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Stewartby Brickworks, Stewartby, Bedfordshire

The Historical Significance of Stewartby Brickworks

Kathryn A. Morrison with appendices by Andrew Williams

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STEWARTBY BRICKWORKS
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BEDFORDSHIRE

THE HISTORICAL SIGNIFICANCE OF STEWARTBY BRICKWORKS

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SUMMARY

Stewartby Brickworks, Bedfordshire, closed in May 2008. At one time this was not just the largest brickworks in Bedfordshire, nor even just the largest within the extensive Fletton-making industry that spread from Hunts to Bucks between the 1880s and the late 20th century. Stewartby could also claim to be the largest brickworks – in terms of output – in the world.

Beside the brickworks, the company (until 1984, the London Brick Company) built a model village for its workforce. Begun in 1926, this was laid out on 'Garden City' principles. Successive groups of overseas workers arrived to work in the local brick industry and settled in the village and surrounding area with their families. In this way, Stewartby is a reminder of how Bedfordshire acquired its rich multi-cultural society.

The Fletton industry is of particular significance, as huge numbers of mid-20th century buildings, the length and breadth of the country, are constructed of this type of brick, whether plain or decorative. One of the best known facing bricks is the Rustic Fletton, invented at Stewartby in 1923. With the closure of Stewartby, only two of the 50 principal Fletton brickworks remain in production (see Table 1).

At its peak, Stewartby had numerous Hoffman kilns, with a total of 32 chimneys which were visible for miles in all directions. Although greatly reduced in number, the surviving chimneys are a dramatic and iconic feature in the local landscape, and are known not only to local people but to those who pass through the county. As Alan Cox has commented: 'they could be, dare I say it, Bedfordshire's answer to the Angel of the North or the huge white horse proposed for Kent'.[1]

Today only two kilns and four chimneys, listed in January 2008, survive. These kilns can now be dated as follows: CK1, 1931-32 (modified c.1937-38) and CK3, 1950-51. Both are rectangular Hoffman kilns with arched chambers along two sides, and with flat roofs. Variations on this type of continuous down-draught kiln were deployed for Fletton manufacture throughout its history, but examples survive today at only three sites: at Stewartby, where they have been decommissioned, and at King's Dyke and the Saxon Works, Whittlesey, where they are still working. Of these, the Stewartby kilns are the earliest in date.

CONTRIBUTORS

Kathryn A. Morrison, with Appendices by Andrew Williams.

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DATE OF RESEARCH

This Report was researched and written in 2008 and has not been updated prior to publication in 2018.

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INTRODUCTION

In February 2007, Stewartby Brickworks (fig 1) was proposed for listing. While this was being considered, in November 2007, the owners (Hansons) announced the closure of the site. Two kilns (CK1 and CK3) and four chimneys — the last remaining on site — were listed (Grade II) in January 2008, and in February 2008 a request for this listing decision to be reviewed was submitted on behalf of Hansons. On 11 March 2008 the review officer supported the original decision to list. Closure of the site was fully implemented in May 2008. Recently (September 2008) the owners have marketed the structures in the local free newspaper.

Figure 1 *General view of site with chimneys. © Historic England Archive (P1000268)*

In August 2008 the Architectural Investigation Team in Cambridge was asked by John Ette, Inspector of Ancient Monuments, to provide a statement of significance for the Stewartby Brickworks site in general, and its two listed Hoffman kilns (CK1 and CK3) in particular.

Stewartby Brickworks became the largest brickworks in the world in the early 1930s and, until its closure in 2008, was the last working brickworks in Bedfordshire. It produced a very distinctive and recognisable type of brick: Flettons. These were used extensively in the mid-20th century, characterising the built environment of towns and cities throughout the UK, far beyond their area of production. Stewartby's cluster of tall chimneys – 32 at its peak – has formed a local landmark since the site was established in the 1890s, and the surviving four stacks continue to provide a monumental reminder of the historical significance of brickmaking to this area.

To fulfil the brief, a limited amount of new desk-based research (map regression, analysis of aerial coverage and examination of accessible documentation) was carried out to clarify the historical development of Stewartby Brickworks and its structures. It is understood, however, that documents and architectural drawings still held by the owners of the site (Hanson Building Products Ltd, part of the Heidelberg Cement Group) could provide a great deal of further clarification, especially on the flue systems, and the maintenance and repair history of the surviving kilns, CK1 and CK3. The company's archive may also contain information about comparative sites, both demolished and extant. It was not possible for investigators to consult this archive or access the site.

Research was also carried out to establish the position of Stewartby within the Fletton industry, comparing it with other brickworks established on top of the Oxford clay belt (extending from Peterborough through Bedfordshire and Buckinghamshire) since 1881 (see Table 1). Only two Fletton brickworks, King's Dyke and Saxon (both at Whittlesey in Cambridgeshire) are still in production, each with operational Hoffman kilns erected c.1970 and c.1972 respectively.

Regarding the issue of the structural stability of decommissioned kilns, it was discovered that the Hoffman kilns at Stewartby remained dormant for long periods without lasting ill effects. During both World Wars many of Stewartby's kilns were shut down, and though they required time to dry out after each war, no serious structural deterioration was recorded in the company's annual reports.[2] In addition to this, it is worth noting that at least three Hoffman or similar multi-chambered kilns, similar to those at Stewartby, have been successfully restored and preserved, while no less than 15 German museums encompass Hoffman brick kilns.[3] The Hoffman Kiln preserved at Langcliffe, North Yorkshire, was awarded a Heritage Lottery grant in 1999. More locally, the proposed Nirah project has been supported by the local authorities and considerable sums of public money have already been committed to it.

Limited research was undertaken to assess national survival rates of Hoffman kilns used for brickmaking, and to catalogue those protected (listed or scheduled) as significant elements of our industrial heritage (see Appendices). A complete list of those built for lime burning was published in 2003,[4] and so these have been excluded from this report.

HISTORICAL BACKGROUND: THE FLETTON INDUSTRY

Stewartby Brickworks must be considered in the context of other Fletton brickworks (see Table 1) overlying the Oxford clay (i.e. a great swathe of England, running from Lincolnshire to Dorset). After 1881, numerous brickworks in this belt developed similar processes to manufacture vast quantities of Flettons.

Flettons constitute the most recognisable and widespread type of brick used in England in the 20th century. As well as the standard Fletton with its patchy pink/yellow colouring (the patches resulting from the stacking method in the kiln), more refined facing bricks were produced from the same clay, notably the distinctive 'Rustic Fletton', invented at Stewartby in 1923 and widely adopted throughout the country in the inter-war period. Fletton brickworks varied in size and output, but they all exploited the multi-chamber Hoffman kiln for mass production.

Fletton bricks are named after the small village near Peterborough where grey-green deposits known as knotts were discovered approximately 20ft below the Oxford clay in 1881. The knotts were ideal for making bricks; they could be fired without drying, and contained combustible material that meant they required about a third of the amount of fuel needed for firing other bricks. They could be produced cheaply, in vast quantities: in millions or billions, rather than thousands, per annum. This left the Fletton industry vulnerable to boom and bust, for example during wartime.

The process of Fletton brickmaking is simple: the clay is extracted from the pit and transported to the works by conveyor belt. Inclusions, such as stones, are removed, and the clay is pulverised, or ground to a powder. This is then pressed (four times, hence the 'Phorpres' trade name, used by a specific Fletton company) into bricks. These 'green' bricks are stacked in readiness for the kiln, in such a way that they are evenly exposed to heat. They are sealed in the kiln, where the temperature is slowly raised to 1,050 degrees centigrade, then slowly cooled. This involves the skilful manipulation of flues and dampers, and throughout the process, the moisture content of the clay is controlled to ensure the best firing. Once fired, the bricks are removed and stored.

It has been claimed that, 'soon after the First World War the supersession of common Stocks [i.e. London Stocks] by Flettons seems to have been completed'.[5] As a result of the increasing success of Fletton bricks, the number of brickworks nationally declined by two-thirds between 1900 and 1939. From the mid-1930s, Stewartby was not just the largest brickworks within the Fletton industry; in terms of output, it was the largest brickworks in the world. Until the 1960s, the second largest was Marston Valley's Ridgmont Works, close to Stewartby, and so this part of Bedfordshire bristled with chimneys. Other significant Fletton brickworks (see Table 1) were concentrated around Peterborough and Whittlesey, with large sites strung out to the south-west, including Bletchley, Marston, Lidlington and Calvert. Significant non-Fletton sites in the same area included Arlesey (founded 1852), which produced gault bricks but also had a Hoffman kiln.[6]

In 1973, a boom-time in the industry, the five main Fletton Brickworks in Bedfordshire produced a combined total of one billion 458,000 bricks a year, of which Stewartby alone contributed over three-quarters of a billion. In the 1970s

Bedfordshire was producing about 50% of the whole national Fletton output, or, to put it another way, Bedfordshire was producing about 20% of all bricks then made in this country.[7] Nevertheless, between 1973 and 1999 all Bedfordshire's Fletton brickworks closed down and were demolished (see Table 1), apart from Stewartby, which, of course, finally ceased operating in February 2008.

TABLE 1: CURRENT STATUS OF HISTORICAL FLETTON BRICKWORKS (2008)

PRINCIPAL FLETTON BRICKWORKS	SURVIVAL	LISTING
Bedfordshire		
Stewartby	partial	II (2 kilns; 4 chimneys)
Elstow	demolished	
Kempston Hardwick, Coronation Works	demolished	
Lidlington	demolished	
Ridgmont	demolished	
Kempston	demolished	
Lidlington	demolished	
Marston	demolished	
Woburn Sands (Eastwoods)	demolished	
Buckinghamshire		
Skew Bridge/Jubilee (Bletchley)	demolished	
Water Eaton (Bletchley)	demolished	
Newton Longville (Bletchley)	demolished	
Calvert	demolished	
Cambridgeshire/Hunts		
Fletton (Fletton)	demolished	
Orton (Orton)	demolished	
London Brickworks (Fletton)	demolished	
London Brick Yd 2 (Fletton)	demolished	
London Brick Yd 3 (Fletton)	demolished	
London Brick Yd 4 (Fletton)	demolished	
Hicks Yd 2 (Fletton)	demolished	
Hicks Yd 3 (Fletton)	demolished	
Farcet (Fletton)	demolished	
Yaxley (Fletton)	demolished	
Beeby's (Fletton)	demolished	
Norman Cross (Yaxley)	demolished	
Fletton Crown (Fletton)	demolished	
New Peterborough Yd 1 (Fletton)	demolished	
New Peterborough Yd 2 (Fletton)	demolished	
New Peterborough Yd 3 (Fletton)	demolished	
Kings Dyke, post war (Whittlesey)	extant	Not listed
Kings Dyke/Itter, pre-war (Whittlesey)	demolished	
Saxon, post-war (Whittlesey)	extant	Not listed
Saxon, pre-war (Whittlesey)	demolished	
Itter (Whittlesey)	demolished	
Star (Whittlesey)	demolished	

Victory (Whittlesey)	demolished	
Central (Whittlesey)	demolished	
Gildenburgh (Whittlesey)	demolished	
Brickworks (SE of Whittlesey)	demolished	
Northam (Eye)	demolished	
Eye Fletton Brickworks	demolished	
Dogsthorpe Star (Dogsthorpe)	demolished	
Dogsthorpe (Dogsthorpe)	demolished	
Somersham	demolished	
Warboys	demolished	
Werrington (Peterborough)	demolished	

HISTORICAL BACKGROUND: STEWARTBY BRICKWORKS

In 1883, the only brickworks in the vicinity of Stewartby (at that time merely Pillinge Farm) was Randall's, to the north of the present site (fig 2). Meanwhile B. J. Forder, a lime burner by trade, had begun brickmaking (i.e. producing gault bricks) at Bracknell and Westoning in 1894, then decided to expand into the Oxford clay belt and make Flettons. He opened the first two Fletton brickworks in Bedfordshire in 1897, one at Elstow and another at Wootton Pillinge, later to be known as Stewartby. Interestingly, Forder already had a lime-burning Hoffman kiln at his Buriton limeworks in Hampshire.[8] The Westoning brickworks also had a Hoffman kiln from the outset.[9] In May 1900 Forder sold his company to a consortium of businessmen including George and Arthur Keeble of Peterborough, Arthur McDougall of Manchester and Halley Stewart, then a prospective Liberal Parliamentary candidate. Within a month Forder's was transformed into a public company, B. J. Forder & Son Ltd, with Stewart as chairman, and his son Malcolm as managing director.

The OS map of 1901 (fig 3) shows Forder's brickworks as a cluster of three large rectangular buildings (two of them clearly rectangular kilns), with a scattering of smaller structures, positioned on the west side of the Bedford-Bletchley branch of the L&NWR. There was a large clay pit to the west. To the north, Randall's small brick works was still operational. A letter of 1902 refers to a new kiln at Pillinge, with 18 chambers each holding about 20,000 bricks.[10] In the same year there are passing references to kilns 6 and 7, and a site for kiln 8.[11] Electric light was introduced at Pillinge in September 1902, to allow working to continue at night.[12]

By 1910, Forder's had expanded greatly: it was now selling 48 million bricks a year.[13] The Keeble brothers were no longer involved, but it is clear that at least seven kilns had been built at Wootton Pillinge during the period of their involvement.[14] These would all have been erected near the original kilns, on the west side of the tracks.

As a result of the First World War – when many kilns stood empty or were used for storage[15] – numerous small brick companies folded, and the industry came to be dominated by four large groups: Forder's, the London Brick Company (founded at Fletton in 1889), the Itter companies, and the United & Northam Brick Companies. In 1923 all of these groups, except Itters, merged. They became known as the London Brick Company & Forder's Ltd, with Halley Stewart (followed from 1924 until 1951 by his son Malcolm) as chairman. In 1927 the new company purchased a controlling interest in Itters, and from April 1936 it traded simply as the London Brick Company Ltd. These mergers and changes, and the huge demand for bricks after the 1923 Housing Act, led to expansion at Stewartby.

By 1926, Stewartby was producing 118 million bricks annually. The works had grown and the company had started to build a model village for its employees. The OS map of 1926 shows that the site (still identified as Pillinge Brick Works) had been considerably enlarged since 1901 (fig 4). The earlier kilns survived, and others had been added, both around them, and on a separate site to the south, by Green Lanes Crossing. In fact the Green Lanes site had originated as a separate business which had been taken over by Forder's in 1922.[16]

The 1926 map clearly identified many structures as kilns surmounted by chimneys: there were nine on the northern part of the site, and two by Green Lanes Crossing. The site now had its own tramway.[17] Apparently in the 1920s Forder's spent a great deal of money experimenting with tunnel kilns, in which the bricks were moved through the various heating and cooling stages on rails, but this was not a success; the kilns were scrapped and the company reverted to Hoffman kilns. The map of 1926 shows that one of the kilns to the north of the site had rounded ends, on a classic early Hoffman kiln plan; it had gone by 1938. In 1926 it is also worth noting that the clay pit had been massively enlarged, and the former sidings to the north appear disused.

As the variation in Stewartby's kilns suggests, the 1920s was a decade of experimentation. According to a correspondent in *The Brick Builder* in 1928: 'There can be no doubt that vast improvements in manufacture and increased knowledge of the capacities and limitations of bricks machine made by semi-dry process have resulted in a vastly different brick to the early Fletton of evil reputation'.[18]

By 1926 a number of cottages had been built around Pillinge Farm, along existing roads. These cottages were being planned as early as 1902 when A. J. Keeble wrote to Halley Stewart as follows: 'I will endeavor [sic] to send you on plans of the cottages. There is no doubt we shall be obliged to have some built at Pillinge before we shall be master of the men in working nights and days'.[19] Amongst the new buildings of c.1926 was a recreation room, with a recreation ground to its north. An air photograph of 1929 shows the recently built model village.[20] In 1929, there was still no brickworking on the east (village) side of the railway line.

By 1930, if not earlier, the name Stewartby (after the Stewart family) had been adopted, both for the works and the model village. The latter was sometimes referred to in the 1930s as 'Stewartby Garden Village'. In 1930 a Social Hall was erected (architect, E. Vincent Harris). Stewartby became a separate civil parish in 1937.

In March 1932, the company announced that in the previous year (1931-32): 'the main capital expenditure has been at Stewartby works near Bedford, where the productive capacity is being brought up to 6,000,000 per week; these are today the largest brickworks in the world. These works are designed for mass production on unique lines. They are replete with mechanical invention and ingenuity. Their very magnitude involves problems not previously tackled. For the success attained our warmest thanks are due to Mr Ractliffe and our Bedford district engineer Mr P. A. Hill, and to their efficient staff'.[21] The development of the site had been led by the firm's chief engineer Mr Ractliffe, who was clearly responsible for designing special plant. The claim to be the largest brickworks in the world was apparently based on output.[22]

By the time it was visited by Prince George in October 1934, Stewartby was indisputably the largest of the firm's 27 works, producing 9,000,000 bricks per week and with 1,450 workpeople.[23] In the village, an open-air swimming pool was opened.

An undated aerial photograph from the mid-1930s shows the new addition called CK1, before CK2 was added to its east.[24] This shows that CK1 originally had a single

chimney, the tallest on the site, over an ancillary structure at its north end. The kiln was originally covered by a row of 10 parallel gabled roofs, giving a sawtooth effect. A covered rail track ran along its east side.

By 1936 Stewartby employed 2,000 people and produced 500 million bricks per annum. At the AGM, the company announced that another 142 houses were being built for a resident population of 1,000.[25] Furthermore, the chairman announced: 'a further important extension which will shortly commence production and be completed this summer. It will be a self-contained plant with an output capacity of 125,000,000 per annum operating at an exceptionally low cost'.

At the 1938 AGM it was announced that the extensions at Stewartby had been completed. This was undoubtedly the large kiln CK2 (now demolished), which appears in outline on the 1938 OS map.

The OS map of 1938 (fig 5) shows that the new kilns CK1 (c.1931-32) and CK2 (c.1937-38) far exceeded the scale of the earlier kilns. This map also shows that a large amount of new housing had been constructed in the village. There was also a new school (opened January 1937; architect Oswald Milne).

In 1939 air raid shelters were tested at Stewartby,[26] but in 1939-45 efficiency was lost. Demand slackened; stocks piled up, and production was severely reduced. Government quotas were imposed, and transport restrictions put into effect. Of the company's 27 works, 22 closed for the duration (16 were requisitioned for storage), but the 'engineering works' at Peterborough and Stewartby remained open on war work. Kilns were shut down. Non-Fletton brickworks in Bedfordshire fared much worse: none survived the 1939-45 war.

The need to get back into production after the war was hampered by labour shortages: German prisoners were employed for a couple of years, then successive waves of European and Commonwealth immigrants, notably Poles and Italians. The company was also facing coal shortages. At the 1946 AGM the chairman told shareholders 'it should be realised that there is a time lag before the green bricks from the presses can be fired and delivered. Before the kilns can travel at a normal speed and burn their full intake of bricks, the moisture which has soaked in through six years of exposure has to be dried out – a slow and costly process'.[27]

Aerial photographs of 1946 confirm the extent of the site at this time (fig 6). The huge kiln CK2 had a distinctive sawtooth roof, like the original roof of CK1 but with 16 rather than 10 gables. It was topped by three stacks (those later inscribed 'L', 'B' and 'C'). To its west, CK1 had been significantly altered since the mid-1930s. It appears to have been extended, and most of the zig-zag roof had been removed, leaving stubs of gables to east and west. There were now three stacks: one on the now flat roof over the centre of the kiln (later inscribed 'Stewartby'); one over an ancillary building to the south, and a third to the north (probably the original stack). It is not known why CK1 had to be so extensively altered between the mid-1930s and 1946, or precisely when these alterations were carried out. No problems with the original design were mentioned in the company's annual reports, unless this started life as the notorious experimental tunnel kiln (see above).

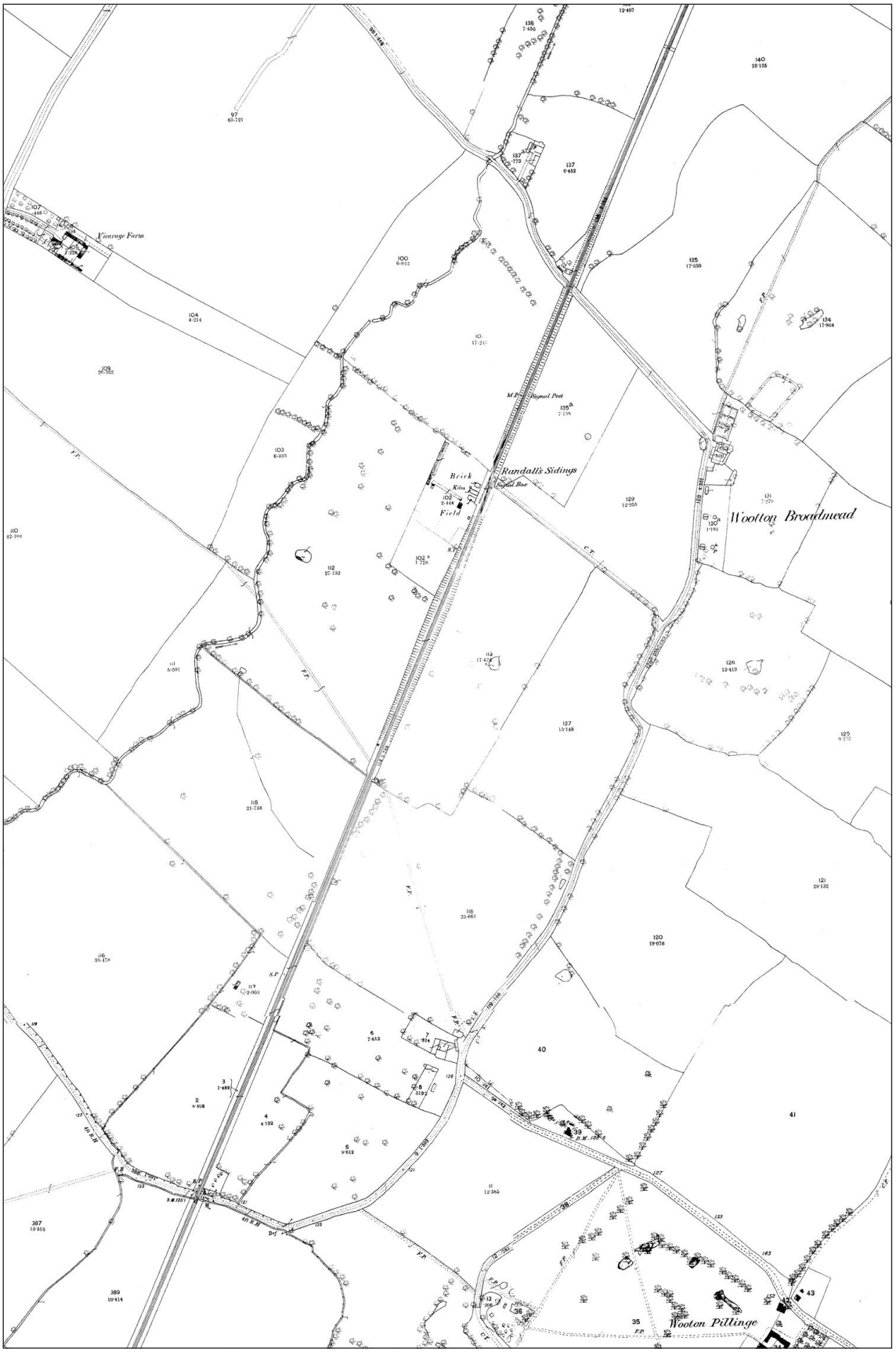

Figure 2 *OS 1:2500 Map 1881 © and database right Crown Copyright and Landmark Information Group Ltd (All rights reserved 2018). Licence numbers 000394 and TP0024.*

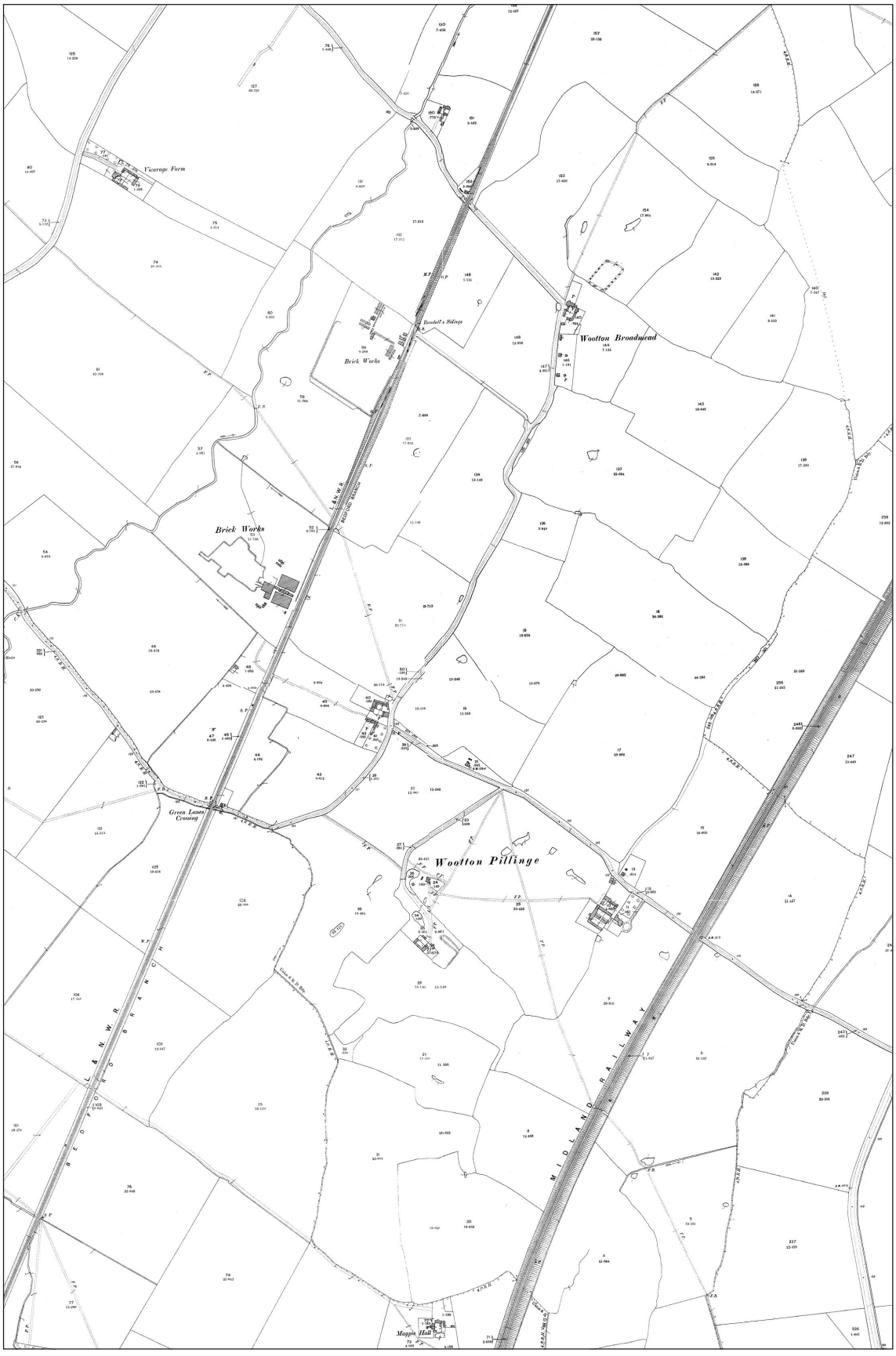

Figure 3 *OS 1:2500 Map 1901 © and database right Crown Copyright and Landmark Information Group Ltd (All rights reserved 2018). Licence numbers 000394 and TP0024.*

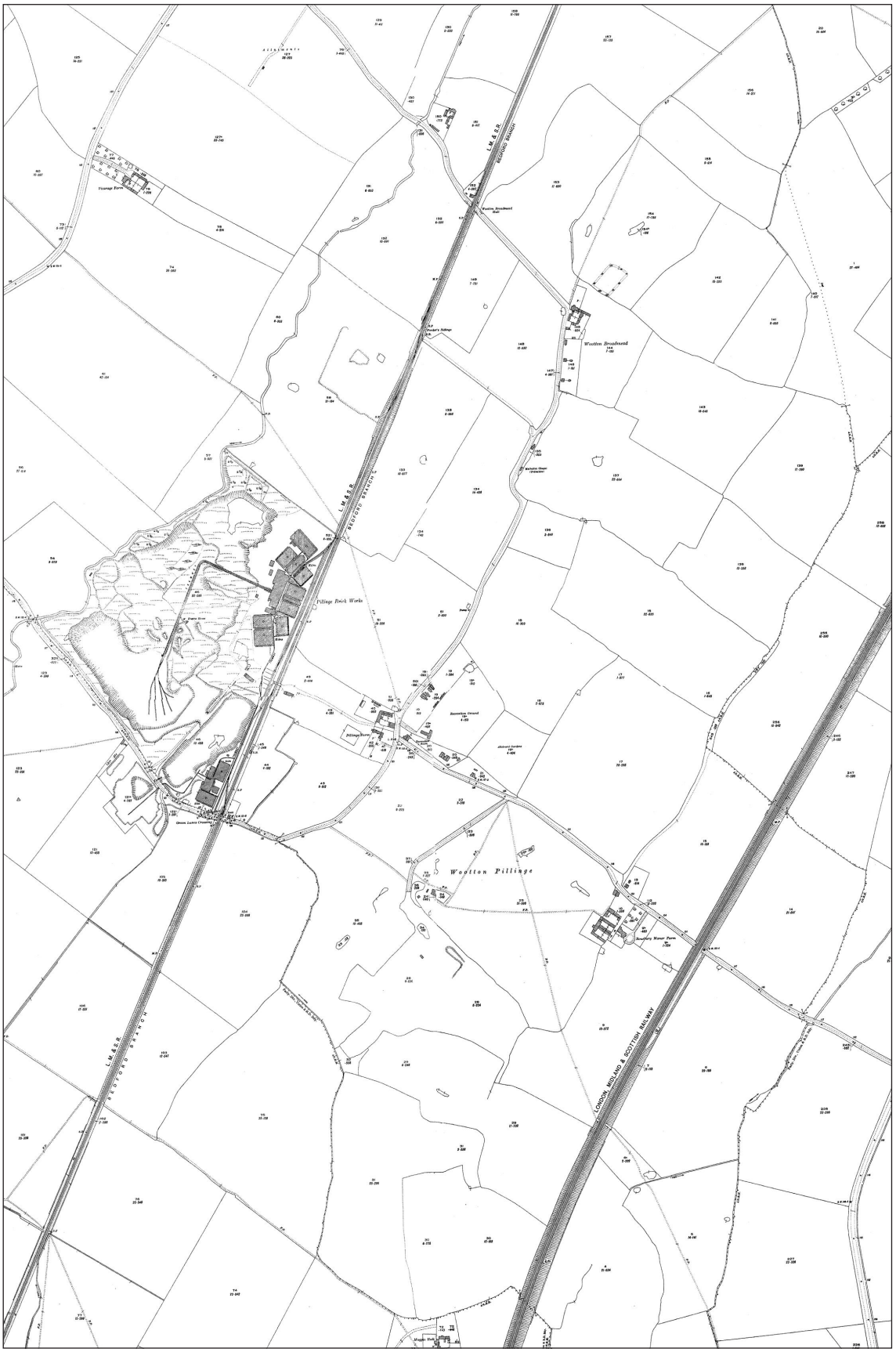

Figure 4 *OS 1:2500 Map 1926 © and database right Crown Copyright and Landmark Information Group Ltd (All rights reserved 2018). Licence numbers 000394 and TP0024.*

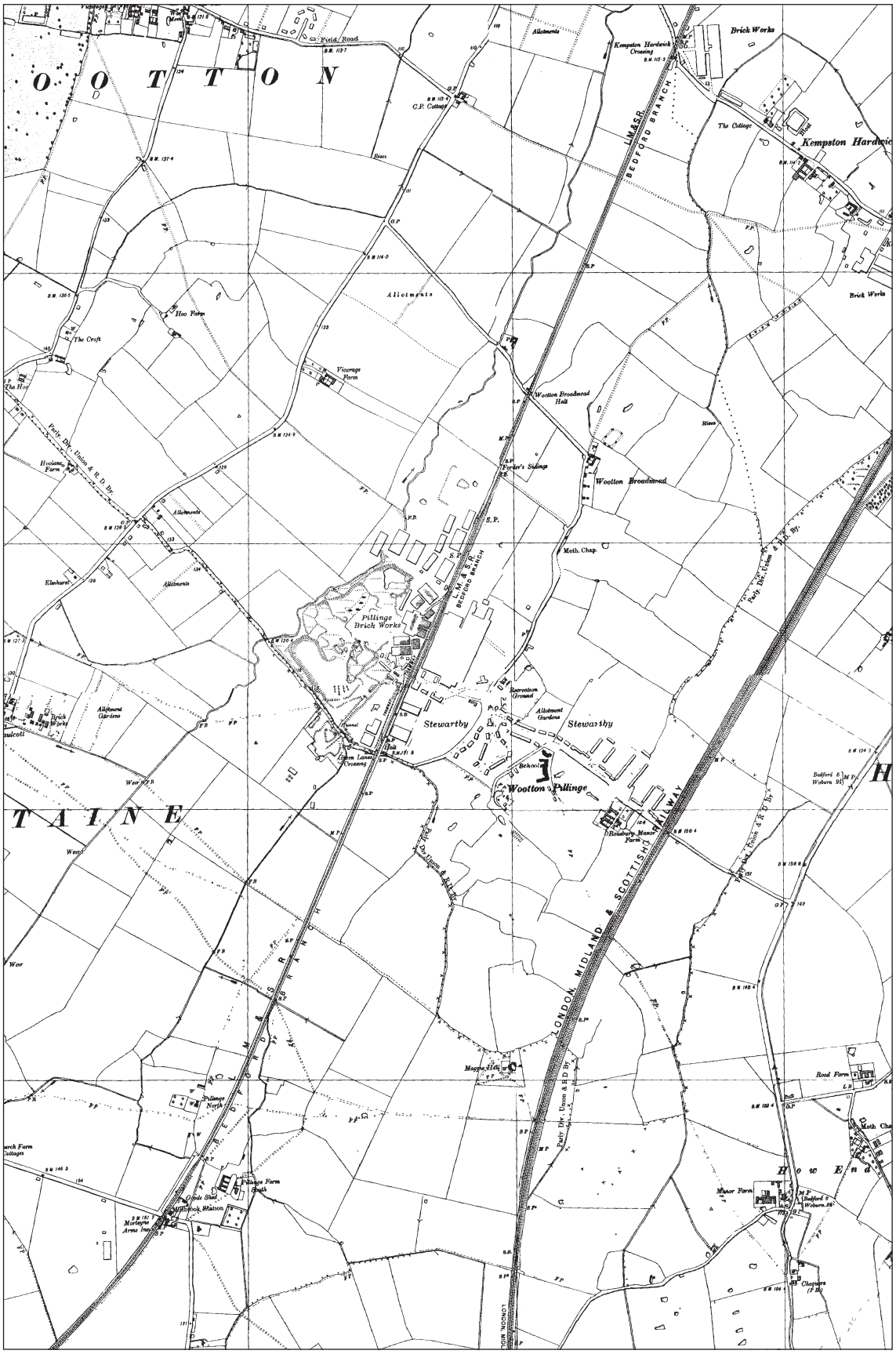

Figure 5 *OS 1:10560 map 1938 © and database right Crown Copyright and Landmark Information Group Ltd (All rights reserved 2018). Licence numbers 000394 and TP0024.*

Figure 6 *Aerial Photograph, 11 October 1946 Historic England Archive (RAF photography)*

In 1949 a new research and laboratory block was built (architect C. C Handisyde), and in 1950-52 another 70 houses, requiring a special building permit, were constructed for workers. By 1950 concrete roads were being laid at LBC sites, gradually replacing rails. Mechanisation and the use of road transport increased. Once Hyster fork-lift trucks began to be used, from 1947, minor alterations had to be made to kilns, especially to the widths of the wickets. Fork-lift trucks revolutionized the industry when they were equipped with inflatable fork clamps of LBC's own design, giving an obvious boost to productivity and giving savings in costs.[28]

In 1950-51, CK3 was built to the north of CK2. It appears on an air photograph of May 1951 (fig 7). The idea of the zig-zag roof had been completely abandoned, and there was a single central stack.

Stewartby United Church was built in 1951; the Sir Malcolm Stewart Homes in 1955-56 (architect Sir Albert E Richardson), and a large disused pit to the south-west was transformed into a lake in 1957.

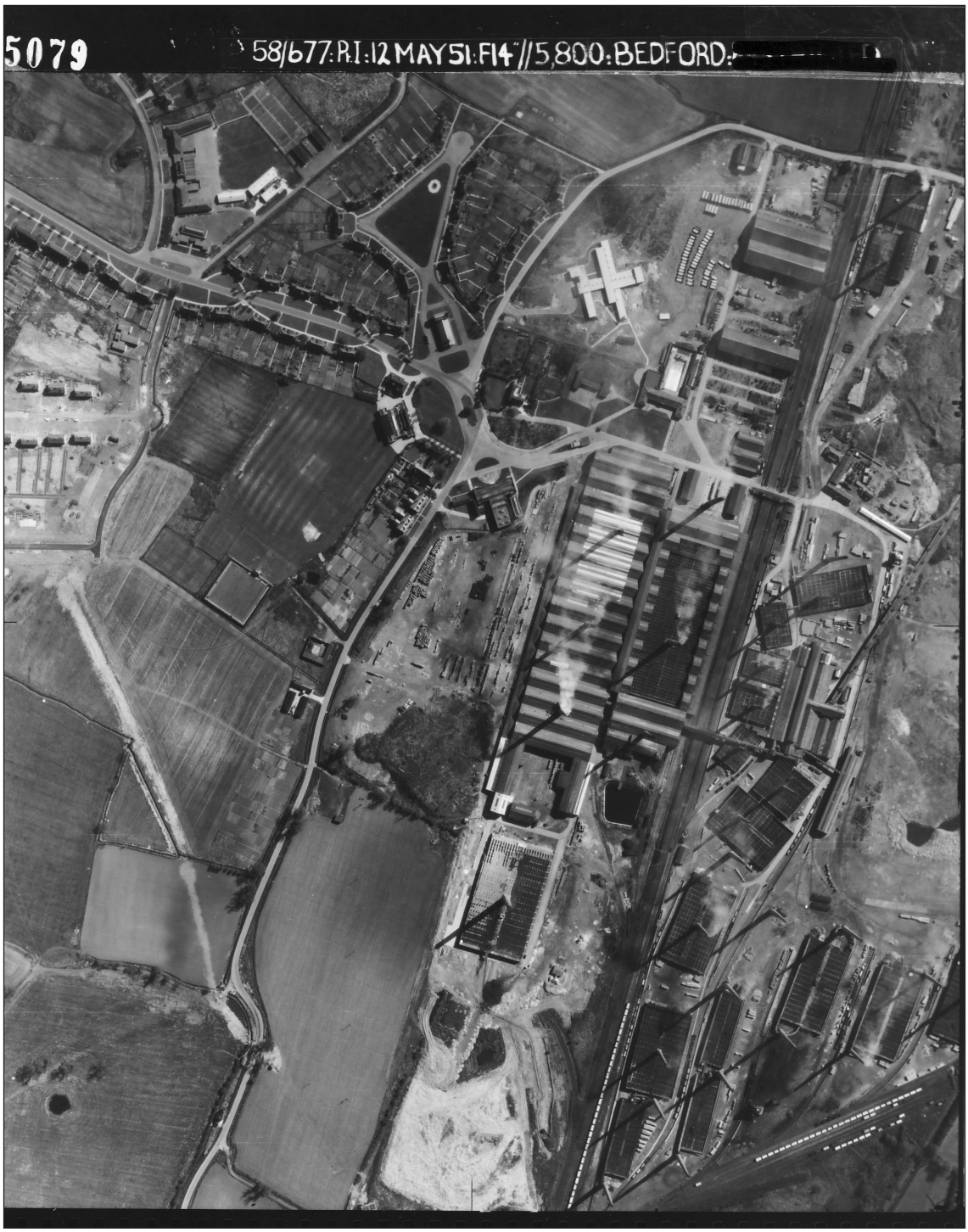

Figure 7 *Aerial Photograph, 12 May 1951 Historic England Archive (RAF photography)*

In the early 1960s, the company erected new kilns at Calvert, making it the second largest brickworks after Stewartby, at Bletchley (completed July 1964) and at the Dogsthorpe Works. In 1964-65 a new kiln was built on the west side of the railway line at Stewartby, just south of the brick presses, replacing an earlier kiln on a different alignment on the same site. A standard rectangular kiln with a single stack – like CK3 but slightly smaller – this can be seen under construction in an air photo of September 1964 (fig 8), and in its completed form on the coverage of 1972 (fig 9). These extensions brought the company's output to 120-130 million bricks per annum; the extension at Stewartby alone is said to have added one million bricks a week. The kilns at Bletchley and Stewartby were 'constructed entirely under our own supervision, and by our own labour and, when I point out that each of the kilns absorbed some 9 million bricks in their construction, the magnitude of the task will be better appreciated'.[29] In 1966-67, additional kilns were built at Bletchley and at Beeby's.

Figure 8 *Aerial Photograph, 12 September 1964. Historic England Archive (Ordnance Survey photography)*

Figure 9 *Aerial Photograph, 6 October 1972 © Crown copyright. Ordnance Survey*

In 1968-70, LBC decided to build the first new Fletton brickworks since the war, at Whittlesey (King's Dyke). Still in production (2008), this has four Hoffman kilns. Around the same time, research was carried out into the possibility of firing kilns using natural gas, but it is not known if this was put into operation. In 1972 the Saxon Works at Whittlesey was rebuilt with two Hoffman kilns. Again, this is still in operation (2008).

In 1974 a 'Fletliner' terminal (a new siding with an overhead gantry, for the transport of bricks by rail container) was built at Stewartby, though by now most bricks were transported by road. In 1980 proposals for new brickworks at Stewartby, Marston Vale and Ridgmont were dropped. These would have involved replacing the existing clusters of chimneys (over 100 in total) with two 400ft high stacks at each site.

Between 1972 and 1991, the roofs over CK2 and CK1 were completely removed, lending them the same roofscape as the other earlier and later Hoffman kilns on site (figs 9 and 10).

Production peaked in the 1960s and early 70s (738 million bricks in 1973). Stewartby was still said to be the largest brickworks in the world in 1979, by which time smaller brickworks were closing down. In 1984, the LBC was taken over by Hanson Building Products Ltd. and much of the village was sold.

Between 1991 and 2002, most of the kilns on the western side of the site were demolished and the northern part of this section had became a large siding with an adjoining container storage area (figs 10 and 11). The only surviving kiln on the west was that built in 1964-65. This, too, had vanished by 2005, under an expanse of hard standing (fig 12). Interestingly, at this date the roof of CK2 was planted with greenery, or perhaps simply overgrown, as its chimneys look dead. CK1 and CK3 were obviously still in production as their chimneys spouted smoke. CK2 was subsequently demolished, leaving only CK1 and CK3 standing. They were listed in 2008.

Figure 10 *Aerial Photograph, 19 September 1991 © Crown copyright. Ordnance Survey*

Figure 11 *Aerial Photograph, 4 July 2002 © Historic England Archive*

Figure 12 *Aerial Photograph, 21 October 2005 © Historic England Archive*

HOFFMAN KILNS AND CHIMNEYS

The traditional forms of brick kiln in this country were the clamp kiln and the Scotch kiln.[30] In each type, the fire was at the base, the bricks were stacked in a single chamber, and heat was drawn up through them by means of air holes at the top. Conical or 'bottle' kilns of the type used in the lime, pottery and glass industries were also used, but the Scotch kiln was more common.

Downdraught kilns developed in the late 19th century and required a greater financial outlay. They were built in a variety of forms, and provided more even heating and higher firing temperatures, but the brickmaker still had to wait a long time for bricks to cool before they could be removed and a new batch fired. The development of the multi-chamber kiln, working on a continuous rotation system, offered the answer. As one chamber was fired, another could be emptied, with various stages of cooling and heating in between, the complete process taking around 14 days. Despite several early experiments (eg: Gibbs, 1841), the key design was patented by the German engineer Friedrich Hoffman (1818-1900) in Austria in 1858. It was first patented in Britain in December 1859;[31] within the next 10 years it was patented in numerous other countries throughout the world.

The first Hoffman kilns, designed for use in the lime, brick or tile industries, were circular, with 12 chambers, and very few were built. Those that were constructed were experimental and enabled Hoffman to make refinements to his design. In 1865, for example, Hoffman registered patents for differently shaped kilns operating on the same principle: one was oval, and another rectangular.

Whether circular, oval or rectangular, Hoffman kilns were termed 'annular' as the raw material was fired in an annulus, or continuous chamber (subdivided into sections, or chambers, by temporary dividers, or dampers), between the central core of the kiln (which contained the chimney, flue system and smoke chamber), and the outer shell. Each chamber was accessed from the outside through an arched opening called a wicket, which was sealed during firing. Exhaust gases were drawn off through the chimney. Fuel (normally small coal) was fed in from above through feeding holes; the fire was moved around the annulus, from chamber to chamber, by opening and closing dampers and flues. The firemen and stokers worked on the roof, where coal was piled next to each feeding hole; they were sometimes protected by an independent roof structure (and so perhaps this is what once existed over CK1 at Stewartby). Rectangular kilns were easier to control than circular kilns as they had a longer annulus, and the number of chambers they contained (in early examples usually 14),[32] could be greatly extended.

Rectangular Hoffman kilns display great variation in size, design and layout. Several improved versions were patented in Britain by Hoffman himself, and by his associates and agents, throughout the 1860s and 1870s and 1880s, for example one including a fan for the better circulation of heat, and another introducing cast-iron caps or bells over the fuel feeding holes to reduce heat loss. Other people took out patents for kilns on the Hoffman principal, with that of Francis Postill of Scarborough resulting in a court case. The distinction between Postill's and

Hoffman's kilns was subtle: Postill made the walls of his chambers straight rather than curved. Thus several patents introduced changes without substantially altering the basic principle. The surviving Hoffman lime kiln at Llanymynech, for example, was based on a patent by George Warren, a brick manufacturer from Exmouth. Some variations were introduced by the kiln owners themselves, who made adaptations to the flue systems, to the sizes of the chambers and to the position of chimneys. Regardless of variations or modifications, these were all Hoffman kilns in the sense that they followed the basic Hoffman principle of multiple arched chambers operating cyclically. By 1870, 639 Hoffman kilns were operational throughout the world; by 1898 there were more than 5,000 globally.[33] Some are still in use today, though numbers have fallen dramatically in recent decades.

In England most Hoffman kilns were built for the manufacture of brick, and relatively few for lime burning.[34] In 1881 the Hempsted brothers claimed to have a Hoffman kiln at their works at Grantham.[35] By 1882, Hempsted's had five Hoffman kilns, each with 14 chambers (initially the preferred number, as the full cycle of heating and cooling took approximately 14 days), on their brickworks site at Fletton.[36] These were topped with chimneys 180ft high. By the 1890s most newly built kilns were of the Hoffman type. Forder built one with an octagonal chimney at his brickworks in Westoning,[37] but it was in the Fletton industry that the Hoffman kiln came into its own. In 1898 the largest Hoffman kiln in Europe was built at the LBC No. 1 yard at Fletton, with 40 chambers. Around 1930 the Marston Valley Brick Co. built an even larger version at Lidlington: it was nearly three-quarters of a mile long, with 190 chambers in two rows of 95, and with 20 chimneys.

Around 1950, it was noted that 540 brickworks in the country used 'one or more continuous kiln of the Hoffman type'.[38] A survey of 1957 found 991 Hoffman-type kilns, including 507 with barrel vaults.[39] In 2001, however, it was estimated that only 26 were still in use. The rapid disappearance of Hoffman kilns has led to a growing interest by industrial archaeologists. Of 11 sites with Hoffman kilns built for brick production, and currently listed or scheduled (see Appendix 2), only those at Stewartby relate to the Fletton industry. The Stewartby kilns are generally at the forefront of national discussions on this subject.[40]

THE STEWARTBY HOFFMAN KILNS CK1 AND CK3

The surviving kilns CK1 (figs 13 and 14) and CK3 (figs 15 and 16) were built in 1931-32 and 1950-51 respectively. Both have been previously dated broadly to c.1938-60,[41] but can now be dated more precisely through a combination of map regression, air photography and company records. Close study of aerial photographs has demonstrated that CK1 was extensively remodelled by 1946. This may have been carried out in 1937-38, around the time its neighbour, CK2, was built. There may have been something experimental – and ultimately unsatisfactory — about the original design.

Both kilns are built of red/yellow brick laid in English bond, with some evident repairs and patching. Rectangular in plan, they have flat roofs surrounded by parapet walls. On the roofs are stoking holes into the firing chambers below. Each one is surmounted by a single, central chimney which is cylindrical in plan; there are another two chimneys at either end of CK1. These chimneys taper and are banded with iron hoops for added stability. Modern steel platforms with access steps are attached, along with modern equipment for monitoring smoke quality.

The blind end elevations of the kilns are battered out. Along the side elevations are round-headed (tunnel or barrel) arched chambers separated by raking buttresses. The arches are formed of four courses of header bricks. The chambers are brick lined, with side vents through which the heat was drawn along the kiln. Beneath the floor are interconnecting flues, through which air was drawn by the chimney. It has been claimed that the kilns incorporate a 'strategic subterranean and inter-chamber flue system . . . . unique to Stewartby'.[42] It has not been possible to substantiate this.

A plan of the Stewartby site, probably dating from the 1970s, indicates that the north end of CK1 was where facing finishes were applied to unburnt bricks.[43] CK2 was described as 'the largest continuous kiln in the world', 280 yards long and 65 yards wide. The 80 chambers had an average capacity of 76,000 bricks, and five separate fire zones. It produced 3,500,000 bricks per week. Between CK1 and CK2 ran a 'lift truck'. Ancillary buildings at the south end of CK2 allowed vehicles to be loaded under cover.

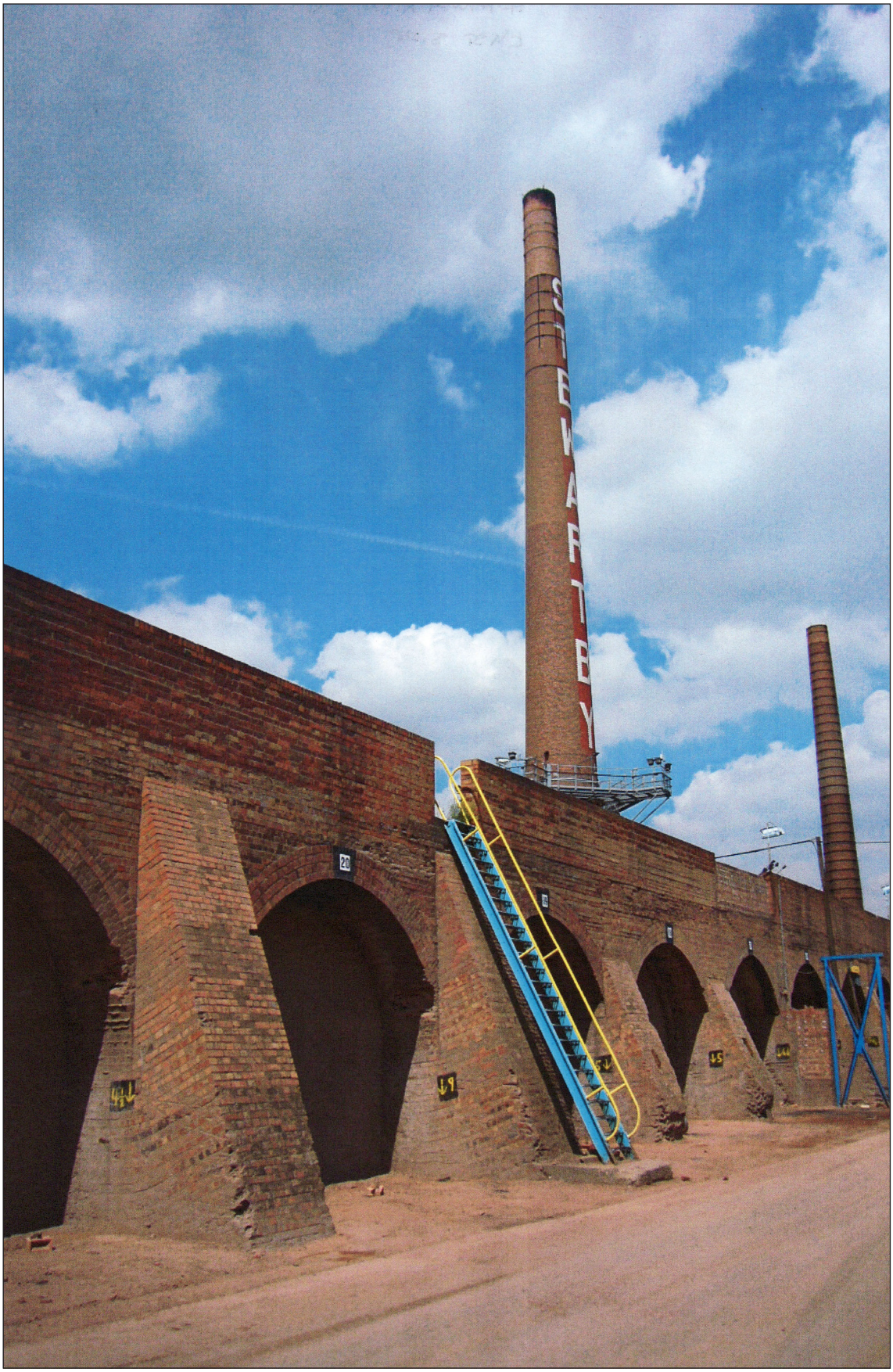

Figure 13 *CK1, general view © Historic England*

Figure 14 *CK1, roof © Historic England*

Figure 15 *CK3, fired bricks in chamber © Historic England*

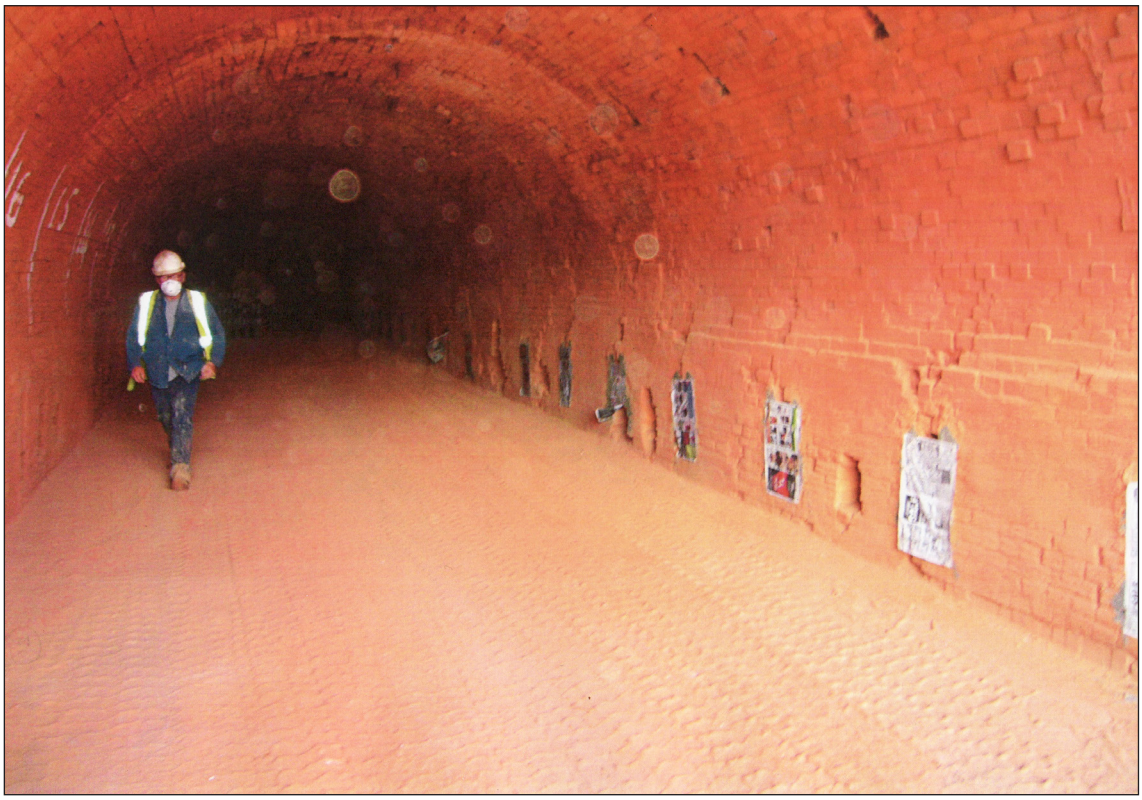

Figure 16 *CK3, kiln chamber © Historic England*

STEWARTBY: SUMMARY OF SIGNIFICANCE

1. From mid-1930s, largest brickworks in Bedfordshire, largest brickworks within the Fletton industry, and (in terms of output) world wide.

2. The first (with Elstow) and last working Fletton brickworks in Bedfordshire.

3. The Fletton industry – of which Stewartby is the most significant representative – is of great importance nationally, trouncing its rivals by the 1920s, and dominating English brickmaking through the 20th century.

4. The Stewartby kilns and chimneys are the earliest to survive from the Fletton industry (CK1, 1931-32; CK3, 1950-51).

5. Stewartby is the earliest of three surviving Fletton brickworks, and the only survivor in Marston Vale. At the industry's peak, 50 existed.

6. The brickworks provide the historical and visual context for the model village of Stewartby, begun 1926.

7. The chimneys form a landmark, symbolic of brickmaking in this region.

8. Instrumental in the creation of Bedfordshire's rich multi-cultural society.

APPENDICES

By Andrew Willliams

1. Known Working Brick Kilns

Name	NGR	Dates	Product	Remarks	Status
Askam in Furness, Cumbria	SD2180076159	c.1900	Brick	1 Kiln	Working
Church Field, Whittlesey	TL2552997090		Brick (Fletton)	2 Kilns	Working
Hundleby, East Lindsey	TF38356598		Brick	3 Kilns	Working
Keymer Works, Burgess Hill	TQ3225619286	1875-	Brick	1 Kiln	Working
Kings Dyke Works, Whittlesey	TL2441197685		Brick (Fletton)	4 Kilns	Working
Plastic Brick Works, Whinney Hill	SD7635930278		Brick (NORI)	1 Kiln	Working
Turkey Road, Bexhill	TQ7215809375	1890-	Brick	1 Kiln	Working
Wealden Works, Pulborough	TQ1703434424	1888-	Brick	1 Kiln	Working

2. Listed and Scheduled Hoffman-Type Bick Kilns

Name	NGR	Dates	Product	Remarks	Status
Asserby Turn, Bilsby, Lincs	TF4789277616		Brick	8 Chambers	Listed II
Chilsworthy, Callington, Cornwall	SX4170471876		Brick	2 Kilns, 6 chambers ea, 1 Chimney	Listed II
Coal Park Lane, Lower Swanick, Hants	SU5002009886	1900-	Brick	10 Chambers	Listed II
Derby Road, Ilkeston	SK4602541130	1900-	Brick	14 openngs	Listed II
Honey End Lane, Reading	SU6853772792	1870-	Brick	6 Chambers	Listed II
Phoenix Farm, Calstock	SX3965171605	1870-	Brick	6 Chambers	Listed II

Skitter Road, East Halton, Humberside	TA1566921264		Brick/Tile	8 Chambers	Listed II
Aizlewood Lane, Sheffield	SK34928503	1879-1920s	Brick		Scheduled

3. Known Demolished Hoffman-Type Bick Kilns

Name	NGR	Dates	Product	Remarks	Status
Beeby Brikworks, Fletton	TL1916693872		Brick (Fletton)	4 Kilns	Demolished
Bletchley Works	SP8693832645	1890 -	Brick	2 Kilns	Demolished
Bretby Brick Works, Derbyshire	SK28072159		Brick		Demolished
Brown Oak Brickworks, Brightling	TQ68702230		Brick		Demolished
Calcott, Bucks	TL0025142341	1920-1940	Brick (Fletton)		Demolished
Calvert Works, Bucks	SP6861724144	1900 -	Brick (Fletton)	4 Kilns	Demolished
Central Brickworks, Whittlesey	TL250469681		Brick (Fletton)	4 Kilns	Demolished
Charndon Works, Calvert	SP6858824126		Brick (Fletton)	4 Kilns	Demolished
Chickerell Works, Crook Hill, Dorset	SY6454779870	1914-1969	Brick	1 Kiln	Demolished
Churwell, Leeds	SE272430041	-1980	Brick		Demolished
Coronation Works, Stewartby	TL0340443997	1935-1974	Brick (Fletton)	2 Kilns	Demolished
Crowborough, West Sussex	TQ5323829617	1880-1980s	Brick		Demolished
Elstow, Bedfordshire	TL0418445706	1897-1973	Brick (Fletton)		Demolished
Eye, Peterborough	TF2224303314	1900 -	Brick (Fletton)	1 Kiln	Demolished
Farcet Works, Peterborough	TL19202944750		Brick (Fletton)	4 Kilns	Demolished

Fletton Crown Works, Peterborough	TL1936694329		Brick (Fletton)	4 Kilns	Demolished
Goatley Farm, Ewhurst	TQ81502220		Brick		Demolished
Hicks Bricks 3, Peterborough	TL1903495576		Brick (Fletton)	5 Kilns	Demolished
Itter Brickworks, Whittelsey	TL2430797152		Brick (Fletton)	4 kilns	Demolished
Kempston Hardwick Works	TL2783444948	1897-1927	Brick	6 Kilns	Demolished
Lidlington Works, Beds	TL062839710	1897-	Brick (Fletton)	6 Kilns	Demolished
London Brick Company no.3, Fletton	TL1863896595		Brick (Fletton)	4 Kilns	Demolished
London Brick Company no.4, Fletton	TL1872596321		Brick (Fletton)	3 Kilns	Demolished
Mapperly Rise Brickworks, Nottingham	SK5854343054		Brick	1 Circular Kiln	Demolished
Millbrook Station, East Sussex	TL0091440618	1920 -	Brick (Fletton)		Demolished
New Peterborough Works 1	Tl1937194707		Brick (Fletton)	5 Kilns	Demolished
New Peterborough Works 2	TL1951995576		Brick (Fletton)	4 Kilns	Demolished
Norman Cross Works, Yaxley	TL1694693641	1898-1980s	Brick (Fletton)	2 Kilns	Demolished
Northarn Works, Eye	TF2303803225	1900-	Brick (Fletton)	7 kiln	Demolished
Nyewood, West Sussex	SU8017921871	1900-1960	Brick		Demolished
Park Road Works, Loughborough	SK5347218159		Brick	1 Kiln	Demolished
Putton Lane Works, Weymouth	SY6503180047	1914-1965	Brick	1 Kiln	Demolished
Ridgmont, Bedfordshire	SP9662137848		Brick (Fletton)		Demolished
Rose Hill, Stockport	SJ9492588630	-1909	Brick	22 Chambers	Demolished
Roundwood Brickworks, Wakefield	SE2995520456	1862-	Brick	1 round Kiln	Demolished
Saxon Brickworks, Whittlesey	TL2513097079		Brick (Fletton)	4 Kilns	Demolished

Star Works, Dogsthorpe, Peterborough	TF2037102214	1890 -1950	Brick (Fletton)	2 Kilns	Demolished
Victory Brickworks, Whittlesey	TL2481997016		Brick (Fletton)	2 Kilns	Demolished
Westoning, Bedfordshire	TL0357031554	1894-	Brick		Demolished
Wyvern Bridge Works, Peterborough	TL1914995953		Brick (Fletton)	1 Kiln	Demolished
Yaxley Works, Fletton	TL1922494085		Brick (Fletton)	3 Kilns	Demolished

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