) (see above 4.5) (Fig 21). The mill itself was built into the dam, which was only about 16m long (17.5yd). A more elaborate layout was required at the Upper Mill (Gunns Mills IV) in order to take advantage of the steep slope to the north-west, which would provide the head of water (Fig 21). The axis of the pool itself was aligned in a north-west south-east direction, pushing it well away from the Gunns Mills stream. As a result a channel had to be dug to intercept the stream water and divert it into the side of the new oval shaped mill pool. The straight channel was culverted under the forest road which led north to join Spout Lane (Fig 21). The pool measured 0.1ha (0.244 acres) and had a stone-built dam at the mill wheel.
On the establishment of the two new mills it appears that the existing upper mill pool (Gunns Mills III) was altered in shape and reduced in size. The sharp tail shown on both the Abenhall parish plan of 1743 (PRO T1/314 f39) and the Foley estate plan of 1774-5 (HRO E12/G/30) (Figs 7 and 8) was broadened and twisted northwards towards the new pool at the Upper Mill. This gave room for the erection of the rag house at the Upper Mill (Building IVa) and the creation of a side race out of the original pool tail, so that the upper waters of the mill stream entered the modified pool halfway along its south side. The pool now covered 0.2ha (0.54 acres).

Early nineteenth century maps show that there were three small ponds above the Upper Mill (Gunns Mills IV) and below St Anthony's well (Fig 11) (PRO F17/122; GRO Q/RG F1/7). These belonged to Gunns Mills since '7 ponds of water' are included in nineteenth century leases of the property (GRO D2172/1/75). The exact origin of the three small ponds is unknown but the water they stored would have come from the iron mine level above Green Bottom (GRO D2172/1/75). The presence of iron in the water would have ruined the Lloyds' paper. It is probable therefore that they were dug as a filter system to allow the water to settle and deposit any iron particles before it passed on to the paper mills (Shorter 1971, 139). The remains of these filter ponds can still be seen today.

The system of pools and mill leats changed little after the Lloyd's establishment of the Middle (Gunns Mills II, III) and Upper Mills (Gunns Mills IV). One of the three small ponds between St Anthony's well and the Upper Mill pool (Gunns Mills IV) had disappeared by 1878-9 (Figs 14 and 15). In 1877, just before the closure of the paper mill, the Cheltenham barrister Joseph Skipp Lloyd and his tenant, Tom Goold were involved in a dispute with the Westbury on Severn Union Rural Sanitary Authority (GRO D2172/1/75) (see above 4.5). The Authority had begun the construction of a pumping station above Green Bottom in order to supply the growing town of Cinderford with water. It intended to exploit the water source intercepted in 1843 when Messrs Henry Crayshaw and Co had sunk a shaft at Beech Pit to mine iron ore (Pearce 1997, 37-49 esp 38) (Fig 33). Crayshaw's mine workings had apparently also captured the stream that had been diverted to Gunns Mills from above Green Bottom. This emerged nonetheless from the Trow Ditch Mine Level and continued to the paper mill as before (GRO D2172/1/75).

In May 1877 Joseph Skipp Lloyd claimed against the Westbury on Severn Rural Sanitary Authority for potential loss of water whereupon the Authority responded that the water belonged to the Crown (GRO D2172/1/75). The new pumping station opened on 31 Jan 1878 (Pearce 1997, 38) reducing the flow of water to Gunns Mills by one third. The Crown deeds to the land occupied by the Upper Mill (Gunns Mills IV) were carefully examined and showed that Lloyd and his tenant had neither a title to the stream nor any right to draw water from it. (GRO D2172/1/75).

The paperworks at Gunns Mills closed in 1878-9. The second edition of the Ordnance Survey plan (revised 1901) shows the mill pools at the upper Middle Mill (Gunns Mills III) and the Upper Mill (Gunns Mills IV) silting up (Fig 17). By 1924 the upper mill pool (Gunns Mills IV) had been drained and thrown into the neighbouring field (Fig 18). The pool to the lower Middle Mill (Gunns Mills II) (Fig 18) had also been drained, but, as it was situated on the stream, a channel needed to be cut to take the water flow. This followed the line of the north bank of the drained pool. A more important change had
taken place at the dam for the lower mill pool (Gunns Mills I), the north end of which was very close to the Gunns Mills House. It appears that between 1901 and 1924, the dam itself and part of the (lower) yard behind were buried to create a new area of flat ground, level with the area immediately outside the main door of the house. This necessitated the construction of a retaining wall to hold this new ground against the remaining yard area. A sheep wash was then built in the lower yard and against the retaining wall (see above 5.1).

During the Second World War there was a water shortage in the Rural District of East Dean, exacerbated by the army troops stationed in the area (GRO DA24 117/6). The District Council decided to pump water from a new well at Gunns Mills, sunk just above the site of the Upper Mill (Gunns Mills IV), along a temporary main to the reservoir at Green Bottom pumping station. The well was six feet in diameter and thirty feet deep. A permanent pump was installed in 1944 and a standby pump was acquired in 1945 (Pearce 1997, 46-7).

By 1959 (Ordnance Survey 1:2500) the only standing water was to be found in the upper part of the pool to the upper Middle Mill (Gunns Mills III), the former corn mill pool (Fig 19). The former furnace pool (Gunns Mills I) had been reduced to a marsh and in 1962 Albert Barrington filled it in (pers comm. Ms J Barrington). In 1965 the North West Gloucestershire Water Board was formed and one of its first acts was to lay a main from Westbury on Severn to Gunns Mills (Pearce 1997, 46). The new pumping plant was constructed just below the area once occupied by the upper Middle Mill (Gunns Mills III) and above the former pool to lower Middle Mill (Gunns Mills II). The remains of the upper Middle Mill (Gunns Mills III) were demolished by Albert Barrington, who spread the rubble into the lower end of its silted up pool and levelled the whole site (foreground of Fig 66). The stream was channelled along the south side of the former pool (Fig 19).

Today St Anthony’s well stream runs uninterrupted through its small valley. At the site of the former furnace it flows into the waterwheel pit and from there it is directed through culverts to the junction of the road from Mitcheldean to Flaxley and Little Dean. The precise direction these culverts take is at present unknown. The little stream passes under the junction to join the Westbury brook as it flows down from the north.
7.0 THE PHASES (Fig 32)

A great number of alterations can be discerned in the fabric of the furnace and only the principal phases of construction and re-construction have been identified here. Combining the documentary evidence presented here with future fabric analysis and archaeological excavation will undoubtedly increase the phases in number and complexity.

7.1 PHASE I pre 1682-3 (Fig 22)

It is possible that some of the fabric of the furnace at Gunns Mills dates from before 1682-3, since it may not have been entirely demolished under the order of Parliament of 1650. Unfortunately there is no evidence, documentary or otherwise, to show whether any remains of Winter’s furnace were incorporated into the early 1680s rebuilding. This can only be revealed by invasive investigation of the fabric. Even if the furnace had been entirely demolished earlier materials may have been reused.

There is a possibility that parts of the wheel pit structure and tail race tunnel and culvert (now inaccessible) date from this period. The tail race culvert may survive intact below the existing ground level.

7.2 PHASE II 1682/3-1701 (Fig 22)

There is a distinct step inwards on the external face of the east wall of the furnace about 5.6m above ground level (c86.25m AOD, WS Atkins 2000 survey) (Fig 52), which at first sight marks a significant break in its construction. The step is present but less discernible on the south and west elevations and appears slightly higher on these sides, about 87.0m AOD, more or less level with the top of the tapping and tuyere openings.

On the east elevation the material above the step butts up against and runs under the much redder friable sandstone of part of the bridge house. The bridge house timbers have a felling date of late 1681 or early 1682 (Fig 42) (Howard, Laxton and Litton 2001) and the furnace fabric contains lintels dated 1682 and 1683. Despite the fact that the bridge house appears to post-date the upper and slightly thinner part of the furnace, both structures must have been erected in the 1680s reconstruction. This would logically also include the main furnace with its dated lintels and, therefore, it is likely that the step in the external face does not reflect a major building phase.

In the absence of positive evidence of any fabric dating from the Winter phase, it is safest to assume that the furnace was radically rebuilt in 1682-3(47). New tuyere and tapping openings were constructed incorporating cast iron lintels, dated 1682 and 1683. (Figs 53-4). The stack interior is constructed of coursed, fine ashlar (Fig 39). It does not appear that the stack was rebuilt during the Foley period, although it should be said that the documentary evidence is not complete. It is therefore possible to conclude that it dates from 1682-3 at the earliest and because it was relatively little used after that date, it survived.

It has been assumed that the walls of the bridge house were radically rebuilt in this phase. There are a number of later openings, some now blocked, which prevent an easy interpretation of this structure. The walls contain two types of sandstone, one red and
friable, the other harder and purplish in colour. Some rebuilding below the wall plate may of course be later. The bridge house appears to have been originally open at both the north (upper yard) end and the south (furnace) end. There are however, four stone nibs or 'buttresses' projecting from each end of the side walls, which would have made the north and south openings narrower. Constructed slightly in from the ends of the side walls, they are not toothed into the interior faces.

The bridge house supports four roof trusses, which contain timber felled in 1681-2 (Howard, Laxton and Litton 2001). Some of the other roof timbers were re-used, shown by earlier mortice holes and more eroded surfaces. There are carpenters' marks on the timbers, but these only number the joints of a particular truss and not the trusses themselves. The significant weathering of the fourth truss from the north, noted by Ron Shoesmith, confirms that this once faced the exterior and marks the southern end of the covered bridge house in the furnace phase (Shoesmith 1988) (Fig 58).

7.3 PHASE 3 1701-1738 (Fig 22)

The account books belonging to the Foley Partnership do not survive for the period between 1717 and 1725. Major rebuilding works during this time cannot therefore be discounted. If, on the other hand, the furnace was not radically reconstructed, then it managed to survive more or less intact through at least four firing campaigns spread over seven years between 1704 and 1732. It was perhaps these short and irregular firings that ensured its preservation. The usual running repairs were required however, the most frequent being the replacement of the hearth and the bosh. The most extended works of repair are recorded in 1710-11 and again in 1729-30. It appears from the extant Foley accounts that the wheel, wheel pit and tail race culvert were not significantly altered or replaced. There are however several general items of cost, e.g., 'masons', 'carpenters', 'labourers', where the actual work carried out was not specified so that it is impossible to reach any firm conclusions on the scale of alteration or replacement that may have occurred.

7.4 PHASE 4 1738-1850 (Fig 26)

In 1738 Joseph Lloyd converted the furnace to a paper mill. The remains of the hearth and bosh were removed and the tuyere blowing hole was blocked. The tapping hole from the hearth was first increased in height by cutting out part of the lowest cast iron lintel and then partly blocked to create a doorway (see below). The open north and south ends of the former bridge house were filled in with sandstone masonry leaving doorways for access. The stack was paved over and the charging area covered in a new timber-framed structure (HRO E12/G/25; Howard, Laxton and Litton 2001) with trusses similar in pattern to those in the former bridge house. The timber differed from the bridge house, being fast growing, squarely cut, clean and well jointed (Howard, Laxton and Litton 2001). This new drying loft contained full height windows along each side wall for ventilation. The south gable frame was filled with wattle and daub panels. About 612 ft of squared timber was used, sufficient to construct both the frame of the drying loft and the roofs of the new paper mill buildings attached to the furnace (HRO E12/G/25). A door from the drying loft led to a short spiral staircase in the former stack. A large hole was then broken through the tuyere opening, cutting and/or removing two cast iron lintels, to provide access from a first floor landing to a new upper floor built
over the former bellows room (Fig 55). The function of this first floor room is unknown. The ground floor, the former bellows room, was converted into a rag beating room, with machinery powered by the water wheel. A Hollander engine was very soon in use, if indeed it had not been installed at the outset. The stair then descended to the ground floor where the furnace tapping hole had been enlarged, requiring the partial removal of the lowest of the cast iron lintels here, to create a new doorway. This led into the vat and press room, which was built on the site of the former casting shop.

It is not known how much of the wheel pit and the tail race culvert were rebuilt as part of the conversion. Following the removal of the scaffolding it will be necessary to examine these structures carefully to establish, if possible, furnace and paper mill phases. Apart from powering machinery, the paper mill would have required a steady supply of water to feed the rag beating troughs/Hollander engine and the vat. There may be some evidence for the route and the fixings of the troughs that carried this water around the works. It is not known how often the water wheel was replaced in the life of the paper mill.

Minor alterations that possibly took place later during this period include the plastering of the roof interior of the drying room and the creation of a doorway, now blocked in the east wall.

7.5 PHASE 5 1851-1881 (Fig 27)

In this period radical alterations were made to the buildings attached to the former furnace to accommodate steam boilers, steam engines, paper making machines and rag masticating engines. The remains of the furnace escaped largely unscathed, except for a small hole punched through the east side of the stack to take perhaps steam pipes or drive shafting (Fig 56). The doorway in the south wall of the drying room, which led to the staircase in the former furnace, was blocked. Another doorway was opened at a higher level to provide access to a new three-storey building to the south, which included another drying room. It is possible that the upper room (the 'office') in the former bridge house roof space was put in at this time along with the vertically sliding sash window in the north gable and the dormer window, now part removed, part collapsed, in the west pitch of the roof. The blocked doorway in the west wall immediately north of an external 'buttress' may have been created in this period, when there was a small extension in this area of the upper yard.

7.6 PHASE 6 1881 to 1982

This period is characterised by the adaptation of the buildings for agricultural use. All of the machinery was removed soon after 1880. The upper part of the furnace, including the former bridge house, was used from the 1940s for milking and more recently (up to 1982) to house pigs and chickens. South of the external 'buttress,' the wide arched opening in the west wall, now partially blocked by a window, may have been made to provide access to the dairy. This stood above the tall, north wall of the wheel pit, which retained the upper yard. The two internal brick walls in the north part of the building and the external doors in the north wall onto the upper yard probably date from the pig housing period. The three-bay dormer window on the west elevation may have been reduced to a single bay after 1950.
Most of the paper mill buildings attached to the furnace had been demolished by the turn of the twentieth century, except for the two-storey extension on the west side and south of the wheel pit. John Ryder apparently purchased a water wheel from Flaxley Abbey Mill and installed it in the wheel pit to run a cider press situated in the former rag masticating room (Fig 60). Cider making helped to preserve this part of the building. During the Albert Barrington’s occupation corrugated iron shedding filled the lower yard (Fig 49). This has now been demolished.

7.7 PHASE 7 1982-2001

No alterations of note have been observed or documented during this period although the furnace has continued to decay. In 2000 English Heritage enveloped the building in scaffolding, which has radically altered its appearance but which represents the first stage in the rescue and restoration of the building (Figs 50-1).

8.0 SIGNIFICANCE

8.1 LOCAL and REGIONAL

Gunns Mills is the best preserved charcoal blast furnace in the Forest of Dean and in the wider area of west Gloucestershire, Herefordshire and the Wye valley (Riden 1993, 35-54). Only Coed Ithel, Trellech and Tintern, all in Monmouthshire, among nineteen other furnace sites in this region, have standing remains of any significance. None of these three however, is as complete as the furnace at Gunns Mills. There are some small remains at Flaxley, Newent and Soudley, all in Gloucestershire, but nothing stands above ground at the other sites in the region.

A change in the shape of the furnace from quadrangular to circular began in Sweden before 1650 and came to England in the mid-seventeenth century (Schubert 1957, 205). At first apparently little used the new shape became common in the eighteenth century. The furnace at Gunns Mills was quadrangular in form and thus represents the earliest type of blast furnace in the region.

Production levels at Gunns Mills during the Foley period were relatively low in comparison with their other furnaces in the region and its firing campaigns shorter and more infrequent. The average production at Gunns Mills was 393 tons p.a. while Blakeney produced an average of 751 tons p.a., Bishopwood 578 tons, Elmbridge 500 tons and Redbrook 571 tons. Only the furnace at St Weonard’s produced a lower average yearly tonnage of 341 tons. St Weonard’s however, was used in longer firing campaigns lasting up to seven years. Elmbridge, Bishopwood and Blakeney were fired continuously for up to fourteen years and Redbrook for up to sixteen years (Johnson 1951-2 189 Appendix). The longest firing campaign at Gunns Mills was two years (see Table 3 above). This relatively low level of use immediately followed by conversion to a paper mill must have been responsible for the preservation of the furnace.

The history of Gunns Mills spans the most important period of charcoal blast furnace production in the region. The furnace was established c.1625 by Sir John Winter, perhaps the most significant of the Dean ironmasters in the first half of the seventeenth
century, and its occupation in the 1680s by the Duke of Beaufort with George Scudamore and William Hall provides a connection with the trade in Herefordshire and the Wye Valley. From 1701 to 1737 the works were occupied by the Foley partnerships, which dominated the Dean iron trade up to the mid-eighteenth century and the period of its decline. The story of ironmaking in Dean and the surrounding region during the seventeenth and eighteenth centuries can thus be told through the history of Gunns Mills.

8.2 NATIONAL SIGNIFICANCE

A short summary of the national significance of the furnace at Gunns Mills is given below. A more extensive examination of the national and international context has been produced for English Heritage by David Crossley and is published separately.

The furnace at Gunns Mills is one of the best preserved charcoal fired blast furnaces in Britain. With Rockley in Yorkshire (built 1652), it is also one of the earliest furnace sites to retain substantial above ground remains - Coalbrookdale in Shropshire, built in the seventeenth century, was converted to coke in 1709. Other furnaces with a high level of survival, Charlcott in Shropshire, Dyfi in Cardiganshire, Duddon in Cumberland, Newland in Lancashire and Bonawe and Craeckan in Argyllshire were all erected in the eighteenth century. The construction of the seventeenth century furnace at Gunns Mills can provide an instructive comparison with these later furnaces. When restored and interpreted, Gunns Mills should be as interesting and informative as the furnace sites at Dyfi, Bonawe and Duddon.

No archaeological excavation has taken place at the site, but it is already possible to identify the areas of greatest archaeological potential. These include the bank immediately east of the furnace, the area of the casting house south of the furnace and the bellows area to the east of the furnace. Apart from the potential remains of the furnace period, it is anticipated that substantial buried structures from the paper making phase will have been preserved. Archaeological discoveries should enhance the importance of the furnace. There is little direct evidence for any ancillary furnace buildings, such as storehouses for iron, charcoal and ore, in the furnace period, but the presence of these buildings should not be discounted.
9.0 CHRONOLOGY

c1435 to 1485  John Cone (water mill)
1485  Crown leases mill to Abbot of St Mary Flaxley (‘le Newmyll’)
1485  Thomas Cun, (Thomas a Conne) granted ‘le Newmyll’
c1538  John a Conne dies, son of Thomas a Conne
1540  Margaret Counteys, daughter of John Cunne, and John Counteys, her
      husband, to Richard Brayne (water corn mill et al)
1540  John’s brother Thomas a Conne, sergeant plumber, claims Connes
      Mylne
1572  Richard Brayne dies, leaves estate in reversion to male heirs.
1597  William Brayne, Richard Brayne, Thomas Brayne and John Brayne
      grant two mills to William Gunn, clothier
1601  William Brayne and Jane his wife grant two water mills and two fulling
      mills to William Gunn
1610  William Gunn Snr extends pool at Gunns Mill
1620  ‘mill of William Gunnes aunciently called cunes mill’
c1625  Sir John Winter constructs an iron furnace next to Gunns Mill
1632  Sir John Winter holds Gunns Mills
1637  Sir John Winter holds pool previously extended by William Gunn
1642  ‘Iron work of Sir John Winters aunciently called Gunnes Mill,’ [altered
      from Gunnes Mill in document]
c1644  Captain John Brayne seizes ‘gunsmill’
1653  Sir John Winter or the owner ordered to remove those that inhabit
      there
1680  Gunns Mill furnace not operating (derelict?)
1682-3  Furnace rebuilt by George Scudamore and William Hall
1685  Gunns Mills appears in Foley agreement
1692  William Brayne dies; estate called ‘Guns Mills now or lately in the
      possession of the Duke of Beaufort’ [Henry Somerset and Constable of
      St Briavels] willed to daughter Margaret Maddox, later wife of Joseph
      Halsey and daughter Rebecca Brayne; ‘antient meeseplace whereupon
      was heretofore one messuage, two grist mills and a fulling mill’
1701  Joseph Halsey and Rebecca Brayne sell Gunns Mills to Thomas Foley I
1703  Gunns Mills in Foley Articles of Agreement
1705-6  Furnace in production
1706-7  Furnace in production
1710-11  Furnace in production
1711-12  Furnace in production
1723-4  Furnace in production
1723  Gunns Mill in Foley Articles of Agreement
1730-1  Furnace in production
1731-2  Furnace in production (last year)
1737  Thomas Foley I of Stoke Edith dies Last rent paid by partnership.
1738-9  Thomas Foley Jnr leases Gunns Mills to Joseph Lloyd papermaker
1740  Thomas Foley builds new corn mill
1761  Joseph Lloyd dies
1780  Rev Robt Foley, under will of Lord Thomas Foley, sells Gunns Mills
      paper mills to Joseph Lloyd II
Gunns Mills II and Gunns Mills IV constructed by Joseph Lloyd II with two new mill pools
1816 Joseph Lloyd II retires
1842 Joseph Lloyd III dies
1851 Gunns Mills leased by Penelope Skipp Lloyd and son, Joseph Skipp Lloyd, to John Birt, steam engine and paper making machinery installed
1855 lease re-assigned to Aaron Goold
1862 Aaron Goold dies
1863-4 Sarah Goold and her three sons take out new lease: ‘Gunns Mills Paper Company’ established
1864 Penelope Lloyd dies
1871 Henry Affleck takes out sub-lease
1879 last of Goold brothers dies
1880 lease surrendered and paper making ceases at Gunns Mills
1890 Gunns Mills estate purchased by William Ryder
1955 Gunns Mills furnace listed Grade II*
1962 Alfred Ryder sells Gunns Mills estate to Albert (Jack) Barrington
1986 Furnace scheduled
1982 Albert Barrington sells Gunns Mills furnace and house to Alfred Beard
1992 Alfred Beard sells Gunns Mills furnace to William Parker and house to David and Caroline Anderson
2000 Scaffolding erected by English Heritage

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Abbreviations

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BL   Bodleian Library
CKS  Centre for Kentish Studies
CPR  Calendar of Patent Rolls
CSPD Calendar of State Papers Domestic
CTP  Calendar of Treasury Papers
GRO  Gloucestershire Record Office
HRO  Herefordshire Record Office
PRO  Public Record Office
VCH  Victoria County History of Gloucestershire

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Fig 2  Forest of Dean furnaces
Fig 3  The medieval environs
Richard Brayne = Jane Digges
of Littledean
will 31 March 1572
proved 19 June 1572 PCC

Thomas  John  George = Joan Hopkins  Marye  William
heir of Richard Ketford

William  Richard  Henry  Marion  Marye
of Littledean
d. 1 April 1621

Thomas  William  Ursula  Ann
of Littledean
d. 9 June 1621
inq. post. mort

Ketford  William = Catherine  James  George
b. c1620  of Littledean  b. c1625  b. c1630
d. 1682  b. c1620
will 30 Jan 1692
proved 27 May 1693
Gloucester

Margaret*  Rebecca*  Richard  Ketford  William
b. c1650  b. c1652  b. c1655  b. c1660  b. c1665

* sell Gunns Mills to Thomas Foley

Source: Visitation of Gloucestershire 1623; Heane (1881-2); IGI

Fig 4  Brayne family tree
Fig 5 Sketch plan of Gunns Mills in the 16th and 17th centuries
Fig 6 Extract from c.1710 plan of Forest of Dean  (courtesy of GRO, original PRO F17/7)
Fig 7 Plan of boundary perambulation of Abenhall 1743  (courtesy of PRO T1/314 f39)
Fig 8  Foley estate plan of Gunns Mills 1774-5
(courtesy of Stoke Edith estate office, original HRO E12/G/30)
Fig 9  Extract from T Blunt’s map of the Forest of Dean 1782  
(courtesy of GRO, original PRO F17/4)
Fig 10  Extract from a map of the Forest of Dean, A & W Driver 1788
(courtesy of GRO, original; PRO F17/6)

Fig 11  Extract from 1834 map of Forest of Dean
(courtesy of GRO, Q/RG/F1/7)
Fig 12  Extract (redrawn) from 1838 Abenhall tithe map
(GRO GDR/T/1)
Fig 16   Gunns Mills estate 1890 based on OS 1st edition
(courtesy of Judith Barrington)
Fig 23 Detail from fireback, dated 1636, showing timber reinforced furnace (Cleere and Crossley 1995, fig 35a)

Fig 24 Section through furnace after Henry Powle 1677-8 (Hart 1971, 52)

A-C height of hearth
B charging level
dess bosh
E back wall
dam stone
G inner lining
H hearth
tymp stone
J tym plate
K sows (lintels)

Fig 25 Abraham Rees' cross-sections, 1820, of Parkend furnace from *Encyclopaedia Britannica*, (Schubert 1953, 159)
Fig 28   Engraving of a Hollander engine from Rees' Cyclopaedia
Fig 29  Sketch plan of Gunns Mills furnace (I), 1964  
(courtesy of Gloucs Council for Industrial Archaeology)
Fig 30  Sketch plan of Gunns Mills II, 1964
(courtesy of Gloucs Council for Industrial Archaeology)
Fig 31  Sketch plan of Gunns Mills IIIa, 1964
(courtesy of Gloucs Council for Industrial Archaeology)
**Guns Mills**

Probable Furnace Layout
A Bellows and levers
B Bridge House
C Possible culvert
D Wheel 21ft.
E Fore Heath
F Furnace
G Tuyeres
on mouth of furnace
0 Later apertures

---

**C.1705 Furnace**

Key as above

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**C.1743 Paper Mill**

A Stamping of Rags
B Drying loft
C Vats
D Press room?
E Staircase

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Fig 34  Guns Mills furnace – plan and cross-sections by B. Cave, 1974
Fig 35  Gunns Mills furnace – cross-sections by B. Cave, 1974
SITE PLAN

Fig 36    Gunns Mills furnace - plan, 1988
(courtesy of Hereford Archaeological Unit)
Fig 37  Gunns Mills furnace – cross-sections, 1988
(courtesy of Hereford Archaeological Unit)
Fig 38  south elevation of furnace 2000 (courtesy of WS Atkins)  Scale 1:50
Fig 40  Gunns Mill furnace – from south-east, 1993
(courtesy of NMR, English Heritage, BB93/33638
Fig 41  Gunns Mills furnace from south-west
(courtesy of NMR, English Heritage, BB93/33639)
Fig 42  Gunns Mills furnace – vertical joint on east elevation
(courtesy of NMR, English Heritage BB93/33643)
Fig 43  detail of Gunns Mills House and paper mill c1890-1900
(courtesy of Wilderness Centre)

Fig 44  Gunns Mills House and paper mill c1900-1910
(courtesy of Mr and Mrs Anderson)
Fig 45  Gunns Mills House and paper mill c1910  
(courtesy of Mr and Mrs Anderson)

Fig 46  Gunns Mills House and former paper mill c1930  
(courtesy of Mr and Mrs Anderson)
Fig 47  Gunns Mills IIIa with William Townley early 1970s?
(courtesy of Wilderness Centre)

Fig 48  Gunns Mills IVa and IVb early 1970s
(courtesy of Wilderness Centre)
Fig 49  aerial view of Gunns Mills house and furnace c1990
(courtesy of Mr and Mrs Anderson)

Fig 50  Gunns mill furnace from the south 2001
Fig 51  scaffolded furnace from east 2001

Fig 52  ledge on east elevation of furnace 2001
Fig 53  cast iron lintel, dated 1682, in tuyere arch 2001

Fig 54  cast iron lintel, dated 1683, in tapping arch 2001
Fig 55 stack interior showing losses of fabric to passages 2001

Fig 56 stack interior showing ashlar face and hole in east side 2001
Fig 59  support for paper drying rack 2001

Fig 60  wheel pit with ashlar masonry and cast iron wheel 2001
Fig 61  Gunns Mills House from west 2001

Fig 62  Gunns Mills House – apsidal bay 2001
Fig 63  Gunns Mills furnace (I) – site of drained pool 2001

Fig 64  Gunns Mills II remains 2001
Fig 65   Gunns Mill III site 2001

Fig 66   site of Gunns Mills III pool and Gunns Mills IV 2001
Fig 69  Gunns Mills IVb  roof truss in paper drying loft 2001

Fig 70  Gunns Mills IVc standing remains 2001
Fig 71  Gunns Mills IVa west elevation 2001

Fig 72  Gunns Mills Iva 'moat' on east elevation 2001