SUSSEX INDUSTRIAL HISTORY

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Cover illustration: Original oil painting of Bishopstone Tidemills in 1861 by G Smith (courtesy Sussex Archaeological Society)

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THE HISTORY OF THE NEWHAVEN (SOUTH HEIGHTON) CEMENT WORKS

Will Pilfold

Introduction

Cement works were established by the Sussex Portland Cement Company Limited (SPCC) in 1884 on the east side of the Ouse river valley, East Sussex, at TQ 448033, mainly in the parish of South Heighton. The town and port of Newhaven are circa 2 kilometres to the south of the site and as a result they were usually referred to as the Newhaven works. The works closed in 1924 and today there are few remains of the plant. However, the large pit and many of the houses, and other non-residential buildings built in association with the works in the village of South Heighton, remain as reminders of what was at one time a major local industry. This article covers the creation of the Sussex Portland Cement Company Limited and the growth and development of the works through to its closure. South Heighton prior to 1884 was a largely rural village with an emphasis on farming for employment. The coming of the cement works led to major changes in the size and make-up of its population and consequently in its built environment – it is hoped that this aspect of the industrialisation of the area will be covered in a future article.

The origins of Portland cement and the chemistry of its manufacture have been well covered by others.[1] Suffice to say here that the main materials required are limestone, locally in the form of chalk, clay and water. The other major consideration is fuel; it is necessary to heat the wet mixture of ground chalk and clay to c. 1,300 degrees Celsius and therefore access to a supply of fuel, initially coke and later coal, is essential. As all the raw materials, fuel and the finished product are bulky, good communication routes, originally by water or rail and later by road, are also key to the location of cement works.

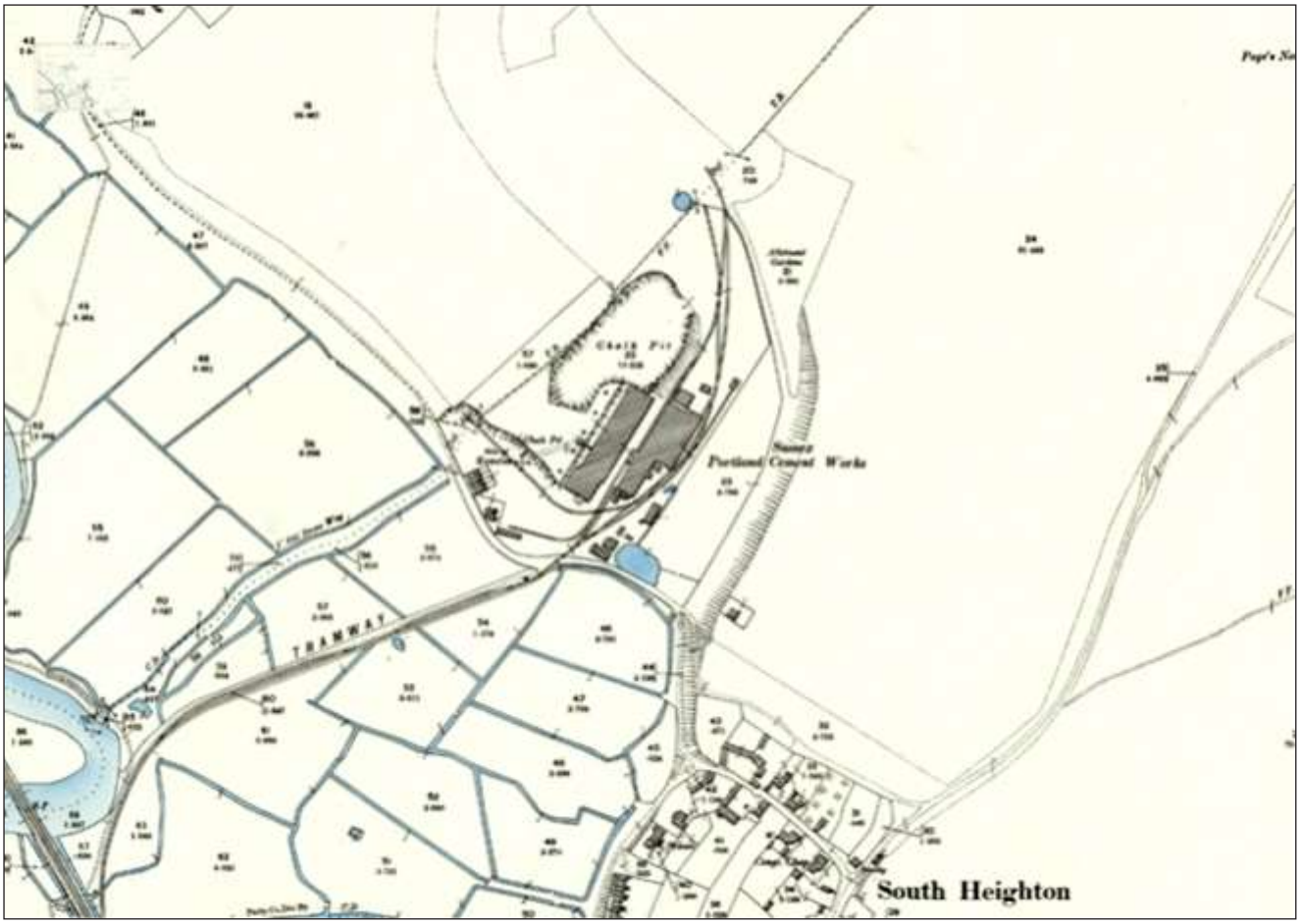

Fig 1. OS 25 inch map Sussex LXVII.15 surveyed 1898, pub. 1899

Three main sources give us 'snapshots' of the works and its plant – an article in *East Sussex News* in 1885[2], an article in the *Sussex Daily News* in 1902[3] and an internal Company plant schedule compiled just before its closure in 1924[4].

Founding of the Sussex Portland Cement Company

The Sussex Portland Cement Company Limited, (SPCC), company number 20124, was incorporated on the 5 August 1884[5] and immediately began to develop a site at South Heighton for the manufacture of cement. The company was formed under the auspices of H.B.W. (Speaker) Brand (Lord Hampden), owner of the Glynde Estate, and two civil engineers, Arthur Jack and Alfred E Carey. Brand was a landowner who reacted to the difficult agricultural economy of the 1870s and 1880s by diversifying the exploitation of his estate's assets with some entrepreneurial flair.[6] He was a long-serving Liberal politician – an MP from 1852 to 1884 and Speaker of the House of Commons from 1872 to 1884.[7] One of Brand's sons, the Hon. Arthur Brand, was also involved with the Company, being one of the initial shareholders and later becoming a Director.[8] Alfred Carey was resident engineer and Arthur Jack a senior engineer working on the harbour improvement works at Newhaven being undertaken by the London, Brighton and South Coast Railway Company (LB&SCR) at the time. Frederick D Banister, Engineer-in-Chief of the LB&SCR and designer of the harbour works, was also an initial shareholder with 100 shares, and his two adult children also held 50 shares each, but he did not apparently take an active part in running the Company.

Newhaven's harbour works, which took place between 1879 and 1893 used large quantities of cement and doubtless this prompted the idea of producing it locally. Some 17,000 tons of cement were supplied by SPCC to this project, and this represents a significant proportion of the output in the early years of the company.[9] Jack was by far the largest individual shareholder in the Company, holding 500 shares (22% of the total) at its formation and he was General Manager of the company from 1887- 1891, when he resigned and joined the Board of Directors; he was still a Director in 1902.[10] The initial issue of 2,256 shares of £10 each raised a total of £22,560, although this was called in instalments and by the first general meeting on 19 December 1884 only £2 per share had been called up.[11] The total cost of building the new works was 'under £28,000' against an estimate of £29,000.

The Company took over the Shoreham Works (at Upper Beeding) of H R Lewis & Co in 1897[12] and the Northam Cement Works of Hooper & Ashby in Southampton in 1902 (although this site was only used as a depot from 1903)[13].

The early works and its plant

The site chosen for the company's works was 18 acres of land owned by the Glynde Estate, being the end of a spur of chalk running between the Ouse valley to the west and the dry valley of Well Bottom to the east (see fig. 1). This land, together with 90 acres of 'clayland' at Glynde, was let on a 99-year lease at a rental of £250 per year, merging in royalties of 2d per ton of chalk and 3d per ton of Gault Clay. A large amount of chalk was excavated from the southern end of the spur to make room for the kilns and other plant and this was used to make an embankment across the Ouse floodplain for a siding connected to the LB&SCR's line from Lewes to Newhaven.[14] This siding is marked on fig. 1 as 'Tramway' and it extended into the works with a range of internal lines going to different parts of the site. The embankment exists today as a noticeable feature covered in trees and scrub, although all trace of the railway appears to have gone. During the initial excavation of chalk a spring was activated, producing clean water suitable for use in the manufacturing process.

Construction of the works appears to have proceeded at some pace and nearly 200 men were employed in this work. The *East Sussex News* of 11 September 1885 reported, just 13 months after the Company's formation, that the following had been constructed: 16 kilns with an output of 300 tons of cement per week, a store capable of holding over 2,000 tons of cement, wet mills, dry mills, [steam] engine house, boiler house, wash mill, a range of stabling and a range of outbuildings, which included a cooperage. A main flue shaft (chimney) had also been constructed at 100 feet high on a 20-foot-square concrete base. The works are described as being 'fitted with the most modern and economical plant in all respects'. It was reported that arrangements had already been made for 'large sales of the company's cement' and it was hoped to develop foreign and export trade via the port of Newhaven. However, it may be that this article misrepresents how far the development of the works

had proceeded; possibly the figures reported relate to the planned works as it is estimated elsewhere that chamber kilns 1-4 (total capacity 84 tons per week) were constructed in 1884, numbers 5-12 (capacity 232 tons per week) in 1891 and 13-21 (capacity 261 tons per week) in 1897.[15] This latter scenario seems to be the most likely as it is improbable that the production capacity was not built up over time. In 1895 the works employed 150 hands.[16]

The works in 1902

The *Sussex Daily News* article gives detailed information about the works in September 1902;[17] it also includes information about the Shoreham Works and it is sometimes unclear if the information provided is for one specific plant or both combined. The article was written just before the rotary kiln at Newhaven was commissioned and chamber kilns were still in use. The Shoreham part of the article does include information on the operation of the rotary kilns, and the key differences, which would apply to Newhaven as well as Shoreham, are noted here. With these caveats in mind it is possible to get a picture of the Newhaven plant at that time.

Newhaven was producing 600 tons of cement per week (c.f. the original 1885 figure of 300 tons per week). By 1902, the excavation of chalk had resulted in eight acres of level ground, with an extensive face of chalk. An electric light capable of travelling the length of the face enabled work to continue at night. A small railway, with tipping trucks, transported the chalk to a wash mill where a process 'quite terrifying in appearance' mixed chalk and clay as a small stream of water constantly flowed in. The washing complete, the mixture passed through a grating to stop flints etc. getting into the slurry which then passed to a mixer before being 'elevated' to a mill where it was ground between stones until it could pass through a fine sieve containing 32,000 meshes to the square inch. It is noted that the company aimed for a residue of only 3% (i.e. material not passing through the sieve) and that 'this part of the process was considerably neglected in most of the English works'. The slurry was pumped to drying floors which utilised waste heat from the

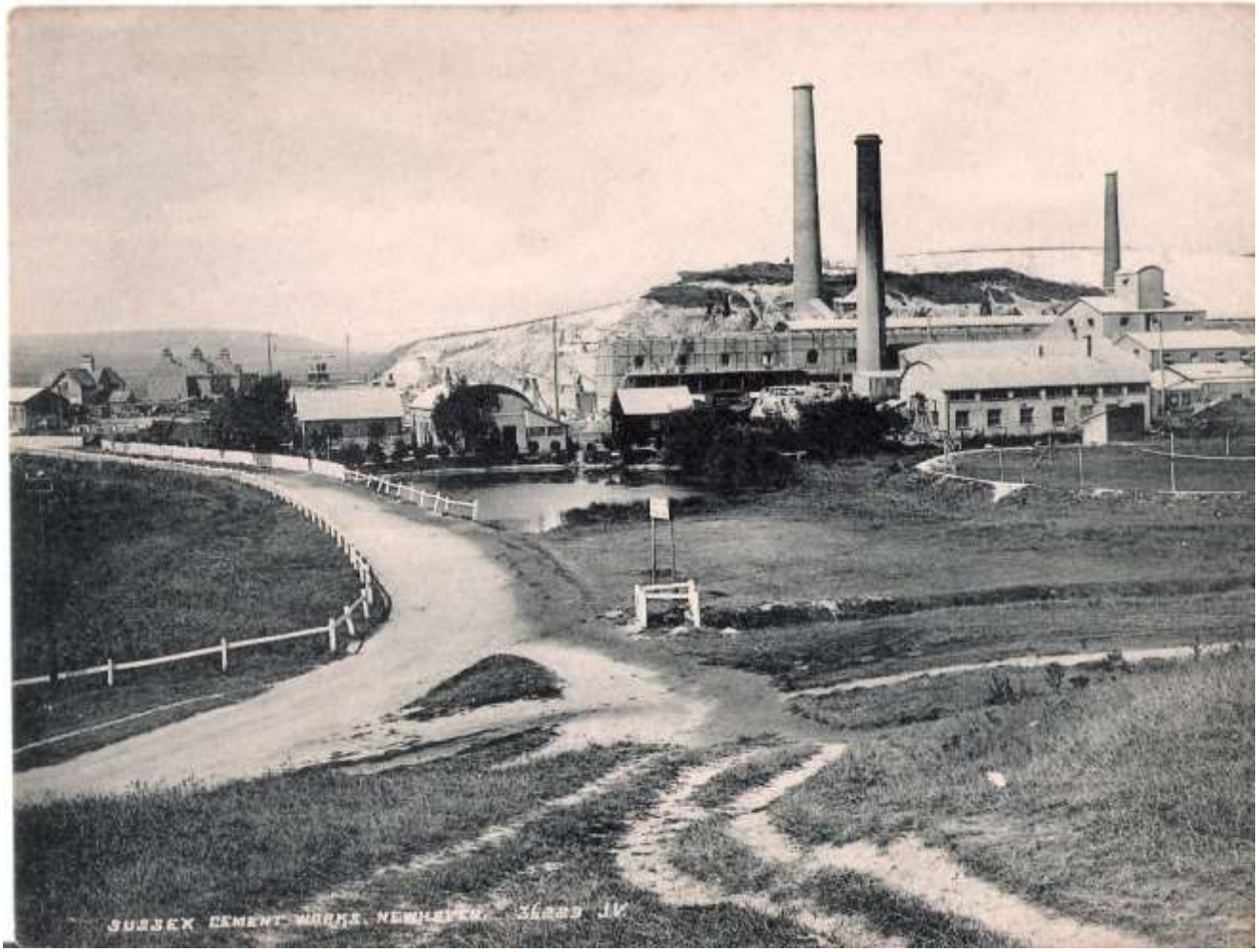

Fig 2. An image of the works, dated 1898 (Photo: Newhaven Museum A062-067)

adjoining kilns, converting it to 'slip'. As the slip dried it was broken up and wheeled to the kilns, where it was deposited with alternate layers of coke. This method used about half a ton of coke to produce a ton of cement. A total figure of 20,000 tons of coke consumed per annum is given, but this seems at odds with an output of 600 tons per week or 30,000 tons per annum of cement. There were 21 kilns, and each burn took four or five days. The kilns needed close attention to ensure the product, now known as clinker, was neither under nor over burnt as it would be of no use. All partly burnt clinker had to be carefully removed by a special staff of men.

From the kilns, trucks transferred the clinker to two large crushers, via a weigh bridge. From the crushers it was transferred to ball mills (rotating drums half full of heavy steel balls) and from thence to tube mills. The milled cement was required to pass through a sieve having 5,776 meshes per square inch. For special requirements it could be ground to pass through a 32,000 mesh per square inch sieve. It was important that the cement was 'aerated' and to this end it was conveyed via a screw mechanism the length of the store, a building capable of holding 8,000 tons, and dropped into bins. Trucks ran on rails both sides of the store and 20 trucks could be loaded with 200 tons of cement in sacks in an hour. The trucks were sheeted and then dispatched to customers. Some cement was dispatched in casks and there was a cooperage on site – this method was probably used for export orders.

Two compound condensing engines were housed in an engine house: one 400 h.p. for the dry mill and one 200 h.p. for the wet plant. An adjoining electricity plant provided lighting for the whole works as well as driving some machinery. To maintain the plant the Company had its own fitters and a large workshop with lathes, shaping machines etc.

Quality control throughout the whole process was very important and tests were carried out at every stage of the process. An on-site laboratory and testing room was used by the Company's chemists and their assistants. All the raw materials were 'constantly tested' and nothing was passed to the kilns until the chemical composition was correct. Tests included the fineness of the chalk and clay after grinding and the amount of carbonate of lime

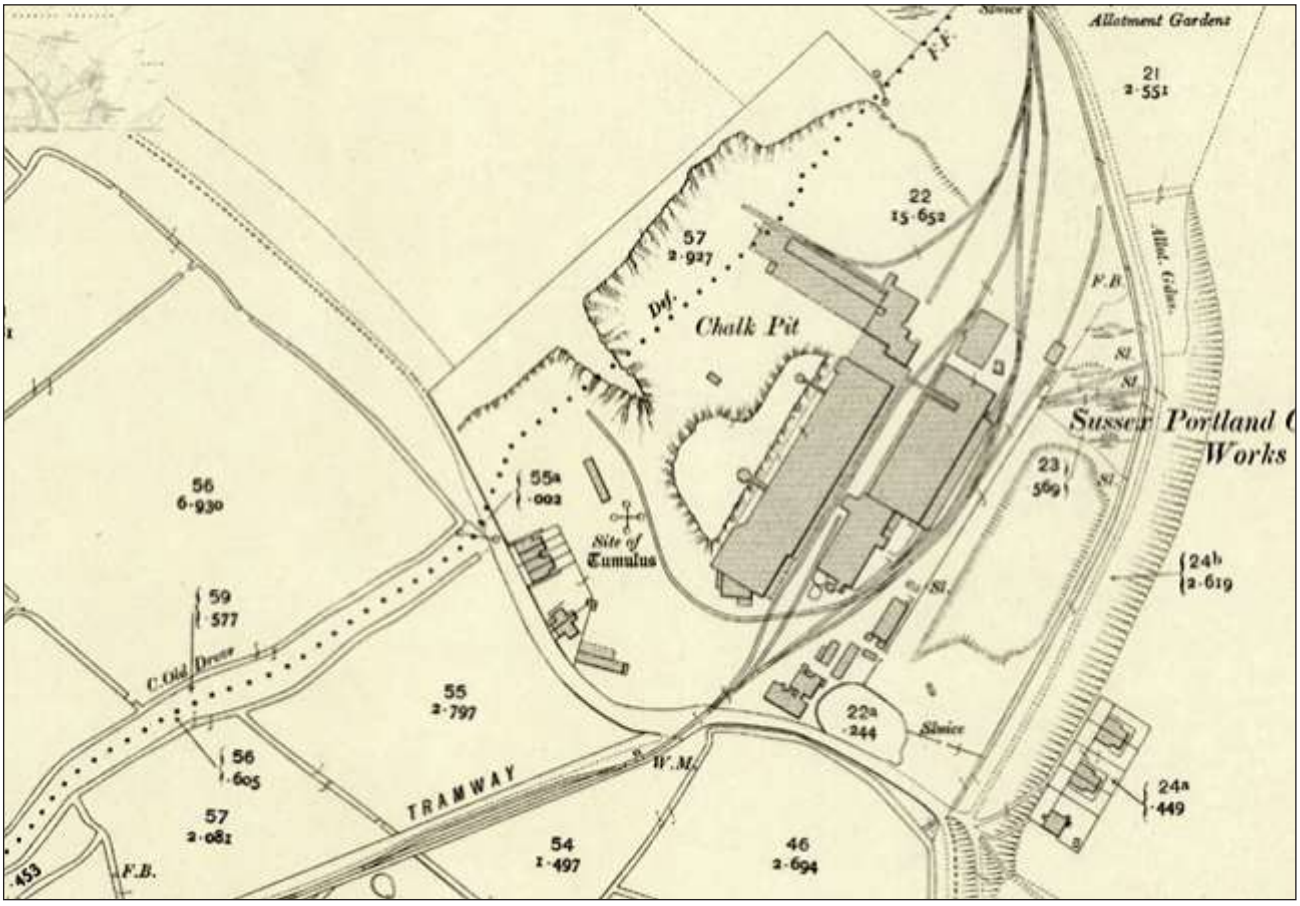

Fig 3. OS 25 inch to 1 mile map , surveyed 1908

in the slurry. This latter task was accomplished using a calcimeter – the Sussex works 'were about the first English works to adopt this instrument [from Germany]' which is noted as having become almost universal in the cement trade. Tests on the finished product were for chemical composition, fineness, setting time, specific gravity, weight per bushel, breaking strain and 'soundness'. Breaking strain tests involved making briquettes, keeping them under water and then testing samples to breaking point at each of 2, 6 and 27 days, 3, 6 and 12 months. It is claimed that the SPCC cement far exceeded the specified requirements of engineers.

It is noted that cement with different qualities was required for different applications e.g. sea-works and drainage require shorter setting times than is generally needed. SPCC seem to have been a major supplier of cement for marine-works, possibly because of its origins as a supplier to LB&SCR's Newhaven harbour project and the expertise thus acquired. Alfred Carey, a Director of SPCC and resident engineer on the harbour works, seems to have been something of an expert in the testing and technical specification of cement. He gave a paper at a meeting of the Institute of Civil Engineers in 1892 which was, in effect, a description of the current best practice for quality control and testing in the manufacture and use of cement.[18] 'Great undertakings' supplied with cement are noted as: large concrete groynes at Brighton and Hove; Marine Parade Brighton; sea walls at Brighton, Hove and Bognor; sea defence works at Seaford; dock and canal works, including the Manchester Ship Canal, Tilbury, Southampton and Newport (Monmouthshire) docks; dockyards at Portsmouth, Devonport and Pembroke Dock, and Admiralty works at Portsmouth and Guernsey. Non-marine works included naval and military barracks at Portsmouth, taking 6,000 tons. Railway works also took considerable volumes - the Company had an annual contract with the LB&SCR (owners of Newhaven harbour) for 13 years. Locally the Hotel Metropole, Brighton took 2,000 tons and annual contracts were held for Brighton Corporation, Eastbourne and Lewes Councils; the East Sussex Lunatic Asylum at Hellingly was also being supplied, as was Glasgow's main drainage works and a six-year contract for barracks at Tidworth on Salisbury Plain.

The introduction of rotary kilns

Fig 4. The Shoreham kilns, believed to be identical to the one installed at Newhaven in c.1901/2 (Photo courtesy Dylan Moore, www.cemenkilns.co.uk)

A rotary kiln was constructed at the South Heighton works in 1901/2 and Francis claims it was only the second site in the country to have this technology, which was introduced from the USA.[19] However, the position is not as clear cut as Francis states. A detailed article on the Cement Kilns website indicates that the SPCC-owned Shoreham site was a very early adopter of this technology, although many other sites were installing it at around the same time (1900/1901).[20] SPCC in fact ordered three identical kilns from F L Smidth, a Danish engineering company, two for Shoreham and one for Newhaven (see figs. 4 & 5). The Shoreham kilns

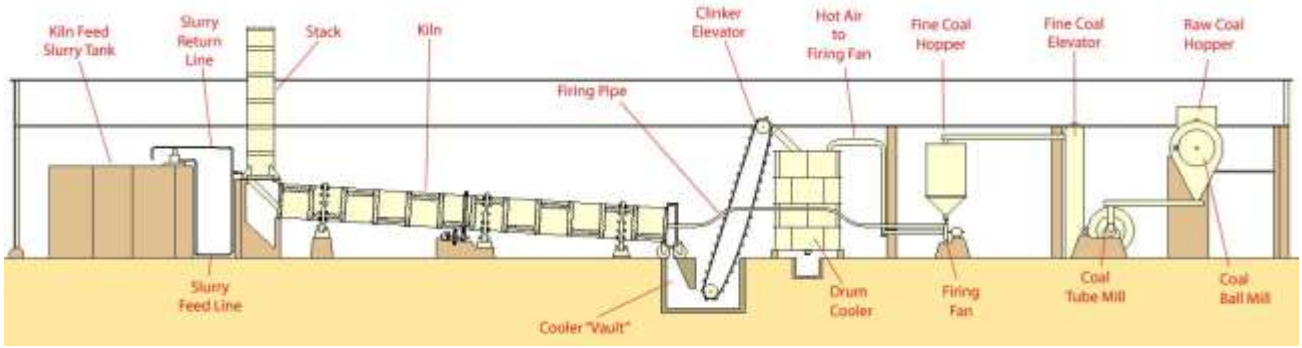

Fig 5. Diagram of a Shoreham kiln and associated plant (courtesy Dylan Moore, www.cemenkilns.co.uk)

were installed in 1899/1900 but It appears there was some delay with the Newhaven one as it did not start operating until October 1902. The Shoreham rotary kilns may have been the first fully operational rotary kilns in Britain. Newhaven was one of many works with this plant by the time it started operating. The original kiln was replaced by a larger one in 1907.[21] The operation of a rotary kiln, albeit in a post Second World War context, has been described by Fred Roberton[22] and detailed information about these kilns can be found on the Cement Kilns website.[23]

The takeover of SPCC

In 1900 Associated Portland Cement Manufacturers (APCM) was formed with a view to bringing all the diverse companies in the country under one umbrella. By July 1900, 27 producers had been acquired and another four had made agreements with APCM. Together these 31 companies accounted for 80% of the country's production. By 1907 APCM's position had weakened somewhat, due in part to increased imports and domestic competition – they now had circa 50% of the market. Further capital was raised, and further takeovers effected. In 1911 British Portland Cement Manufacturers (BPCM) was formed as a subsidiary of APCM.[24] SPCC was taken over by BPCM in 1912, an Extraordinary Meeting of shareholders being held on 8 February 1912 to agree the sale and to wind up the Company.[25]

The First World War hiatus

During World War I, APCM , the parent Company of BPCM played a small, but significant role, placing its labour and transport resources at the disposal of the Admiralty, and promising all its workers their jobs back after the war.[26] Newhaven was one of the major supply ports for the Western front and it is recorded that along with 2.2 million tons of supplies, 15,300 vehicles and 440 guns there were 2,682,800 tons of ammunition and 921,300 tons of ordnance stores shipped from here.[27] The South Heighton chalk pit and works were requisitioned for the storage of munitions and a large number of local civilian workers, many of them female, were employed there, alongside military personnel. An incident involving a burning phosphor bomb in a stack on 23 August 1918 resulted in the award of MBEs for bravery to one female and one male member of staff who were chosen by lot as representatives of the team who dismantled the stack and plunged the burning bomb into a lake at the works.[28] The exact dates that the works were used for munitions storage and work are not known but it is likely that it was the whole period of the war, and for some time after. A Coroner's report into a fatal road traffic accident caused when the works engine was crossing the road on the siding leading from the works is dated 27 March 1919.[29] At a subsequent court case the commanding officer of the Royal Army Ordnance Depot was found guilty of failing to provide sufficient warning signs and ordered to pay £4,000 compensation to the victim's widow.[30] Therefore, we know the works site was still occupied by the military in early 1919. During the army's occupation of the works, production of cement is presumed to have ceased – it simply would not have been safe or practicable to have the manufacturing process operating alongside so many munitions. Anecdotal evidence given by a former worker at the site confirms this.[31]

The final chapter

With the economy effectively bankrupt as a result of the War, the early 1920s were a difficult time for many industries, not least cement manufacture. This prompted a continuation of the amalgamation process within the industry.

An inventory of plant at the works was carried out in 1924, part of a company-wide project believed to be connected to a takeover bid which eventually failed.[32] The data was used to decide on several plant closures as BPCM reacted to the depressed market conditions. Newhaven was among the plants closed and the suddenness of the change of direction can be seen from the fact that a new wash mill was under construction at the time – the inventory report gives details stating that some parts had only excavations complete but about 75% of the brickwork was complete for two finishing mill buildings.[33] Some plant from Newhaven was transferred to the Shoreham works.

There is insufficient space here to detail all the plant and equipment, but the report provides some interesting insights. Chalk was still being blasted from the quarry face, some 200 yards from the rotary kiln, and was broken, loaded and pushed in 1-yard tip wagons, all by hand. A new method was about to be introduced, utilising a Whittaker Steam Shovel working on 'galleries' to dig and load chalk into ¾-yard trucks. The chalk would then be dumped into

crushers near the chalk face, the crushed chalk being moved by conveyors to the roughing mill. Clay was still being obtained from Glynde, where it was loaded by hand into railway trucks utilising sidings taken up to the 12-foot-high pit face. This illustrates that the method of work was still very labour intensive, and presumably relatively costly, which may have influenced the decision to close the plant. The site had one Smidth rotary kiln 110 feet long and 6 feet 10 3/4 inches in diameter, presumably that installed in 1907. There were also 21 chamber kilns "to be sold". It is not known what happened to the majority of the plant on site, some was probably sold whilst the remainder scrapped.

An unanswered question is why two large ponds, shown on successive editions of large-scale Ordnance Survey maps were dug at the eastern edge of the works. Sometime between the 1898 and 1908 maps a large depression has been created. By 1929 this appears to be a lake extending to 1.618 acres, with a further lake of 0.355 acres just to the north of it. It is possible that these were excavated to provide alluvial clay to the works, although, as stated, Gault Clay from Glynde was still being used at the time of closure in 1924. Today these ponds, along with another to their north of unknown date, are very attractive nature-rich features which give the residential caravan site now occupying part of the pit its Three Ponds name.

Conclusion

The use of concrete in major civil engineering works grew rapidly in the last three decades of the nineteenth century as the technology to mass produce it, knowledge of its properties and skill in using it, all rapidly evolved. The Sussex Portland Cement Company and its works at South Heighton was one of many producers established around the country and its story, from foundation to demise, is not untypical. Competition and the need to find a 'USP' (unique selling point) led to its developing expertise in both quality control to provide a superior product and in manufacturing cement suitable for marine works such as harbours and sea defences. The Company had close links with both the Glynde Estate and the LB&SCR Company, which undoubtedly stood it in good stead, especially in its early years. The early adoption of technologies such as the rotary kiln and testing equipment and its takeover activity show that SPCC was a forward-looking enterprise, at least until c.1902. Its demise was no doubt a reaction to the depressed market conditions prevailing in the early 1920s, but it should also be noted that its supplies of chalk and clay within its original leases were probably nearing exhaustion and the plant needed investment to make the site more productive. It will not have helped that the works were closed for the duration of the First World War to facilitate the munitions depot role it took on.

The final image (fig. 6) is one likely to upset any industrial historian – the felling of one of the chimneys, probably sometime in the late 1920s.

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1. See for example Martin R, *The history of Shoreham Cement Works,* Sussex Industrial History 34 (2004), p26ff; Roberton F, *Southerham Cement Works 1948-1971*, Sussex Industrial History 50 (2020), p43ff; Francis A J 1977 *The cement industry 1796-1914: a history,* David &

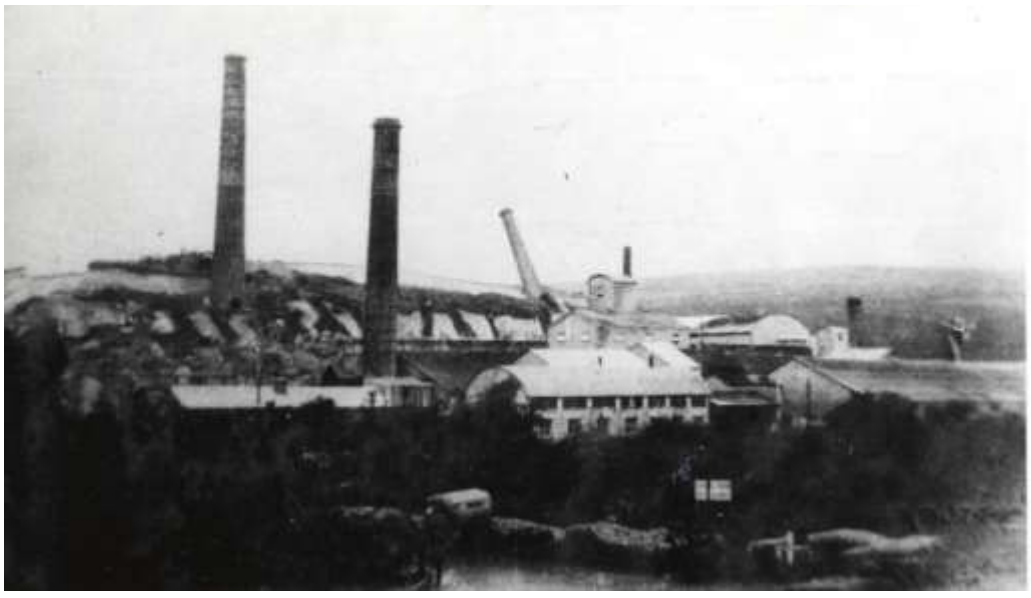

Fig 6. Felling of the easternmost chimney of the chamber kilns, probably late 1920s (Photo: Newhaven Museum A022 P077)

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2. Anon 1885 East Sussex News 11/09/1885 (transcription in Lusted A, 1985 *The Electric Telepherage Railway* The Glynde Archivist 2 16-19). This article describes 'an official inspection of the works' attended by the shareholders and local dignitaries. It gives considerable detail about the founding of the Company and the newly built works and is the source of much of the information in the sections dealing with this period. It also has a similar account of the opening of the associated overhead electric Telepherage Railway built at Glynde for the transport of clay destined for the works (see also *The Times (London)* 19/10/1885, 4 and M I Pope 1987 *The story of the Glynde aerial runway* Sussex Industrial History 17, 13-20).
3. Anon 1902 *Sussex Industries No.2 – Cement Making: Sussex Portland Cement Company* Sussex Daily News 15/10/1902. This article is the source of much of the information concerning the early years of the Company and the works.
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7. Pollard A F (revised by Matthew H C G) 2009 *Brand, Henry Bouverie William, first Viscount Hampden* Oxford Dictionary of National Biography online (www.oxforddnb.com accessed 06/06/2020)
8. PRO BT 31 3373/20124 Document 4
9. The harbour works at Newhaven, were constructed by the London, Brighton and South Coast Railway Company. The construction of Newhaven's 2,800 ft long breakwater's foundations involved the use of a large steam powered concrete mixer capable of producing 104 tons of concrete per load and located on Newhaven's east quay. A special 'steam hopper' vessel carried large tarpaulin bags of concrete which were dropped through the bottom of the boat to form the breakwater's foundations (information from Newhaven Historical Society's Museum reference A003 P045). However, the major works of the breakwater and associated promenade were mostly completed by 1883 i.e. before the works were established. The 17,000 tons referred to were presumably used to finish the breakwater and on the East Quay development, but this has not been confirmed.
10. Anon 1902 *op cit.*
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13. www.cementkilns.co.uk/cement_kiln_northam.html (accessed 05/01/2021)
14. PRO RAIL/797/26 Siding, Portland Cement/ LB&SCR. This document contains details of the agreement between the railway company and the cement company. I am grateful to Derek Eager for drawing this document to my attention and supplying a transcript of it.
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CHICHESTER GASWORKS
Supplying a Small Cathedral City from 1823 to 1956

Alan H J Green

Fig 1. A tranquil turn-of-the-century view of Eastgate Square with a magnificent gas lamp standing on its own plinth in the middle of the road. Much larger than the usual standards, its hefty casting incorporated a pump whose spout can be seen on the left hand side. Sadly only St Pancras church survives today; the gas lamp was ousted by an electric one in 1911 and the other buildings perished in the 1930s. (Author's collection)

Let there be light…

Nineteenth century Chichester was something of a one-horse town whose corporation had some rather antipathetic attitudes to new – and even not so new – technology: for example they did not concede that there was a need for a sewerage system until 1892, despite successive cholera outbreaks. As such it may seem strange that Chichester was amongst the first towns to be lit by gas, which it was in 1823. The reason for this was undoubtedly because the Corporation were *not* a party to it as the Guardians of the Poor had been charged — somewhat perversely — by Act of Parliament way back in 1753 to light the city's streets as an adjunct to setting up a joint workhouse for all the parishes, which was the main purpose of the Act.[1]

At the start of the nineteenth century this lighting was by means of oil lamps attached to buildings which, according to a contemporary description, gave only as much light as a candle.[2] The Guardians of the Poor decided to improve the situation and in 1821 promoted a Bill to light the city with gas which, with the support of the MP William Huskisson, was enacted.[3]

…and there was light

In December 1822 the Guardians had entered into a 21-year contract with James Ward and Major Ainger to supply this service, they being required to provide 'not more than 100 iron pillars…on or near the kerbstones' to carry the gas lights.[4] Ward and Ainger bought for £400 a piece of orchard ground

south of the city on the east side of Stockbridge Road which abutted the newly-constructed canal basin to the south and, on its east side, a new road (now known as Basin Road) and cathedral lands belonging to the Prebend of Bracklesham.[5] Conveniently the coal for the gasworks could come all the way by sea without the need to transfer the cargo from ship to road at Dell Quay. The canal basin was some distance from the Cathedral, and at that time was also remote from habitation, so the inescapable pong of gas production would not give rise to too much public nuisance. However, as the nineteenth-century city spread down towards the railway, living in the south did come with an olfactory challenge.

On this land Ward and Ainger spent '£6,000 and upwards [on building] a gasometer [*sic*] and works, buildings and erections for lighting and supplying the City of Chichester with gas'.[6]

John Marsh, that great recorder of the goings-on in Georgian Chichester, wrote in his journal in April 1823 that erection of the gas holder and pipe-laying in the streets commenced about Lady Day. He records having first seen the streets lit by gas the following October when he returned from his travels, describing the effect as "strikingly brilliant". Then, in November 1824, he records that an intrepid Mr Green*, set off from the gasworks in a balloon filled with gas and managed to reach Steyning. Mr Green was obviously not a smoker.

Fig 2. A view of North Street shewing two of the original Georgian gas lamps still in service some 80 years after installation. (Author's collection)

* Not a relative — as far as I know.

In 1844 the Gas Company ran into in trouble; James Ward had been declared bankrupt and died, whilst Major Ainger had also departed this life leaving his business affairs in the hands of his youngest son, William, who was seemingly out of his depth. Running of the company was taken over by a group of seven Chichester men, led by Charles Dixon, a civil engineer, and in September 1844 the business was legally assigned to them.[7]

The previous April a deed of transfer had been agreed moving responsibility for lighting the city from the Guardians of the Poor to the Corporation with whom, logically, it should have rested in the first place. As a result negotiations began with Mr Dixon over transferring the lighting contract to the Corporation. Dixon was quick to point out that the previous contract with Ward & Ainger had been on low terms and did not include for provision of additional lamps, so he offered a new 21-year deal including this proviso and a service which allowed for all lamps being lighted 'by a little after sunset' and extinguished 'a little before sunrise'.

The Corporation's newly-formed Gas Committee consulted 'a gentleman well versed in Gas Affairs' who recommended entering into such a contract with Dixon, and so it was, but no sooner had the ink dried, Dixon requested the contract be transferred from his sole name to those of his cohorts, Messrs Cooper, Adames, Fuller, Paull, Pratt Jnr and Cottrell – or any four of them. This strange request was agreed to, and the 21-year contract was sealed to the new company in October 1844. Under it the Gas Committee quickly ordered the installation of several new lamp posts.[8]

The street lighting was paid for by the levying of a gas rate on the populace which started at 4d in the pound in 1844, and this funded the six-monthly payments to the Gas Company of £365. The Corporation decided in 1849 that it was time for them to leap into the nineteenth century by lighting their Council House with gas, and paid the Gas Company £58 16s 6d (£58.82) for fitting it out with the necessary pipes and burners.[9]

By 1852 the six-monthly payment to the gas company had risen to £380 to take account of the additional lamps installed, and two years later the Market Cross was added to the contract, it being lit by eight fishtail burners. Despite this extra provision, the gas rate remained resolutely at 4d in the pound.[10] The Gas Committee decided in March 1860 to appoint an Inspector of Gas Meters and

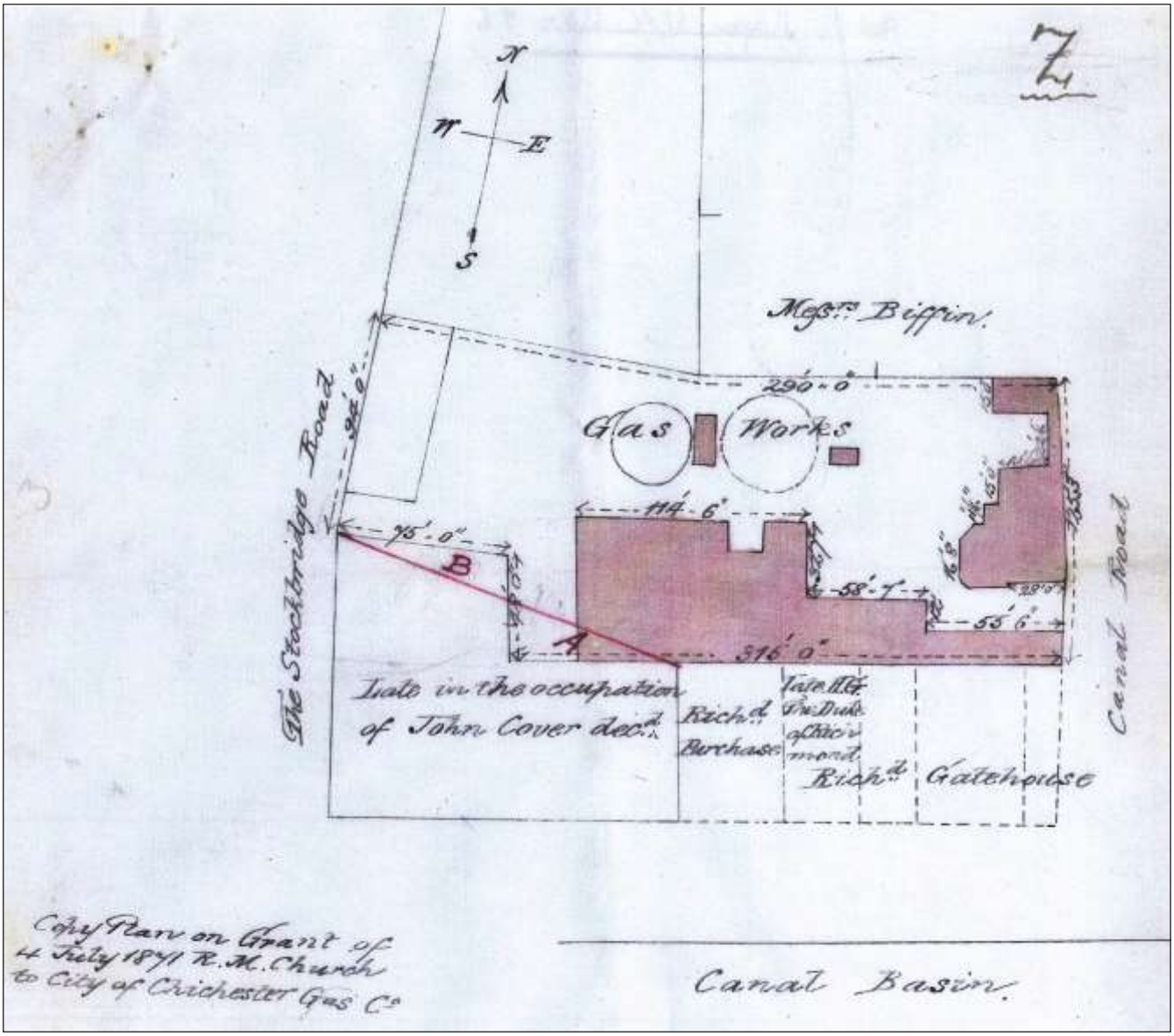


Fig 3. A plan of Chichester Gasworks dated 1871, still more or less as it was built. The dotted areas to the south are the coal staithes used by coal merchants. (WSRO)

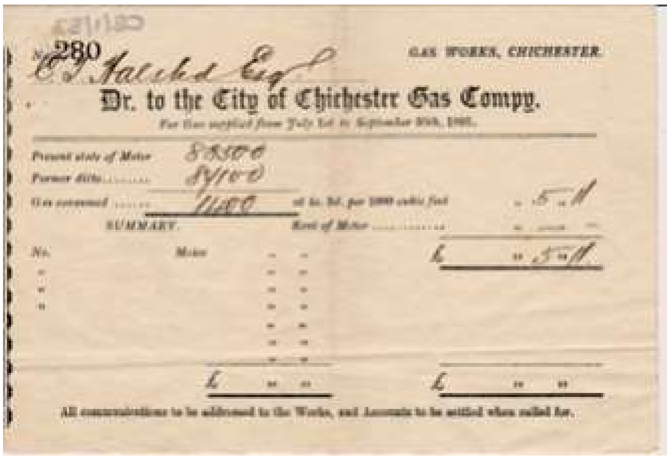
awarded the post to Charles Everett, who already held the post of Chief Superintendent of Police. This appointment, and in particular its appointee, might have caused unease to both the Gas Company and householders who could sense being under police investigation for fiddling the meter when the inspector called![11] The contract was renewed in 1865 for another seven years with the cost for supplying, maintaining and lighting each lamp post rising to £4 10s (£4.50) per annum, but this increase was cleverly offset by the Corporation who reduced the hours of lighting by half an hour at each end of the night![12]

Ownership of the company changed again in June 1868 when Robert Mark Church of Weymouth purchased the undertaking and obtained an Act to set up the City of Chichester Gas Company as a body corporate, with a capital of £18,000 to be raised in £10 shares. The Act also empowered him to extend the works and area of supply.[13]

As we have seen, coal initially came in by sea and canal, but after the railway arrived in 1846 economics dictated that rail was a cheaper option, and sidings were installed south of the station for this traffic. The coal had to be unloaded from rail wagons and transported across the road in carts, a laborious process which could be eased by a direct rail connection. To this end the London Brighton & South Coast Railway (LB&SCR) included in their 1876 General Purposes Bill the provision of a connection across Stockbridge Road into the gasworks. Chichester Corporation vigorously opposed this section of the Bill opining that:

> The existing level crossing of the Company [i.e. the LB&SCR] is a present production of much inconvenience and delay to traffic entering Chichester by the Selsey road… if the powers sought are granted… the inconvenience and delay will be so seriously augmented to lead at times to an almost total cessation of traffic in the Selsey road.

In the light of today's traffic congestion caused by the Stockbridge Road level crossing with its ten train movements per hour, this seems a piffling objection, but the Corporation succeeded in defeating the Bill and no such connection was ever provided.[14]


No. 280
C T Halsted Esq

GAS WORKS, CHICHESTER.

Dr. to the City of Chichester Gas Compy.

Present state of Meter	88500		
Former ditto	87400		
Gas consumed	1100		5 /
SUMMARY		Rent of Meter	—
No.	Meter		£ 5 /

£

All communications to be addressed to the Works, and Accounts to be settled when called for.

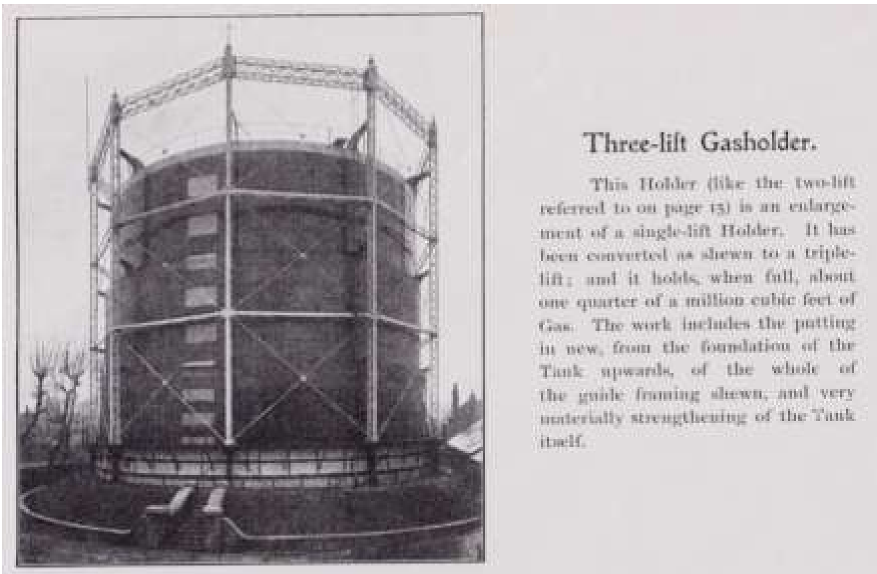
Fig 4. An invoice from the City of Chichester Gas Company for gas supplied to C T Halsted (he of Halsted and Sons the ironfounders) and the rent of a meter. No address for the billed premises is given, but at this time CT Halsted was living at 40 North Street. (Author's Collection)

Expansion

The City of Chichester Gas Company set about extending their gasworks in 1905 in order to supply more homes in the city and serve outlying villages. The new installations, which included two large gas holders, were completed in 1907, and in February that year they produced an illustrated brochure to mark the opening, whose effusive introductory page ran as follows:

> During the past two years the Company have completely remodelled and partly reconstructed their Works at Stockbridge, bringing them fully up-to-date. Allowing for a normal increase in population of the District, the Works are designed to afford an ample supply of Gas for at least another decade. And it is believed that, for a City of the size of Chichester, the Works are among the finest and best equipped to be found today in the Country.
>
> The Directors of the Company have thought that a description of these New Works, which bear so intimate a relation to the welfare of the City of Chichester and immediate surroundings, will not be without interest to Cicestrians; to this end a series of Photographic Illustrations have been prepared, which, with descriptive particulars of the various apparatus referred to, are submitted in the following pages.
>
> The New Works have been carried out to the designs and under the superintendence of the Company's Engineer, Mr T. E. PYE, FCS, AMIMechE; the bulk of the Structural Engineering work by Messrs S. CUTLER & SONS of Millwall; and the Building Work by Messrs. J O HOLT & SONS, of Chichester.

There then followed photographs and enlightening descriptions of the works, including the three-lift gasholder, the scrubbers, the washer and the new offices and showroom facing onto Stockbridge Road.


Three-lift Gasholder.

This Holder (like the two-lift referred to on page 13) is an enlargement of a single-lift Holder. It has been converted as shewn to a triple-lift; and it holds, when full, about one quarter of a million cubic feet of Gas. The work includes the putting in new, from the foundation of the Tank upwards, of the whole of the guide framing shewn, and very materially strengthening of the Tank itself.

Fig 5. An extract from the 1907 brochure describing the new three-lift gasholder. (Author's collection)

Fig 6. The visit of the Mayor and Corporation to the extended gasworks on 26 February 1907. The Mayor, Walter Gibbings sporting a top hat, is seated front row centre flanked by his councillors and aldermen. The rest of the assembled company are presumably directors and senior staff of the company. This pre-addressed postcard was issued by the Company to encourage customers to enquire about new appliances.. (Author's collection)

Fig 7. A view of Chichester looking north from the canal with the enlarged gasworks in the middle ground. To the left is the chimney of the retort house and to the right the two towers are the scrubbers which wash ammonia out of the gas. One of the gasholders provides the back drop. (Author's collection)

The Mayor and Corporation made an official visit to inspect the extended gasworks on 26 February 1907 and were doubtless impressed by the new installations which, *inter alia*, were fulfilling their contract for lighting the city's streets. Little did the company's directors realise that their honoured guests were to turn against them in under two years' time when they started courting the new electricity company.

To capitalise on this increased production capacity the company were empowered by the City of Chichester Gas Act, 1911[15] to extend their limits of supply to Bosham, Chidham, Funtington, Boxgrove, Lavant, Merston and West Stoke and to raise £20,000 in capital to fund the works.

The enlarged gasworks naturally occasioned an increased demand for coal and this caused the LB&SCR to rethink a rail connection across Stockbridge Road which was drawn up in 1908. However it was not for a standard gauge line which would enable wagons of coal to be unloaded within the works site, but for what is described as a 'portable tramway' of 2' 3" gauge with a fixed level crossing set into the carriageway. An agreement was drafted but, as the coal would still have to be double handled, it is probably not surprising that the Gas Company wrote to the LB&SCR saying that they had 'no desire to proceed at the present time'.[16]

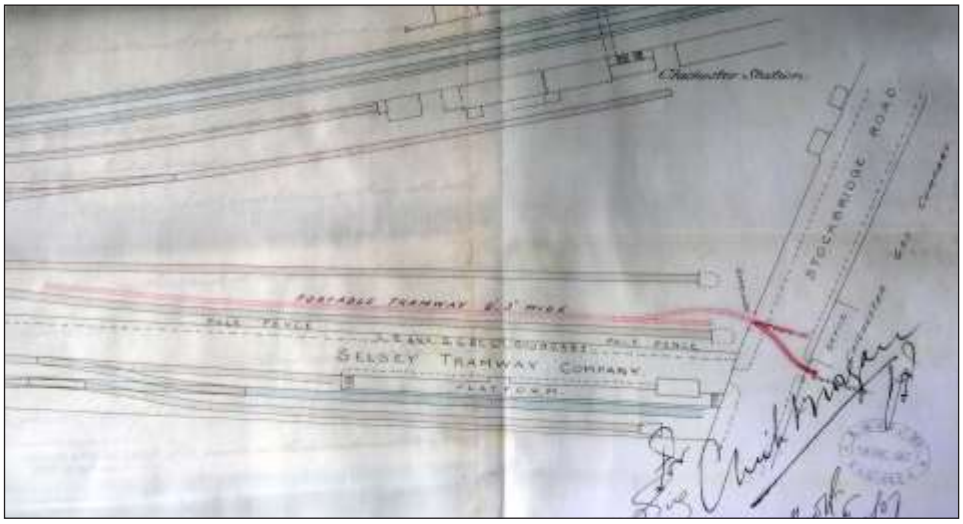


Fig 8.The LB&SCR 1:480 scale drawing shewing the proposed tramway across Stockbridge Road for transfer of coal between the railway sidings and the gasworks. It also shews part of the adjacent Selsey Tramway station – probably the largest-scale survey that was ever plotted of it. (WSRO)

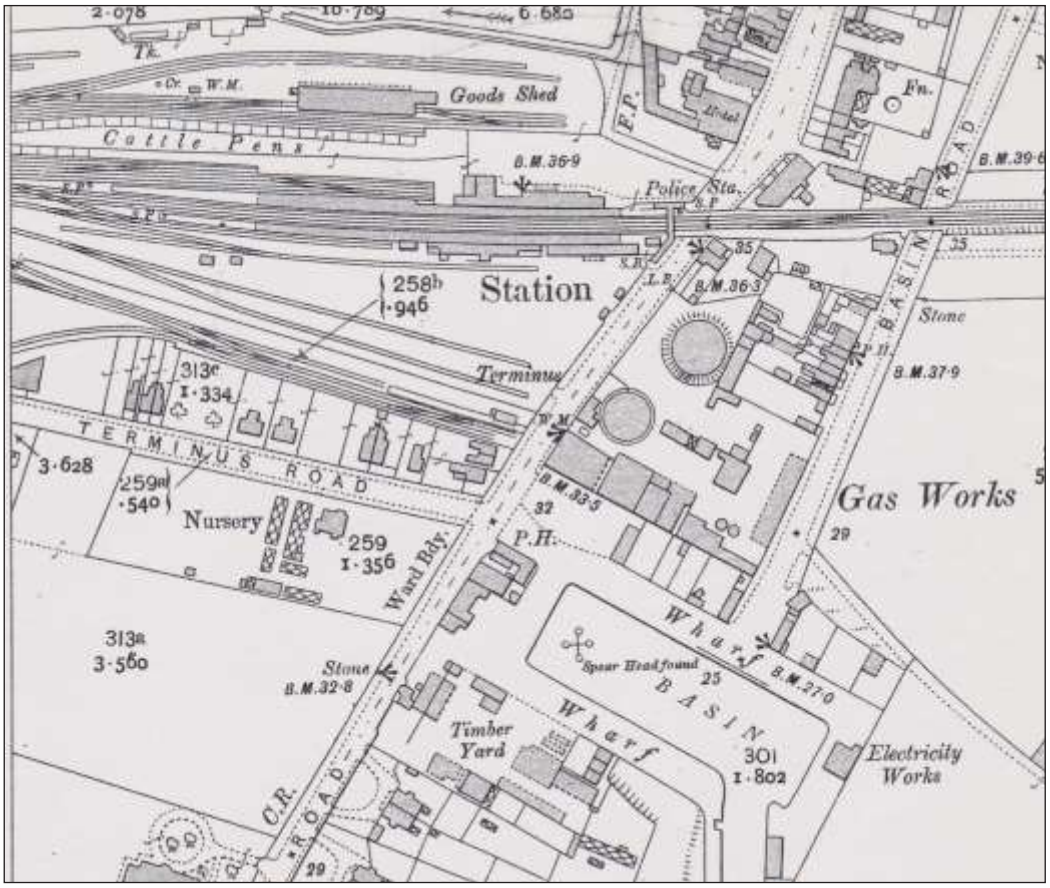


Fig 9. An extract from the 1911 1:2500 OS shewing the remodelled gasworks site which has extended northwards towards the railway. The coal staithes are still in position south of the boundary. The map shews that by this time the city had spread southwards with dwellings to both east and west of the gasworks site. It also shews at the east end of the canal basin the electricity works, newly arrived on the Gas Company's doorstep.

Fig 10. A section of the gasworks wall in Stockbridge Road which includes a doorway. This shews quite clearly the predominant use of retort-linings with brick used for the piers and quoins and lacing courses at the top. The wall is capped with concrete. This section of wall was demolished after 1996 when the site was sold to McCarthy and Stone. (Author)

Fig 11. A piece of retort lining, once part of the gasworks wall which somehow found its way into the author's garden. The curvature can clearly be seen. (Author)

A new high wall was built around the site, composed principally of recycled retort linings. These linings were firebricks, curved to match the inside of the retorts, which had a limited life and needing frequent replacement. The intense heat caused many of them to vitrify and thus become very weather-resistant, creating an ideal - and free – building material. The Gas Company obviously marketed this plentiful brick alternative to local builders for it is to be seen in several houses and garden walls around the city.

Unwelcome Competition

An electricity works was opened at the east end of the canal basin in 1909 by the Chichester Electric Light and Power Co who were immediately set on a collision course with the Gas Company. Its DC generators were driven by oil engines whose exhaust would have added to the miasma from the gasworks, and their steady thumping would contribute a new nuisance to this beleaguered part of the city — noise! With a canal basin, a gasworks, two railway stations, coal yards and now a power station, Stockbridge had become the city's industrial area.

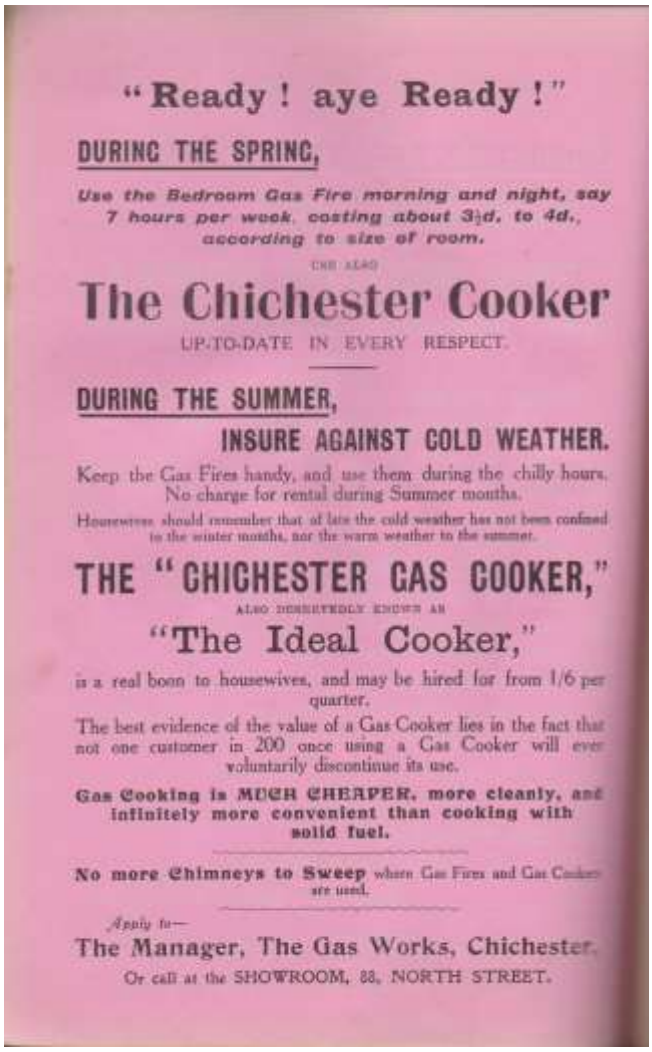
That same year the Corporation had entered into a new five-year contract with the Gas Company for street lighting but then, almost immediately, advertised for new tenders for the service, the method of illumination being unspecified. The new contract was awarded to the said Electric Light and Power Co and the existing contract with the Gas Company was unceremoniously determined after only one year. The Gas Company, understandably, took umbrage, seeking advice over the legality of this and refusing to cooperate over removal of their now-redundant lamp posts. This got them nowhere, and from 1 January 1911 the streets of Chichester were lit by the new-fangled electricity.[17]

There then ensued a vicious and long-running turf war between the two adjacent utility companies over domestic supplies; the new electricity was fast attracting public attention with its offer of clean flick-of-a-switch lighting. The Gas Company issued a pamphlet titled *New Lamps for Old* in which they argued the superiority of gas lighting on both price and efficiency. They also made dubious claims about gas lighting being 'more healthy and sanitary as the gas flame has a corrective and sterilizing effect on the air' and that it also 'provides a corrective to damp atmospheric conditions.' They ended the pamphlet announcing their intention to set up in their showroom at 88 North Street a dark room lit by metered supplies of both gas and electricity to enable visitors to judge for themselves the relative merits of the two 'illuminants'.

Unfortunately for the City of Chichester Gas Co the take-up of electricity for domestic lighting purposes was to prove exponential, as it did nationally, but in the 1950s there were several houses in Orchard Street, where I was brought up, that were still gaslit. One of my boyhood jobs was for an old lady who lived in one such and it was to take the accumulator that powered her wireless to the cycle shop for recharging every week, carrying the heavy glass jar of sulphuric acid against my bare little legs.

The Corporation were greatly embarrassed when their favoured Electric Light & Power Company was declared bankrupt in 1921 after only 12 years trading. They immediately took over the undertaking and ran it themselves, thus saving the city's streets and many of its houses being plunged into darkness. They now owned both the street lighting infrastructure and its means of supply – but that's another story![18]

That same year, 1921, the Gas Company modernised and further extended their gasworks, this time adding a water gas plant;[19] demand for gas was obviously still high enough to warrant it.



"Ready ! aye Ready !"

DURING THE SPRING,

Use the Bedroom Gas Fire morning and night, say 7 hours per week, costing about 3½d. to 4d., according to size of room.

THE ALSO

The Chichester Cooker

UP-TO-DATE IN EVERY RESPECT.

DURING THE SUMMER,

INSURE AGAINST COLD WEATHER.

Keep the Gas Fires handy, and use them during the chilly hours. No charge for rental during Summer months.

Housewives should remember that of late the cold weather has not been confined to the winter months, nor the warm weather to the summer.

THE "CHICHESTER GAS COOKER,"

ALSO DISSENTEDLY KNOWN AS

"The Ideal Cooker,"

is a real boon to housewives, and may be hired for from 1/6 per quarter.

The best evidence of the value of a Gas Cooker lies in the fact that not one customer in 200 once using a Gas Cooker will ever voluntarily discontinue its use.

Gas Cooking is MUCH CHEAPER, more cleanly, and infinitely more convenient than cooking with solid fuel.

No more Chimneys to Sweep where Gas Fires and Gas Cookers are used.

Apply to—

The Manager, The Gas Works, Chichester.

Or call at the SHOWROOM, 88, NORTH STREET.

Fig 12. An advertisement for the Chichester Gas Co placed in the 1909 Chichester Directory extolling the virtues of gas fires and cookers. It mentions their new showroom at 88 North Street. The showroom later moved to 67 South Street. (Author's collection)

The end draws nigh

The City of Chichester Gas Co suffered the ignominy of being taken over by a Bognor organisation, the Bognor Gas & Electricity Co, in 1939 but Chichester's gas was still produced in Stockbridge Road.[20] Following nationalisation of gas supplies in 1948, the mammoth Portsmouth Gasworks at Hilsea* was enlarged in order to supply other towns at some distance away, including Chichester, Bognor and Petersfield. Thus it was that Chichester gasworks ceased production in 1956 and demolition of all but the gas holders commenced that May.[21] The air quality at the scruffy end of the city improved enormously but the gasholders remained in use to store the imported gas and regulate its pressure. The gas showrooms were moved to 62/63 East Street where they remained until British Gas was privatised in 1986 after which anybody – including 'Sid' (remember Sid?) — could sell and install gas appliances.

The south end of the gasworks site was sold to the GPO who built a new, architecturally-challenged sorting office there which opened in 1964. This occasioned the demolition of sections of the aforementioned wall in Basin Road and Canal Wharf, along with half of that in Stockbridge Road. The north end of the site remained in use by the Southern Gas Board as a maintenance depot, even after the arrival of North Sea Gas in 1970 brought about the demise of the gasholders, but in 1996 British Gas withdrew and sold the site to McCarthy & Stone for redevelopment as retirement homes. This required much site remediation to remove the nasty by-products of gas making which had leached deep into the ground, and brought about the destruction of the last section of the wall facing onto Stockbridge Road.

However, way back in 1964 one tiny section of the wall in Basin Road had had a reprieve by the GPO as it still served as a boundary wall to an adjoining private house – and it stands to this day as a souvenir of the gasworks. Sadly, Chichester District Council's plans for wholesale redevelopment of the area south of the railway will destroy this, leaving no physical reminder of 133 years of gas production in this small cathedral city.

* Hilsea Gasworks was an impressive undertaking with its own internal railway system. Its distinctive bouquet always pervaded approaching trains, providing a timely warning that Fratton was the next stop.

Fig 13. The sole remaining section of gasworks wall in Basin Road. Its future is under threat from wholesale redevelopment of the area. (Author)

Envoi

Back in 2015 the 'Mystery Photograph' in SIAS Newsletter 166 was of the above-mentioned section of gasworks wall in Basin Road (for which I — of course — claimed the prize) and it prompted me to write up the research I had been carrying out on the subject which was published in Newsletter 167. It came with a promise of an extended article for *Sussex Industrial History* when my researches were complete. Somewhat belatedly that promise is hereby fulfilled.

References

1. 26 Geo II Cap 99, 1753 *An Act for the Better Relief and Employment of the Poor and for enlightening the Streets, Passages and Open Places within the City of Chichester and several Places adjoining thereto and the Close in the Said City.*
2. WSRO MP19 Memoirs of William Hoare
3. The resulting Act is lost – there is not even a copy in the Parliamentary Archive!
4. WSRO Raper Uncatalogued Box 96 Case for Counsel in a 1911 dispute about removal of the lamp posts recites articles of agreement with Ward & Ainger
5. WSRO Raper Uncatalogued Box 101, Abstract of Title to the gasworks site 1867, which recites earlier leases
6. *ibid*
7. *ibid*
8. WSRO Chichester City Archive C/6 – council minute book 1840-1844
9. WSRO Chichester City Archive C/7 - council minute book 1844-1851
10. WSRO Chichester City Archive C/8 - council minute book 1851-1858
11. WSRO Chichester City Archive C/9 - council minute book 1858-1864
12. WSRO Chichester City Archive C/10 - council minute book 1864-1868
13. 31&32 Vict Cap lxxvi *An Act for better supplying with gas the City of Chichester and adjoining Places; and for Other Purposes.*
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15. 1&2 Geo V Cap xiv 1911
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18. WSRO Chichester City Archive - CA/18 Committee minute book 1920-1923
19. T G Willis *Records of Chichester – Some Glimpses of its Past* T G Willis, Chichester 1928
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21. *Hampshire Telegraph* 25 May 1956 - a report about the Corporation's concern about the scruffy state of the Southgate area of the City.

A STREET AT WORK OVER TIME

Continuity and Change in Bond Street, Brighton

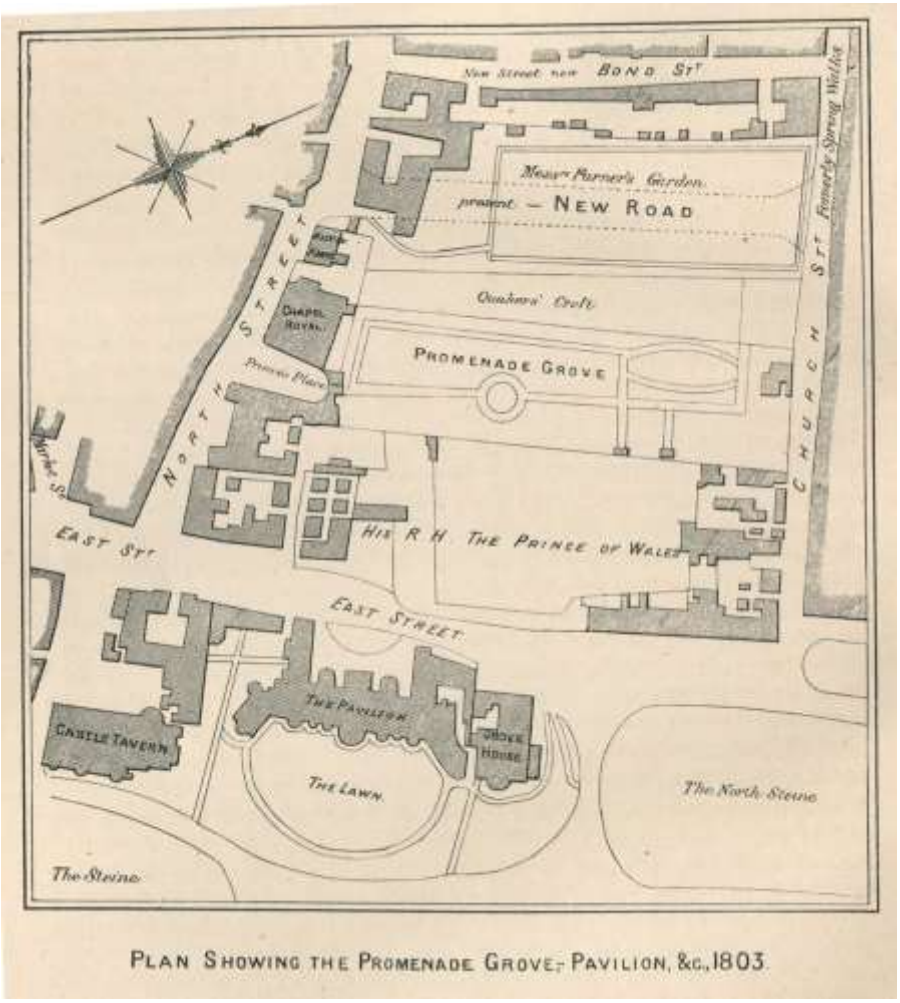
Geoffrey Mead

Introduction

This article was researched and written in the midst of the Coronavirus crisis in 2020/21 when access to archives and library sources was not possible. Reference material was that which was in the author's collection at that time or available on the internet. A single directory was sampled for each decade for the years 1914-1974. These are the earliest and latest directories I possess and indeed 1974 was the last Kelly's Directory published. Additional information was utilised in the form of published works, selected advertisements from a range of 19th and 20th century street directories and newspapers, from the James Gray photographic collection and from the 'My Brighton & Hove' and NLCA websites. This is not a comprehensive local history project but one written with IA interests in mind; thus the range of domestic traders, bakers, greengrocers, hairdressers, etc., have largely been omitted after their introduction in the 1914 directory. One significant exception to that is the inclusion of the removal and auctioneers firm, Mead & Co; my grandfather Ernest Henry Mead established his commercial premises in Bond Street from 1913 and our name was 'over the door' until the late 20th century. My father grew up above the shop along with 13 brothers and sisters(!) and worked at Bond Street all his working life apart from his service in WWII.

Bond Street – its history

Bond Street is a small road running north from North Street, now part of the North Laine Conservation Area. It was developing in the 1780s as one of the first extensions of the town across North Street. Bond Street was renamed as New Street in 1794, but in 1805 reverted to Bond Street as New Road was opened immediately east of it, across what had been the Furner brothers' market garden.[1] The origin of the name is not recorded and Bond may have been a builder or developer at that time. The area of Bond St prior to its development had been part of the 'tofts and crofts', that area north of the town containing a range of farm buildings, stables, cart sheds and hay barns, the plots running north to Backside Lane; this was later renamed for more genteel ears as Spring Walks, which in turn became Church St. It is a testament to the perverseness of Brighton that a charming name such as Spring Gardens, a relatively rare street name, should become the wholly prosaic Church Street, a ubiquitous term prevalent across the English-speaking world!



PLAN SHOWING THE PROMENADE GROVE, PAVILION, &c., 1803

Fig. 1 Plan of Pavilion Estate and Bond Street, 1803

As the town of Brighton grew in population, the open land within the curtilage of the Old Town was increasingly built over, and when open land was all but gone there was a change in use of existing premises. Those that were considered 'noxious trades', such as smithies and horse slaughterers, or those with extensive open areas, timber yards and builders' yards, moved out of the town across North St onto the old farmyards, utilising the vacated post -agricultural buildings. The land use changes brought more housing and a rising population to the Old Town, but saw a decline in storage and manufacture. North of Church St lay the big open field of North Laine, one of the five that comprised most of the non-urban area of the parish.[2] With no marine frontage and limited access to the social hub of The Steine, North Laine was never going to be an area of upmarket developments, and it was rapidly assuming a role that it was to fulfil for the next two centuries. This area, on a low angle downland slope, served as a storage and manufacturing area; North Laine's physical landscape and its location north of the commercial area gave it an identity not wholly lost today.[3] Slaughter yards, wood-working shops, foundries and sawmills, bacon stoves and lead pipe makers, soap makers and printers all jostled for space amongst the growing urban working-class terraces of houses, the market gardens and orchards. Sandwiched between the raw materials coming in from rural Sussex and the market for them in the burgeoning resort, the raw materials, foodstuffs, fuel and building materials were moved into North Laine for storage and processing. Bond St, sandwiched between the commerce and leisure activity of the Old Town and the manufacturing and processing in the North Laine, acted as a conduit between the two areas.[4] Its businesses served both districts and, as has been said about the USA 'The business of America, is business', so it was with Bond St - its business was… business. The business of Bond St lay in servicing the needs of the commercial activities north and south of it, with an extension of trade out into the wider urban landscape of Brighton as the resort grew rapidly in the 19th and 20th centuries.

Some aspects of life in the early years of the street can be gained from 18th century trade directories. Two of them published in 1792 and 1799 list some of the traders; that of 1799 gives street numbers, but these have changed over time as the *Wheatsheaf* pub is listed there but with a different address number to its later location. That of 1792 gave names and streets but no numbers, but the later directory gave more information and it was possible to cross-reference some of the traders. The IA character of the then New Street is evident from those traders that appear in both copies; *William Colbron* is listed as an 'upholder' (upholsterer) in 1792 and a carpenter in 1799, *George Grantham*, a basket maker in 1792 is in 1799 'Turner, basket & chair maker & sieve maker'; *John Palmer* is 'whitesmith and bell-hanger'. (A whitesmith is a metalworker who does finishing work on iron and steel such as filing, lathing, burnishing or polishing. The term also refers to a person who works with "white" or light-coloured metals, and is sometimes used as a synonym for tinsmith.)[5] The *Wheatsheaf* pub listed in 1792 is still in the street in 2021 although no longer a licensed premises.

Working along Bond St on the west side, the premises are numbered 2-20, before returning south along the east side with 21-41. As it is an adjunct to North St the main commercial area of Brighton then as now, the two buildings on each corner at the southern end are early 20th century bank buildings: on the SW corner *HSBC* (formerly Midland), built c1902, and on the SE corner the former National Provincial Bank 1921-23, now a branch of the pub chain *Wetherspoons*.[6] These imposing buildings are very much of commercial North St, but the rest of Bond St is that melange of styles, dates and materials that these days typify the North Laine. Although Bond St was never a part of the historic agricultural unit of North Laine, it now sits within the North Laine Conservation Area, as its appearance and character is very much of the North Laine.[7]

Kelly's Directory 1914

In 1914 there were some aspects of the wider Brighton community within Bond St, apart from the national banks on the street corners; local government was present with the *Brighton Corporation Water Works Office* at 12; this had originally been the *Brighton, Hove & Preston Water Co.* until taken over by the borough.[8] The Salem Strict Baptist chapel, originating in 1787 as the Particular Baptists Meeting House, was opposite at 41 and a few doors down at 35 the stage entrance to the *Brighton Theatre Royal*.[9] All reflected a wider world than just this small thoroughfare. The southern end of the street was one that housed several clothing and footwear premises - numbers 3, 4 & 5 were *James Bishop, 'clothier'*. *Bishops* provided workwear of all sorts: chefs' whites and maids' uniforms for the hotels south of Bond St, and workmen's overalls for the multitude of manufactories and warehouses to the

Fig. 2 (left) Hector Mackenzie, tailors, 1895

Fig. 3 (right) Advertisement for De Costa, cigar stores, 1886

north; they were one of the few businesses which were there for the length of this study. Also in this category was *James Smith boot & shoe stores* at 2 and *Hector Mackenzie, tailor* in this location at 9 since at least 1895, along with the appropriately named *Samuel Muslin, tailor* at 40. A cloth-related industry here in 1845 was *Clinch, practical dyer, calenderer and hotpresser* further along the street at 16; the advert states he had been there for 14 years.[10]

Further south between 7 and 8 Bond St lay Bond St Row, a twitten which housed in 1886 *Henry Hobbs '(The Original Town Bill Poster and Successor to the late Town Crier) Church and Chapel Bill Poster';* another advert places him still there in 1900.[11] The long-standing firm of *William Fellingham, sanitary and hot water engineers (show rooms)* lay across the twitten corner at 8. The commercial aspect of the street is reflected in several firms – *Isaac de Costa* at 39-40 is listed as 'a commission agent', an occupation defined as 'someone who sells a company's products and receives a part of the money paid for the goods for doing this',[12] and Mr de Costa is listed here much earlier as *Sussex Cigar Stores, cigar importer* in 1886 and some evidence that the firm was established in 1867 but maybe not in Bond St.[13]

At 32-33 were *J. Hooker & sons, 'wholesale watchmakers, jewellers, opticians & bullion dealers, importers & exporters of watches, tools, materials & sundries'*. At 6a *H W Butler* is a *ticket writer* and *Henry Ledigo* at 14, *a lithographer.* Some specialist occupations clustered here, such as at 9a *Miss EA Stepney, dealer in druggists' sundries;* Miss Stepney lived behind the premises in the tiny cul-de-sac twitten of Bond St Cottages. Next door here also was her work neighbour, the tailor *Hector Mackenzie*. Another Stepney, William, was across the street at 37, a *carver & guilder.*

Adjacent to Miss Stepney at 10 comes an old Brighton name, *Daniel Friend, leather seller,* a trader who was to stay in the street for the length of this study…and indeed longer. Across opposite, was *Frank Sharp, india rubber warehouse* at 22; this seems to have developed from an earlier business, *Sharp's Depot*, which in an 1858 advert shows this to be a *Gutta Percha and India rubber manufacturer of every description.*

Fig. 4 Advertisement for Sharp's Depot, 1858

The Sussex Dental Supply Co., dental materials and sundries was at 33, possibly part of the Hooker's business above. Some small-scale manufacturers, reflective of much of the area's trade, are seen in *William Garrett, watchmaker* and *William Weller, electro -platers* who is also there in 1886. At 23-24 *H. Cozens, ironmonger* advertises an extensive range of metal-based trades: '*Stove, range, gas and bell-fitting works, baths fitted on the most modern and approved principles, Greenhouses heated with hot water apparatus'*. A later advert states that it was established 1858 and also notes that by 1900 Cozens was also an *electrical engineer*.[14]

The everyday life of the nearby population is reflected in a range of businesses, and everyday life does include death; *George Knight undertaker* was at 31 in 1914, but in 1858 *J. Gregory* carried on the disparate trades of *'undertaker, house & estate agent'* at 8.[15] *W B Spikins, butchers* was on the north-west corner, number 20; this was a long-standing trade and had been here since at least 1845;[16] in 1886 this was *H. Miles, 'family butcher, by appointment to The Hebrews'*, a kosher butcher's. As a local history link this could not be more appropriate as the tiny street next to Bond St and linked at one end by a brick-lined twitten, is Jew St, the site of an early synagogue in 1792.[17] At different times in the 20th century there were two other kosher butchers in Bond St. [18]

On the east side of the street are more domestic traders, *H J Massey hairdresser*, *John Batchelor butcher*, *The Wheatsheaf* public house, *Banyard confectioner* and the splendidly named *Dalton Monger newsagent*. At

Fig. 5 Miles & Co, butchers, 1908

34 Bond St is *William Houzego, fruiterer, greengrocer, potato merchant, new laid eggs, a speciality, at the Royal Fruit Stores. Chatfield & Son, wholesale confectioners* at 15 had a long pedigree, as a directory of 1858 shows *E Chatfield, wholesale and Retail Confectioner Lozenge & Biscuit Manufacturer* at the same address; they remained here until sometime in the mid-1950s.

My grandfather's premises are shown at 17-18: *Mead & Co furniture removers and auctioneers, Auction rooms*. This was part of a cluster of furniture dealers here, as *William Lacey* was next door at 16, also *furniture dealer*, and *Harry Weller*, also *a dealer in furniture*, further down at 11, with *James Gladwell Bond Street Furniture Stores* at 13. In the mid-19th century 17 & 26 Bond St were advertised as *Crunden's upholstery and furniture warehouses*; there is some evidence that, prior to *Crunden*, 17 was Theophilus Pollard's brewery in 1830, but Crunden's furniture factory in 1845 which survived until 1910.[19]


CRUNDEN'S
UPHOLSTERY
AND
FURNITURE
WAREHOUSES,
20 & 21, NEW ROAD,
AND
Nos. 17 & 26, BOND STREET,
BRIGHTON.
IN ADDITION TO THE ABOVE,
LARGE WAREHOUSES,
FITTED WITH HOT-WATER APPARATUS,
For the express Storage of Valuable Furniture,
Musical Instruments, &c., for any period.
ALSO A
FIRE-PROOF ROOM,
FOR
PLATE, DEEDS, &c.

Fig. 6 Advertisement for Crunden's furniture factory and warehouses, in Melville's Directory, 1858

This would not be a Brighton street without some curiosity; next to grandfathers' was *Henry Thomas Gibb bird dealer*. I recall this shop, when as a small boy I visited grandfather; 'Mrs Jibbs' (always Jibbs!) *'bird shop'* sold the sand, seed and millet needed by Joey, our house canary. At an earlier date a range of manufacturing enterprises was established in the street; in 1870, at 3a, Richard Green is of some interest - an '*Engineer and Manufacturer of Improved Bicycles and Patent Tricycles'*. The advert also states *'for many years connected with Palmer, Green & Co'*, the principal iron founders in Brighton at that time.

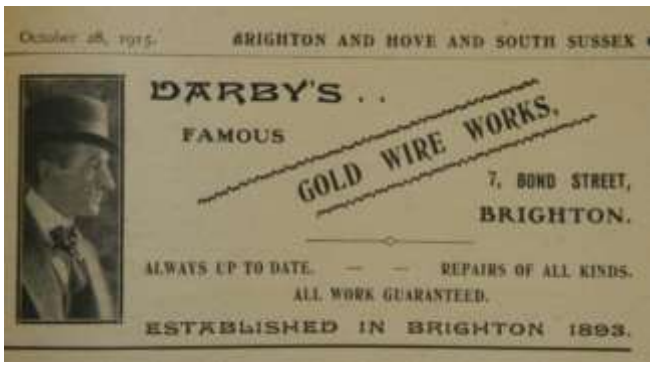


Fig. 7 Darby's Gold Wire Works at 7 Bond Street, 1915

Further up the social scale at 7 was *Darby's famous gold wire works, 'established in 1893'.*

Kelly's Directory 1927

The next decade sees the continuity and change apparent in any landscape, and the Kelly's Directory 1927[20] reflects a changed post-war world. The southern end was still a clothing area, milliners, tailor, draper, haberdashers and the long standing *Bishop's overall shop.* These are followed in the geographical sense by an assemblage of builders - *Jackson Bros* at 9a and *Hart & McClean* next door, curiously with *Malcom Scott, confectioner* also at 10 and the *Associated Decorative workshops* at 11. The furniture dealers come next: other than *Mead & Co* at 17-18, *William Lacey* was at 16 and also at 24 across the street.

Heading back south were *Wallers electro-platers* and *Greater London Rubber Co rubber warehouse*; *Hookers watchmakers and wholesale jewellers* and the *Dental Supplies* was still operating. *Mr de Costa, commission agent* appears to have moved on, his premises now the more manufacturing concern of *English & Sons cutlers*, possibly just the business address, as they share the same address with *Ridley & Hollis, auctioneers*. *Daniel Friends, leather merchant* remains here until late in the 20th century. A few food suppliers, with the butchers at 20 now more overtly kosher, as it is now *Lewis Frankel*, and the long-standing concern, *The Wheatsheaf Inn*, remained.

Pike's Directory of 1937

This directory[21] shows the steady changes that all urban areas go through - the continuity and change that is the theme which ties these decades together. 1937 was a different era for the resort; the economic recession of the late 1920s had not had too much of an impact on the overall economy of the resort, although there was some unexpected industrial strife in the General Strike, but by 1937 social progress was being made across the borough, mainly in clearing the inner urban slum areas. Municipal flats were being constructed on the site of the notorious Carlton Hill slums in the centre of the town; new commercial premises had been completed along the north side of Western Rd, the main retail zone; housing was booming with new estates developing around the urban fringe, both as local authority dwellings such as at Moulsecoomb, and as private middle class estates in Patcham, with pockets of up-market developments such as Roedean and Dyke Rd Avenue. Blocks of quality flats were appearing along Brighton & Hove seafront, notably at Embassy Court and Viceroy Lodge.[22] All this new housing, much of it being dwellings for those rehoused out of the poorer areas, generated a boom in furniture and fittings for the new housing. Most was not new but second-hand (pre-loved in the 21st century lexicon!), and this trade provided income for the 68 furniture dealers in this directory; and for moving the families' goods there was trade for the 13 removals firms, especially *Mead & Co,* and a demand for *Fellinghams'* heating systems.

Fig. 8 (above) 17-18 Bond Street, Mead & Co in c1924

Fig. 9 (right) Mead & Co. in 1936

Fig. 10 W. H. Fellingham at 8 Bond Street in 1926

All this combined with a growing leisure industry of cinemas and dance halls, 'Brewers Tudor' pubs and road-houses, and a revamped seafront.[23] Bond St at the heart of the town still carried on its duality as provider of services to town centre commerce and the local areas' activities both domestic and industrial. Milliners, costumiers (3), outfitters and tailors still occupied the southern end, but a 'new' antiques business appears at 6, *Norman's antiques*; in the late 20th century *Normans* take over grandfather's auction rooms and, though trading as *Meads of Brighton* for several years, eventually rename as *Michael Norman Antiques*. Another similar firm is *J Freedman antiques* at 31 across the road. The *Fellinghams* are joined by an overtly industrial supplier, *Swift & co grinders and cutlers.* Swifts advertised *'knives, scissors, saws, shears, mowers & locks repaired, keys cut, skates ground.'* As *Airds,* a neighbouring firm in nearby Gardner St, took over *Swifts* at a later date, the business survived into the first decade of the 21st century. *Swifts* had an oversize wood saw hanging on the first floor wall in the form of an advert.

Fig. 11 Swift & Co. at 14 Bond Street

On the north side of *Mead & Co furniture removers, London & provisional carriers and auctioneers', H.T. Gibb* is now bracketed as *E. Gibbs, Fanciers' Provider - birds attended and boarded*. An early example of a 21st century North Laine occupation, Air B&B…but for cage birds! Edith Gibb carried on for several decades after this and her 1937 advert shows the diversity of her enterprise.

Fig. 12 H. T. Gibb at 19 Bond Street

Across the road from the kosher butchers, now *Benjamin Glassman*, is the first listing of another pub, the *William IV*. This had previously been listed under Church St; the pub's original name was *Gardners Arms*. This may reflect the 18th century land use here of the Furner brothers market garden,[24] but years of researching into place names has made me cautious of such a simplistic notion. The adjacent street north is Gardner (sic) St and this and the *Gardners Arms* may just have been named from an owner Mr Gardner. *Mr Lacey, furniture dealer* who had shops at 16 & 24 has gone, replaced by *Maison Lucille, gowns* at 16, and 24 had been taken up by *James Hooker, watchmaker* who had moved here from 33. Along the east side of Bond St some familiar names and trades survived: *The Wheatsheaf* whose name, in 2020, appears on a stone band across the building, along with the *London Rubber Co* and the *Hookers watch makers and jewellers*, *Sussex Dental Supplies, Stepney the picture framer* and *Mr Bryan, sign writer.* The *Waller* business of *electro-platers* was now *Miller & Co jewellers (trade).*

Kelly's Directory 1949

The coming of World War II saw an end to issues of

Fig. 13 Removal lorries from Mead & Co. outside the Royal Pavilion, 1951

street directories, and the next I had available was for 1949,[25] the year I was born. WWII had brought a deal of destruction to Brighton, which after Eastbourne was the second most bombed south coast town. Bond St escaped bomb damage and the changes that came about were again part of a continual process of continuity and change. One particular period change was the introduction into the picture of the *National Health Service,* as the Brighton Executive of this new body was located at 26, having morphed from the *Health Insurance Committee* at this address in 1937. Grandfather's firm is now listed as *'high class furniture removers London & provincial carriers & auctioneers & warehousemen'*, Ernest Mead is still on his auctioneer's podium or behind his leather-topped desk, and my dad is back from his wartime service at Chester Moor colliery, Co. Durham.

Fig. 14 Page & Miles (Refrigeration) Ltd, 2 Bond Street, 1950

At 2 Bond St there is a dramatic change from *ladies tailor* in 1937 to *Page & Miles (refrigeration) Ltd, Prestcold distributors.* There are still two dressmakers, *Mrs Rosetta Wackett* at 9 and *May Black, costumier* across at 25, with *Bishops clothiers* at the lower end of the street, but a new post-war business has appeared at 6: *Cameron Yorke, photographic material dealers.* At 11 and 15 are two different *wholesale confectioners Pantos* and *Chatfield.* Previously at 10, what had been the strange combination of builders and confectioners, we see a wardrobe dealer *JA Philips.* This curious term does not apply to used furniture but to the contents of wardrobes, i.e. old clothes. At 12 &13 the *Brighton Corporation Waterworks Office* is headed by *F.*

Needham Green, someone with a fine collection of designations after his name: 'B.Sc.(Eng.) A.C.G.I;A.M Inst.CE; A.N.I. Mech.E, A.M .Inst W.E,F.G.S. water works engineer'. At 16 *David Crook, fancy goods dealer* appears next to grandfather's. He would later change the business to antiques; however '*David Crook, antique dealer'* has an ironic air! Survivors are *Edith Gibb* with her birds and *Friends leather merchants*. A recent arrival - *A.G. Saunders musical instrument dealer, repairs & overhauls; 'trunks & suitcases bought, sold & repaired'* at 36. *Houzego the greengrocer* - has now gone, replaced by *Ransom for Radio*.

Kelly's Directory 1954

Five years on, the Kelly's Directory 1954[26] shows there are similar subtle changes in the economic structure of the street, and as before a considerable element of continuity. *Prestcold distribution* still takes place at 2 but no longer through *Page & Miles* as it is now *Hampshire Refrigeration*. Next door *Bishops (The overall shop) clothiers (protective clothing all trades)* is a street fixture. *Mrs Mitchelmore, dressmaker* at 7 has gone and is replaced by *Brighton Office Supplies*. A change at 10, as this had been *Philips, the wardrobe dealer* but is now *James Benson, rubber goods manufacturers.* This must mean a distributor, as the premises are too small for manufacturing; they seem to have taken over this niche market from the *London Rubber Co* of 1949. This address also has two other firms trading here: *Waters Publicity advertising agents* and *Exhibitions (Sussex) Ltd exhibition organisers and stand contractors*. These latter firms trade from the same telephone number and are indicative of Bond St being an adjunct to the commercial town. *Panto wholesale confectioners* at 11 have been replaced by *Southern Warehouse, general wholesale warehousemen.* But then a run of continuity: the *Corporation Water works office, Swifts the cutlers, Chatfield the wholesale confectioners and David Crook* previously a fancy goods dealer now trading with *Harry Woolf, second hand furniture dealer. Mead & Co* still secure at 17, 18, 18a, *Edith Gibbs* and her birds at 19 and the butchers still at 20 – now no longer a Jewish butchers but *Edwin Sumner,* who in a 1952 advert states '*As in France, horsemeat for human consumption….rump steak 2/6*'. It is not clear from which animal this particular cut has emanated…

Fig. 15 Edwin Butchers Ltd, 20 Bond Street, 1952

Across on the east side *Kaye's café* has *Michael Lyne manufacturing jeweller* carrying on a long association above the café. At 22, what had been the *London Rubber Co* had become a post-war 'new boy' as it was now *Super Mart (R. Hyman proprietor clothiers, waterproof zip jackets a speciality).* At 34 *Ransoms,* which in 1949 was an electrical engineer, was now in 1954 a 'television engineer, television, electrical installations, Radio, HP from 3/9 weekly' - technological progress. In 1954 Brighton had been in the television world for a year, but TV had been demonstrated in lecture form in 1934 in the town, and houses on Ladies Mile Estate, Patcham had power points for television promoted in the sales brochure of 1936,[27] but the town in general had to wait until it was linked into the national network for the coronation of 1953. I have heard unsubstantiated accounts of homes high on the downland at Woodingdean being able to receive signals before that date. Bond St still had this duality in its trading pattern of serving both the domestic and commercial side of the town's economic structure.

Fig. 16 Ransom Electrical Retailers, 1950

Kelly's Directory 1968

1968[28] saw a continuation of the processes noted at other decades with some long-standing concerns remaining, some changes within an established trading sector and some complete change with loss

Fig. 17 Nos. 11-13 Bond Street in 1967 (Regency Society)

of old firms and the entry of some new components into the economic world of Bond St. *Bishops overalls* and *Cameron Yorke photographic materials* survive, as does *Fellinghams, heating engineers,* but *Brighton Office Supplies* of 1954 is now *Tugwell sign writers*. The many configurations of the rubber trade in the street have another appellation, as there is now *Peter Benson, latex foam & plastics foam rubber merchants also flooring contractors*. Then a break, as 11, 12, and 13 are missing from the sequence; this had been the premises of Southern Warehouse with the Brighton Waterworks office adjacent. Demolition of this block had commenced in October 1967.[29]

Airds has now replaced *Swifts* as tool specialists & cutlers, but with *Cine Accessories (films) Ltd* above and a similar trade next door is *John King (Film) cine, phototape specialists, tape recorders, camera's servicing (also East St and Hove). David Crook* now antique dealer and *Mead & Co auction rooms* also remain, but alas no longer with grandfather, and no longer owned by any Meads. Similarly *Mrs Gibbs* birds have flown and 19 is now another antique dealer, *Tudor-Hart*. The butcher's next door has now gone, and 20 has been absorbed into the many-branched local ironmongers, *Dockerills* with Raymond Dockerill living on the premises, which also lists the last butcher Mr Sumner there. *Dockerills* is still an indispensable component to the local area and is now located down the road in Church St. Over on the other side of the street still *Kaye's café* and *Rex Clothing* (no longer listed as Super Mart); *David Crook*'s other shop is next, confirming the north end of the street as the furniture and antiques quarter. This may indicate the change in the economy of The Lanes to the south, long considered the antique centre; rising rentals were pushing out traders north across North St to the lower rentals of Bond St. Some evidence exists to suggest *Tudor-Hart* has left Prince Albert St in the centre of the Old Town to its Bond St location sometime in the 1960s.[30] *Dental Materials* are still in the street at 24 where it had been long established. At 25 is a shop that epitomises the social changes which have come over this area. Here in 1968 it is the *Sample Shoe Co*; it sold shoes that only your mother would want you to wear: black, and flat and of no fashion at all! If memory serves me correctly, they were imported from Czechoslovakia and East Germany; they were very cheap and serviceable for local work usage. In the 21st century this address has become *Badger Badger*, still retailing

Fig. 18 The Wheatsheaf at No. 27 Bond Street, 1970 (Regency Society)

footwear but at the far end of the price scale from Sample Shoe - evidenced by there being no prices shown in the window! Continuity and Change. Local electricians shopped at the next place, *Edwards & Hope wholesale electrical distributors*, who also traded from another branch one street away in New Rd. *The Wheatsheaf*, in full Tamplins Brewery signage, was still providing its hostelry services.

Kelly's Directory 1974

The final Kelly's Directory was published in 1974,[31] at which point after that date the regular changes that were recorded since the late 18th century in a variety of similar publications have ceased to be recorded in directory form. *Bishops and Cameron Yorke photographic materials* survived but the sign writers is now *Arcadia Antiques*. A major change has occurred at 8 which for all the years since 1914 in this study has been *Fellinghams heating electrical and sanitary engineers*, now the *Reprographic Centre. Fellinghams* moved to Richardson Rd, Hove, and ceased trading in the mid-1980s.[32] The long tradition of furniture

and fittings in the street is carried on with *Bowles of Brighton house furnishers*. 10 still has *Benson latex foam & plastics foam rubber merchants* but then the gap still, up to 14 and *Airds tool specialists & cutlers, John King (films) Ltd* and *David Crook Antique Dealer*. Across the road *Kaye's Café*, in this spot since 1947,[33] has become another antique dealer; *Bond St Galleries* and *Rex Clothing* is now a noted stamp-dealer, *J A Franks*. *David Crook*'s other shop next and then a long line of well-established enterprises: *Claudius Ash dental materials. Sample Shoes, Edwards & Hope, Friends leather merchants*, all surviving, but the venerable *Wheatsheaf Inn* built in the 1790s has closed.[34] A new trader *Lyon & Sons carpet & flooring* has moved into 31, but at long last the Salem Baptists, in Bond St since 1787, are missing from the lists, the building empty and demolished in this year.[35] In true Brighton spirit the Strict Baptists site was rebuilt and opened as Brighton's first sexual appliances store!

Postscript

This was not a structured analysis of the street, which would have taken a long time and access to sources not available at the time of writing; rather, it is a random sampling of available directories and other materials. Moreover, its shortcomings became apparent to me when I randomly glanced in other directories for a different project. For example, Pikes Directory 1925 shows one of the Stepney family at 9a, who in 1914 had been 'a dealer in druggists sundries', was by 1925 'bottle merchant'. My grandfather's premises at 17/18 shared 18 with *Green & Co wholesale boot and shoe merchants*. Similarly, Pikes 1932-33 shows the tailors at 9 was by then E*&M Newman radio engineers*, and the bottle merchant at 9a was a billiard table manufacturer and *Westminster Wholesale Electrical Co Ltd*. At 13, the furniture stores of 1914 and drapers of 1925 was another Kosher butchers, *Frankel & Schneider* and *Mr Houzego greengrocer* at 34 was also a ladder salesman.

There is no similar format to the street directories today, but it is instructive to look at this street across time and note those twin aspects of the urban economic landscape that have determined the structure of this article: continuity and change.

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RECONSTRUCTING THE PAST
- A Personal View

James Tasker

Introduction

We all love the past, we like to visit it, we enjoy investigating it and when it has deteriorated, we want to see it repaired. A problem arises, however, if it has been lost and we miss it: what do we do then? Do we rebuild it and, if so how, do we rebuild it? Do we reconstruct it as an accurate replica or do we rebuild it so that it looks as it did, even though it is built with modern materials?

My own experience is of the reconstruction of Ashcombe Windmill near Lewes which collapsed in 1916; its reconstruction raised a number of issues. Unlike the SPAB approach to building conservation[1] there appears to be no widely recognised advice on reconstruction, and I have tried to find examples of how others have dealt with it. Where I can I have referred to industrial buildings in Sussex. I do not claim to be a heritage specialist; my knowledge is based on what I have learnt during this journey as a structural engineer.

Restoration and reconstruction

In recent years technology has allowed us to reconstruct the past in both the real and the virtual worlds and we can look in and around buildings even if they exist only as computer models. These models can be taken to a high level of detail and realism; they can also provide a starting point for a physical reconstruction. They allow us to see a good visual representation of the reconstruction before we are committed to the physical process of building it; many of us will have seen the excellent computer models relating to mills drawn by John Brandrick.

There has traditionally been opposition to the reconstruction of lost buildings as it can falsify history; the well-known advice of a French art historian and archaeologist[2] was that 'for ancient monuments, it is better to consolidate than repair, better to repair than restore, better to restore than reconstruct'. Recently attitudes to the reconstruction of buildings appear to be changing.

The extent to which buildings have been reconstructed varies from 'building in a sympathetic style' to accurate replication using original materials. I have tried to find examples of different approaches; where I have not found examples of industrial buildings I have looked at other building types:

Fig 1. Looking south along the River Ouse from Cliffe High Street, Lewes

- The construction of new buildings in a sympathetic style. This is a loose form of reconstruction. The view down river from Cliffe High Street in Lewes was formerly of a busy river, and the new residential buildings reflect the style of riverside warehouses. A sympathetic style has therefore been adopted without any illusion that these new buildings are historic.

- The creation of new buildings which imitate the appearance of buildings from a former period. The shop buildings in Dukes Lane in the Lanes area of Brighton were built in 1979; they are popular and replaced a run-down area with garages. They have been described as a clever pastiche.
- The retention of the surviving parts of a building but with new additions. These are additions that will not be mistaken for historical reconstruction and can be sympathetic to the original building or can be products of their own time. The ground floor roundhouse walls

Fig 2. Malling Windmill, Lewes, March 2021

Fig 3. Harebeating Windmill, Hailsham
(*Photo © Robin Webster cc-by-sa/2.0* *geograph.org.uk/p/393433*)

of Malling Windmill in Lewes were the only parts to survive a fire in 1908 and the remains were converted to a single-storey dwelling. Recently a first floor and roof have been added which reflect the former upper storey of the roundhouse. The roundhouse of Harebeating Windmill survived the collapse of the body of the mill in 1934 and a new superstructure has been added which does not pretend to be a replica of the body of the mill but is visibly a product of our time.

- The construction of new buildings in traditional barn styles using new timber. More recently replica shepherds' huts have also been built, and both barn style buildings and shepherds' huts are now manufactured and built commercially in Sussex. Whilst these buildings are in the style of historic buildings, they do not generally claim to be accurate replicas of particular examples. They are popular and demonstrate a fondness for historic utilitarian styles of construction.

Fig 4. Littlehampton Municipal Engine House
(*Amberley Museum*)

- The relocation of an existing building on a new site with the reconstruction including some new materials. The Littlehampton Municipal Engine House at Amberley Museum has been rebuilt with the original windows and other external features but with new bricks as the original bricks were not in a good enough condition to move. Similarly, the transport café from Fairmile Bottom in Arundel has been

Fig 5. Village Garage (*Amberley Museum*)

Fig 6. Brockham Station shelter (*Amberley Museum*)

rebuilt at the museum, it is made up of the original basic framework, windows and doors, but with new cladding and a new roof.

- The construction of a new building which is a replica of a typical building. The Amberley Museum again has examples: the Village Garage is a replica based on pictures/knowledge of similar garages of the late 1920s/early 30s and the Southdown Bus Garage is a replica utilising original bus garage doors, as is the 1950s-style replica Fire Station. There is also a passenger shelter on the narrow gauge railway based on examples from the Kent and East Sussex Railway.
- The reconstruction of a lost building that recreates the external appearance of the original building and incorporates modern materials. This is the basis on which Ashcombe Windmill has been rebuilt. Interestingly, at Goodwood the 2008 Motor Show building has a 1950s Art Deco replica frontage of the Earls Court Motor Show exhibition area.
- The construction of a replica of an historically important building type when only archaeology remains. Buildings utilising timber and other organic materials typically fall into this category as they have generally only survived as archaeology. Weald and Downland Open Air Museum has two such buildings, the Anglo-Saxon Hall House, based on archaeological evidence from Steyning, and the Flint Cottage, based on evidence from the deserted medieval village of Hangleton. In both cases the superstructure is conjectural but is based on other buildings and on the knowledge of specialists familiar with the period. Similarly an Iron Age Round House has been built at Michelham Priory.
- The reconstruction of a badly damaged building using traditional materials and techniques which match as closely as is practicable the original materials and techniques. Uppark House is a fine example and it will be interesting to see how Notre-Dame Cathedral progresses.

A reconstructed building will often have to comply with current building regulations and other requirements if it is to be reused; these requirements may include modern standards of comfort and financial constraints. Other comparable heritage objects are also likely to have to comply with current regulations, for example the Brighton H2 Atlantic locomotive being built at the Bluebell Railway.

Internationally there have been many major reconstruction projects. In 1980 there was massive rebuilding of the centre of Warsaw to its original appearance with very little retention of existing material, following war damage, and in 2004 the well-known bridge at Mostar, which had stood for 427 years, was reconstructed following its destruction in the 1990s Balkans conflict. The destruction of such landmarks can be traumatic for local people. The causes of destruction are varied and include natural disasters and planning errors which result in demolition. Reconstruction of buildings has also been undertaken where their historic significance was not recognized until long after their demolition.

Popular surviving historical buildings are often replicated in new locations so that they can be appreciated by a wider audience. The Parthenon can be seen in Nashville, Tennessee, complete with the metopes depicting Greek history and a number of other famous buildings can be seen in theme parks around the world. Replicas have also been built for filming and for military training purposes.

Historic England[3], in considering reconstruction, quotes a definition from a 2013 charter[4] as 'Returning a place (or part of one) to a known earlier state….' Further, it defines 'Re-creation … as the *in situ* creation of a presumed earlier state on the basis of surviving evidence from that place and other sites and on deductions drawn from that evidence, using new materials.' It states that authenticity is essential to any consideration of reconstruction.

One new technique that can help in respect of authenticity is photogrammetry; this uses software to assemble ordinary photographs which have an overlap of around 60%, to produce an accurate 3D model. In recent history a number of historic structures have been intentionally destroyed during conflicts, and where the buildings were previously photographed, say by tourists, it is sometimes possible to create an accurate 3D computer model from their photographs. This technique can be of great benefit regarding authenticity as it allows dimensional accuracy and helps to reduce the extent of conjecture. Doubtless the Mars rover 'Perseverance' will be using this and other techniques as it looks at the surface of the planet.

Reconstruction of Ashcombe Mill

The reconstruction of Ashcombe Windmill would be defined by Historic England as a recreation and we have some 25 photographs of the exterior of the mill to work from. The mill was built between 1827 and 1829 by millwright Samuel Medhurst, assisted by Jesse Pumphrey, a journeyman millwright. The 1840 tithe map shows that the land[5] was owned by Sir Henry Shiffner and it has been suggested that he wanted to showcase the renaissance of industry in Lewes following the Napoleonic Wars.

The mill, which was owned by John Weston,[6] is the only known six-sweep post mill in Sussex. Sadly, it was blown down in a gale in March 1916. There were two pairs of millstones,[7] and at least three stones remained on the site for some years after it had been cleared following the collapse.

By the time of our involvement with the site nothing of the original mill remained above ground other than a few bricks which had been exposed during ploughing. The first stage of the investigation was therefore an archaeological excavation[8] to expose the foundations; this identified the precise location of the mill and allowed the dimensions of the base of the mill to be measured. The archaeological finds included millstone fragments, shutter cranks and other miscellaneous ironwork. The three-way canister which had held the sweeps was stored at the Phoenix Ironworks yard in Lewes after the collapse. It was unfortunately scrapped, probably during the Second World War, but a photograph of it in the yard survives.

The next stage was to use the photographs and the base dimensions to build a 3D computer model. The photographs of the original mill were not unfortunately of sufficient quality or quantity to utilise photogrammetry; the model could, however, be displayed in perspective and this allowed comparison with the views seen in the photographs. The model was then adjusted so that it closely matched the proportions in the photographs and this gave confidence regarding the dimensions of the superstructure. Where the photographs did not show particular details, Jill Windmill at Clayton was inspected — this was also built by Samuel Medhurst. Very fortunately there was also a set of measured drawings made available by Jill Windmill which provided a further check on dimensions and details.[9] One photograph of Ashcombe Windmill in a collapsed state exists[10] and this shows some of the internal components such as the brake wheel; other than this photograph no others have been found of the interior of the mill and it was decided not to attempt to duplicate the interior of the mill. This reduced the extent to which the reconstruction would be conjectural and allowed alternative materials to be used. The basis of the reconstruction would be to restore the original mill to the landscape, and therefore only the external details would be replicated.

Steel was chosen for the frame construction and one reason for this choice was that the original mill leant forward as it aged — it became headsick. The weight

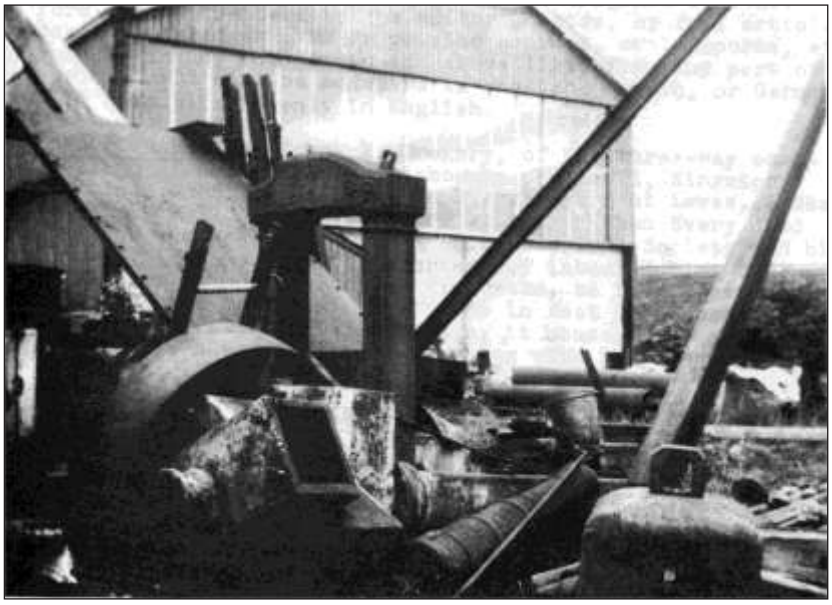

Fig 7. Original windshaft with three-way canister at Phoenix Ironworks, foreground of picture, bottom left. (*Photograph by Frank Gregory, Philip Hicks collection*)

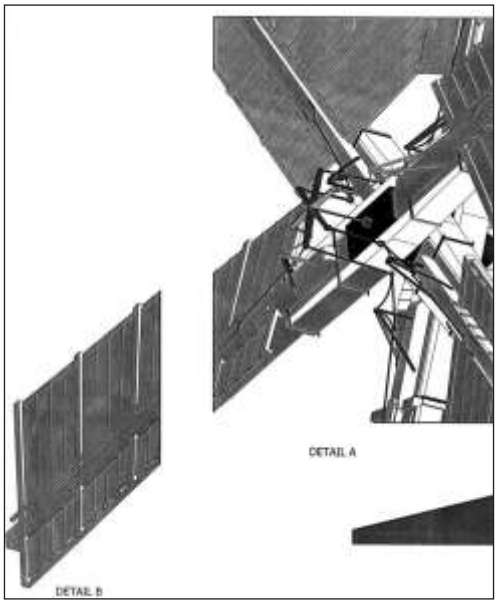

Fig 8. Spider and canister in computer model, with clamps to either side of the stocks.

Fig 9. Computer model

of the six sweeps is likely to have contributed to this, being some 50% heavier than four sweeps. Their weight was also set further forward on the mill because of the size of the heavy three-way canister supporting the stocks. It is not known whether the original millwright used the same timber frame sizes as he would have used for a four-sweep mill, but if he had then this may have further contributed to the headsickness. A second reason for choosing steel was that it is a more consistent material than timber and there is a sophisticated and competitive steel fabrication industry that routinely utilises 3D computer models for the generation of fabrication drawings. Although not investigated in depth it was assumed that a steel frame would be more economical than a timber frame of equal strength.

The sweeps were also designed in steelwork, with dimensions to replicate the appearance of the timber sweeps that existed at the time of the collapse when viewed from a distance. Galvanising was used for all the external steel members and provided the paintwork over the galvanising is maintained the sweeps should not need replacement in the future. The shutters are in timber as it would be difficult to replicate their appearance in steel and they are relatively easy to maintain and to replace.

Current building codes require a structure to carry specified wind loads with specified factors of safety. These loads give rise to timber sizes that are generally higher than traditional mill member sizes and it is therefore easier to replicate the original timber sizes in steel rather than in timber. A six-sweep mill has to resist approximately 50% more horizontal wind load than a four-sweep mill and this is a significant increase in the horizontal load on the structure of the mill.

Financial viability was a critical issue and residential accommodation is provided below the mill and within the mill mound. This should help to ensure that the mill is maintained in the future as it has an asset value. The accommodation is not visible in the landscape and it does not interfere with the authenticity of the mill above. The mill is designed as

Fig 10. Ashcombe windmill and a partially collapsed outbuilding in c1910. The shutter lengths have been modified from the original configuration.

Fig 11. The reconstructed windmill in 2018.

an electricity generator, and this means that the mill can be seen working — planning guidance encourages renewable energy generation. Planning consent has also been given for the installation of millstones.

The only other extensively reconstructed windmill in Sussex, Rye Windmill, was rebuilt in 1932 as a static mill. It is shorter than the original mill and the shape of the cap is modified. Internally it has been bed and breakfast accommodation since 1984. Although it is a static mill and differs in outline from the original mill, it is a well-loved landmark and is Grade II listed. Further windmill reconstructions are believed to be under consideration in Sussex, together with a new waterwheel installation.

Conclusion

It has been said that it is because of our history that we know who we are. Historic buildings enable us to see our past and to picture our ancestors' lives. Most historic industrial buildings were lost because there was little interest in their preservation at the time. Reconstruction of these buildings can assist us in our understanding of the past.

The question is whether reconstruction can be justified and some would argue that we should not turn our countryside into a theme park whilst others would argue that historic architecture can be more attractive than contemporary architecture. Reconstruction is a subject on which there will always be many opinions. With the passage of time it is not apparent to some that buildings are reconstructions and they become accepted as part of the landscape.

Sussex was once the centre of the iron industry in England. Iron was smelted in the Weald for over 2000 years and the last furnace, at Ashburnham near Battle, closed in 1813.[11] All the buildings associated with smelting in Sussex appear to have been lost; only slag and hammer and furnace ponds survive. These ponds remind us of the importance of water power to industry before the steam age but it would be great to see reconstructed buildings that would allow us to better appreciate this industry.

I have found only one survey on the public attitude to reconstruction. I do not have specific details but in a representative survey undertaken in Germany, 80% of all participants were in favour of the reconstruction of historic buildings and 15% were against.[12] When asked whether historical buildings should also be rebuilt for other uses, 80% of all participants answered with "yes" and 16% with "no".

My own conclusion is that there are significant benefits in the reconstruction of buildings where these can inform us of our history with a reasonable degree of authenticity. Records of works undertaken in the current era are now so readily available to researchers that new constructions are not likely to be mistaken for anything other than what they are. The risk of falsifying history should therefore be limited. There will be others who have greater knowledge of much of the above and I would be very interested to hear any comments or views.

Acknowledgements

I would like to acknowledge the assistance that I have received from the Sussex Mills Group who have kept me on the authenticity path.[13] I would also like to thank Amberley Museum for photographs and information on their own buildings.

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BISHOPSTONE TIDEMILLS AND ITS IMPACT ON LANDSCAPE

A history of an innovative green initiative ahead of its time

Charles Grimble

Introduction

Although there are already several accounts of this significant industrial establishment, recent information arising from the extensive, but as yet incomplete, excavations carried out under Luke Barber of the Sussex Archaeological Society, and the collation of further cartographic research, has made it possible to fill in more details about Tidemills. This, when reviewed against contemporary surveys, and brought together with archaeological findings, sheds further light on this important local enterprise. Almost all of the illustrations are available as higher resolution images at Seaford Museum. I have omitted the impact on the beach profile of the various breakwater works at Newhaven Harbour since the 1880s, to focus on Tidemills itself. There will soon be a 1:300 scale model of the Tidemill 'island' buildings in the Seaford Museum.

Lt. William Roy and David Dundas were commissioned in 1756 to carry out a military survey of the Channel coast from Dover to Milford Haven. England was in the middle of the Seven Years' War with the French (1756-1763), which therefore made this stretch of coastline vulnerable to invasion. The first part of the 1756 survey (eight sheets covering the Sussex coastline) was published on 1 February 1757 (fig. 1). The whole commission was not completed, as the threat of invasion was diminished significantly following the Royal Navy's significant defeat of the French Navy at the Battle of Quiberon Bay (off St Nazaire) on 1 November 1759.

Roy and Dundas' survey depicts the Ouse estuary, just before Tidemills was constructed. Although Roy was responsible for the magnificent feat of mapping the Scottish Highlands between 1747 and 1755 and became generally recognised as the founder of the Ordnance Survey, his 1756 survey reflects the speed of production and should be viewed in this light, as it contains several inaccuracies. Based upon earlier surveys he exaggerates the width of the beach in front of the Hawth Hill cliff, inserting a road that would have been impracticable on such a foreshore. It places Seaford on The Salts, and also gets the town's street pattern and orientation completely wrong; it misses out the road from Bishopstone to Blatchington, and gets the Seaford to Exceat road wrong, all of which would be useful intelligence from a military, strategic point of view. However, it is a remarkable document in its entirety and is the best depiction of the area just prior to the Tidemill enterprise began. It illustrates clearly the multi-channelled nature of the Ouse below Newhaven, with the Ouse emerging beside Castle Hill, and a long tributary running behind the shingle beach towards Hawth Hill and Valley Dip. In this context,

Fig 1. 1757 Detail of the Roy/Dundas survey
(*courtesy Sussex Archaeological Collections)*

a major re-engineering of the landscape through the construction of the Tidemills infrastructure would also bring significant land reclamation benefits. In the Bill presented to Parliament in 1761, the area is described as *"a Piece of Saltmarsh, or Waste Ground, covered with Water at the Time of High Tides, lying within the Manor and Parish of Bishopston"*.[1] This accords with the 1757 survey (fig. 1).

Tidemills— the early years 1761-1807

In 18th century Britain, wheat prices increased significantly, partly as a result of the Seven Years War, from a range of 26-35 shillings per Winchester quart in the period 1745-1755, to 28-56 shillings in the following period up to 1767 and rose steadily after that.[2] This ensured that there would be encouragement to British farmers to continue to grow this staple crop, as long as imports of cheap grain could be controlled. In 1760, The Society for the Encouragement of Arts, Manufactures & Commerce announced a competition in *The Universal Magazine* with a prize of £60 (£12,000 in today's values) to produce '*the best model of a tide-mill by the first Tuesday in April 1761*'.

Despite the Seven Years' War continuing, in this atmosphere of invention, Tidemills was created on Lady Day (25 March) 1761 through a private Act of Parliament sponsored by the landowner, the Duke of Newcastle, who was at that time on his second term as Prime Minister (1757-1762). It is clear that the parties to the Tidemills project meant business, as the engineering works involved substantial, long-term, private investment. The three corn merchants, John Challen, John and William Woods, now controlled a greater part of their process chain. As for the Duke of Newcastle, he granted a 500-year lease from 25th July 1761.[3] It is fair to assume that he also judged that the reclaimed land behind the new structures would increase the value of this part of his Bishopstone holding. Also, he was willing to facilitate the construction process, by enabling the builder to carry out major quarrying work on the seaward end of his estate at Hawth Hill. This provided landfill for raising the land, both to enclose the new mill ponds and to site the buildings above flood level.

The extent of lands in this lease is described in the Bill as '*extending from the Mark Post erected at the East End of the Manor of Meeking , otherwise Newhaven, to the easternmost part of the Manor of Bishopston next to Bletchington Marsh,* [i.e. Valley Dip] *and abutting on the sea wall or mound against Bishopston Marsh, and the road leading from Bishopston to Seaford, towards the north* ***and on the shingle or stonebeach against the sea, towards the south*** [my emphasis], *and the use of the water flowing and reflowing over the said ground, creek or channel*.

I emphasise the phrase relating to the stone beach as it clearly envisaged the smaller millpond built on it. This would be a challenging piece of engineering to withstand the battering it would get from the sea. It further gives rights over *"a creek or channel of water passing through or lying in the said salt marsh, or waste ground, comprised in the said lease, which extends from a dock wharf and warehouse erected and built at the east end of the said marsh or waste ground, at a distance of about one mile from the town of Seaford, to the west part of the same ground where it runs into or communicates with a creek or channel called Old Haven Creek, and which also communicates with the River (Ouse) running from Lewes to Newhaven, and which creek or channel is navigable for boats or barges at Spring tides only"*. 'Old Haven Creek' is clearly 'The Old Harbour' in fig. 2.

The poor state of the River Ouse is clearly problematic, as seaborne traffic could only get to the mill at high tide. In fig. 2 therefore, Middle Marsh (plot D),

Fig 2. Detail from Thomas Marchant's 1777 survey of Bishopstone and Norton Farms (*courtesy ESRO Ref. AMS 557*)

Mill Marsh (plot E), the Mill compound, the two mill ponds (plots O), and the foreshore of Hawth Hill are included in the conveyance in 1761. This meant that the Duke of Newcastle retained the benefit arising from the reclamation, of the maximum area of land north of this lease. It also shows that the easternmost mill pond was an essential requirement to provide sufficient capacity until plans arose for enlargement of the mill. Over time, William Catt had to negotiate with the Earl of Sheffield as the capacity of the East Pond diminished, and his plans required additional mill pond capacity.

The four components of the first mill in 1761

See fig. 5 for a floorplan of the principal buildings of the Tidemill.

(1) The 'islands' and causeway on which the Tidemill structures were built. It is clear from the earlier survey map (fig. 1) that the Tidemills venture was to be sited on level salt marsh with very mobile drainage arrangements over the previous two centuries. Tidemills, as described in the Act of Parliament of 1761, could only justify its investment (in 1791 it was worth nearly £500,000 in today's money), if there was an infrastructure of a greater robustness than that which had gone before. In terms of land reclamation measures, shifting creeks and streams off the Ouse had to be harnessed using new techniques to achieve a solution which, up to now, had proved fruitless when exposed to potent, daily fluvial and marine processes.

The solution was to import significant volumes of landfill to supplement the shingle that would be excavated through the engineering works. This, as will be seen in (3) below, came from Hawth Hill. One finding of Luke Barber's archaeological research is of particular interest. The curving north bank of Mill Creek where it turns south across the face of the mill is reinforced with mortar-bedded stonework encased by contemporary chalk landfill forming a reinforced bank just where the coal wharf was sited. Luke Barber reports that chalk was indeed extensively used to bring up the levels for the buildings on site. Most of the chalk layers were not more than 400mm thick. The deepest level of infill (excluding the wharf reclamation) was seen under the coal yard (originally the wharf where corn was unloaded) – but that was dumps of alluvium, shingle etc. All round the site the excavations hit 'alluvium' at a relatively shallow level, but it is difficult to distinguish between what is in-situ alluvium and what is recycled alluvium, required to build up levels. I think certainly some of the building-up will have used alluvium/clay rather than just chalk. These islands had to be protected from the twice-daily scour of the mill stream.

A photo of the mill taken late in its life shows the eastern face of the island wall abutting the East Mill Pond to be constructed with stone rubble also to a significant height. Another photo of the Mill Creek embankment beside the coal yard wharf shows reinforcement with large-section timber piles. I conclude that where stone reinforcement was required, it was used. This is important in my speculation about construction of the smaller easternmost mill pond. The two islands were linked by the mill race channel which flowed through a brick, three-arched bridge/causeway which served as the main street. The faces of the arches of the causeway have been much altered over time, by being reduced, refaced with new brickwork or cement, or even filled in, but it is nevertheless possible to see that the western façade of the causeway has a regular pattern of two rows of original brick arches forming the original voussoirs, two of which are under the old mill (see fig. 4 and building B in fig. 5) and one of which is under the 'new mill (see fig. 4 and building F in fig. 5). Two of these arches (E2 & E3 in fig. 5) provided the entry point for the five mill races within the original mill. It will be noted that E2 & E3 are of different widths, as E2 drove wheels D1 & D2, and E3 drove wheels D3, D4 & D5. The third arch, E1, bypasses the old mill. It appears to be a means of filling the eastern millpond on a rising tide, supplementing the sluice gate further south. It would therefore provide backup in the event that the southern sluice gate

Fig 3. The Mill from the south-east showing the dressed stone retaining walls, 1883 (*courtesy Seaford Museum*)

Fig 4. 1871 Block Plan of the Tidemills buildings (*courtesy Luke Barber*)

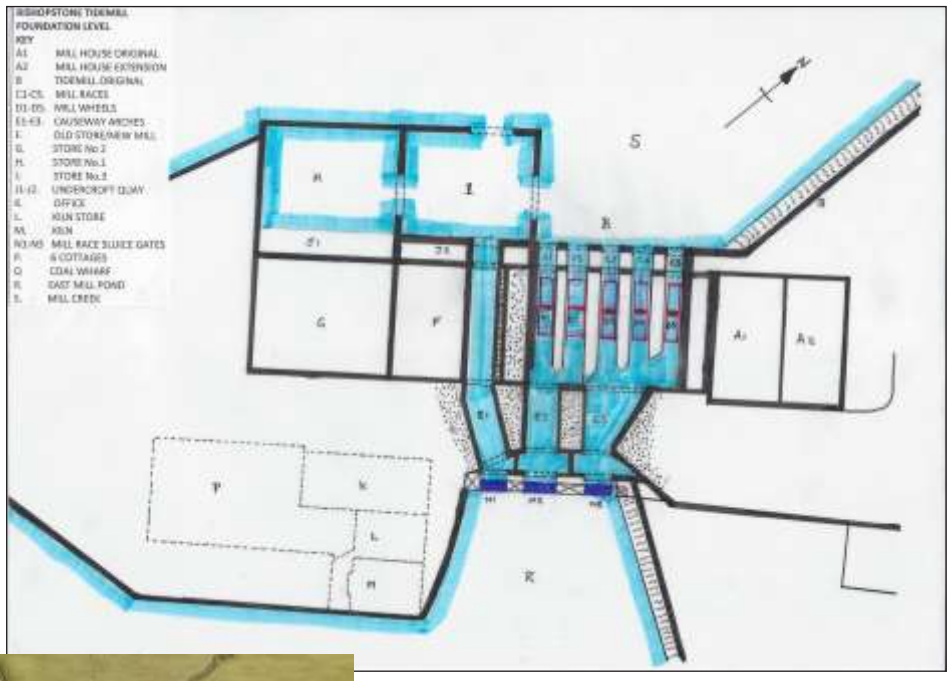

Fig 5. Bishopstone Tidemill Floorplan

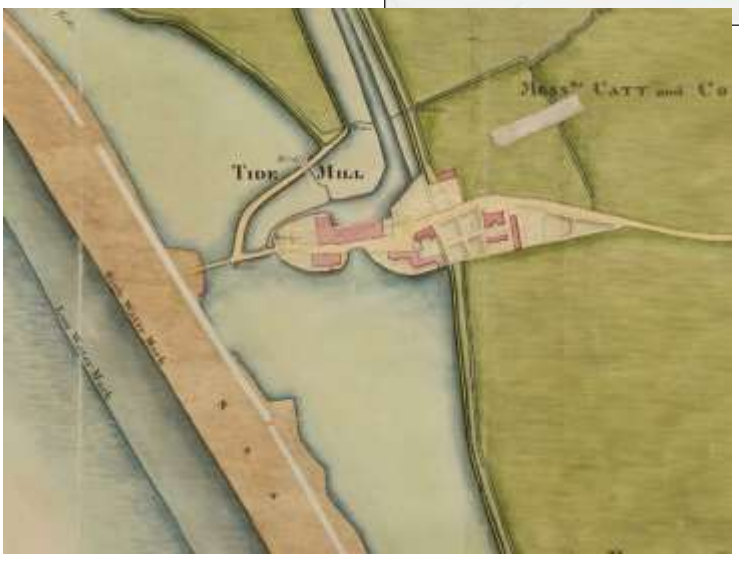

Fig 6. 1824 Plan of Newhaven Harbour by William Figg—detail (*courtesy ESRO Ref. ACC AMS 7046-1*)

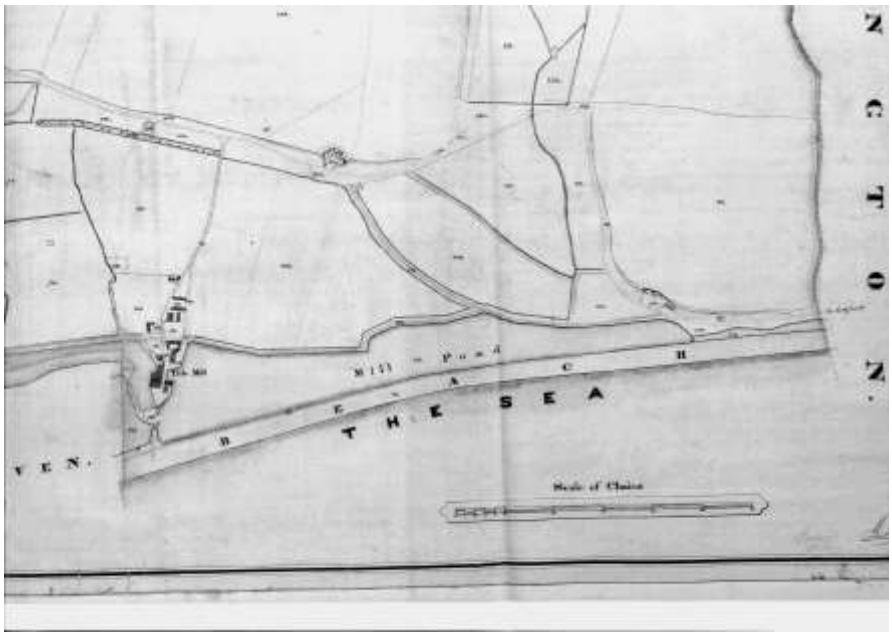

Fig 7. 1841 Bishopstone Tithe Map—detail (Plan of Newhaven Harbour by William Figg—detail (*courtesy ESRO*)

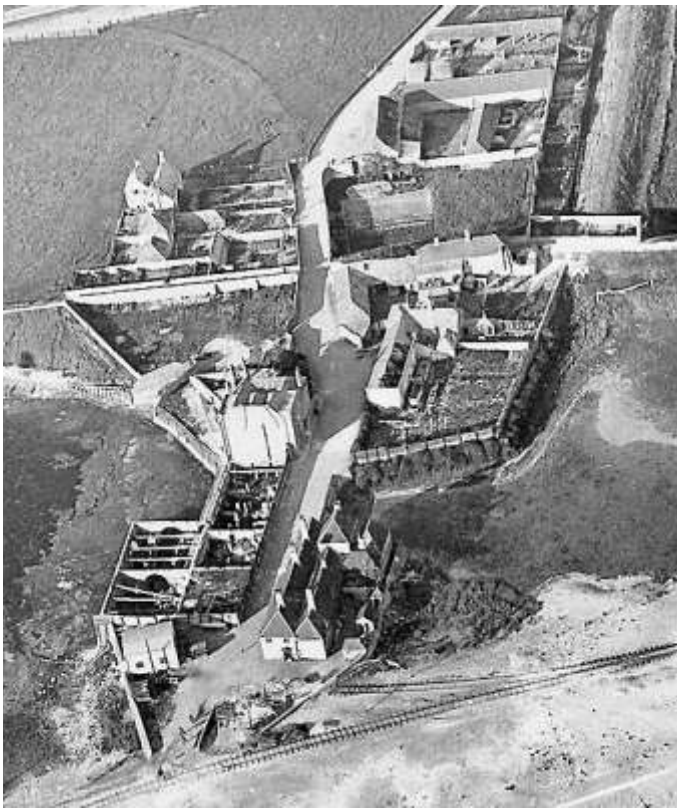

Fig 8. 1918 aerial photograph of the partially-demolished Tide Mill (*courtesy Seaford Museum*)

Fig 10. French survey by Le Seigneur de Beville, Lt. Col. of the Dragoons (*courtesy ESRO Ref. ACC 9705/1*)

Fig 9. 1861 The Tidemills viewed from the east. Part of an oil painting by G Smith (*courtesy Sussex Archaeological Society*)

failed. All three arches would have had rising gates on their eastern facade, although these were replaced by a new timber structure that spanned the stream as N1-N3. This new structure appears for the first time in the Bishopstone Tithe map of 1841 (fig. 7) but was absent in William Figg's survey of 1824 (fig. 6).

Fig 11. West elevation of original Tide mill showing loading door and gantry (*courtesy Seaford Museum*)

(2) The mill was a three-storey building, 98 feet long by 37 feet deep, (10,878 square feet floorspace) with a clay tile roof with two elements separated by a party wall that pierced the roof (see fig. 9) The larger element, 64 feet long, (see fig. 4) with 7,104 square feet (660 sq. metres) of floorspace, was the mill containing five undershot wheels driving five pairs of stones. The ground floor enclosed the top half of the wheels, the first, or stone floor, had the five pairs of millstones, and the second, or bin floor, had the chutes that fed the millwheels. The second, smaller element, 34 feet long, (3,774 square feet) was the storehouse for the wheat and flour, separated by the brick party wall to provide fire protection. Abutting the western façade of the brick causeway, the mill was supported on its eastern side by the three causeway arches, and on the western side by an undercroft with five arches each six feet wide.

The mill was constructed wholly on piled foundations and fig. 8 shows that the undercroft structure of the mill section was subdivided into four 'cells'. The cell nearest the Mill house was infilled as it was not required for a waterwheel, as it had the Mill ground floor entrance door above it. The next two cells related to mill races C1/C2 and C3/C4/C5. The floor to ceiling height of the ground floor was ten feet (3.1m). The final cell was the space between mill race C1 and the party wall. I assume that the axles for the undershot wheels were within the undercroft but close to floor joist height, so the wheels were of the order of 12-18 feet maximum in diameter. The wheels were as wide as the races, i.e. six feet. The sale details of 1791 set out at the top of page 43, refer to five pairs of millstones, relating to the five wheels. The water from the east millpond entered the undercroft through causeway arches E2 & E3, turning the five vertical undershot wheels, providing the driving power for the five pairs of millstones on the first floor above. The water then exited into Mill Creek out of the five arches. The cycle of operation therefore was for the rising tide to fill the East Mill Pond, both through the southern sluice and through arch E1, until high tide was reached. The southern sluice and E1 gate were then closed, and the mill race sluices for E2 & E3 were then left sufficiently open at their bases for the head of water to exit via the five mill races on the falling tide, until the mill pond was empty. The undercroft of the storehouse element was not sub-divided, apart from the tunnel E1. It is conjecture as to what the western façade of this building looked like, but it is likely to have elements shown on this façade in the 1900 photo, i.e., a series of vertical windows and loading doors and gantries, and a ground-floor doorway onto the timber wharf. The undercroft façade was the arch for E1 and the rest was solid brickwork (see fig. 8). This extension of the feature above arches C1 to C5 enabled barges within the undercroft to load and unload via doors and gantries, directly into the three floors of the store. This is the certainly the pattern with the façade of the later 1824 extension. It would also allow coal deliveries to be handled on a different wharf completely separate from wheat/flour cargo handling. This feature was preserved when the new three storehouses G,H & I, were constructed.

In 1768, a French officer mistook the multi-storied brand-new building as a barracks (*un gros corps de cazerne tout neuf à plusiers étages*) marked 'C' on the map (fig. 10)! He also mistook the island it was built on as '*ouvrage qui deffend la vallée, on ignore sa forme et s'il est en maçonnerie ou non*' (works to defend the valley, not known if it is of masonry or not) marked 'B' on the map. This spy's map shows that the building was an impressive edifice, dominating the saltmarsh. Grain would be brought in by sea-going barge at high tide because Newhaven as a port was only starting, and only had a wooden quayside on the eastern side of the main Ouse channel created in 1735. The only connection with Newhaven from this quayside was a '*bac pour passer la rivière, ou y peut passer au gué quand les eaux sont bassee* (ferry to cross river where it is possible to ford at low tide) marked with a 'D' on the map.

John H Farrant suggests that the corn trade was kick-started by this tidemill, creating a significant demand for about 1.5 tons of corn a week.[4] The Duke of Newcastle commissioned Thomas Marchant to survey his Bishopstone and Norton farms in 1777, and this gives the full picture of the mill construction (fig. 2).

Fig 12. Original cottages on the Tidemills 'island' (*courtesy Seaford Museum*)

Fig 13. Buckle cottages in 1924 (*courtesy Seaford Museum*)

(3) Adjacent to the mill was a '*small neat mill-house*'. A measured survey of the Mill House conducted by LB&SCR in 1903 shows the original house sharing the northern party wall of the mill, and was one room wide and two rooms deep, with a main entrance between the rooms on the northern façade. It had a cellar and the three floors above contained seven rooms. The roof structure has a saw-tooth profile roof structure with three exposed gable ends. In addition, fig. 2 shows a small group of six back-to-back cottages built on the island for the mill-workers, together with four cottages on the newly-quarried ledge at the seaward side of Hawth Hill. Figs. 12 & 13 show both have unusual sliding windows on the first floor. Although the Buckle cottages have sash windows on the ground floor in 1924 when the photo was taken, it is possible that, given the exposed position of the Buckle cottages, the original ground floor windows could have been replaced. Both groups of cottages have arched window heads and both are constructed in brick.

There is a footpath from the Buckle cottages along the north retaining wall of the mill pond westwards to the Tidemill, reinforcing the theory that both groups formed the nucleus of housing for mill workers. Given the unsocial hours of working because of the ever-changing time when high tide happened, workers' accommodation was an essential part of the mill's operation. The 1841 census shows that mill workers and a bargeman lived in the Buckle cottages. It is not known when the Buckle Inn started as a pub in the easternmost cottage. It was a pub in the 1841 Tithe map. The Buckle cottages were owned by the Pelham-Holles family until 1807.

There is no document that sets out how much quarrying was undertaken to provide the material for the island and the retaining embankments for the mill pond, and the trackway now called Mill Drove, but we can be certain that one result of quarrying the cliff face was the creation of the Buckle ledge, seven metres above sea level, with a 10-11m high vertical chalk face behind it. The 1761 Buckle ledge was about 30m from front to back from the assumed 1777 cliff face back to Buckle Bank. The fields above the platform are around 17m above sea level. Thus, an average depth of 10m of material had to be removed to get down to the Buckle ledge. I calculate that approximately 100,000 cubic metres of material was quarried to help form the new Tidemills infrastructure. I believe a further justification for the creation of the Buckle ledge was to create a more manageable route from the east side of the Ouse valley into Seaford. Up to that point, the Richard Budgen map of Sussex (fig. 14) shows the old route from Newhaven to Eastbourne via Seaford marked by

Fig 14. 1724 detail of Richard Budgen Map of Sussex showing route through Seaford (*courtesy Seaford Museum*)

milestones with Milestone 12 at Denton, through to Milestone 6 at Exceat Bridge. This route had to negotiate the steep drop from Denton into Bishopstone and then up to East Blatchington, passing through the Duke of Newcastle's estate. The new Buckle ledge allowed the 1761 Buckle road to avoid these slopes via Bishopstone, because the road now followed the valley edge via the Buckle Inn, and on via what was to eventually become Claremont Road, into Seaford.

(4) The East mill pond had two clear elements both marked 'O' in the 1777 survey (fig. 2): (i) the large east mill pond, sitting on the former saltmarsh between Tidemills and Hawth Hill and (ii) a smaller, narrower, westward-draining mill pond at beach level below the Buckle ledge, which also served to drain what was then called 'The Salts', now known as the Old Brickfield or Valley Dip (see fig. 2). It included two sluices, two bridges and a levée on the seaward side to provide protection for the pond and its enclosing structures from the sea. There is no evidence as to how this smaller mill pond was constructed, but as the feature lasted from 1766 until at least 1864 (figs. 2 & 15), it must have been built on the underlying chalk platform (figs. 16 & 17) in front of Hawth Hill and have been robust enough, when sheltered by a rampart of shingle excavated from within the new mill pond, to withstand the marine forces that assault this part of the coastline. I do not think a simple shingle embankment would either have the slender cross-section shown in fig. 15, or be robust enough to protect this important source of energy to operate the mill from the ravages of the sea. We know there were significant storms that damaged the mill infrastructure in 1785, 1792, 1824 and 1855, in addition to four severe ones after that period. The embankment must have been constructed of more durable material, since washed away. The chalk ledge it sat on is typical of the entire stretch of chalk cliffs from Brighton to Beachy Head and was exposed at low tide. Fig. 16 shows this ledge.

Tidemills— the first 46 years 1761-1807

After 1761, the mill ownership went through several hands in fairly quick succession for unexplained reasons. A series of documents[5] covering William Catt's estate when he died in 1853 lists various assignments of title during this early period, namely, an assignment of John Challen's interest on 24 June 1772 to Mr Thomas Rickman, and an assignment of Thomas Rickman's interest to John Woods on 3 May

Fig 15. 1860 detail from early OS map, showing the eastern second mill pond (*courtesy Seaford Museum*)

Figs 16 & 17. 1892 The Buckle cliff as it was from 1761-1899, looking east and west (*courtesy Seaford Museum*)

1777, by which means John Wood consolidated his ownership. Tidemills was put on the market on 19 September 1791[6] and at that time it was described as "*a newly built tide corn mill….(*with*) five pairs of stones and the mill is capable of grinding on average, about 140 quarters* (just over 1.5 tons) *of wheat a week. Adjoining the mill is a small neat dwelling house also a coal wharf, from which an increasing trade is carrying on; vessels of 100-140 tons load and unload at the mill and the situation is well adapted for an extensive coasting of foreign trade in corn and flour*".[7] It was purchased from John Woods in 1791 for £3,000 (£429,000 in 2018) by Thomas Barton of Lamberhurst. There were several recorded attempts to protect the mill infrastructure and these will be described later in this article.

There was a violent storm in 1792 that destroyed large quantities of flour and wheat at the tidemill.[8] The 1795 survey of the Ouse by an unnamed surveyor (fig. 14) is technically poor in a number of respects, but it does seem that the two east mill ponds have diminished in capacity and therefore capability, possibly because of shingle encroachment on its seaward defences. On 1 November 1798, Thomas Barton assigned his interest to John Farncombe, a local farmer based at Bishopstone Manor with a mortgage of £2,000 (£238,000 in 2018), so unless Farncombe invested assets of his own to supplement the mortgage, it had lost significant value over the passing years. On 23 October 1801, the asset was assigned to Edmund Catt, who passed it on to his cousin, William Catt, and to Edmund Cooper, on 9 October 1807. William and Edmund finally got the freehold on 4 August 1820. The Buckle went through a separate ownership route before ending up in William Catt's hands on 24 June 1828, having been previously in the hands of the Earl of Chichester until 5 November 1807 when it was leased to Mr John Gorring until he sold it in 1828.

Tidemills— the era of William Catt 1807-1853 (see mill plan in fig. 5)

William Catt (1776-1853) was an energetic entrepreneur, and during his ownership (1807-1853) the mill expanded significantly. Firstly, there was a continuing need to maintain the beach/embankment, which had eroded the capacity of the East Millpond. Next, William wanted to enlarge the mill. This would require an increase in stored water, and so on 11 March 1814, William Catt and Edmund Cooper entered into an agreement with the 1st Earl of Sheffield to lease and embank marshland to the west of the mill, creating the West Mill Pond. This was enlarged by a further lease dated 3 June 1816.[9] It is not clear where the material came from to embank the new West Mill Pond, but much must have come from the West Mill Pond site itself. I reach this conclusion because I cannot find any contemporary records akin to the 1899 agreement for enlarging the Buckle ledge. Indeed, such an arrangement in 1816 would have involved the 4th Duke of Newcastle, and agreement may not have been forthcoming. Also, a comparison of the width of the Buckle ledge in 1777 (fig. 2) with that of 1841 (figs. 16 & 17) shows little difference.

William Catt purchased the freehold of his Tidemills lease from the Earl of Chichester in 1820. This consolidation of his asset would have enabled him to invest significantly in enlarging the mill complex. Edmund Cooper ceased to be included in leases after 1826. New leases from the Earl of Sheffield regarding this marsh land, i.e. on 15 March 1830, 12 November 1835, 9 November 1841, and 13 November 1844, all are solely with William Catt as is the purchase of the Buckle. Further protection for both mill ponds had to be provided on the beach side, because of the occasional storm damage, such as that in 1820 which damaged the mill building and washed away some of the mill dam.[10] So a series of 20 groynes between Newhaven and the Buckle were constructed between 1824 and 1842. William Catt's grand ambitions were realised when I believe he converted the mill store (Building F) into a new mill which got its drive for the new millstones via shafts connected to the old mill wheels and passing through the party wall.

The new extension (Buildings G, H & I) was of four storeys of 16,380 sq. ft. (1,522 m^2) and increased the floor area of the mill enterprise by 150%. It had to use totally different construction methods, as the area occupied by Store Rooms 1 & 3 was built on piled foundations in the mill creek, whereas Store 2 (Building G) appears to have no undercroft as it was built on the island infill. Stores 1 & 3 incorporated an internal loading bay for barges to load and unload under cover. This loading bay probably used the old door openings and gantries on the western façade of the original building to which it was attached, with appropriately placed trapdoors in the floors. The external coal wharf expanded its use as a coal yard for the new Kiln House which dried the corn before it was milled. This arrangement can be clearly seen in the 1918 aerial photo (fig. 8). The weight and height of the new mill buildings were kept down by an innovative roof structure with a saw-tooth profile, having four ridges and valleys orientated W-E over Store Rooms 1 & 2, and another set of four ridges and valleys over

Store Room 3. These valleys drained out to the west and east elevations where gutters took the rainwater round to a major cistern on the southern side of the building. This can be clearly seen in fig. 3 and is another example of early 'green' thinking, partly because there was no freshwater source nearby until the water supply was provided in the 1880s.

Fig. 4 shows that the extent of other buildings on site had increased, when William more than doubled the size of his home by adding a three-storey extension and a significant single-storey extension in the rear garden. He also converted and extended a barn to include an extensive greenhouse heated by a new boiler, as well as building the Kiln House and seven new workers' cottages. The construction of the West Mill Pond required a new, more southerly sluice entry point for the incoming tide to enter West Pond and pass through to East Pond. Whilst maintaining the simplicity of flow, it did make the mill more vulnerable to marine erosion because it was nearer the beach. Fig. 6 illustrates this point. However, it is not clear how successful this West Millpond was, as on 23 November 1824 a great storm hit Seaford Bay, with Seaford Beamelands being inundated, and boats being swept up inland as far as Bishopstone. In the 1838 Newhaven Tithe map, the site is called Brookland rather than Mill Pond (as in the 1841 Bishopstone Tithe Map, fig. 7), indicating that it was of marginal use at that time as a reservoir to feed the mill-races.

Fig 18. 1864 Proposed improvements to Newhaven Harbour—detail (*courtesy ESRO Ref. ACC 5179/24*)

Tidemills, the last flowering 1853-1875

After William Catt's death on 4 March 1853, his son George (1813-1878) continued his father's work by installing the smock mill around 1862, above building H, to assist in hauling sacks within the mill building, particularly from the undercroft quayside. This became a very distinctive part of the silhouette of the establishment. It may have been this extra loading on the building that meant that 'S' shaped pattress plates appeared at regular intervals at each floor joist level on each façade to stabilise the structure. The 1861 census describes George Catt as 'employing 40 men and 3 lads' so it was still a major enterprise. He also put a new pitched roof over his late father's extension to the Mill House. George also tackled the problematic West Mill Pond around 1864. This appears to be a joint venture with the Commissioners of Sewers, as a plan proposal was carried out for the Commissioners by William Figg (fig. 18). In addition, the LB&SCR posted plans to extend their network from Newhaven Wharf station to Seaford and this was done by 1 June 1864. It is suggested that George Catt actually invested money in the railway,[11] and certainly a siding from the main line onto the Tidemills site was constructed, featured on the 1864 William Figg survey (fig. 18). A cottage built around 1830 on the field numbered 94 in fig. 7 became the stationmaster's house. The groynes inserted on the beach by William Catt were extended when a further ten were added just beyond the Buckle Inn in 1869/70. The small east mill pond disappears from the next major OS survey of 1872 (published 1875). The circumstances of its gradual disappearance are documented in a number of newspaper articles of the time.

25 October 1855 *"On the night of 25th October 1855 a storm raged here which for violence has not been equalled for many years. At dawn on the 26th it was discovered that the embankment between the East Pier and the Tidemills had been breached by the sea. These anticipations were painfully realised. On came the tide, the waves frequently rushing and dashing over the piers, so as to render it dangerous to venture on them. Many months will elapse before the damage can be repaired , an enormous expense must be incurred by Messrs. Catt can again raise the barrier between the ponds and the sea."*[12]

8 November 1859 *"SEAFORD. On the morning of Tuesday, the 1st inst., this town was visited by a severe storm of rain and wind, accompanied by lightning and thunder, which continued throughout the day. About six in the evening it increased to a heavy gale. Long before high tide the sea broke over the lower and weaker parts of*

the beach, and the green in front of the town was speedily covered with water, which continued to flow up to the New Inn. Much damage has been done to the battery wall facing the sea in which there are several large fissures, owing to the force of the tide having undermined the foundation, which caused the wall to sink from its own weight. The boat house upon the beach was completely destroyed, and much damage has been done to the tower. The road facing Blatchington battery has been entirely washed away and a great part of the battery was washed down by the force of the waves."[13]

8 November 1859 *"Storm flooded New Inn. Battery wall collapses, much damage done to the Tower. The road facing Blatchington Battery entirely wasted away with a great part of the battery".*[14]

28 October 1862 *"There was a grand sight here. Just noon at high water. The sea was coming right over the bank, the road was flooded and a beautiful cascade of water was falling over the road into the valley between the coastguard station and Blatchington Battery".*[15]

These were not the first storms to batter the coast, but with previous events, this easternmost mill pond was an integral and necessary part of the millpond capacity required to drive the water wheels. By 1830 the added capacity of the West Mill Pond made the smaller eastern millpond almost redundant, and so I suspect George Catt thought it was an unnecessary expense to keep it going and allowed it to decay. Thus, although the western boundary of the eastern millpond appears sharp in fig. 15, it will be noticed that it is open at the eastern end and clearly at the time of the survey (1860/61) it was already beginning to become choked with shingle such that it was dry at low tide. The storms would clearly have exacerbated this situation so that by the time the photos in figs. 16 & 17 were taken the effects of the intervening storm damage had eliminated this mill pond.

The Great Storm and the growth of Newhaven Harbour 1875-1883

Two factors sounded the death-knell of the Tidemill, i) the force of Nature, and ii) the economic regeneration of Newhaven Harbour.

Nature took a further cruel turn on 14 November 1875, when a combination of high tides and strong winds breached the beach from Castle Hill to Splash Point causing immense damage. This was far stronger than earlier ones, causing the overwhelming of the two remaining mill pond retaining walls, rendering the Tide Mill powerless, and heavily damaged. It is clear that the shape of the east mill pond changed significantly between the survey for the Tithe Map (fig. 7) and the 1875 OS map, which shows a sinuous shingle structure on the north side of the East Millpond within the boundary of the original configuration. The records do not explain its purpose or structure. It reflects the damage caused by the series of earlier storms. A 2018 Google Earth photo shows that the current footpath that runs along the northern boundary of the millpond depression runs along the line of this sinuous shingle structure, NOT along the original bank. The ground immediately to the north of this modern footpath is botanically of a different nature to the rest of this field between the footpath and the railway, and there is a land drain that defines the edge between these two areas of Bishopstone Tithe map that this field was owned by the Earl of Chichester and farmed by George Farncombe (John's son), and so was not part of Catt's Tidemills operation. The Commissioners appointed Capt. James Ardagh to report on how to restore the operation of the Tidemill and repair the wider damage, and he reported on 17 August 1876. His accompanying plan demonstrates the destruction caused to the estuary (fig. 19). His solution was to create an entirely new channel north of the Tidemill complex, together with a new East Mill Pond covering 20 acres, south of the railway embankment.

No immediate action could be taken as a further storm on 6 January 1877 was reported to have *"submerged the railway, and the road and from Newhaven to the Buckle; also the whole of Mr Catt's land at Bishopstone, the principal part of Mr Farncombe's land,*

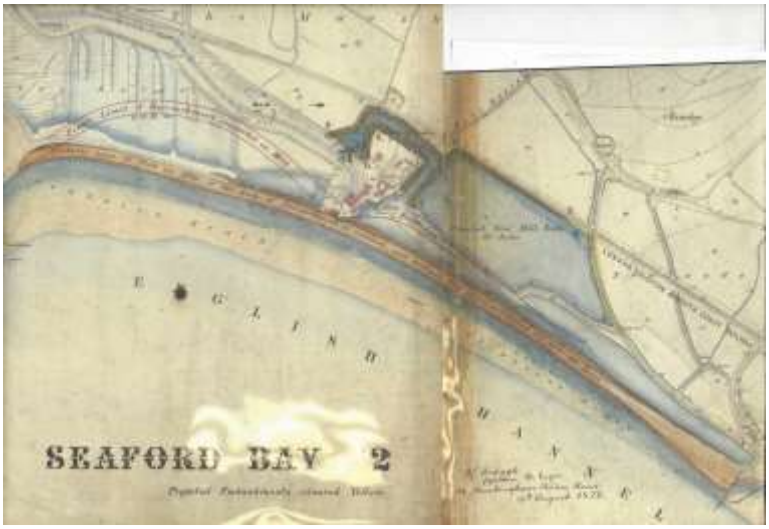

Fig 19. 1876 Capt. J Ardagh's proposal for restoring Tidemills (*courtesy ESRO Ref ACC 6965/1*)

Fig 20. 1900 Quarrying chalk from Buckle Bank for sea defence repair (*courtesy Seaford Museum*)

south of the main road leading from Newhaven to Seaford. The land between the Buckle bank and Blatchington Battery was entirely under water, some 10 feet deep. The sea wall from Bishopstone mills to the Buckle, for upwards a mile in length, is now nearly total wreck, only a few mounds being left of it, with large gaps between".

This was just a small part of the coastal damage done in the storm, and Seaford people claimed more immediate attention (the new sea wall from Splash Point to Pelham Road was started in May 1881 and completed by November 1882), so George Catt started legal proceedings against the Commissioners seeking repayment for the money he had to spend repairing the sea defences that had been breached. The case was not settled before he died on 10 April 1878, probably prematurely, as he passed away in London at the Gloucester Road Underground station of the Metropolitan line, aged 65, leaving an estate worth £34,197 4s 8d, (£3.8m in 2018), probate being settled finally on 20 May 1886. There were clearly complications, as attempts to settle probate in 1878 and 1880 failed. His widow, Emily was left to settle all these loose ends, and on 25 January 1879 accepted settlement of the damages at £1,200, and on 29 September 1879 sold the Tidemills operation to the Newhaven Harbour Company for £11,000 (£1.3m in 2018).

Newhaven Harbour was being rejuvenated at this time under the terms of the Newhaven Harbour Improvement Act 1878 which got Royal Assent on 17 June 1878, and so the Trustees of the Newhaven Harbour and Ouse Lower Navigation transferred their interests to the newly-formed Newhaven Harbour Company which was largely under the control of the LB&SCR. The Harbour Company immediately set about the major work of constructing the two breakwaters and improving both banks of the Ouse mouth. John Catt (George's younger brother who changed his surname to Willett) and Edgar Stoneham took out a 14-year lease on the mill from the Company on 29 September 1879, but the Newhaven Harbour Company bought back the lease four years later for £3,000 as they tried to find a new use for the site as a cement works but these negotiations with the Portland Cement Company foundered in 1884.

Tidemills under new management 1883 to date

The works during the early 1880s to develop the East Wharf of the harbour had interrupted the flow of mill creek, which was now regulated by a sluice rather than free tidal flow. By then the smock mill had blown down in a gale, severely damaging the granary as it fell. The west mill ponds were filled in with chalk from Brighton College which was expanding with new Gothic buildings built between 1883-7 and needed to dispose of the landfill.[16] This was brought in via the new tramways that were created by the Newhaven Harbour Company. The OS revisions of 1893-8, 25-inch series (sheet 78.7) (fig. 21) show these tramways extending from Newhaven Harbour station onto the beach above ordinary high tide across lands that had clearly been restored at least in volume and extent, until bigger sea defence

Fig 21. 1898 The Tidemill transformed—ready for demolition, Mill Creek sluiced, west mill pond filled in.

work could be implemented. The tramways ran on land fill that covered the two sluices from Mill Creek and the western Mill Pond because they served the new use for the Mill buildings as a bonded warehouse. Thus, with this work and the sluice where the River Ouse meets Mill Creek, the tidal mill was dead.

The decision to restore the beach defences was effected through an agreement for excavation chalk from Hawth Hill dated 7 June 1899 between the Earl of Chichester and The Commissioners the Newhaven and Seaford Sea Defence Works, setup by Act of Parliament in 1898. This completed the wall from Pelham Road to Tidemills, linking with sea defences carried out by the LB&SCR between Tidemills and the East Pier at Newhaven in the early 1880's. This fresh quarrying resulted in Buckle Bank retreating on average by 20m inland. This created enough spoil to reconstruct the beach from the Buckle to the eastern breakwater probably by using the quarried chalk as landfill above the high tide mark and allowing the shingle it replaced there to be moved seawards to form a more effective barrier on the lower beach. The landfill was distributed by a rail system which also connected to the existing network from Newhaven Harbour station. This is recorded in a well-known photo held at the Seaford Museum (fig. 19) and remnants of these tracks can be seen even today. The railway embankment west of Tidemills served also as a part of the sea defences and remains to this day. The groynes were extended to Splash Point. In 1890 the main mill building was converted to a bonded warehouse, a use which lasted ten years before the mill and warehouses were demolished, leaving the small village standing.[17] The Tidemills site had a varied life after the mill buildings were demolished, and this is well recorded elsewhere[18] and so this paper does not seek to reproduce that account here. The superstructure of the mill buildings was demolished in 1901, and by 1937 when the survey for the 1938 OS map was done, even the undercroft structures had gone, and by January 1939, all the inhabitants were rehoused leaving the residual structures to be used by the Army for military training. By 1945 the site became as we see it today.

Conclusions

The 1898 OS map (fig. 21) shows the transformation of the landscape to meet the Newhaven Port's requirement, its former use fading away— a sad end to a daring experiment that was remarkable for tapping into 'green' energy, more than 200 years before such concepts became essential to the survival of this planet.

I appreciate that my speculation about the construction of the small east mill pond may be controversial but it seems entirely consistent with the varied construction details used to create the Mill in the first place and to protect the massive investment it represented for over 100 years.

Without reference to the historical development of Tidemills, it is difficult for visitors now to interpret the landscape on what is now the Tidemills Local Wildlife Site. It is important to recognise what a significant enterprise it was during its lifetime, bringing much more than a return on investment by a succession of private entrepreneurs. I want to acknowledge the significant help given to me by Luke Barber, who has excavated significant elements of the site, and been most generous with the records he has amassed over the years.

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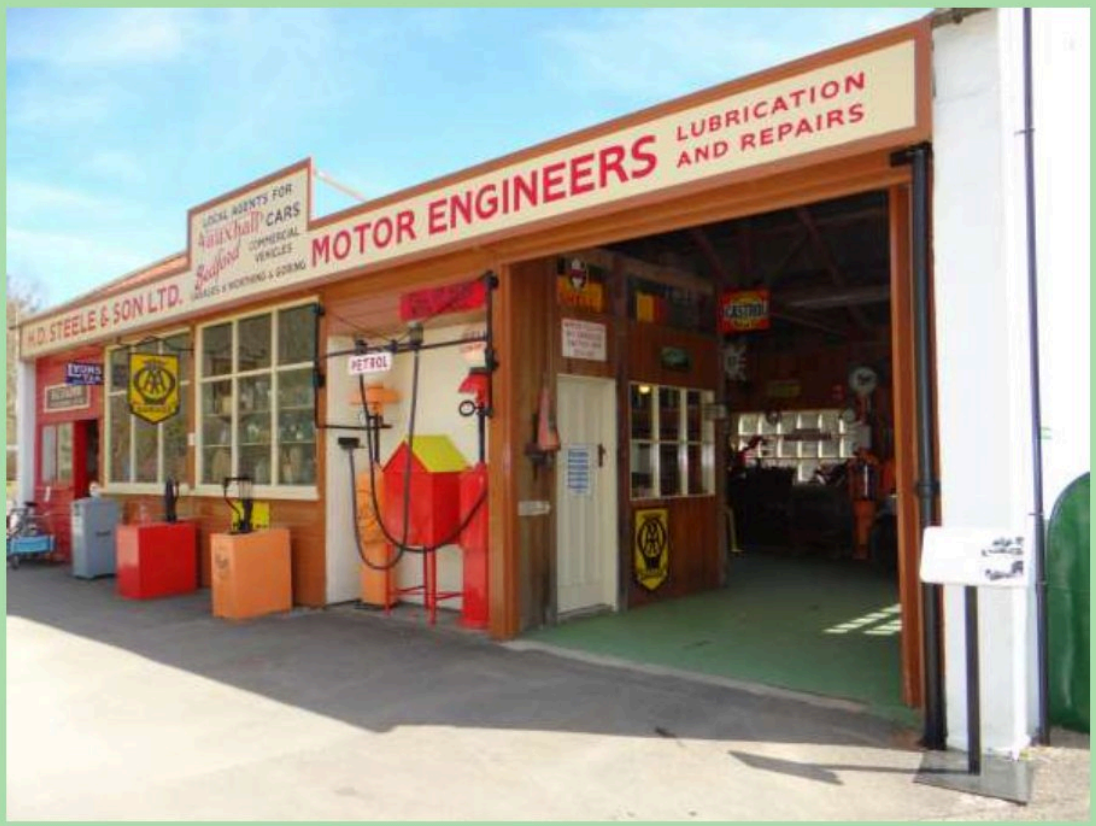
Ashcombe windmill, reconstructed in 2018



The Village Garage at Amberley Museum, a replica of a typical building of the 1920s/30s