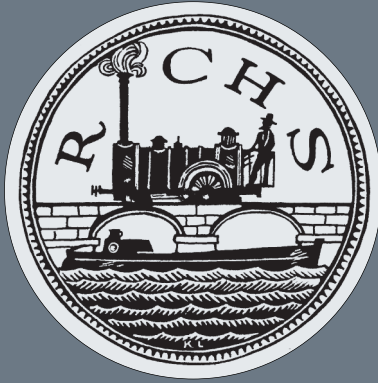




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Front : A view inside the former Worcester Engine Works, 2019
[photo Ian Martin] (see pp 70–81).

Back : The former Worcester Engine Works. (*Upper*) Rear of the main buildings, 2019 [photo Ian Martin]. (*Lower*) View of the works when owned by Dutton’s Railway Signalling Co, 1890 [by courtesy of Kidderminster Railway Museum] (see pp 70–81).

On the outside looking in: a short history of the Worcester Engine Works Co Ltd, 1864–1872

Ian Martin

Introduction

Very little information has been published with regard to the Worcester Engine Works company. This account attempts to detail the issues and provide an explanation as to why things turned out the way they did. The data used to compile this article has come mainly from contemporary reports of shareholders' meetings in local newspapers. All company documentation was lost in a fire. From this distance in time it is difficult to fully understand the logic of the Board's decisions. The formal nature and modes of address further hinder understanding. Why the company failed has never been clearly explained, most conclusions being based on a very rudimentary understanding of the available evidence.

Due to the lack of data in a number of areas certain assumptions have been made; they are mine alone, as are the conclusions that have been drawn.

Railway development in Worcester

This began in 1845 with construction of the Oxford, Worcester & Wolverhampton Railway. Many problems ensued, mainly due to insufficient

funds. In an attempt to improve the management of the company, Alexander Clunes Sherriff, MP, former mayor and also, incongruously, Sheriff, was brought in and matters gradually improved. Over time other local lines were incorporated and the railway changed its name to the West Midland, with Worcester as the operational and engineering centre. Sherriff imported highly skilled men as top officials, and built up a large skilled work force. Later the company was taken over by the Great Western Railway. When a great fire destroyed the carriage works in 1864, the GWR, rather than rebuild, relocated them to Swindon. In an attempt to find work for his skilled men, Sherriff and a number of former executives then promoted the building of the Worcester Engine Works in Shrub Hill Road.



Figure 1. Alexander Clunes Sherriff (1816–1878), Chairman of the Worcester Engine Works, MP for Worcester (1865–1878).



Figure 2. Italianate tower at Worcester Engine Works. [Photograph by author]

Establishment of the works

The works were established in 1864, the company purchasing the former works of McKenzie, Clunes & Holland (who continued to rent a part of the site) at Shrub Hill and also building new works on the upper yard above Shrub Hill Road. The original plan was to utilise the old site for girder construction work while the locomotive works were being built.

The men concerned in founding the company, Alexander Clunes Sherriff, Thomas Rowley Hill, Walter Holland and others, were men of vision, used to working on ambitious projects, and everything regarding the engine works was planned on a grand scale. They were designed by Thomas Dickson, who was the assistant to the Managing Director, Edward Wilson. At the time the works were described as one of the finest industrial buildings in the Midlands (Fig 2 and cover).

A summary of the Company's prospectus is shown in Table 1.

Construction

The time taken proved to be a great deal more drawn out than expected and resulted in the company continuing with, and developing, girder and bridge work. Over its short life this appears to have been the only profitable area of business.

The following contemporary newspaper articles give an idea of the progress of construction.

Update on Progress at the Engine Works

The land comprises four to five acres, and for the most part consists of a hill on the summit of which stands the beautiful new church of the Holy Trinity, and Mr Sherriff's former house sloping towards the Virgin Tavern Road. To get to the requisite level the soil has been excavated to the depth of some yards in places, and to facilitate this portion of the operations, a tram way was laid across the station road in front of Shrub-hill, and by means of a temporary bridge spanning the New Town Road, carried to a spot by the Workhouse, where, as it was dug out, the ballast was carried and "tipped" for the purpose of making the level required for the

Table 1. Prospectus of the Worcester Engine Works Co Ltd

Authorised Capital £300,000 (in 30,000 shares of £10)

Directors

Alexander Clunes Sherriff	Chairman
William Fenton	Deputy Chairman, GWR
Peter Hardy	Hardy & Padmore, [Worcester Foundry]
Thomas Rowley Hill	Hill, Evans & Co, [vinegar manufacturers, Worcester]
John Wheeley Lea	Lea & Perrins
John McKenzie	McKenzie, Clunes & Holland
John Parson	Deputy Chairman, Metropolitan Railway
James Dyson Perrins	Sheriff of Worcester
Joseph Bradley Read	[Wine merchant, Worcester]
Antony Kington Baker	Director, GWR and Contract Corporation Co

Managing Director & Engineer Edward Wilson

Resident Manager John McKenzie

Secretary Walter Holland

Bankers The Worcester City & County Banking Co
The London Joint Stock Bank

Temporary Offices 14 Foregate Street (next to the station)

Purpose Constructing and maintaining locomotive and other Engines and Machinery, and disposing of, leasing or hiring the same, some to Railway Companies and others for immediate payment, or deferred payments, whereby a large field will be opened for the operations of the company.

[Extracted from *Birmingham Daily Post*, 7 May 1864 and later]

new goods depot of the Midland Railway Company.

The excavations have been vigorously proceeded with, and many thousand cubic feet of soil have been removed, but a great quantity has still to be cleared away. However much progress has been made, and the foundations of portions of the buildings are now being laid, and it is hoped that in the course of the summer the works will be fairly in operation. The front of the building will be parallel with the road leading from Lowesmoor to Shrub-hill Station, and when complete will form one of the largest establishments in Worcester, not only from the area of ground covered, but the number of hands engaged, some 400. The length of the block will be 244 feet and the depth 240 feet. The centre will comprise the erecting shops, which will be 50 feet in breadth and extend along the whole depth of the building. To the right and left of the erecting shops will be the tool shops, 45 feet each in width by 122 feet in depth. In rear of these and extending to the end of the block, the smiths' shops and forges will be placed. The boiler shops will be on a level with the Virgin's Tavern Road, and under the smiths' and tool shops. These boiler shops will be at the north-western end of the building, and extending beyond these to the extreme end of the land, additional foundations are being laid down,

so as to be available at any time. The boilers for driving the machinery in the shops will be placed under ground, and to the front of the premises. There will be direct communication with the railway, tramways running through different parts of the shops and connecting with a siding that will pass over a bridge crossing the Virgin Tavern Road, and joining the downside of the Malvern line. There will also be a tramway between the new works and the Vulcan Works.

The building will be of glass and iron, with angle roofs and "North Lights". The plant and machinery will necessarily be of a very large and expensive kind, and much of it will be supplied by Messrs Whitworth of Manchester. Already, a steam hammer – the first in Worcester we believe – is in operation, and important contracts have been entrusted to the new company, including work for the Metropolitan Railway and for railway works in Madras. The works are being carried out under the able and energetic engineer of the company, Mr. E Wilson, the superintendence being entrusted to Mr. Dixon.¹

Update on Progress at the Engine Works

The works belonging to the Worcester Engine Works Company, at Shrub-hill, have since spring, been steadily progressing, but it has been found that, in consequence of the magnitude of the

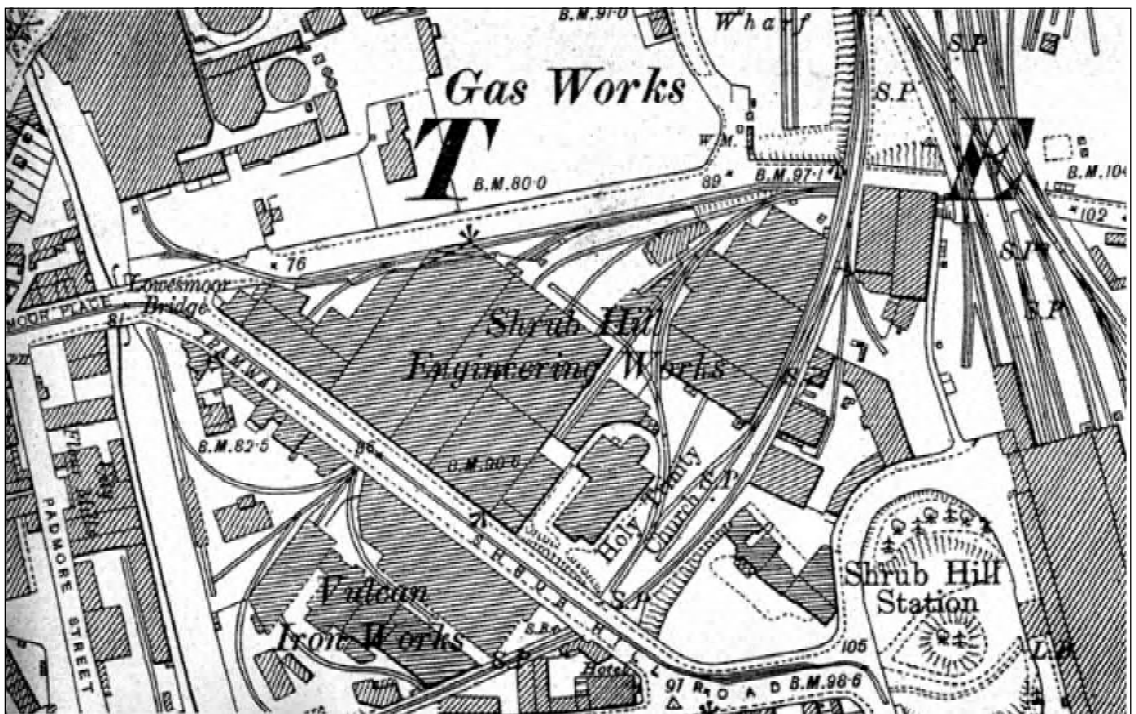


Figure 3. Worcester Engine Works as shown on the 1904 1:2500 Ordnance Survey map. At this date the works were in the possession of Dutton & Co's railway signalling works.

operations, it will be impossible to bring them to completion in the present year.

One of the smith's shops, although without a roof, is already fitted up with every appliance and convenience for work, and amongst other machinery may be found two large steam hammers, the one striking with the force of 5cwt and the other 10cwt. In April the foundations were being worked out, but at the present time the front of the building, with the exception of the roof, is completed, and constitutes a great improvement to the neighbourhood.

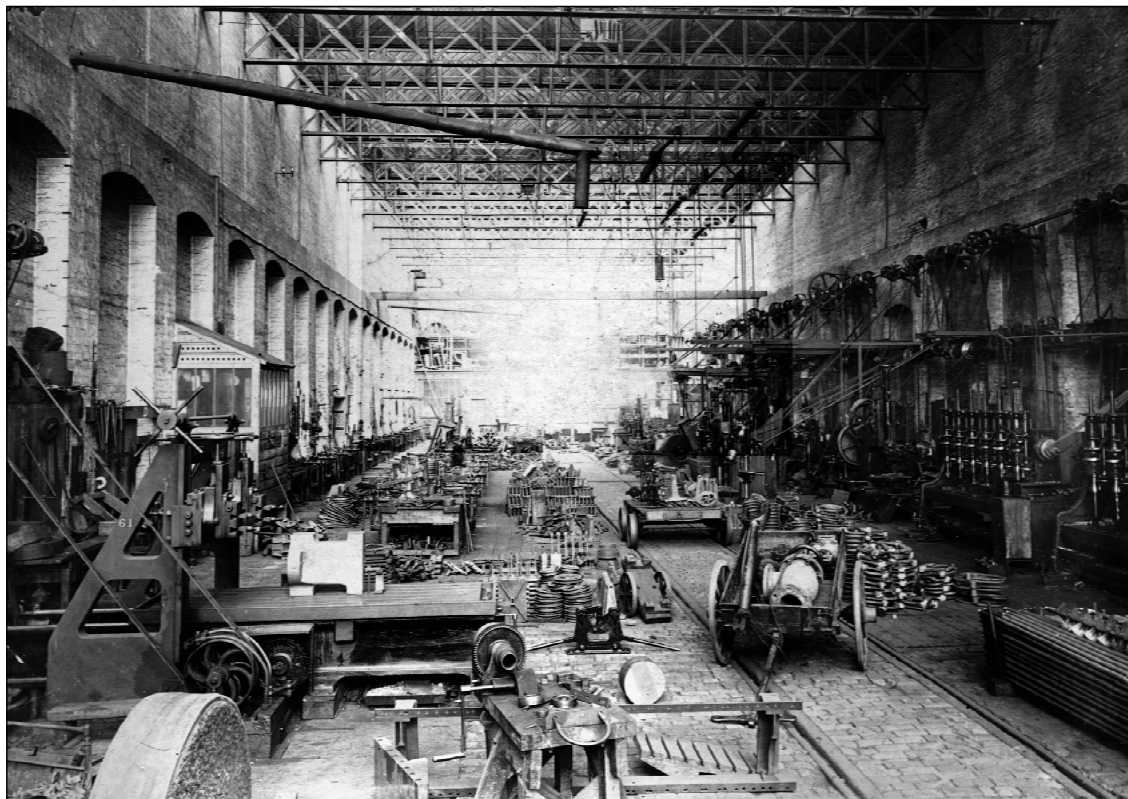
The length of the block is 244 ft, and its depth 240 ft, so that it is nearly square. In the centre is the erecting shop, which runs backward the whole length of the building, and is 50 ft in width. A huge traverser or moveable crane, for lifting heavy weights, will be placed in the erecting shop, the small wheels on which it moves being fixed in the cornice near the roof. Another traverser will also be fixed in the boiler shops at the north-west end of the building facing Lowesmoor.

Temporary engines are now used for driving the machinery in the fitting shop at present in working

order. The fuel will be brought from the siding by a tramway running from the permanent way to the works, and thence under a tunnel to the boilers. The fitting shops front Shrub-hill Road, and the smith's shops are in the rear. Each of these shops is 122 ft long and 45 ft wide.

The offices are at the Lowesmoor end of the building, and near the new church will be erected stores, with a prettily designed storekeeper's office facing the Shrub-hill Road. An underground tramway connects the works on either side of Shrub-hill Road. With regard to the rear of the building, the foundry, which is near the bridge crossing the Virgin Tavern Road, is rapidly approaching completion. Other fitting shops, smith's shops etc. will in due course be erected in the rear of the present buildings. It is expected that the required level of earth will be obtained in about three weeks. The earth is still being excavated and removed to the new Midland Railway Goods station near Wyld's Lane. The work altogether is one of great magnitude, 229 bricklayers and labourers being employed.

The first order for engine work, received many months ago, was for 40 locomotives.²



**Figure 4. Former locomotive erecting shop, 1890, when the works were owned by Dutton & Co.
[Courtesy Kidderminster Railway Museum]**

The new works were built of red Staffordshire bricks with dressings of stone, and blue and yellow brick facings (Fig 2 and cover). The cost of the new buildings and equipment was upwards of £145,000 (by today's value around £17 million).

Sales

Locomotives

The first six locomotives appear to have been made for stock. Initially there was no shortage of orders from the railway companies, the main customers being the Great Eastern Railway, the Metropolitan Railway, the Bristol & Exeter Railway and the North Staffordshire Railway. It may well be that other directorships held by some of the Directors enabled such orders to be obtained.

The cost or selling price of any orders is unknown. However, it was mentioned in the minutes that the North Eastern Railway was, according to a Birmingham newspaper, paying £2,250 for its engines. This ties in well with an article in *The Engineer* for 1871 which uses an average figure of £2,000 for both tank and tender engines. A shareholder thought that with all the modern equipment at the Engine Works it should be possible to produce such orders profitably at the price quoted for the North Eastern Railway. This proved not to be the case. Towards the end the company was trying to get any orders from almost anywhere. The final locomotive order was obtained from the Nicholas Railway in Russia. This has often been quoted as the reason for the company's final demise, but is far from being the case. Its implications are discussed later.

Iron work

As with the locomotive orders, a number of these were probably influenced by other directorships, such as those for the Metropolitan and the Great Eastern Railways. At the start work was concentrated on a contract with Lucas Bros to supply girders for the Metropolitan Extensions of the Great Eastern Railway. Other orders were for a bridge over the Clyde for the City of Glasgow Union Railway. It carried the line into St Enoch station. The girders for the roof of the vinegar works of Hill & Evans in Worcester also came from the Engine Works in 1866.

Employees

This is a difficult area with missing and inconsistent data. The following numbers are taken from the minutes of the shareholders' meetings and any newspaper details.

07.10.1865	229
07.02.1865	492
07.08.1865	750
05.02.1866	500
02.08.1866	683
30.06.1867	904
02.02.1869	472
02.08.1869	467
02.02.1870	592

The Board and major shareholders

The members of the Board were all well established Worcester businessmen, some having interlinking directorships. A number had been Mayor, two had been Sheriff, and one was a Member of Parliament. Within this club-like atmosphere, the real power appears to have rested with Alexander Clunes Sherriff.

When he chaired the shareholders' meeting, there appears little doubt who was in charge. All major decisions required his approval. This was the case until a clash occurred with Sir Francis Lycett. There was more to this than just a difference of opinion on how the company was being run, as they were fierce political rivals. Lycett was raising all the right questions; however, he received little if any support, and things carried on as normal, at least until it was too late.

The Directors seemed to have little idea of how to run a such a business and failed to take an active role in steering the company as would be the case today. This seems strange as their number included Clunes, Holland & McKenzie. Their understanding of finance, especially in the costing area, seems to have left a lot to be desired, but presumably this was not untypical for the times. Like a lot of people with little knowledge of a subject, they concentrated on the trivial whilst ignoring the consequential.

Significant employees and shareholders

Alexander Allan

In 1832 he went to work for Messrs Robert Stephenson in Newcastle and then Liverpool, later taking a position at Crewe as works manager and assistant locomotive superintendent to Francis Trevithick. He left Crewe in 1853 to become Locomotive Superintendent of the Scottish Central Railway. Then, when it was absorbed by the Caledonian in 1865, he became Manager of the Worcester Engine Works, a position he held for four

years until in 1870, when he was partly disabled in an accident in Birmingham, he was obliged to retire.

Andrew Alexander

Worked for Brassey, Jackson & Betts at their Canada Works in Birkenhead. Later worked on the Mont Cenis Railway (also a Brassey contract) and then the Worcester Engine Works as Manager, which he eventually left for a position in Sheffield.

Walter Holland

After working for the Oxford, Worcester & Wolverhampton Railway, he formed a partnership with Thomas Clunes (Vulcan Iron Works) and John McKenzie to form McKenzie, Clunes & Holland. They expanded to become the foremost manufacturer of signalling equipment in the UK.

Edward Wilson

He worked for E B Wilson & Co (no relation) at the Railway Foundry in Leeds. Later he became Engineer in Chief of the Oxford, Worcester & Wolverhampton Railway. In 1864 he was appointed Managing Director and Engineer of the Worcester Engine Works Company.

William Thomas Rudd

Manager of the works until his sudden death.

Apprenticed to Alexander Allan at Crewe. When Allan became General Manager of the Worcester Engine Works Company, he appointed Irving his sub-manager.

Stephen Woodley

Secretary of the Engine Works Company until 1868. Later he became the proprietor of the Great Western Hotel which was owned by the company and eventually sold by them at a loss of £1,900.

William Thow

He was a pupil of Alexander Allan on the Scottish Central Railway before being employed as a draftsman with Dübs Locomotive Works, Glasgow. When Allan was made general manager of the Worcester Engine Works Company, Thow joined him and became chief draftsman. He later worked at Crewe and in Egypt. He was appointed locomotive engineer to the South Australian Railways in 1876 and then locomotive engineer to the New South Wales Government Railways in 1889.

Thomas Daniels

In 1865 appointed foreman of the machine shops. Later employed at Sharp, Stewart & Co and then

Nasmyth, Wilson and Co where he rose to become a Director.

James Porter Maginnis

He served his apprenticeship at the Worcester Engine Works. Acted for a number of years as the English representative of the South Western Railway of Russia.

Sir Francis Lycett

The dissenting voice at the shareholders' meetings. A very wealthy businessman and philanthropist and a prominent member of the Methodist Church.

Key points from shareholders' meetings, illustrating the rise and fall of the Company³

4 August 1864

Initial meeting, optimism abounds.

11 February 1865

Income from bridge and girder work; labour cost £500 per week; first dividend paid.

12 August 1865

Much work carried out in the open air; delayed deliveries; locomotives made for stock; orders for 40 locomotives; 530 employees cost £ 17,000 per annum; second dividend paid.

10 February 1866

Lack of cash; borrowing in advance of further calls; locomotive manufacturing for orders commences; about 500 employees at £26,000 per annum; third dividend paid.

August 1866

Economic crisis (following the failure of Overend & Gurney); purchasing machinery; 638 employees at £22,000 per half year; fourth dividend paid.

9 March 1867

Intense price competition; general depression in railway industry; fifth dividend paid.

10 August 1867

Manager Allan unavailable due to illness; trade still depressed; major discontent at shareholders' meetings; bills discounted due to cash shortage; bank overdraft; building almost complete; increase in calls in arrears; 904 employees at £25,000 per half year; sixth dividend paid.

8 February 1868

Site completed; first meeting at Shrub Hill; trade conditions continue to deteriorated; seventh and last dividend paid.

2 September 1868

Professional accountant brought in to review the accounts; first loss and over-estimates come to light; another new Works Manager (Rudd); first suggestion that share value should be reduced; appointment of professional auditors; death of Chairman's wife.

8 February 1869

Large losses come to light; Directors recommend write down of shares; recognition of lavish capital spend and bad management; resignation of McKenzie; revaluation of plant and machinery; additional call to pay debentures due; mention of two locomotives in stock, not made to order; revealed that capital items had been inflated to improve the profit (capitalised) when they should have been written off; recognition that no profit had been made on locomotives manufactured.

11 September 1869

Slight improvement in results; return of optimism; Rudd in Russia, wins contract for 15 locomotives; 472 employees.

February 1870

Further optimism with 12 months girder work in hand; mention of heavy fixed charges; £19,000 spent on Russian order; 467 employees.

10 September 1870

Work completed on two large contracts but no profit taken; no new orders; recognition of bad debts; large amount paid into the bank against the Russian order; the debtor's account being considerably reduced; recognition of outdated manufacturing equipment compared with competitors; 592 employees.

March 1871

Another loss; death of Rudd; large sum collected from debtors; in Sherriff's absence Directors have 'no view' on what action to take.

September 1871

Recognition that the contract for girder work with Lucas for the Great Eastern Railway is open-ended with regards to quantity and time but is at a fixed price, this in a rapidly rising price market for raw materials; possible loss £4,000–5,000; balance of

Russian contract still outstanding; Rudd blamed for current contract problems; claim by the company against the Russian contract of £6,000 (extra work done ?) with a counter claim of £2,500 which will be treated as a doubtful debt.

Special Meeting 22 June 1872

Agreement to voluntary liquidation.

Special Meeting, 10 August 1872

GER contract still outstanding; majority of debts settled.

Liquidation, 17 May 1873

The part of the yard rented from the Vulcan Ironworks given up; GER girder contract settled; shareholders recoup a proportion of their investment on the sale of the business to the West Central Wagon Company.

Trading account 1864–1871

An attempt to give a financial feel for the business from the largely unstructured numbers available is shown in Table 2.

Locomotive building

Overview

After a long delay in constructing the building, locomotive production began in 1865. The first batch of locomotives, works numbers 1–6, are thought to have been contractors' engines, all 0–6–0, although whether tank or saddle tank, is unclear. Most of the work in constructing them must have been carried out in the open.

The first specific order was for ten 0–6–0 goods engines for the North Staffordshire Railway which were built in 1866–67 (Fig 5). Forty similar engines were ordered by the Great Eastern Railway, these being delivered from 1867 to 1869. The Great Eastern locomotives were followed by six 0–6–0 goods engines and two 2–4–2T passenger engines supplied to the Bristol & Exeter Railway's standard-gauge section.

The best known locomotives were those built for the Metropolitan Railway. They were 0–6–0Ts designed by R H Burnett, the Chief Mechanical Engineer of the railway. They were delivered in 1868.

The final order (April 1870) was for fifteen 4–4–0 locomotives for the Nicholas Railway in Russia and these were all despatched during 1870. They were based on the then standard American 4–4–0.

Table 2. Trading account 1864–1871

Half year	Turnover	Labour	Materials	Margin	Net profit	% profit
	£	£	£	£	£	%
June 1864						
Dec 1864	27,980	8,000	15,783	4,197	1,724	6.16
June 1865	37,000	13,000	18,450	5,550	2,486	6.72
Dec 1865	52,660	8,500	36,261	7,899	3,166	6.01
June 1866	52,153	13,000	31,330	7,823	3,980	7.63
Dec 1866	60,000	20,000	31,000	9,000	4,821	8.04
June 1867	74,780	22,000	41,563	11,217	4,126	5.52
Dec 1867	70,300	25,000	34,755	10,545	2,272	3.23
June 1868	53,700	15,000	30,645	8,055	-445	-0.83
Dec 1868	22,920	15,000	4,482	3,438	-4,848	-21.15
June 1869	59,900	12,000	38,915	8,985	770	1.29
Dec 1869	47,153	12,000	28,080	7,073	143	0.30
June 1870	42,880	14,000	22,448	6,432	-372	-0.87
Dec 1870	4,873	3,284	858	731	-3,963	-81.32
June 1871	15,233	3,000	9,948	2,285	-1,315	-8.63
	621,533	183,784	344,519	93,231	12,545	2.02
Further write off	44,988			-32,443	-5.22	

Assumptions abound and many numbers are debatable.

A 15% gross margin on average is assumed.

Sales value of locomotives assumes lower values to tank engines, with prices rising but then falling. The value of NER locomotives as per minutes is used as check.

Labour costs are from notes in minutes and spread on numbers employed.

Materials assume turnover every 3 months.

In the space of five years the company constructed 84 locomotives of various types and on two different gauges. The majority can be traced and illustrated; the problem has always been with the first and last types constructed.

Which, if any, of the above actually made a profit is hard to say. Certainly the Great Eastern contract seems to have been problematic both regarding margins and payments. There is mention in the minutes of quality problems but it is unclear as to which locomotives this refers. Both the Metropolitan and North Staffordshire locomotives had relatively long lives. The Russian locomotives were further produced by local manufacturers, so were presumably a successful design.

Specific locomotives

Works number 1

The first locomotive is thought to have been an 0–6–0ST named *Salford* which later worked on the Manchester Ship Canal contract of T A Walker. It had 3ft 2in wheels and 11½in by 18in cylinders. Further formation comes from an auction announcement in June 1874 of the plant used by T A Walker in building the Somerset & Dorset Railway extension to Bath. This included four 6-coupled standard-gauge inside-cylinder saddle tanks, of which two were by Manning Wardle, one by Fox Walker and one by the Worcester Engine Company.



**Figure 4. North Staffordshire Railway loco no 90 (Worcester Engine Works no 7, 1866).
[ETH-Bibliothek Zürich, Bildarchiv]**

Salford appears again in an auction announcement relating to equipment to be sold by the contractor John MacKay at Gloucester in July 1894. The locomotive had been working on the GWR Maidenhead–Twyford (Waltham) widening contract in 1891–94. It was described as having 12in by 18in cylinders.⁴

In 1895 this locomotive was rebuilt by Kerr Stuart, using parts of *California* from Kerr Stuart, Stoke on Trent, and named *Godshill*. The rebuilt locomotive was used on a contract of C J Westwood between 1895 and 1897 for the Newport, Godshill & St Lawrence Railway, which later became the Ventnor branch on the Isle of Wight. It was then hired to the Isle of Wight Central Railway in November 1897. The final record is of it going to a contractor, J Firbank, c1900, and being used on the Great Central Railway Marylebone–St John’s Wood contract which finished in the same year.

Works numbers 2, 3 and 4

Salford was followed by three contractors’ locomotives whose wheel arrangement and destinations are unknown. There is, however, a possible link to these locomotives, and that is a bad debt of the contractors, Peto & Betts. The minutes state that this debt had been written down to 7s 6d in the pound, or £1,993, in 1868. If this is grossed back up, it gives an order value of £5,300, sufficient for three locomotives. The problem is that it is not known

whether the debt was for locomotives or bridge/girder work, since Peto & Betts were the principal contractors for the Great Eastern Metropolitan Extensions (see ‘Iron work’ above).

An Industrial Railway Society handbook gives details of a further locomotive. A Worcester Engine Works 0–6–0ST, no works number, was used on a contract for the Somerset & Dorset extension from Evercreech Junction to Bath, by T A & C Walker in 1872–74. It was offered at auction by Fuller, Horsey, Son & Co on 11 August 1874. It was next reported as being used by contractor Charles E Daniel for the Kings Sutton–Chipping Norton section of the Banbury to Cheltenham Railway in 1885. It was sold for scrap by F Homan at Hook Norton/Chipping Norton on 9 April 1885.⁵

The final record is from a Manning Wardle memo-book that quotes the order of a boiler for a Worcester Engine Locomotive with cylinders of 11½ inches by 18 inches. The order is from the Fryston Coal Company Limited (Yorkshire) and is dated 27 July 1893.⁶

Works numbers 5 and 6

These two locomotives were built in 1865 and eventually found their way to the Lemberg–Jassy Railway in Austria-Hungary. They were 0–6–0Ts and in service they formed class IIIa and were numbered 101 and 103. 101 was named *Mihuczeni*;

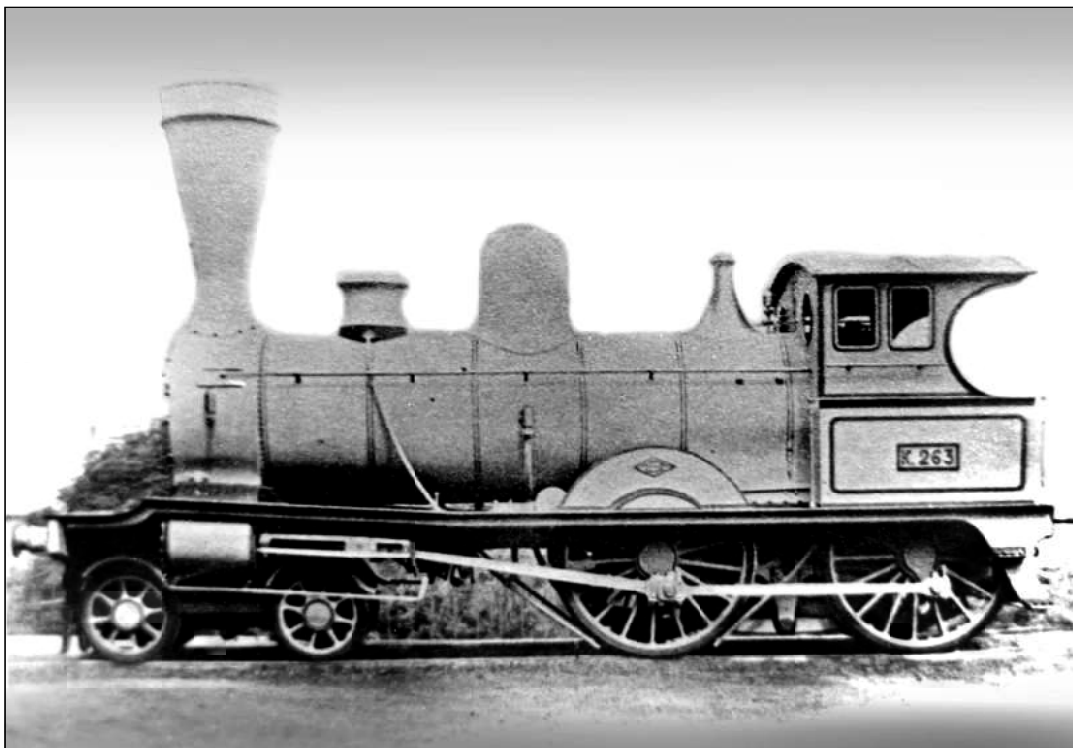


Figure 5. Nicholas Railway (Russia) no K263 (works no 84, 1870), the last locomotive built by the Worcester Engine Works. The photograph is the only image known of a WEW loco ex-works at Worcester. [Courtesy Kidderminster Railway Museum]

it was sold in 1874 to the Erzherzog Albrecht Bahn and scrapped in 1889. Number 103 was named *Brzezany*; it was sold to the Imperial State Railways in 1889 and scrapped in 1895.

Two similar locomotives were built by Manning Wardle. Interestingly, a website giving details of all locomotives that ran on the Lemberg–Jassy Railway gives exactly the same dimensional data for Manning Wardle and Worcester Engine Company locomotives.⁷

A description of the works in *Berrow's Worcester Journal*, 16 March 1867, states that 'the company possesses an engine of its own construction. 'This engine has a funnel of such a peculiar fashion that we should recognise it amongst a thousand others'. It would appear that two years after manufacture, the company still had at least one of the first six locomotives in its possession.

The Nicholas Railway, Russia

These were the last locomotives manufactured by the Engine Works (Fig 6). They were built in 1870 for passenger services between St Petersburg and

Moscow and were ordered after a trip to Russia by the Works Manager, W T Rudd. The Company hoped for further orders but these did not materialise. The order gave rise to a number of problems with regards to additional costs and disputed payments, withheld presumably due to defective workmanship. However, despite popular opinion at the time, it would appear that these difficulties were overcome and all outstanding payments received. How the engines were transported from Worcester to St Petersburg would be interesting to know. Possibly canal to Gloucester, then to Bristol and finally by sea to St Petersburg. The wheel arrangement was 4–4–0, works numbers 70 to 84, and numbers on the Nicholas Railway were 249–263.

After these locomotives proved successful Russian and German builders provided additional locomotives. Eleven were manufactured between 1871 and 1873 by Alexandrovskii Zavod in St Petersburg, and these were eventually followed by eleven more from Emile Kessler of Karlsruhe in 1879.

A grandiose failure

The minutes of the six-monthly shareholders' meetings and a few newspaper articles give the only glimpse of the activities of the company during its short life. It did not take long to move from florid, verbose praise to abject disappointment.

The main Directors had many contacts within the railway industry and themselves had directorates on a number of railway companies, enabling them to pick up orders very early on, even before the works were completed. Taking over the lower yard from McKenzie, Clunes & Holland allowed them to gain contracts in the girder and bridge business that contributed to the initial profitability of the concern, the irony of the situation being that at the end, that was the only business they had retained. They had come full circle, only this time around they were finally broken by such a contract.

Failure has been variously attributed to:

- The difficulties surrounding the Russian contract. It is thought that either the contract was unfulfilled and/or that it was not settled by the Nicholas Railway.
- The lavish expenditure on the works and its plant and machinery
- The rate of management change
- Loss-making locomotive contracts
- Defective workmanship

From a detailed analysis of the minutes of the shareholders' meetings it would appear to be a combination of the following issues that caused the Company's demise:

The 'panic' of 1866 which was followed by an international downturn in economic activity. In the short term this cut off finance for both renewal and expansion.

The high level of capital expenditure from start-up. Instead of gradually using the funds raised from the share issue in line with the expansion of business, all funds were expended in a short period of time on the best of premises and plant, leaving nothing for working capital. The problem was that the men involved were men of big ideas, used to working in a big way, with everything planned on a grand scale.

The payment of dividends from capital. In their eagerness for an immediate return on their investment, the shareholders agreed to dividends that could only be paid out of capital or borrowings.

Lack of any management control at the Director level. There was a lack of business expertise able to understand and monitor the operation and direction

of the business. All responsibility in this area was left to the day-to-day management.

Poor audit procedures. Electing inexperienced shareholders to oversee this function removed all critical comment.

Lax financial reporting/recording. Numbers that were inconsequential were discussed in detail, significant expenditure was buried.

A domineering Chairman. No one was really prepared to take on the Chairman at a shareholder level until it was too late and then it was seen to be political.

A lack of understanding regarding fixed and variable costs. Contracts could have been taken that provided a contribution to fixed costs, rather than having to meet a specific return, that is, a profit, but this did not seem to be understood.

No importance given to cash flow until too late. When there was a lack of short-term funding, then with their business contacts the Directors were able to borrow, hoping that business would eventually improve. It was always jam tomorrow.

The fixed price girder contract with Lucas Bros for the Great Eastern Railway. The one area of the business that remained profitable, that of girders, was eroded by a fixed-price contract for an indefinite period with Lucas Bros which had been made at a time when iron prices were beginning to rise. The contract was finally re-negotiated by Thomas Holland in his role as liquidator, and the company was able to give up the lower yard which was then disposed of.

Slow or non-paying debtors. As no company accountant is mentioned it is assumed that this role was performed by the Secretary. The lack of effective monitoring allowed significant bad debts to arise, such as those of Peto & Betts.

Factory management turnover. On arrival each new manager was considered a messiah, on departure each one was blamed for failure. The company had very capable top and middle level managers, many who went on to great success elsewhere; it appears that they just did not get sufficient support.

Contract pricing the sole responsibility of the Works Manager. The Directors did not understand, did not want to understand, did not have the time to understand.

Inability to re-equip with new specialist machinery. This was quoted by Rudd as a reason for not getting new business. This comes back to the earlier point of spending all the funds at the beginning.

Excess capacity in the industry due to the trade downturn, especially in the railway sector.

Increased productivity in the locomotive construction industry.

The effect of foreign competition. It is true that certain costs were lower in Europe at this time; the Great Eastern for example ordered locomotives from *Schneider Creusot of France*.

The Russian contract problem. The order was completed in full. There was a delay in payment but most was then paid. After the end of the contract there appeared to be an extra charge that the Engine Works invoiced to the Russian company. What this was for is not detailed, possibly extra work: Andrew Alexander, for example, had constructed a much improved reversing gear. The Russian company made a counter claim, again reason unknown, but possibly for defective work.

At the 12th shareholders' meeting it was stated that £19,000 had been expended on the locomotives for Russia, and that those engines were delivered during the early portion of the year (1870) and whatever profit was derived would go to the credit of the current half year, that is, the last six months of 1870.

Prior to winding up it was stated that all debts had been cleared, and so it would seem that all issues were resolved.

The capitalisation of own work done at cost plus a profit margin. This enabled a dividend to be declared which otherwise would have been impossible. It was picked up by the external auditors and formed part of the large write-off.

The effect on Sherriff of the death of his wife and his own ill health is difficult to judge, but it cannot have helped at such a crucial time.

In considering the manipulation of accounts, it should not be forgotten that there was little experience or precedent for managing of such companies. Errors of procedure were as likely to result from inexperience as from ill-intent; problems had to be solved as they arose. (Mark Huish, the General Manager of the LNWR, was the first to make a major contribution to management accounting practice.)

On a more simplistic level it could equally have been just a case of wrong industry, wrong place, wrong time. However, whilst it is true that a number of companies failed after the financial crisis of 1866, a large number did not and went on to bigger and better things, for example, the Gloucester Carriage & Wagon Company which was founded in 1860.

The one positive outcome from the all of the above, is that the magnificent building still exists. Seeing it can take anyone with a little imagination back to the time of Victorian ambition, optimism and confidence in the future.

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Steam tugs on the Trent & Mersey Canal

Mike G Fell

Background

The North Staffordshire Railway (NSR) was incorporated in 1846 following the granting of the Royal Assent to no less than three Acts of Parliament.¹ All three Acts included a provision for the railway company to acquire the shares held by the Proprietors of the Trent & Mersey Navigation either by a share swap, exchanging canal shares for railway shares, or, for those shareholders not wanting to swap, by outright purchase. Subsequently the shareholders of the canal company made an extremely hard and lucrative bargain for themselves in selling their

undertaking to the NSR. The Trent & Mersey Canal, originally known as the Grand Trunk Canal, runs from its junction with the Bridgewater Canal at Preston Brook in Cheshire to a junction with the River Trent at Derwent Mouth in Derbyshire, where the River Derwent joins the Trent. The length of the canal is 93 miles and three furlongs.

Tunnels

There are three tunnels at the northern end of the Trent & Mersey Canal, which opened throughout its length in May 1777. From north to south, the three tunnels are at Preston Brook (1,239 yards) (Fig 1),



Figure 1. This is a close up view of the southern portal of Preston Brook tunnel. The houses were provided for the canal agent and two clerks. The bricks stacked either side of the tunnel mouth were presumably for repairs to the tunnel lining. [David Kitching collection]

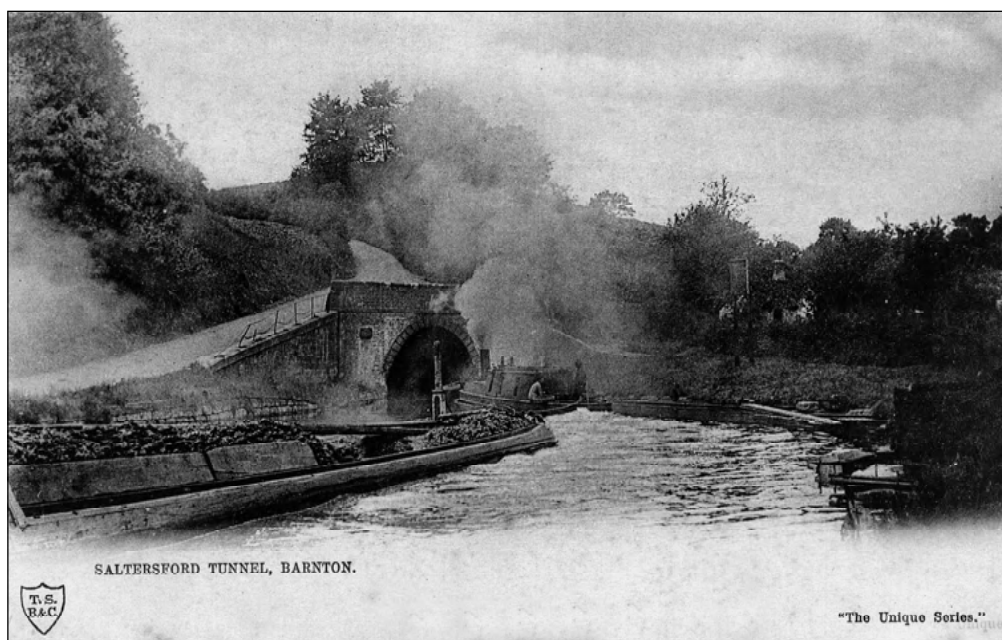


Figure 2. This 1910 scene shows a tug and its train of boats about to enter the south end of Saltersford tunnel. [Neil Parkhouse collection]

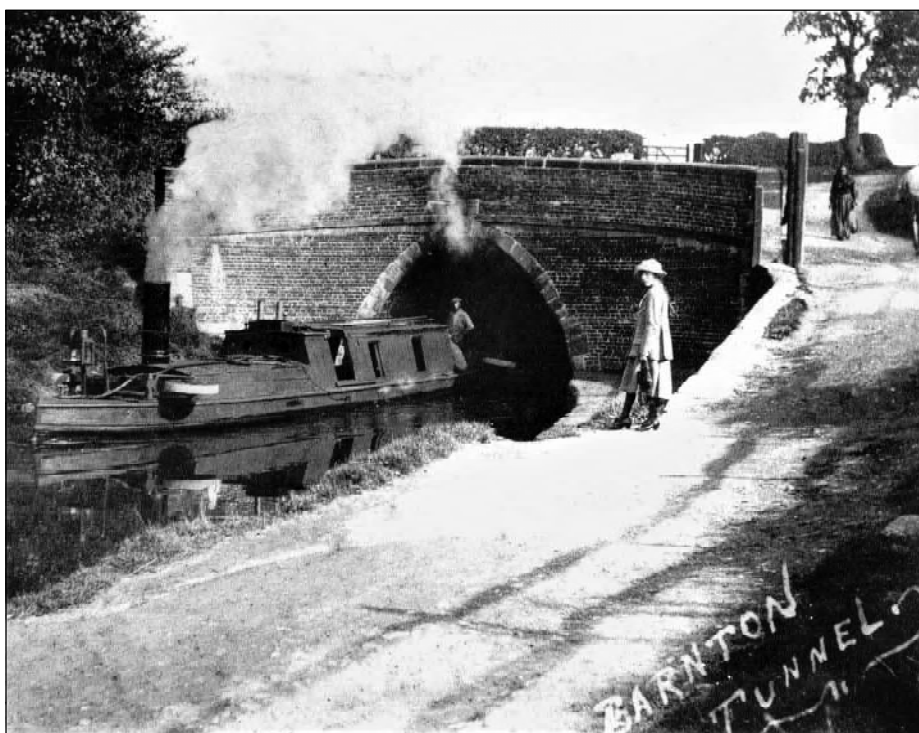


Figure 3. A tug emerging from the north end of Barnton Tunnel in the 1920s with the number '2' displayed on its bow. The fashion of the clothes worn by the two ladies could not be more contrasting. [Neil Parkhouse collection]

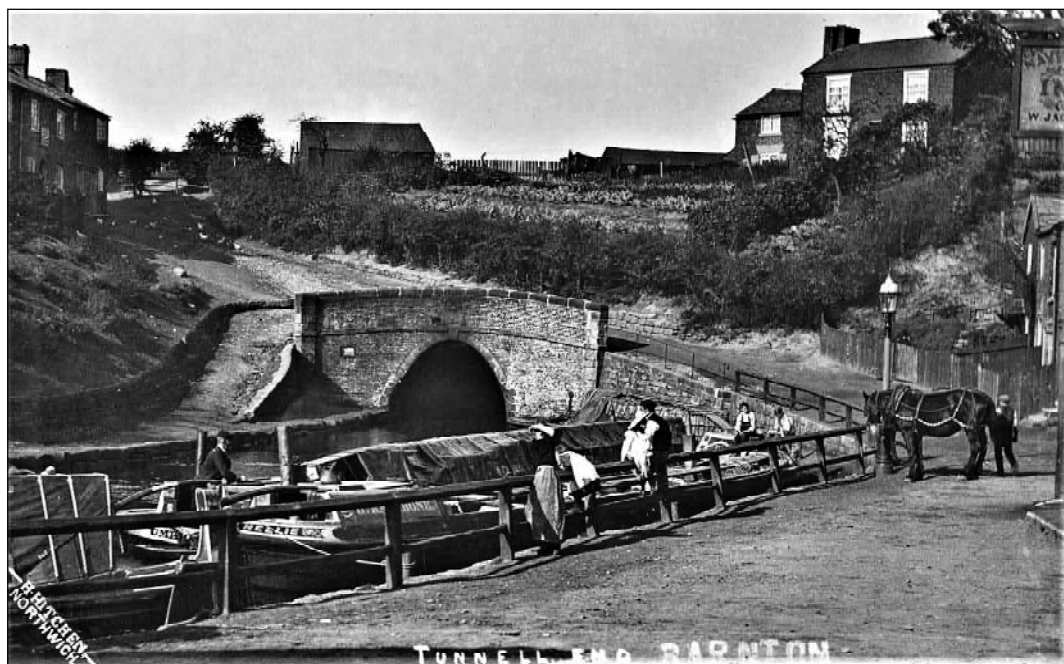


Figure 4. The south end of Barnton Tunnel circa 1910 with the Navigation Inn on the right; the innkeeper was William Jackson who was born at Little Leigh, Cheshire in 1850. The narrowboat Nellie was owned by Henry Rathbone and was returning empty from the Potteries; abreast and astern of her are two boats loaded with crated pottery bound for Runcorn. [David Kitching collection]

Saltersford (424 yards) (Fig 2) and Barnton (572 yards) (Figs 3, 4). None of these tunnels have towpaths. There were two much longer tunnels at Harecastle which ran parallel to each other. The first, designed by James Brindley (1716–1772), opened in April 1775 and closed in 1918; the second, designed by Thomas Telford (1757–1834), opened in 1827 and is still in everyday use.² There was another much shorter tunnel at Armitage but that was opened out to form a deep cutting in 1971. However, it is only the three northern tunnels that concern us here.

Steam power

The NSR's first experiments with steam tugs began in 1864 with one hired from the Grand Junction Canal Company. At the NSR Board meeting held on 9 March 1864, it was reported that the steam tug had been working through the tunnels (note the plural) for a period of five days which was deemed highly satisfactory.³ The NSR's Traffic Committee, at its meeting held the previous day, resolved that until further notice a charge equal to one half of the charge made by leggers be made for the use of the steam tug at Preston Brook tunnel.⁴ At the NSR Board

meeting held on 13 April 1864, the chairman reported that the tug had been returned to its owners owing to defective machinery.

However, the experiment must have been regarded as successful as at the same Board meeting the directors ordered that the company's common seal be affixed to a Petition to Parliament for statutory powers enabling the company to require boats trading on the canal to use steam tugs provided by the company for passing through the tunnels at a fixed charge, instead of being legged through as was the practice at that time (Fig 5). At the same meeting, the chairman reported that an order for procuring new boats had been suspended until a clause or bye law enabled the company to exercise the requisite powers.⁵ Those powers were granted in the North Staffordshire Railway (New Works) Act 1864, which received the Royal Assent on 29 July that year.⁶ At the meeting of the Directors held on 2 August 1864 the Chairman reported that, under the authority of the Board, the Engineer had ordered three steam tugs from Edward Hayes of Stony Stratford for £1,680.⁷ A tender for £2,049 from Mr E Booth of Manchester had been rejected.



Figure 5. Boatmen Daniel Jinks (1899–1979) and Ernest Wood (1903–1986) demonstrate legging through Barnton tunnel on 28 February 1961. This is how boats were moved prior to the arrival of the steam tugs. The narrowboat being used for the demonstration is ‘Admiral’ class Lindsay which was built by W J Yarwood & Sons Ltd of Northwich for the British Transport Commission and launched on 4 May 1960 (yard no 922). It is still afloat and can usually be seen at the Etruria Industrial Museum, Stoke-on-Trent, having been donated by the British Waterways Board.
[National Waterways Museum]

Edward Hayes (1818–1877) was born in Manchester and was apprenticed to James Kennedy (1797–1886) who became a partner in the locomotive building firm of Bury, Curtis & Kennedy. Soon after the completion of his indentures Edward Hayes accepted an appointment on the London & Birmingham Railway (LBR) at the newly opened locomotive works at Wolverton in Buckinghamshire where Edward Bury (1794–1858), in addition to being a private locomotive builder was, at the same time, the LBR’s Locomotive Superintendent. In 1847, shortly after the LBR had become part of the London & North Western Railway, Edward Hayes forsook his railway employment to establish his Watling Works at Stony Stratford. Initially he concentrated on manufacturing steam engines and machinery for agricultural use but by 1860 his

business was focused on building small steam driven vessels for the coastal trade and for canal and river work in the form of launches and tugs. At the Traffic Committee meeting held on 10 January 1865, the Engineer reported the arrival of the first tug.⁸ At the next meeting it was resolved that the tug should continue working for another fortnight and as soon as the time for the delivery of the second tug could be ascertained, notice should be given of a day for working regularly and making a charge.⁹

During 1865 the NSR Finance Committee approved accounts for the new tug boats on 7 February (No 1), 21 March (No 2) and 16 May (No 3). In each case the amount approved was £560 with £50 retained in each instance. The Finance Committee, at its meeting on 7 August 1866, approved the balance due on the steam tugs which amounted to £150 and so the tugs by then must have been operating to the NSR’s satisfaction. They no doubt moved along the canal network from Stony Stratford on the Grand Junction Canal to their place of work on the Trent & Mersey under their own steam, except through Harecastle New tunnel (Telford’s) which at 2,926 yards, was too long to permit steam working. However, it did have a towpath and so the tugs would have been hauled through by horse power.

A tragic accident

On 20 May 1865 tunnel labourer Peter Cawley, aged 52, was drowned in Preston Brook tunnel having been overcome by fumes from one of the steam tugs. At the time four air shafts were being constructed in the tunnel to improve ventilation; the ones at each end had been completed but the two in between had not. Peter Cawley and George Wainwright, a bricklayer’s labourer, both employed by the NSR, had been ordered to go into the tunnel to bore up to one of the uncompleted shafts. This it seems was a fairly regular practice in order to let off water that had accumulated in the shafts being bored from above. Cawley’s and Wainwright’s means of getting to the shaft concerned was to attach the ice-boat¹⁰ to the end of a string of five or six other boats about to be towed through the tunnel from its northern entrance. Shortly before reaching their workplace the ice-boat was released from the tow and manoeuvred into position. Wainwright commenced boring while Cawley was steadying the boat. About three minutes after boring had commenced, a quantity of smoke came from the direction of the tug and made Wainwright insensible and he fell back into the

bottom of the boat. He did not see Cawley but heard something fall into the water. Sadly that was Cawley. After about half an hour the tug, on its return trip with another string of boats, ran into the ice-boat. The tug skipper, referred to as an engine-driver, put out the boiler fire and let steam off, the men in the boats behind the tug legged their boats back out of the tunnel.

At the inquest, James Billington, superintendent of the work of sinking the air-shafts, explained that he had told Wainwright and the deceased to go into the tunnel and do what was required, if they had time, but if they had not, to retreat to the north end of the tunnel as soon as they heard the tug re-enter the tunnel. After an hour he became concerned that Wainwright and Cawley had not returned and made enquiries only to discover that there had been a collision in the tunnel. He then entered the tunnel in a boat at the north end with lights and equipment and the boat was legged to about the half-way point when they heard the steam from the tug *fizzing*. It was at this point they found the deceased in the water and recovered his body. A little further on the rescue party found the ice-boat and the tug jammed together with Wainwright still insensible in the latter. Wainwright was put into their boat and they loosened the ice-boat and the tug. Wainwright was then taken back to the north end of the tunnel and a doctor was called. Thankfully he survived.

At the inquest James Forbes, described by the *Warrington Advertiser* as Resident Engineer to the Trent & Mersey Canal, was cross examined.¹¹ He was actually James Forbes (1804–1866), the NSR's Canal Surveyor/Engineer who had been appointed to that position on 16 December 1848.¹² He explained that he had been employed on the canal for 22 years and went on to say that until recently Preston Brook tunnel had been legged through, there being no towpath. This caused delay and inconvenience. He recalled that about five months ago (at the beginning of 1865), under the powers of a special Act of Parliament, the NSR had started running a tug-boat through the tunnel. An experiment had been tried for about a month during the previous autumn when, on many occasions, he went through the tunnel himself. He said there was no inconvenience except on still days when one suffered from the sulphur arising from the coal in the engine. No one was rendered insensible during the time the experiment was being tried. On 22 April last he had heard that one of the engine drivers and the steerer had suffered very much in their heads from sulphur

following which he sent orders for the engine-driver to be exchanged for one from Barnton Tunnel. He also took steps to have two additional air shafts sunk into the tunnel which were commenced at once. From the commencement of the running of the tug-boat, the engine-drivers had orders to get a good clean fire and a good chest of steam before entering the tunnel and to discontinue tugging if there was any danger. He concluded his evidence by stating that once the four shafts were completed, there would be no danger from smoke or vapour. The two additional shafts had been authorised by the Traffic Committee at its meeting on 18 April 1865 at a cost not exceeding £60 each, following a report from Forbes stating that they were necessary for the proper working of the steam tugs.¹³

The jury returned a verdict of *Accidentally Drowned* and coupled their verdict with a recommendation to the NSR to discontinue the use of the tug-boat until the foul air shafts were entirely completed. The jury also recommended that arrangements should be made for enabling the engine-driver to be aware of the number of boats he was taking through the tunnel so that he knew whether or not he had brought them all safely out at the other end.

At its meeting held on 29 May 1865 a report was read from Forbes concerning the fatal accident and it was resolved that the tug service should be discontinued at Preston Brook tunnel until the additional shafts were finished. In fact, the tugs had already been stopped since 23 May.¹⁴ The tug service was resumed through Preston Brook tunnel on 19 June.¹⁵ However, it appears that the problems of smoke and fumes were not completely resolved as at the Traffic Committee meeting held on 27 June 1865 a letter from Fereday Smith dated the previous day was read concerning the steam tugs at Preston Brook. It was subsequently resolved that Forbes be instructed to continue to use wood instead of coal as fuel for the steam tugs when the state of the weather rendered that course necessary. It was also agreed that the number of turns of the tug at such times be reduced to allow the clearing of the tunnel from smoke. George Samuel Fereday Smith (1812–1891) was at that time a man of considerable influence, responsible for managing the Bridgewater Trust which not only administered the Bridgewater Canal but also the Mersey & Irwell Navigation and the collieries at Worsley.

At the meeting of the Traffic Committee held on 13 January 1874 the company's Solicitor reported that the NSR had no right to sink a shaft for Barnton

tunnel, in the light of which the General Manager was instructed to procure anthracite for the steam tugs to ascertain in a trial whether the use of a purer fuel would render the proposed shaft unnecessary.¹⁶ It was not until 1890 that shafts for Barnton and Saltersford tunnels were authorised at a cost of £412.¹⁷

Tug running costs

The cost of running the tugs was closely monitored by the NSR Traffic Committee with expenses offset by receipts. For the half year ending 31 December 1866 there was a loss of £123 3s 3d.¹⁸ The results for the 50 weeks ending July 1867 and July 1868 are given below; these presumably took into account an annual stoppage of two weeks for maintenance.

	Expenses	Receipts
50 weeks ending July 1867	£960 16s 9d	£759 0s 6d
50 weeks ending July 1868	£877 3s 3d	£932 12s 0d

This showed a loss over the two years of £146 7s 6d but presumably the greatest advantage was the quicker movement of traffic. The profitability improved and the operation of steam tugs must have been successful as more tugs were ordered to replace

those that became life-expired. In the early days the tugs worked day and night.¹⁹

More tugs

At its meeting on 21 June 1870 the Traffic Committee resolved that a new steam tug for working Preston Brook tunnel be constructed in the company's shops at a cost of £600.²⁰ The man responsible for building the new tug was John William Hartley (1845–1942) who had joined the NSR earlier that year to take charge of the Drawing Office and control of the Locomotive Building Department. He had served an apprenticeship at the Holmes Engine Works of Dodds & Son at Rotherham from 1862 to 1867 and, prior to joining the NSR had worked for the Yorkshire Engine Company at Sheffield and Sharp Stewart & Company at Manchester, both prominent builders of locomotives. His application for membership of the Institution of Mechanical Engineers dated 1 August 1931 contains the following in regard to his NSR employment:

Whilst here I designed and constructed a Twin Screw Steamer for canal haulage. I personally made the wood model and set up the frame sections in the Boiler Shop, where it was built by the Boiler Makers.

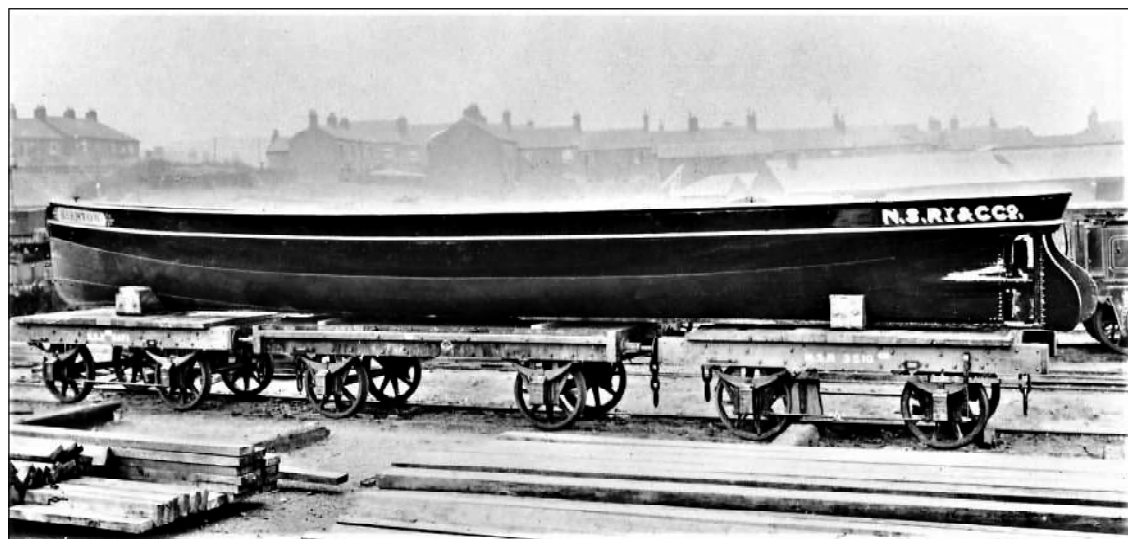


Figure 6. This is the hull for the steam tug Barnton as built by the North Staffordshire Railway at the company's Stoke-on-Trent workshops. In addition to its name, it also bears an abbreviation for the North Staffordshire Railway and Canal Company, clearly demonstrating the company's dual interests. This could well be the tug authorised in 1870, although the record states that it was intended for working Preston Brook tunnel. The hull is supported by two dumb buffered locomotive boiler trucks, nos 3471 and 3510, with a spring-buffered flat wagon in between which has a type of axlebox introduced in 1870. [Peter Lead collection]

Hartley left the NSR in 1874 to set up a general engineering business on his own account with two partners, under the name of Hartley & Arnoux Bros at the California Works, Stoke-on-Trent. The accompanying photograph (Fig 6), taken near Stoke Works, may well depict the hull for this new tug even though it was named *Barnton*.

The NSR-built tug must have been an additional tug as the ones built by Edward Hayes were only five years old. In 1876 the working and repair of the steam tugs became the responsibility of the NSR's Locomotive Superintendent.²¹ On 21 March 1877 the NSR Board sanctioned the purchase of a new tug as ordered by the Traffic Committee at a cost of £820, less a £250 allowance for the old tug (presumably one built by Hayes), with the cost being charged to the company's revenue account.²² The order for the new tug was placed with Richard Smith & Company of Preston, the forerunner of the Lytham Shipbuilding and Engineering Co Limited (mentioned below). The new tug was needed to replace Tug No 3 which by this time was obviously not performing as the company would like. On 20 May 1879 the Traffic Committee accepted a tender from Richard Smith of £350 for a new hull for Tug No 1.²³

On 9 January 1905, the Lytham Shipbuilding & Engineering Co Limited, based on the Ribble estuary, launched a single screw steel steam tug (yard no 338) for the NSR which must have been a replacement for one of the earlier tugs. It had a length of 56ft, a beam of 8ft and a draught of 4ft 10in and was equipped with a two-cylinder compound non-condensing engine. The high pressure cylinder was of 8in diameter with a piston stroke of 9in, the low pressure one being 15in by 9in.²⁴ The shipbuilding company's tender of £950 had been accepted at the meeting of the Traffic & Finance Committee held on 18 October 1904 and the relevant minute specifically refers to Preston Brook.²⁵

Passage through the tunnels

Bradshaw's Canals and Navigable Rivers of England and Wales by Henry Rodolph de Salis, published in 1904 by Henry Blacklock & Co Limited of London and Manchester gave details of the working of the steam tugs through the tunnels.²⁶ It confirmed that boats were worked by the steam tugs between the south end of Barnton tunnel and the north end of Saltersford tunnel as a single passage. The tug left the south end of Barnton tunnel at 6.00am, 7.40am, 9.20am, 11.10am, 12.50pm, 2.25pm,

4.00pm, 5.40pm and 7.35pm. In the reverse direction the tug left the north end of Saltersford tunnel at 6.50am, 8.30am, 10.10am, 12 noon, 1.40pm, 3.10pm, 4.50pm, 6.40pm, and 8.30pm.

The arrangements for Preston Brook tunnel were as follows: *Boats are worked in trains by the Company's steam tugs* leaving the south end of the tunnel at 6.50am, 8.30am, 10.10am, 11.50am, 1.40pm, 3.20pm, 5.00pm, 6.45pm and 8.30pm; and the north end at 6.00am, 7.40am, 9.20am, 11.00am, 12.40pm, 2.30pm, 4.10pm, 5.50pm and 7.35pm. The practice of working the tugs throughout the night had clearly ceased.

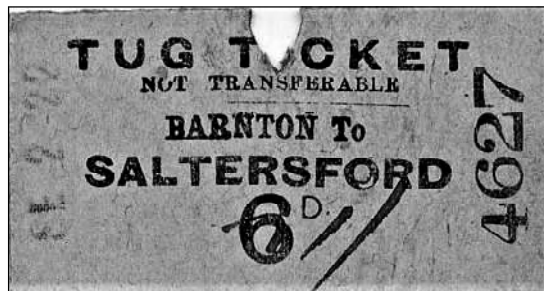


Figure 7. A Barnton to Saltersford tug ticket issued in 1922. [David Kitching collection]

The handbook gave the dimensions of the tunnels as shown below:

	Barnton	Saltersford	Preston Brook
(a)	9ft 2in	10ft 1in	10ft 5in
(b)	13ft 6in	13ft 6in	13ft 7in
(a) Minimum height above water level			
(b) Minimum width at water level			

Preston Brook Tunnel has a straight bore but the other two have pronounced bends no doubt due to surveying mistakes when the headings were being driven. The width of the tunnels seems to have been dictated by a desire to operate wider craft on this stretch of canal but they were not wide enough to accommodate Mersey flats or to enable two narrowboats to pass within the tunnels.

Operation and maintenance

The late Edward Paget-Tomlinson (1932–2003) in the January 1976 issue of *Waterways World* wrote about the steam tugs and the following is based on what he had to say about their operation and maintenance. Each tug had a crew of two, a steerer and an engine-man: two shifts were worked each day. Fires were banked each night except on Saturdays



Figure 8. This tug, with an Anderton Company narrowboat as leader of the tow, has just passed through Saltersford tunnel and is heading south across the wide to Barnton tunnel.

[Neil Parkhouse collection]

when the fires were allowed to go out which meant starting from cold on Monday mornings. Boiler tubes were swept every morning and the boilers were washed out weekly. The tugs never used canal water because of its salinity in the salt producing area of Cheshire. The tugs' water tanks were replenished from tanks installed on the canal banks; the tugs' coal supply was stored near the Dutton dry dock which was at the south end of Preston Brook tunnel.

Paget-Tomlinson stressed that the tugs had to be *winded* or turned at the end of each trip for which purpose winding holes were provided a few yards from each portal of the three tunnels, making six winding holes in total. The holes were not sufficiently far from the portals to allow the tugs to draw their full trains of boats clear of the tunnels as a train could consist of as many as twenty boats. Horses coming over the hill were used to pull the boats out when the tugs had cast off, the train getting shorter and shorter and further and further out as each horse came for its boat.

Paget-Tomlinson referred to three tugs, two smaller ones with a length of 56ft and a beam of 7ft which could work through all three tunnels and a larger

vessel with a length of 60ft and a beam of 9ft which was restricted to Preston Brook tunnel *as she was too wide for the curves of the other two*. None of these measurements tally with those of the tug produced by the Lytham Shipbuilding & Engineering Co Limited launched in 1905. The smaller vessels were fitted with horizontal guide wheels, two forward and two aft which protruded from each side of the vessel. They were mounted on a spring loaded arm and had wide iron treads which made contact with the tunnel walls (Figs 9, 10). Usually the forward pair was locked and those aft left free. This meant that there was very little for the steerer to do when the tugs were in the tunnels. The larger tug was not equipped with the wheel assisted steering mechanism. Paget-Tomlinson said that

... all three tugs had injector-fed locomotive type boilers with squat chimneys, the working pressure being about 90psi. The smaller tugs had single cylinder engines arranged horizontally down the length of the boat, driving a single screw through a right-angled bevel gear.

The larger tug had

... a two-cylinder inverted engine, **not a compound**, but a simple expansion. No



Figure 9. A steam tug at the north end of Preston Brook tunnel. Note the horizontal guide wheels extended to the front and stern of the tug which made contact with the tunnel walls.

[Peter Lead collection]

condensers were fitted, the engines exhausted to atmosphere.

Again, none of these descriptions tally with the tug built by the Lytham Shipbuilding & Engineering Co Ltd.

After the tugs

The three tugs were withdrawn in 1943, 1944 and July 1946 when the tug service was discontinued.²⁷ By then they were owned by the London Midland & Scottish Railway of which the NSR formed a constituent part on the grouping of the railways in 1923. By 1946, horse-drawn boats were becoming relatively few and latterly motor boats were allowed through the tunnels ahead of the tugs but had to keep to the timetable. However, their owners were exempt from paying a tug toll. When the tugs were withdrawn, the old timetables remained in force, regulated by the tunnel keepers. At its meeting held on 1 April 1952 the Docks & Inland Waterways Executive (DIWE) agreed to the installation of an

electric light control system for Preston Brook tunnel at a cost of £2,000.²⁸ It was explained that once the installation had been completed, the services of the two tunnel keepers then employed could be dispensed with, with a consequent saving in wages of about £600 per annum.

The following description of the new control system is taken from the DIWE's house magazine *Lock and Quay* for October 1952.

A scheme which is now being undertaken at Preston Brook Tunnel will provide for automatic control of traffic through the tunnel. This will be done by means of signal lights, similar to road traffic lights, which will be actuated by switches arranged in specially constructed narrowings in the canal.

As a boat approaches the tunnel it will find no light exhibited if the tunnel is unoccupied; on passing through the narrowings it will operate the switches which will in turn light a green light at the tunnel entrance. This will indicate that the tunnel is clear and the boat may proceed. When the green light is



Figure 10. A steam tug at the south end of Preston Brook tunnel giving a clearer view of the extended guide wheels. [David Kitching collection]

lit at one end a red light will be lit at the other to indicate to any craft arriving there that a boat is approaching through the tunnel and that they must wait. Should any further craft follow the first they will find the green light exhibited and will be able to follow it through the tunnel.

In the case of a continuous stream of traffic arriving at one end provision is made for craft waiting at the other to ensure their turn by pressing a priority push button which will exhibit a red light at the other end of the tunnel and prevent any more craft entering the tunnel. When all craft are clear of the tunnel the lights will be extinguished. Provision is also made for lighting of the tunnel while craft are passing. The details of the actuating mechanism to record the entry and departure of boats have been developed by Mr. W. Brown, electrician, Northwich Yard.

In November 1981 a section of Preston Brook tunnel collapsed requiring an extensive stoppage for repairs. The tunnel was reopened on 17 April 1984 by Sir Frank Price, Chairman of the British Waterways Board (BWB)²⁹ which was created in 1963, following the abolition of the British Transport

Commission. From 2 July 2012 all BWB assets were transferred to the Canal & River Trust which has charitable status. Nowadays, Preston Brook tunnel is open on the hour, remaining open for ten minutes for northbound traffic. For southbound traffic, it is open from half past each hour, again remaining open in that direction for ten minutes. That arrangement applies for 24 hours each day, seven days per week. There is no such control for Saltersford and Barnton tunnels – a far cry from the heady days of the steam tugs with their trains of narrowboats!

Acknowledgements

I am most grateful to Allan C Baker, David Kitching, Peter Lead, Neil Parkhouse and George Robinson for their kind assistance in providing information and illustrations for this article. Allan kindly visited The National Archives at Kew at my request to clarify a number of important points. I would also like to acknowledge the records held by the North Staffordshire Railway Study Group of which I am a member. It would be interesting to identify with absolute certainty the origins of the three

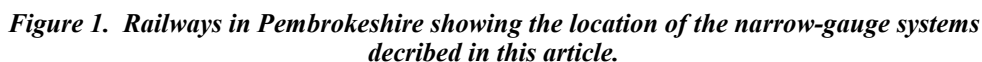
steam tugs that were withdrawn by the LMS in the 1940s. If any members can assist in this regard, I should be very pleased to hear from them via the Editor.

Notes and references

1. 9-10 Vic cap lxxxiv (The North Staffordshire Railway (Harecastle & Sandbach Line) Act); 9-10 Vic cap lxxxv (The North Staffordshire Railway (Pottery Line) Act); 9-10 Vic cap lxxxvi (The North Staffordshire Railway (Churnet Valley Line) Act)
2. Allan C. Baker and Mike G. Fell, *Harecastle's Canal and Railway Tunnels* (Lydney : Lightmoor Press, 2019)
3. The National Archives (TNA), RAIL 532/6, NSR Directors' Meeting, 9 March 1864, Minute 1501
4. TNA, RAIL 532/17, NSR Traffic Committee, 8 March 1864, Minute 4354
5. TNA, RAIL 532/6, NSR Directors' Meeting, 13 April 1864, Minutes 1505 and 1506
6. 27-28 Vic cap cccviii
7. TNA, RAIL 532/6, NSR Directors' Meeting, 2 August 1864, Minute 1539
8. TNA, RAIL 532/17, NSR Traffic Committee, 10 January 1865, Minute 4595
9. TNA, RAIL 532/17, NSR Traffic Committee, 24 January 1865, Minute 4612
10. The ice-boat was used in the winter months to break ice on the canal by men standing on the vessel and rocking it from side to side, but at other times it was used as a work boat.
11. *Warrington Advertiser*, 27 May 1865
12. TNA, RAIL 532/4, NSR Directors' Meeting, 16 December 1848, Minute 362
13. TNA, RAIL 532/17, NSR Traffic Committee, 18 April 1865, Minute 4699
14. TNA, RAIL 532/17, NSR Traffic Committee, 29 May 1865, Minute 4748 and 13 June 1865, Minute 4762
15. TNA, RAIL 532/17, NSR Traffic Committee, 27 June 1865, Minute 4797
16. TNA, RAIL 532/18, NSR Traffic & Finance Committee, 13 January 1874, Minute 7666
17. TNA, RAIL 532/7, NSR Directors' Meeting, 22 April 1890, Minute 3181
18. TNA, RAIL 532/17, NSR Traffic Committee, 5 February 1867, Minute 5465
19. TNA, RAIL 532/17, NSR Traffic Committee, 11 July 1865, Minute 4816
20. TNA, RAIL 532/18, NSR Traffic & Finance Committee, 21 June 1870, Minute 6689
21. TNA, RAIL 532/19, NSR Traffic & Finance Committee, 11 January 1876, Minute 8856
22. TNA, RAIL 532/7, NSR Directors' Meeting, 21 March 1877, Minute 2481 and RAIL 532/19, NSR Traffic & Finance Committee 13 March 1877, Minute 9564
23. TNA, RAIL 532/19, NSR Traffic & Finance Committee, 20 May 1879, Minute 10375
24. Jack M Dakres, *A History of Shipbuilding at Lytham* (Kendal : World Ship Society, 1992), p 51
25. TNA, RAIL 532/22, NSR Traffic & Finance Committee, 18 October 1904, Minute 22276
26. The book was reprinted by David & Charles in 1969. Henry Rodolph de Salis (1866–1936) was a director of canal carriers Fellows, Morton & Clayton Limited.
27. Basil Jeuda, *The North Staffordshire Railway in LMS Days, Volume 1* (Lydney : Lightmoor Press, 2010)
28. Docks & Inland Waterways Executive Meeting, 1 April 1952, Minute 2256. The DIWE was one of several Executives created by the British Transport Commission following the nationalisation of the railways which took effect from 1 January 1948.
29. Sir Frank Price (1922–2017) was Chairman of the British Waterways Board from 1968 until 1984.

M R Connop Price

may have predated most of those in north Wales. As early as 1770 there is said to have been a short-lived tramroad at Nolton, on St Bride's Bay, for the purpose of conveying coal from local pits for shipment at a timber-built pier at Nolton Haven. The actual existence of this tramroad has never been proved satisfactorily, partly because the pier at Nolton Haven



is supposed to have been quickly destroyed by a storm.¹ Thirty years later the Orielson estates, which included the hamlet of Landshipping on the east bank of the River Cleddau, were in the trusteeship of an enterprising Colonel Colby. It is clear that in 1800/1801 he not only built a causeway across Landshipping Pill but also a pier projecting into the Cleddau.² Initially these carried a plateway to aid the shipment of coal from the Landshipping colliery. Forty years ago a few L-shaped track remnants were observed in the mud and stones on the foreshore, including a casting for a point frog, and their proportions suggested that the associated horse-worked tramway was probably of a gauge somewhere between 3 and 4 feet, or perhaps 4 feet 2 inches. It is known that a few years later there was a similar tramroad from pits at Freystrop running down to a quay at Little Milford, west of Hook, on the Eastern Cleddau. By the 1850s this was an edge railway with short branches serving small pits around Maddox Moor, not far from Hook.³ There is a dearth of detail about these early lines, including a short-lived tramway linking the Nash & Sprinkle pit with Sprinkle Pill, near Hook. Coal proprietors of the time plainly recognised that shipping from the sheltered tidal waters of the River Cleddau was greatly preferable to shipping from an open beach on an often dangerous coastline.

Given Pembrokeshire's rather remote peninsular position, main line railways came relatively late to the county, the first being the broad-gauge South Wales Railway. Although the SWR obtained its Act of Parliament in 1845, and some construction took place in the late 1840s, assorted delays meant that it did not open between Carmarthen and Haverfordwest until 2 January 1854. The line was extended to New Milford (Neyland) on the north side of Milford Haven in 1856. In the meantime the first generation of local lines had come into being, built either to serve quarries (often slate) or coal mines. These ventures were quite small and sometimes short-lived, the track usually confined to the particular site served. In just a few instances the old railways, all long closed, actually possessed enough track for each to have a meaningful route, and occasionally these may have carried workmen or even members of the public on an informal basis. Authorised by an Act of 1829, the best known of these was probably the Saundersfoot Railway, the track being laid to the rather unusual gauge of 4 feet 0¾ inches. It was built to convey coal and culm (the small of anthracite coal) from pits in the hinterland of Saundersfoot

down to a new harbour on Carmarthen Bay. In brief, just as the slate trade provided the stimulus for narrow-gauge railway construction in north Wales, so the coal industry in Pembrokeshire prompted the building of the Saundersfoot line. Quite simply, at that period there was no better way to convey any bulk commodity to a port for shipment than by rail.

The Saundersfoot Railway & Harbour Company (SR&H)

This fascinating company was formed to serve the coal industry in the Saundersfoot district, and as the writer has discussed it in detail on a number of occasions, an outline history will suffice.⁴ For present purposes it will be enough to say that the line was an early narrow-gauge edge railway, broadly in keeping with other mineral lines in south Wales at that time, which were usually laid to a gauge of 4 feet, or maybe 4 feet 2 inches, using fish-bellied rails. When authorised it was one of the earliest combined railway and harbour projects,⁵ the motive power being provided by horses or, if the company seal is to be believed, also oxen. In this first phase of activity the company provided the transport facility, and various mine owners and merchants were permitted to use it, subject to company rules. Provided trams or wagons met the required specification, and traders were willing to observe the necessary operating provisions and pay an appropriate fee, they could use their own trams or wagons on the line for their own purposes.

In an era when coastal sea transport prevailed, loading and unloading small sailing vessels resting aground on an open beach could be quite a slow and risky business. At Saundersfoot the prevailing winds were from the west or south-west, and as the village looked east across Carmarthen Bay, in normal circumstances beached craft had some protection. If, however, the wind moved around to the east or south-east, the beach could become very exposed. In 1829 the aim was to create a robust harbour at Saundersfoot for the safe shipment of coal from the numerous collieries situated within a radius of perhaps five or six miles. The local product was not the steam coal of Glamorgan, but rather high-quality anthracite. Unfortunately the thin fractured seams of the Pembrokeshire coal measures provided far more small coal or dust (known as 'culm') than actual coal. The latter was noted for being relatively clean, burning with great heat and little smoke, and so gained favour with brewers and maltsters. The plentiful culm was far less valuable, and although it

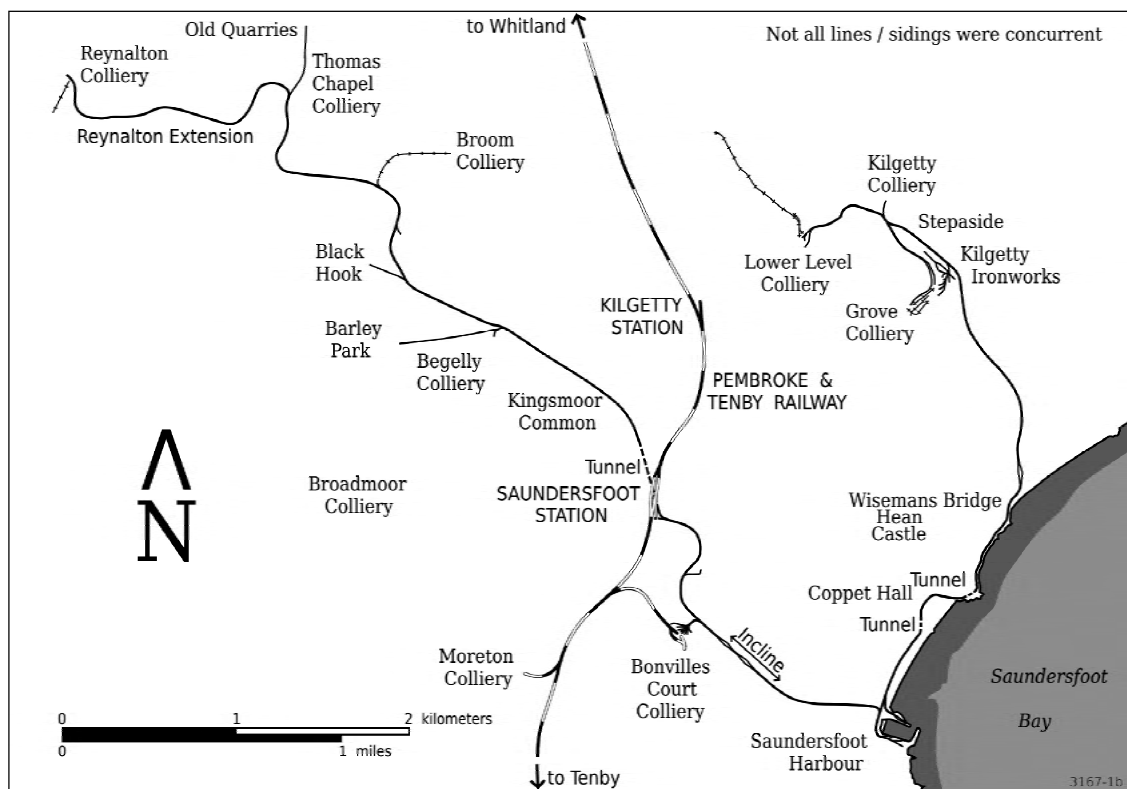


Figure 2. The Saundersfoot Railway & Harbour Company railway system.

was widely used for domestic purposes, substantial quantities were shipped coastwise for use in the many limekilns then found around the shores of west Wales and the West Country. To minimise congestion and argument, each of the main coal shippers using the railway were granted priority at one of the five loading shoots installed around the harbour. Even so, as maritime activity was inevitably influenced by tide, weather and the presence (or otherwise) of vessels engaged in the coal trade, there was always going to be some risk of delay or inconvenience.

The Saundersfoot Railway & Harbour Company officially opened for business on 1 March 1834, and the 'main line' of the railway ran inland for half a mile to a 500-yard rope-worked incline leading directly up to a colliery which was then being developed at Bonvilles Court. Beyond Bonvilles Court the line followed a minor road until it plunged into Kingsmoor tunnel with a height clearance of only 6 feet 6 inches (just sufficient for a horse!) below the hamlet of Pentlepoir. After crossing Kingsmoor Common, a couple of miles from the harbour, the railway served several small pits at the village of

Begelly, before continuing in a north-westerly direction to reach yet more small pits in the vicinity of Thomas Chapel. The total length of this line was about 4½ miles. A shorter branch from Saundersfoot to Kilgetty became active in 1836, having been delayed by difficulties in building the line above the beach and below the cliffs between Saundersfoot and Wisemans Bridge, almost 1½ miles to the north. A mile or so beyond Wisemans Bridge the branch had separate offshoots running to Kilgetty colliery and to Kilgetty ironworks, the line terminating at the Lower Level Colliery, Kilgetty, some 2½ miles from the harbour.

The tramroad era at Saundersfoot lasted for almost forty years, during which C R Vickerman, a wealthy London solicitor, became the principal proprietor not only of the SR&H, but also of the Pembrokeshire Iron & Coal Company, owners of the Kilgetty ironworks and several collieries. In 1863 he purchased the mansion known as Hean Castle, and as the principal employer in the district for the next thirty years Saundersfoot was close to being his personal fiefdom. However Vickerman did not get

everything his own way. In 1866 the standard-gauge Pembroke & Tenby Railway (P&TR) was extended from Tenby north to Whitland, on the South Wales main line. The extension crossed the Saundersfoot Railway above the southern portal of the Kingsmoor tunnel, and it was suggested that standard-gauge track be laid over a portion of the Saundersfoot route to serve Bonvilles Court colliery. The directors of the P&TR ignored the idea, and instead provided a siding for the Moreton colliery, which was then outside C R Vickerman's domain! In 1868 a new P&TR Saundersfoot station was sited just above the mouth of the Kingsmoor tunnel, and a siding from the Saundersfoot Railway was laid towards the P&TR goods yard, where an utterly inadequate coal drop was installed, to allow drams to be emptied one at a time into standard-gauge wagons. As three or four drams were needed to fill one standard-gauge wagon, and each one had to be laboriously manoeuvred into position, it seems likely that the facility was seldom used. Although Vickerman was well aware of the potential advantages of moving coal by rail, Pembrokeshire anthracite had to compete with that from Carmarthenshire, and railway freight rates always favoured the latter. The Saundersfoot Railway was designed to move coal for shipment by sea, and in practice did so until the operation became hopelessly uneconomic.

In the early 1870s C R Vickerman decided it was time to modernise the entire operation. Several improvements were made (or planned) at the collieries and the ironworks, and in 1873 he arranged for the line north from the harbour to Kilgetty, including the spur to the ironworks, to be re-laid with heavier rail for locomotive use. At the time he was considering a possible extension of the railway from the ironworks directly to Kilgetty station on the P&TR, which may be the reason why he did not initially relay the relatively short section of line from the harbour to the Bonvilles Court incline. A small 0-4-0 saddle tank, *Rosalind* (Manning Wardle 476/1874), was acquired to work over the re-laid track, but by the time it was delivered there had been a serious downturn in trade. The Kilgetty ironworks was closed by labour troubles, and the Pembrokeshire Iron & Coal Co soon went into liquidation. C R Vickerman was by far the largest creditor, and as such he retained control, and set up the Bonvilles Court Coal Company to run his collieries. This concern was never robust financially, and the railway also suffered when several of the small pits it served were abandoned. In the 1880s coal traffic from Begelly

ceased, and in 1887 the railway was lifted beyond Kingsmoor tunnel. After years of complaint, in 1893 Vickerman persuaded the P&TR to lay a siding to Bonvilles Court colliery, and the coal tip in Saundersfoot station goods yard was finally abandoned.⁶ C R Vickerman died in 1897, aged 79, and his now diminished business interests were inherited by his son, C H R Vickerman.

The story of decline continued in the first half of the twentieth century. Both Lower Level, and the nearby Kilgetty colliery, closed in 1900/1. As the SR&H had a workshop building at Kilgetty, near the former ironworks, the only trains over the Kilgetty branch were either to the workshops or workmen's trains operated solely for the purpose of taking colliers from Kilgetty or Stepside to work at Bonvilles Court colliery. These operated in conjunction with the day shift at the colliery, so that the southbound train ran early in the morning and the return working operated in late afternoon. The miners travelled in half a dozen ordinary coal drams, and after reversal at the harbour the *Rosalind* appears to have propelled the morning train to the foot of the Bonvilles Court incline, leaving the men with a walk up the incline to the colliery. This procedure was reversed for the return journey, although on this occasion it seems that the locomotive did run round the train whilst at the harbour. The afternoon trip was much photographed, and described by postcard publishers as 'The Miners' Express'. Local people referred to the train as 'The Armour', from some alleged similarity to the armoured trains being used in the Boer War!⁷ Surprisingly, the Saundersfoot Railway did have one vehicle intended for passenger use, an extremely simple 'director's carriage' – actually the underframe of a coal dram rebuilt with a timber superstructure which included a couple of wooden benches and (it is thought) the framework for an awning when required. This contraption was used by C R Vickerman not only for visiting and inspecting sites around Saundersfoot, but also to further his enjoyment of field sports. From time to time it would be used to convey him and two or three friends to locations where they might be able to shoot pheasant or woodcock.⁸

The development of the New Reynalton Anthracite Colliery in 1913 was a positive initiative of benefit to the Saundersfoot Railway. At the behest of this colliery company, the Saundersfoot Railway was re-laid from Kingsmoor Tunnel out past Begelly and Broom to a point near Thomas Chapel where a new 1½ mile extension was built to reach the new pit.

The dimensions of the tunnel meant that the colliery company had to order an extremely compact 0-4-0ST locomotive to work their section of the line. Named *Bulldog* (Kerr Stuart 2401/1915), the cab was so cramped and hot that the cab roof was soon removed. Unfortunately the Reynalton colliery suffered from geological problems, and in 1921 work was halted by a labour dispute, during which the mine was accidentally allowed to flood. As a result the pit never re-opened and in 1922 the assets of the colliery were sold at auction. The locomotive and most of the company's iron or timber-bodied coal drams then became the property of the Saundersfoot Railway.⁹ As before, the *Rosalind* continued to work the line below the incline, whilst the *Bulldog* worked above it. Even though the SR&H only had two locomotives, it is thought that they actually only met on one occasion, when the *Bulldog* was lowered down the Bonvilles Court incline, and taken to the workshops at Stepside for repairs.

Bonvilles Court colliery closed down in April 1930, although in the next couple of months some use was made of the railway during dismantling. The screens at the colliery were retained, because it was

thought that the former drift mine at Broom, beyond Begelly, might be worth re-opening. Between 1933 and 1935 not only Broom, but also Kilgetty colliery, were refurbished and brought back into use, but once again the problems proved to be far larger than the funds available to sustain the effort. Early in 1939 both pits were closed, although the railway remained in use for the movement of coal stocks until the month of May. In July the relatively young *Bulldog* was sold for further service (re-gauged) at Llanelly steelworks, and six months later the *Rosalind* and most of the remaining rolling stock was scrapped. A number of life-expired coal drams, and even the so-called 'director's carriage', were disposed of by dumping in a deep excavation on the Kilgetty Ironworks site. The *Bulldog* was finally scrapped at Llanelly in 1951, being the last remnant of the Saundersfoot Railway's rolling stock.

The Abereiddi Tramway

If coal drove the building of Pembrokeshire's earliest narrow-gauge lines, the slate industry soon prompted the construction of others. *The Cambrian* of Swansea was a newspaper with an opportune interest in events right across Wales, and in June 1838

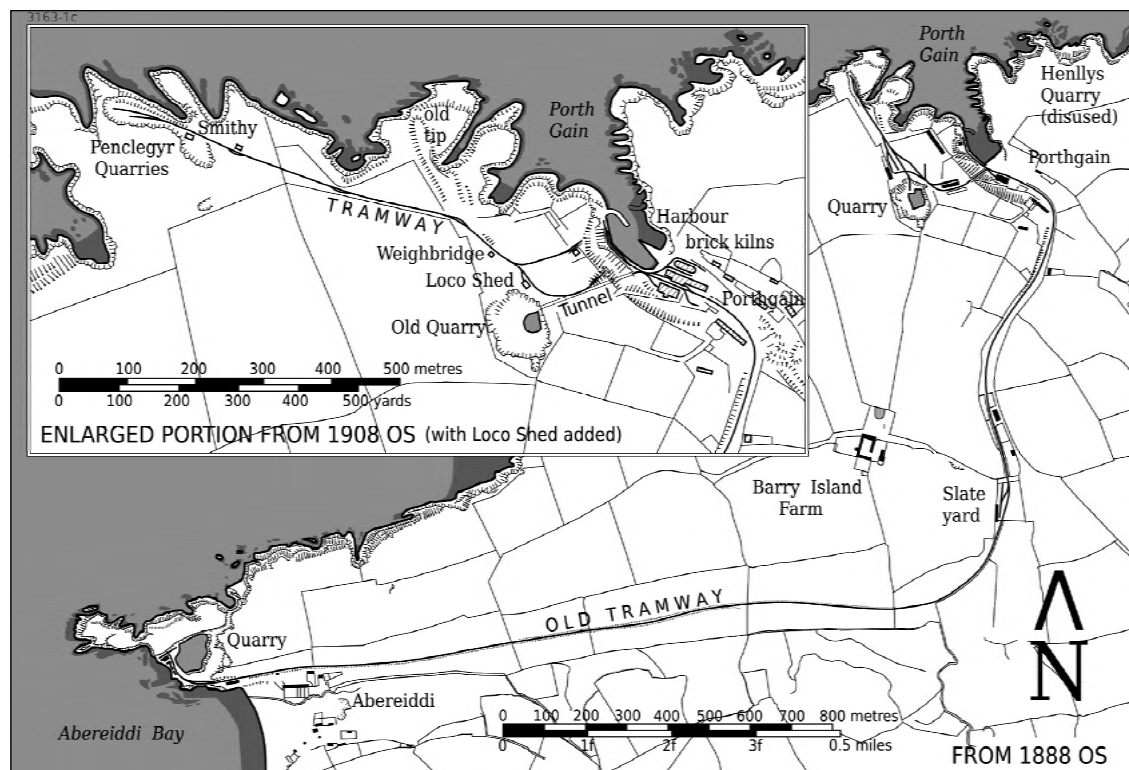


Figure 3. The railways of Abereiddi and Porthgain.

it noted that William J Ward of Barry Island Farm, near Porthgain on the north Pembrokeshire coast, had given his staff and workers a celebratory meal at his slate quarry.¹⁰ At about this time, quarrying began on the headland at Abereiddi, over a mile to the west of the farm. The initial plan appears to have been to use the nearby beach for shipping purposes, but it soon became apparent that the exposed, west-facing beach at Abereiddi was quite unsuitable. Much of the north Pembrokeshire coast was rocky, and subject to strong currents, but the narrow tidal inlet at Porthgain was deemed useful for a harbour which might be given a tramway connection to Abereiddi. By 1848 the proprietors appear to have decided to build an outer wall to protect the Porthgain inlet from the ocean swell. Sadly this endeavour was delayed by a fatality. In December, 1848, a Carmarthen newspaper reported that a charity concert had taken place to assist the family of a man who had drowned whilst supervising the building of a breakwater at Porthgain.¹¹

This setback indicated that a more considered approach was required. In April 1850 contractors were invited to tender for the construction of both a tramway and a breakwater in the parish of Llanrhian, with the contacts named as John Hyslop and John Barclay.¹² It appears that during the 1840s the Abereiddi quarries were leased by Barclay and two other London businessmen, B Hill and R Norman, who then formed the Barry Island Slate & Slab Company to help develop the enterprise. Fortunately the slate was good enough to be worth the effort, and cottages were built at Abereiddi to accommodate sixteen quarrymen, most coming from north Wales. In 1848 a stationary steam engine was erected to work a quarry incline, and by 1850 the London men were not only building a pier at the small inlet of Porthgain but they also had access to the land necessary to lay a two mile narrow-gauge tramway to it from Abereiddi.¹³ It is thought that the horse-worked tramway and the harbour were in use by 1851. Once again, a published reference to an accident provides an indication of progress – in this case the development of Porthgain harbour and associated works. In May 1851 *The Welshman* reported that the smack *William*, of St Davids, laden with culm from Nolton Haven to Porthgain had sunk after striking rocks in St Davids Sound.¹⁴ Just two weeks later *The Pembrokeshire Herald* carried an advert for tramway horses and a railway carpenter.¹⁵ Sadly there was another accident a few weeks later, because the local press reported on an inquest into the death

of William Evans, who died while ‘driving a loaded wagon from Porthgain Quarry’.¹⁶ Two more quarrymen were killed only a fortnight later.¹⁷

The reference to the Porthgain quarry is especially interesting, because it suggests that as early as 1851 the proprietors, having selected their shipping place, were already looking to open a quarry nearby. This quarry, also known as either the St Brides Quarry, or ‘Pen Top’, was producing slate by 1855, but surprisingly it was opened out as a pit sunk from the cliff top about 160 yards west of the harbour. In the absence of a tunnel between the pit bottom and the quayside, there was a rope-worked incline to lift the slate up to the cliff top, and then either a shoot, or another incline, to bring the product back down to the harbour! These arrangements somewhat restricted output, but although the slate was not as durable as that from Caernarvonshire (Gwynedd), it found a ready market by reason of being closer to the expanding towns of south Wales. In 1857 there were about thirty slate shipments from Porthgain, and the majority went to different ports in south Wales.¹⁸

In 1862 the quarries at Abereiddi and Porthgain, and also at Trwyn Llwyd, to the east of Porthgain, were purchased by Messrs Hewett & Grierson. Two years later, in partnership with John Davies, they formed the St Brides United Slate & Slab Company to work the three quarries. This company made more capital available for development, and the tramway between Abereiddi and Porthgain appears to have been re-laid as a 3ft-gauge railway, although still horse-worked.¹⁹ A passing loop was laid just east of the quarry at Abereiddi and a couple of sidings laid at a slate yard established near Barry Island Farm, just over half a mile from the harbour. Unfortunately all these improvements do not seem to have helped the business, because in October 1869, it went into voluntary liquidation. In the 1870s the stuttering career of these quarries continued, because John Davies obtained a lease on the Porthgain quarries and set up another company – this time the St Brides Welsh Slate & Slab Co. Even though Davies had an active interest in numerous Pembrokeshire quarries, regrettably his approach to business did not impress all his contemporaries.²⁰ Whatever the truth of the matter, the new company was no more successful than its predecessor, and after the slate market collapsed in the late 1870s, it became bankrupt by 1880. Even so, the Abereiddi Tramway seems to have remained operational into the 1890s, and on the evidence of OS maps, the slate yard near Barry Island Farm was used into the early twentieth century.

The railways at Porthgain

In 1883 the Porthgain slate quarries passed into the ownership of the United Welsh Slate Co and funds were found to install a new boiler at the slate mill. The chief problem facing the undertaking was the fact that most Porthgain slate was not regarded as being of the very highest quality, and if offered in the same market as north Wales slate the product might have to be sold at perhaps 20 per cent below the going rate. To make matters worse, in 1889 the Trwyn Llwyd quarry, which produced better quality slab slates, was reclaimed by the landlord. In the face of this setback the quarry company decided to diversify, and turned to the production of bricks. A brickworks and its accompanying chimneys were erected directly behind the harbour at Porthgain, and broken slate was successfully mixed with clay to produce satisfactory bricks. The output soon reached no less than 50,000 bricks per week.²¹

After the loss of Trwyn Llwyd, other improvements were clearly needed at Porthgain. The existing Pen Top quarry was only 160 yards from the harbour, but the product was still being laboriously hauled to the top, before being lowered down an incline to reach the quay. By 1890 this absurd situation had been resolved by driving a tunnel direct from the quarry through to the quay. In the meantime, in 1889, work began on a new quarry on the cliffs at Penclegyr, half a mile to the west of Porthgain. The rock at this site was dolerite, a tough, fine-grained igneous rock, not dissimilar to granite, and the work was only made possible with the assistance of what was then a recent invention – dynamite. To emphasize the toughness of the product, the company actually marketed it as granite, for use either for road stone or for setts. This was timely, because demand for the commodity was rising thanks to the increasing use of iron-tired wheels on horse-drawn vehicles. Accordingly working Penclegyr required the Porthgain quarrymen to gain new skills, in the safe handling and use of explosives. As blasting reduced some aspects of the arduous manual labour in a quarry, it was probably welcomed.

The development of the Penclegyr quarry necessitated an extension to the relatively short lengths of 3ft-gauge track already in position between Pen Top quarry, waste tips on the cliff, and the old incline down to the harbour. The new line ran west from Pen Top for about half a mile and eventually served two different levels in the Penclegyr quarry, the junction being adjacent to some red brick buildings used for stores and a smithy. After blasting

workmen known as ‘breakers’ reduced the rock to manageable size for movement in horse-drawn trams to stone crushers set up on the cliff above Porthgain harbour. Beneath the crushers were several concrete bins, each holding stone of a different size. On the harbour ships were loaded with the assistance of a couple of steam cranes, running on a short length of standard-gauge track.

In spite of all this effort, in the 1890s Porthgain was again on the margins of commercial viability, with two or three changes of company name, and ‘stop-start’ operations at the quarries. In 1897 Porthgain Quarries Limited re-opened the quarries, and prepared plans for the further improvement of the harbour. Between 1902 and 1904 work was carried out to enlarge the quays, and in the latter year all the assets at the harbour and the quarries were acquired by the United Stone Firms, a subsidiary of a Bristol company. Soon after this the Aberreiddi Tramway, which after 1890 appears to have been little used, was finally abandoned. The slate business was terminated in 1910 and brick-making ended in 1912. Thereafter everything depended upon the success of the Penclegyr quarry, and in 1909 it was decided that the railway should be operated by a steam locomotive. The track was refurbished, and in 1909 a new Andrew Barclay 0–6–0 side tank (1185/1909), appropriately named *Porthgain* arrived. It required a traction engine to manoeuvre it up to the railway above the harbour and, given this exposed location, a brick-built shed was provided for accommodation between duties. Two more engines arrived before World War I, namely *Charger*, an 0–4–0T by Bagnall (1381/1891) and *Singapore*, an 0–4–2T from Kerr Stuart (659/1899) which had previously been employed on contracts in Ireland and Scotland (but not Singapore!) before moving to north Pembrokeshire. As late as 1929 another engine, a Hudswell Clarke product (311/1889), *Newport*, was brought in, but it cannot have been used much before all activity at Porthgain ended abruptly in the summer of 1931. For many years this machine was allowed to rust in its cliff-top shed before being scrapped in 1953.²²

The St Davids Railway narrow-gauge schemes

By 1869 the broad-gauge main line from Carmarthen, by way of Whitland, Clynderwen, Clarboston Road and Haverfordwest to Neyland (then known as New Milford) was well established. This had opened as the South Wales Railway in the 1850s, but was now owned by the mighty Great

Western Railway. However residents of the remote city of St Davids, the home of Wales' finest cathedral, felt overlooked, and fervently hoped for the construction of a branch line from their city to the nearest point on the South Wales main line at Clarbeston Road. The cost of a broad-gauge line was beyond contemplation, but a lighter narrow-gauge line appeared feasible. In the course of 1870 several public meetings were held to discuss the idea, although unanimity over the preferred route was lacking. In February a 3ft-gauge railway from St Davids to Heathfield, near Letterston, was advocated, on the assumption that the GWR would soon be extending their line through Heathfield to reach Fishguard.²³ In April 1870 a substantial deviation in the line was proposed to take it further south, close to 'the village of Solva and the collieries'.²⁴

The obvious advantage of a narrow-gauge railway lay in the fact that the civil engineering required was generally far less than that needed for either a broad-gauge or standard-gauge line, thereby greatly reducing costs. For many years the main difficulty lay in the provision of narrow-gauge steam locomotives robust enough to work heavy loads. In this respect the year 1870 has significance. In February of that year the 1ft 11½in-gauge Festiniog Railway in north Wales conducted some well publicised trials with a distinctive locomotive designed by the engineer Robert Fairlie. The Festiniog handled considerable slate traffic from quarries around Blaenau Ffestiniog, and their earliest locomotives, introduced in 1863, were not really up to the job. In 1870, though, Fairlie's new engine *Little Wonder* demonstrated that it was possible to build a machine capable of handling serious loads on steep gradients on a narrow-gauge line. This widely publicised development seems to have acted not only as an encouragement for existing proposals – like the St Davids line – but also as a stimulus for some other new narrow-gauge schemes, including a line later proposed to run between Whitland and Pendine. As that project lay almost entirely within Carmarthenshire, it falls outside the scope of this present essay.²⁵

Another year elapsed without progress for the St Davids line, and by the autumn of 1871 the overall picture had changed in that now the GWR had decided to replace the broad gauge in South Wales with standard-gauge track. As it was obvious that for the time being the main line company would investing in its own infrastructure before anything else, those hoping to see a narrow-gauge railway to

St Davids reverted to the idea of building the line to Clarbeston Road on the existing GWR main line. The intention of the GWR to re-gauge its main line across south Wales seems to have encouraged other local railway proposals. The standard-gauge branch lines from Whitland to Crymmych Arms (and later Cardigan), and from Clynderwen to the isolated village of Maenclochog, (later the North Pembrokeshire & Fishguard Railway) both of which would carry slate traffic, were first conceived at this period. Perhaps the appearance of these standard-gauge schemes absorbed both the energy and the resources of some of those who might have been willing to support the St Davids scheme, but by 1874 it was apparent that it would not proceed as originally planned. In 1880 another Bill for the line was submitted to Parliament, but again it did not make progress. The repeated failure to build a railway to St Davids was a huge disappointment to the district, and in later years there were yet more attempts to promote such a line. All those envisaged a standard-gauge route, but by the time the last such proposal was made in 1922, it was too late – the motor bus had proved its worth.

The narrow-gauge in the twentieth century

At the beginning of the twentieth century there were only two narrow-gauge lines of any length in Pembrokeshire – the Saundersfoot Railway, and the Porthgain line, and the latter did not use a locomotive until 1909. There were a number of slate and other quarries across the county with narrow-gauge tramways (hand or horse-worked) to assist internal operations, and it is thought that in most cases they were laid to a gauge of 2 feet.²⁶ However there were one or two exceptions near the former Whitland & Cardigan Railway. The less than successful Penlan quarry was connected to the Cardigan branch at Rhydowen by what is believed to have been a 2ft 6in-gauge tramway, perhaps ¾mile in length.²⁷ Built in or about 1879, this is shown on the 6 inch OS map printing of 1891, together with an incline at the quarry. Fifteen years later the next OS printing showed that the quarries were closed, and the tramway lifted. Further north, at Glogue quarries, near Crymmych Arms, a short portion of 2ft 4in-gauge track was found in the old workings in January 1975, almost 50 years after closure. North of Maenclochog the North Pembrokeshire & Fishguard line also ran close to the two main quarries at Rosebush and Bellstone. Both had their own tramway systems, and in the view of one expert, although this group was not of national importance,

‘they are of local and regional importance in South Wales, a region where slate extraction was relatively limited’.²⁸

Goodwick brickworks

In the Edwardian period another quarry was opened, at Goodwick, near Fishguard, which initially provided blue shale and clay. This was excavated largely by hand, and then heated in a couple of beehive brick kilns. In 1907 the owners of the new brickworks traded as the Fishguard Harbour Brickworks Company. The name surely provides a good clue as to the origins of the business. In 1898 the Great Western Railway gained Parliamentary powers for an audacious project, first to build a railway from Clarboston Road to the coast at Fishguard, and then secondly to construct a sizeable new harbour at Goodwick intended for both Irish and (it was hoped) transatlantic traffic. The GWR, with the Great Southern & Western Railway of Ireland, provided most of the capital required for the Fishguard & Rosslare Railways & Harbour Company, to enable infrastructure improvements in both Wales and Ireland. At Goodwick, across the bay from Fishguard, a large portion of cliff was acquired, and preparations made to create a levelled area beneath measuring 27 acres as a site for the quays, railway station and sidings. Initially it was imagined that the job would be done by 1902, but – as with certain noted infrastructure projects in the twenty-first century – there were numerous unexpected problems and delays. Between 1902 and 1905 the cliffs were cut back and almost 2.5 million tons of stone brought down, and incorporated into the construction of the quay and its protective piers. Fishguard Harbour station was eventually completed and opened for traffic on 30 August 1906. Prior to this date Irish traffic had been handled at New Milford (later Neyland) and the harbour staff were then asked to transfer to Fishguard – surely a huge upheaval, not only for the families, but for both communities.²⁹

If the completion of the railway and the harbour were the primary aims, the provision of suitable staff housing was a very necessary ancillary task. At the landward end of the harbour some of the hillside overlooking the bay became the site for a housing estate – sometimes referred to as ‘Harbour Village’. Construction of this estate – modern by the standards of the time – seems to have started by 1901, and at first building materials appear to have been brought in. Eventually the estate comprised over 100 homes,

and additional homes were built for railwaymen employed at the new locomotive depot. Although original company papers have not been seen, it seems probable that Goodwick brickworks was created belatedly to meet the evolving needs of the Fishguard Harbour development. In 1907 the GWR installed a standard-gauge siding to serve the quarry, and it seems likely that a 2ft-gauge line was then laid from the quarry to allow stone to be transferred from narrow-gauge trams or trucks to standard-gauge wagons. The stone produced by the quarry appears to have included some limestone and a relatively low-grade slate and, as at nearby Porthgain, this material was used for brick manufacture. In 1910, after the completion of the harbour development, the ownership of the quarry was vested in the Goodwick Brickworks Company Limited, and this change of name suggests that the direct involvement of the GWR had come to an end.

Railways within quarries are often moved and re-laid according to whichever rock face is receiving attention, and these changes are seldom recorded. Accordingly very little is known of the layout or operation of the narrow-gauge lines at Goodwick, but in a period of new investment in 1938 the brickworks acquired a small (20 hp) 4-wheel diesel mechanical machine built by Ruston & Hornsby of Lincoln (RH 193973). After World War II ownership passed to British Anthracite Sales Limited, a name which may hint at some commercial link with the anthracite industry in west Wales. Only in the 1960s did decline set in, and the private siding agreement relating to the main line siding near Fishguard & Goodwick station was terminated in May 1965.³⁰ By then it is likely that much of the output of the quarry was being moved away by lorry. The quarry ceased production in June 1969, and the 2ft-gauge line was abandoned that July. By the end of the year the chimney had been felled and the site cleared. The locomotive was scrapped in 1970.

Wartime forestry railways

From Tudor times (if not earlier) the greatest demand for timber had been for ship building, mines and construction. In World War I there was a sudden and huge demand for timber on the Western Front, and once this was recognised the Home Grown Timber Department was set up within the Board of Trade to ensure a sufficient supply. Numerous sites in Wales and the Marches were identified as possible sources of good timber and three of these were in north Pembrokeshire.

In 1916 the Pencelli Forest 2ft-gauge tramway was built eastwards from Pont Baldwyn, on the A487 between Nevern and Eglwysrwrw (SN104390) towards Pencelli, a distance of perhaps 2½ miles. The felling of timber – particularly oak – began immediately, especially in the Pant Teg Wood area of the forest. According to local tradition the workforce consisted largely of ‘Rooshians’, which was probably a blanket term covering labourers from different parts of eastern Europe. Two locomotives are known to have been used at this period, the first of which was an 0–4–0ST built by Kerr Stuart & Co of Stoke on Trent (2421/1915) which had been previously employed on new works at Catterick Camp in North Yorkshire. The second was a new small 10hp petrol powered locomotive, built by the Baguley Car Co (609/1918). It seems that this machine did not reach the Pencelli Tramway until October 1918, only a few weeks before the war ended. However clearance work in the Pencelli Forest seems to have continued for some time after the war, probably because good quality oak was still required for both military and domestic purposes in the immediate post-war period. It is not known when the tramway closed, but it was resuscitated in World War II, again to assist in the extraction of timber. On this occasion only one 2ft-gauge locomotive was employed, a small 4-wheel 14hp diesel built by F C Hibberd (1823/1933).³¹

Very little is known about the second of these forestry tramways, which was located at the village of Maenclochog (SN 078270). The only known picture shows a small timber yard west of Maenclochog station, on the former North Pembrokeshire & Fishguard Railway, with maybe twenty men standing alongside two horse-drawn carts carrying planks and other cut wood and in front of a small locomotive and flat truck. Unfortunately the image is indistinct, but the cab, saddle tank and twin domes on this machine strongly suggest an engine of North American origin.³² According to the description accompanying the picture, ‘they were cutting down trees in the woods, and a tramway came up from the woodlands bringing timber up to the mills.’³³ On this basis it would appear that the line was quite short, running west from Maenclochog on the south side of the minor road leading to New Moat, before turning south into woodland in the valley of the Afan Rhydafallan. It was also noted that huts were provided for the workforce, although given the isolation of Maenclochog on the southern flanks of the Preseli hills, it must have been a distinctly spartan

existence. The report declares that these sawmills continued to work after the end of World War I, but eventually closed in the early 1920s.³⁴

The third forestry tramway is even more obscure. According to local sources (without documentary proof) a tramway was installed at Pontfaen in the Gwaun valley, about 5 miles east of Fishguard, just off the B4313 road from Fishguard to Rosebush. The line began at SN 02423400, at a small saw mill adjoining a minor road some 50 yards south-west of a bridge over the river at Picton Mill. It then headed west north-west for about 150 yards on a low raised embankment before curving south-west to run by the base of some north-facing woodland at Pontfaen. The full extent of this tramway is not known, and as there is no evidence of any locomotive being employed, it must be assumed that horses provided the haulage.³⁵ The low embankment is still visible, and is now used as an access track into the fields.

Munitions factory railways

Royal Naval Mines Depot, Milford Haven

Pembroke Dock, on the south side of Milford Haven, was once noted for its naval dockyard, opened in 1814, which built many warships and auxiliary vessels for the Royal Navy. Various squadrons of the fleet regularly visited the Haven, and on Armistice Day in November 1918 some warships were allowed to fire star shell to celebrate the end of the conflict. Although in 1922 it was decided to close the dockyard, the link with the Royal Navy was not entirely severed. In 1934 the former shipbreaking yard of T W Ward, adjoining Castle Pill, Milford Haven, was sold to the Crown for redevelopment as a Royal Naval Mines Depot. The land adjoining the waterway to the east of Castle Pill already carried a standard-gauge railway, of complex history, known as the ‘Milford Haven Estate Railway’ which by 1883 continued out to a pier at Newton Noyes, which was initially intended for transatlantic business. Sadly the hopes for this project were not fulfilled, and for years the pier was little used. Once the Admiralty became involved though, the rail-served pier became a positive asset and was soon extended and adapted for the safe shipment of mines and munitions.

Construction of the Mines Depot began almost as soon as the land was acquired. In addition to several buildings, a major aspect of the work was the need to drive numerous tunnels into the hillside above the Haven, primarily to create secure working areas and munitions magazines. It is known that the contractors employed had the use of three 2ft-gauge 4-wheel

Hibberd petrol locomotives, which were removed at the end of the contract.³⁶ The depot was provided not only with standard-gauge railway, but also with metre-gauge track, primarily for use in and around the magazines and underground areas. As is the way with most such sites, very little is known of railway activity around the Mines Depot, but the standard-gauge system had an allocation of at least nine diesel locomotives and, for a couple of years, improbably, two ancient LNER Class Y9 0-4-0 saddle tanks of North British Railway origin.³⁷ On the metre gauge six small battery locomotives were employed in the early days, and there were two diesels from 1941, with another added before the end of the war. In the 1960s three more diesels were added, and it was surely some measure of the depot's importance that two more were introduced as late as 1983.

According to the historian D J Davies, the Mines Depot became active in 1940 and promptly became 'Britain's principal production plant for sea-mines; from June 1940, it aimed to turn out 230 Mark IV mines a day, 1,300 'R' mines a week, and 250 huge 'A' mines a month. In the early years of the war its principal objective was the laying of huge minefields in home waters, the Western Approaches, and the Bay of Biscay'.³⁸ Accordingly minelayers regularly called at Newton Noyes to collect these lethal cargoes, and continued to do so for the duration of the hostilities. The minelayer as a distinct category of warship was phased out by about 1960, but a number of other vessels had the capacity to lay mines, and for many years the Royal Navy continued to maintain a (declining) number of minehunters. Even before the collapse of the Soviet Union, activity at the Mines Depot was reduced, and in the 1980s most of the standard-gauge locomotives were moved away. After 1983 only the two most modern metre-gauge diesels remained in use, and even these were phased out by 1988. Presumably thereafter road transport sufficed for the depot's needs, until the entire site was closed down in 1991.

Royal Naval Armament Depot (RNAD), Trecwn

The building of this depot was first proposed in March 1937, but the intended site in the remote valley of the Nant y Bugail, south of Fishguard, was controversial from the outset.³⁹ The efforts of local objectors were in vain, because by 1939 the German threat to peace was obvious. Despite the protests, building contracts were awarded to Messrs Higgs & Hill and to a consortium formed by two construction firms, Messrs Paulings and Edward Nuttall & Co.

They soon began work on a vast 1,000 acre site extending for almost three miles up the narrow valley, not only building the various buildings for the extensive depot, together with 58 underground magazines, but also a village to accommodate many of the workers required. Standard-gauge rail access to the depot gates was achieved by building a 2½ miles branch line from Letterston Junction, some four miles south of Fishguard. The first 250 yards of this line followed the alignment of the old North Pembrokeshire & Fishguard Railway, which had reached Goodwick in 1896 as an extension of the earlier Maenclochog Railway across the southern slopes of the Preseli hills from Rosebush.⁴⁰ The remainder of the line to Trecwn was of new construction, and given the extent of the depot, the total length of this line was in excess of 4½ miles.

Within the depot's confined valley the standard-gauge track ran along one side, and the parallel 2ft 6in-gauge line ran mostly on both sides. As at Milford Haven, the narrow-gauge was laid primarily to serve the dispersed magazines and other underground workshops and stores, and it is thought that eventually the numerous facilities were served by about eighteen miles of track, much of it below ground. Even then it is understood that stores were mostly moved around by fork lift trucks, which could be carried on the narrow-gauge system on suitably designed well wagons. In the building phase the contractors employed 2ft-gauge locomotives on some scale. The provision made by Messrs Higgs & Hill has not been seen, but the Paulings/Nuttall consortium introduced no less than 21 new 4-wheel 30hp Ruston & Hornsby diesel locomotives late in 1937, followed by 13 more in 1938. Another eight were added in 1939, clearly indicating the vast extent of the required works. Twenty-nine of these locomotives are recorded as being moved elsewhere during the war, the remainder being either scrapped or sold. Two similar 40hp locomotives were added to the fleet in 1941, but these moved on later.

There is no record of the contractors employing any standard-gauge locomotives, and the Admiralty provision on the standard gauge at Trecwn was quite modest. In 1939 a single 0-4-0 Hunslet diesel appeared, followed in 1940 by another Hunslet and two rather similar Andrew Barclay diesels, and two railcars by Baguley of Burton on Trent. Three Hunslet 0-4-0 diesels followed in 1941, the year that production at Trecwn appears to have begun. Meanwhile on the 2ft 6in-gauge one (or maybe two) 23hp 0-4-0 Hunslet diesel locomotives were

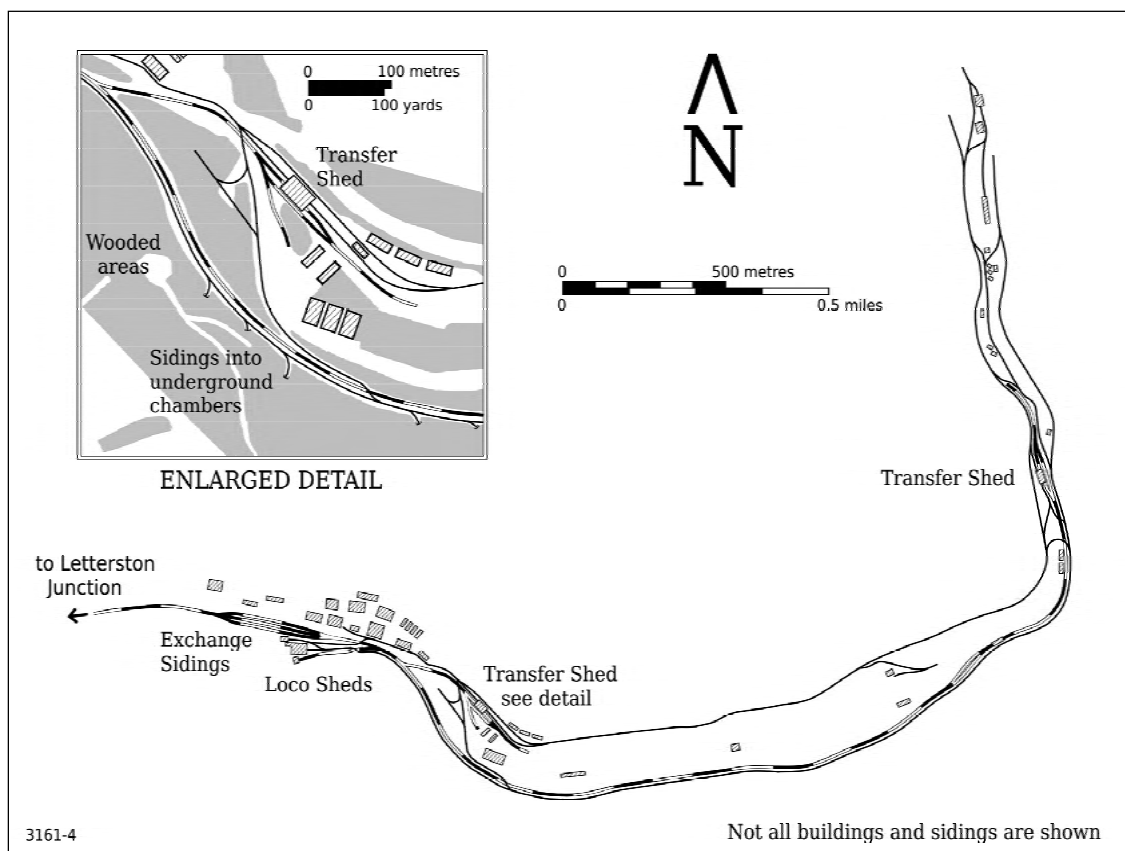


Figure 4. Railways at the Royal Naval Armament Depot (RNAD), Trecwn.

delivered in 1939, followed by four Wingrove & Rogers battery locomotives and two small Baguley railcars. Unexpectedly, around 1940, a steam engine – Peckett 0-4-2T (1868/1934) – arrived from the Chattenden & Upnor Railway in Kent, but it was soon returned there when Trecwn staff discovered that it had a habit of fouling point levers. Eight 50hp 0-4-0 Hunslet diesels arrived in 1940, and six more in the following year. There were also four 2ft 6in-gauge battery locomotives, and before the end of World War II two small diesel railcars built by Baguley of Burton on Trent were added to the fleet.⁴¹

If the creation of the Milford Mines Depot had been a large undertaking, the construction of the Trecwn depot, branch line and adjoining village was massive – and yet this remarkable achievement was hardly noticed outside Pembrokeshire. For the remainder of the war, and even for some time afterwards, the armament depot was worked to its full capacity. For many years an unadvertised workmen's service ran on the standard gauge from

Fishguard & Goodwick to a platform just outside the gates at Trecwn and, given the sheer length of the RNAD site (over 3½ miles), there were also passenger trains on the narrow-gauge. Unfortunately very little is known of this service, but it would appear to have been the first narrow-gauge service for passengers ever operated in the county. Although the Baguley railcars may well have been used in passenger service, it is thought that there were two or three small carriages, and at least two vehicles described as 'passenger brakevans'. The narrow-gauge passenger service ended in 1979, being replaced by buses.

RNAD Trecwn had a working life of fully fifty years, but as with many defence establishments, little or no publicity was given to the activities within it. Undoubtedly it contributed to the operations of the Royal Navy up to the Falklands War and beyond, but with government finances under strain it was bound to come under review following the end of the Cold War. In this respect Pembrokeshire suffered



Figure 5. A former Trecwn brake van now re-gauged for use on the North Gloucestershire Light Railway at Toddington, May 2019.

severely, because soon after the announcement of the intended closure of the Milford Haven Mines Depot it was also announced that the county's last RAF station, at Brawdy, near St David's, would also be closed down. In July 1991, the news that Trecwn would also be run down was a profound shock for a district with very few major employers. At its height Trecwn is believed to have given work to over 1,000 people, and even in 1991 it provided 516 jobs. Naturally objections were raised, but the government view was that in the context of the times the depot was simply in the wrong place. By the time of final closure in 1994 the work force numbered only 200, and Trecwn village life had been much diminished by the closure of the primary school. If the building of Trecwn had been a considerable unsung achievement, the near simultaneous closure of the county's defence establishments in the 1990s was a massive and under-publicised state-inflicted injury.

After closure the Trecwn site was soon put on the market, but it was 1998 before it was sold to a company named Omega Pacific. The chequered history of Trecwn since 1994 is outside the scope of this article, but at the time of writing standard-gauge track is still in situ. The narrow-gauge system was dismantled and much of the track and rolling stock sold, mostly to the benefit of various narrow-gauge railway preservation projects (Figs 5, 6). Meanwhile the huge changes at home and in the wider world since the closure of Trecwn have made many wonder if the decision to close such a substantial rail-connected depot, located only a few miles from the sea, was far too hasty. Indeed, it is even rumoured that the government really regrets it.



Figure 6. Re-gauged Trecwn vans on the Corris Railway at Maespoeth Junction, 13 October 2019.

Tourist railway schemes

To complete this survey of the narrow-gauge in Pembrokeshire mention must be made of some post-war ventures linked to the leisure and tourist industries. As early as 1964 there was a proposal to build a miniature railway on about a mile of the route of the old Saundersfoot Railway at Begelly. After months of discussion, the idea was eventually abandoned. In 1978, though, a 2ft-gauge petrol locomotive and three carriages were acquired for a short line then planned for Kiln Park, a caravan and leisure park just to the south of Tenby. In this case the negotiations and argument continued for two years, but in 1980 the locomotive and rolling stock were put up for sale, and eventually were dispatched to Essex. Two later projects fared rather better, although it must be admitted that one was very short-lived. Both were built to a gauge of 15 inches and so just come within the orbit of conventional railway legislation. The less successful of the two schemes was another attempt to revive part of the former Saundersfoot Railway for tourist use.

The Saundersfoot Steam Railway

In the 1980s supporters of the Stepside Industrial Heritage Project were active in clearing and patching up some of the buildings of the former Kilgetty Ironworks (closed 1877, dismantled c.1901). In the process it was suggested that a 15in-gauge railway should be re-instated along the Kilgetty branch of the former Saundersfoot Railway, running north from the car park at Coppet Hall. Such a line would have required at least one level crossing, at Wiseman's Bridge, but somehow in 1987 a retired motor

engineer from Lancashire, Albert Hart, managed to secure the backing of South Pembrokeshire District Council. The original plans for the Saundersfoot Steam Railway were far from fully prepared, and encountered numerous objections in the district. In 1988 Hart secured the assistance of another experienced engineer, John de Havilland, who pointed out that a scheme on the scale proposed would require a Light Railway Order under the 1896 Light Railways Act. This necessitated a full and detailed survey of the proposed route prior to a Public Enquiry in 1989. The work was carried out by John de Havilland, who then went over the line with the appointed inspector. Eventually the project was approved, with the proviso that the construction would have to be completed within three years. This was both good news, and bad news – because unfortunately much of the money available had been expended on the survey and the enquiry!

After so much effort, Albert Hart did not want to give up. He decided to begin by using the rails and rolling stock already to hand in the creation of a demonstration line in a field near the old Kilgetty Ironworks. In 1991 this line was built by John de Havilland and Brian Gent as a 500 yard circuit, using rail weighing 35lbs/yard, although the amount of work involved meant that it was not completed until the summer peak season had finished. As a result initial operations were low-key, but in 1992 trains were run using a small 0-4-2 tank locomotive, with the witty name of *Chough* (Fig 7). The line served



Figure 7. 15in gauge locomotive Chough operating on the Saundersfoot Steam Railway in 1992. [John de Havilland]

its purpose in demonstrating what might be achieved, but the location was far from ideal for attracting customers. It was soon clear that this limited operation would not be financially viable and that a substantial additional sum would be required to fulfil the original vision. Sadly these funds were not available, and by the autumn of 1992 it had been decided to abandon the project, and recoup some of the expenditure by dismantling the line and selling the materials.

Oakwood Adventure Park

This well-known attraction was opened in 1987 by the Macnamara family on a site adjoining the main road from Canaston Bridge to Carew, not far from the Eastern Cleddau River. It has expanded over the years since, not least with the nearby development of the large Bluestone Leisure Village, but Oakwood primarily offers a variety of exciting leisure rides and play areas intended to appeal to residents, local holidaymakers, and day-trippers from across South Wales. The 15in-gauge railway is used to convey day visitors from the car parks at the entrance down a gentle hill to a lower station close to the assorted attractions (Fig 8). The line is built in the form of a large loop, so that a train arriving at the lower station disgorges its passengers, before other passengers intending to leave the site are allowed to board. The train then carries them back to the upper station and the car parks. This simple and efficient arrangement has now operated for over thirty years, in which time at least four different locomotives have been employed, three built by Severn-Lamb of Stratford on Avon.



Figure 8. Oakwood Adventure Park station, by far the largest narrow-gauge station ever provided in the county, November 2019.

Conclusion

This survey of the often overlooked narrow-gauge lines of Pembrokeshire is not comprehensive. Short tramways were provided at a number of small quarries and collieries, and also at one silver-lead mine – Llanfyrnach – although this had closed by 1890.⁴² There was also a farm, Merrion Court at Warren, where a narrow-gauge tramway was installed, perhaps in about 1874, to transport feed to the cattle sheds.⁴³ At least two short lines had maritime associations – one serving the lighthouse on the island of Skokholm, and the other the RNLI, at St Justinian's lifeboat station, near St David's. Even so, the lines mentioned in this essay may be seen as a microcosm of all narrow-gauge development and change in Wales, although within the confines of a single county. After the remarkably early and little recorded tramroads, the Saundersfoot Railway & Harbour Company was promoted not only to aid the coal industry, but also to ensure that the commodity could be shipped readily to distant customers. Meanwhile, in north Pembrokeshire, the Abereiddi Tramway serving the slate industry was a modest reminder of the much greater use of narrow-gauge lines in moving slate from the quarries of Snowdonia. Slate, and then later bricks, prompted the use of railways at the nearby village of Porthgain. At the period, and especially in the late 1860s, the Festiniog Railway in north Wales provided a striking example of what could be achieved on a gauge as narrow as 1 foot 11½ inches, or 2 feet, thereby encouraging others to believe that there could be useful working railways of such a modest gauge. That said, the story of Abereiddi and Porthgain in the nineteenth century provides a striking example of the many trials and tribulations encountered by those trying to improve industry and transport in rural Wales at that time.

In the twentieth century the main emphasis in narrow-gauge construction related to matters of war and defence. The small forestry lines played their part in the supply of timber to the front lines, especially in World War I. The growing threat from Germany in the 1930s encouraged the building of both the Milford Haven Mines Depot and the RNAD at Trecwn. Even isolated Castlemartin, in the very south of the county, required narrow-gauge tracks for target trolleys used on the firing ranges. In the late 1980s and early 1990s, all this changed. The military and defence establishments were closed with thoughtless – if not ruthless – haste, leaving Pembrokeshire very heavily dependent on the tourist

industry. Of the two 15-in gauge ventures, the Saundersfoot Steam Railway sadly did not prosper, but during the summer season the line at the Oakwood Adventure Park continues to be extremely busy. The story of the narrow-gauge in Pembrokeshire virtually reflects the story in the rest of Wales, beginning with the rise of extractive industries, and then the decline of the various industries derived from them. Now in Pembrokeshire there is arguably an almost excessive reliance on tourism. In the circumstances it is a pity that, apart from a number of infrastructure features, like the three Saundersfoot Railway tunnels on the coastal footpath between the village and Wiseman's Bridge, there are few other relics of the narrow-gauge era. Even so, Pembrokeshire, as well as the Principality, can be proud of a long and remarkable history with narrow-gauge railways.

Acknowledgments

In conclusion, I must express my sincere thanks to John de Havilland for the provision of maps, and for his careful and constructive counsel, not least in relation to RNAD, Trecwn, and the Saundersfoot Steam Railway. My thanks also go to Peter Claughton for reading the first draft of this essay and offering most helpful comment.

Notes and references

1. M R Connop Price, *Pembrokeshire – the Forgotten Coalfield* (Ashbourne : Landmark Press, 2004), p 125
2. National Library of Wales, Ffynone estate papers (formerly Owen and Colby), 2043, 2073
3. Connop Price 2004, pp 125–8
4. Greater detail is to be found in M R C Price, *The Saundersfoot Railway* (Godstone : Oakwood Press, 1963), and in M R Connop Price, *Industrial Saundersfoot* (Llandysul : Gomer Press, 1982).
5. In this respect the SR&HCo was second only to the Llanelly Railway and Dock Company, authorised by Act of Parliament in 1828, which was a standard-gauge rather than a narrow-gauge scheme. It should be noted that the very first public railway in Wales, the Carmarthenshire Railway or Tramroad, authorised in 1802, conveyed traffic to the Carmarthenshire Dock at Llanelly (the customary spelling for the town at the time).
6. Ironically the Pembroke and Tenby Railway's siding to the Moreton colliery was already defunct, following the closure of the mine in 1887.
7. In 1900 the SR&HCo had 75 of these primitive iron bodied drams. By 1913 the number was down to 71.
8. The SR&HCo was not alone amongst early narrow-gauge lines in having such a vehicle for directors.

- The Peak Forest Tramway in Derbyshire had a 'committee waggon' which had upholstered bench seats and was evidently much better appointed!
9. See *Archive* no 23 (Lydney : Lightmoor Press, 2001), for a full history of the New Reynalton Anthracite Co Ltd.
 10. *The Cambrian*, 23 June 1838. The place name 'Barry Island' is quite misleading because the farm was not located in South Glamorgan, but in the Pembrokeshire parish of Llanrhian. The particular quarry mentioned may have been a short lived venture behind the beach at Traeth Llyfn, half a mile west of Barry Island Farm.
 11. *The Welshman*, 12 December 1848
 12. *Pembrokeshire Herald*, 12 April 1850
 13. *Pembrokeshire Herald*, 5 April 1850
 14. *The Welshman*, 2 May 1851
 15. *Pembrokeshire Herald*, 16 May 1851
 16. *Haverfordwest Herald*, 13 June 1851. The load is not described; it could have been spoil rather than slate.
 17. *The Welshman*. 27 June 1851 noted that two quarrymen had been buried in the slate quarry at Aberethy (sic), and that one had died. It added grimly that this had been 'the second fatal accident at the quarry in the past three weeks'.
 18. P B S Davies, *Porthgain and Abereiddy : a century of industry* (St Davids : Merrivale, 2004), p 22
 19. J de Havilland (ed), *The Industrial Locomotives of Dyfed and Powys* (London : Industrial Railway Society, 1994), p 222
 20. Davies moved from Newtown to Narberth to seek commercial opportunities in the slate industry, but he appears to have been less than scrupulous in relation to several of the schemes he promoted. See Alun John Richards, *The Slate Quarries of Pembrokeshire* (Llanrwst : Gwasg Carreg Gwalch, Llanrwst, 1998), pp 34–35.
 21. For greater detail see R C Jermy, *The Railways of Porthgain and Abereiddi*, (Oxford : Oakwood Press, 1986, and also Davies 2004.
 22. de Havilland 1994, p 214
 23. *Pembrokeshire Herald*, 16 February 1870
 24. *Pembrokeshire Herald*, 22 April 1870. The collieries comprised several small pits situated at Newgale and Nolton on St Bride's Bay.
 25. Acts of Parliament for the Whitland, Cronware and Pendine Railway were passed in 1877 and 1882. The 1882 act proposed a line of 1ft 11½ in gauge. This was never built.
 26. Richards 1998, p 148
 27. Richards 1998, p 150
 28. P F Claughton, 'Bellstone and Rosebush Slate Quarries' (Mining History Information Pages) <<https://people.exeter.ac.uk/pfclaugh/mhinf/slate.htm>> [accessed 4 February 2020]
 29. Miles Cowsill (ed), *Fishguard–Rosslare : the official 1906–2006 anniversary book* (Ramsey, Isle of Man : Ferry Publications, 2006), p 95
 30. R A Cooke, *Track Layout Diagrams of the GWR and BR (WR), section 58, West Wales*
 31. de Havilland 1994, p 213
 32. de Havilland 1994, p 221 notes that a 3ft-gauge locomotive built by an American company, Porter, was available for sale at Neyland in May 1924. However, there is no clear evidence that this machine was the one previously used at Maenclochog.
 33. *Western Telegraph*, 28 January, 1996. The testimony was given by Hedley George who also recalled the tramway being lifted after the war.
 34. Richards 1998, p 50. The narrow-gauge ¾ mile tramway from the closed Penlan quarry to Rhydowen on the Whitland and Cardigan branch line was apparently refurbished during World War I and a temporary incline installed to assist the removal of timber.
 35. I am grateful to Peter Claughton for his advice regarding the Pontfaen tramway.
 36. de Havilland 1994, pp 210–11
 37. R E Bowen, 'The Y9 Wee Puggies : the LNER reaches west Wales', *Welsh Railways Archive* (Welsh Railways Research Circle) vol 5, no 2 (November 2010), p 43. At the time traffic to and from the Mines depot was so heavy that GWR footplate crew were asked to help work the standard-gauge traffic. Ray Bowen memorably described the Y9s as motive power 'coelacanth's'!
 38. J D Davies, *Britannia's Dragon : a naval history of Wales* (Stroud : The History Press, 2013), p 223
 39. Objectors were numerous, but the best known was a local schoolmaster, pacifist and highly regarded Welsh poet, Waldo Williams. See Davies 2013, p 223.
 40. By this time the NP&FR had closed to passengers but was still in use for rather intermittent freight traffic.
 41. de Havilland 1994, pp 216–20. Some of the original published information has been revised with the IRS issuing revisions or corrections.
 42. A map of this site and tramway has been included by P F Claughton in 'Llanfyrnach silver-lead mine circa 1752 to 1890' (Mining History Information pages) <<https://people.exeter.ac.uk/pfclaugh/mhinf/llanfyr.htm>> [accessed 4 February 2020]
 43. Thomas Lloyd, Julian Orbach and Robert Scourfield, *The Buildings of Wales : Pembrokeshire* (London : Yale University Press, 2004), p 494

Travel in the novels of Jane Austen

Peter Brown

In the early nineteenth century in which Jane Austen's novels were set, the vehicle a person owned was as much about how they wished to be perceived as about their travel needs. Hence the novels contain many references to the vehicles used by the various characters, and the contemporary reader would have had no problem in making the right inferences.

For example, the third sentence of the unfinished novel, *The Watsons*, graphically introduces the central characters by reference to their carriages: 'The Edwards were people of fortune who ... kept their coach; the Watsons ... were poor and had no closed carriage ...'. And when Lady Catherine de Bourgh, a grand lady who was the epitome of snobbery and wealth, wanted to establish Elizabeth Bennet's position in the social hierarchy, she asked what carriage her father kept.¹

The word for passenger vehicles most frequently used by Jane Austen was 'carriage', which could mean anything from a humble gig to a grand state coach. When she was trying to make a point about social status or personal character she employed more precise words.

Four-wheeled closed carriages

Lady Catherine de Bourgh had 'several carriages' including a coach, a chaise-and-four, a barouche and (for her daughter) a pony phaeton. The coach would have been a relatively heavy four-wheeled closed carriage probably displaying her coat of arms, pulled by four horses.²

This implication in the word 'coach' of a rather old-fashioned heavier vehicle is emphasised in *Sanditon*, where Mr Heywood, minor gentry and a working farmer, had a coach which was more than thirty years old; it was used for two journeys to London each year and also occasionally by his wife, Mr Haywood preferring to travel on his 'well-tried old horse'.³

The type of carriage mentioned most often in the novels is the chaise, the meaning of which changed with time. The older meaning was a two- or four-wheeled light open carriage for two people, drawn by one horse, and used for pleasure rather than travelling; later the word came to be used for a four-wheeled carriage with a closed body. The exact

design varied: some took two or three passengers on one seat, others four passengers on two seats, both facing forward. Pulled by two or four horses, it was sometimes 'postilion driven', that is, by a person riding the near-side (left) horse. Sometimes called a 'post-chaise', it was used for travelling. The contexts make it clear that Jane Austen consistently had in mind this latter meaning.

Chaises with four horses were owned by Lady Catherine de Bourgh, General Tilney, Sir Thomas Bertram and John Willoughby (though it is difficult to see how he could have afforded it). When Lady de Bourgh travelled in hers, she was accompanied by a liveried servant. ('Liveried' meant wearing a special uniform – another indicator of wealth and status.) General Tilney's post-chaise had 'postilions handsomely liveried', and 'numerous outriders, properly mounted' – an emphatic statement about his status.⁴ Sir Walter Elliot also had a chaise-and-four. He consistently spent more than his income; it was suggested to him that he should sell one pair of horses, but he thought that was hardly less painful than selling both pairs.⁵

The other mentions of chaises do not explicitly state that they had only two horses, but the absence of information and the generally middle status or wealth of the owner (compared with those who used four horses) make it seem probable. For example, Sir William Lucas took his daughter and Elizabeth Bennet on the 24 mile journey to London in his chaise. Mr Bennet, Elizabeth's father, was a gentleman but also an active farmer. We are never explicitly told what type of carriage he owned but various mentions of it imply that it was probably a chaise pulled by only two horses. It is stated that they had a coachman but the horses were also used for farm work, which took priority.⁶

Chaises could be hired. The eloping George Wickham and Lydia Bennet hired one to travel from Epsom to Clapham, as did Frank Churchill when he went 16 miles to London, returning the same day. Captain Frederick Wentworth hired a chaise from the inn at Lyme Regis, travelled the 20 miles to Uppercross and returned the same day; a couple of days later Charles Musgrove hired one from Crewkerne for the journey to Lyme Regis and back.⁷

A variety of chaise which was owned by the better-off was the chariot: a light closed four-wheeled carriage with only two forward-facing seats, designed for long journeys. Two were owned by rich minor characters in the novels: Mrs Jennings and Mrs Rushworth; the former also had a second closed carriage which emphasised her wealth.⁸

Four-wheeled open carriages

A landau was a relatively heavy vehicle. It had much the same profile as a coach, being symmetrical about a door in the middle of each side, and had a forward- and a backward-facing seat. The essential difference was that it had a folding leather head in two parts, joined over the doors, that could be lowered front and back. There was usually a separate raised open coachman's seat and also, outside at the back, a groom's seat. Landaus were produced in a variety of styles, being particularly favoured as a luxury city carriage.

Captain Frederick Wentworth, who had become a naval captain and gained wealth amounting to about £25,000 from prize money awarded for capturing enemy vessels, married Anne Elliot (who had reluctantly turned him down eight years earlier) and gave her 'a very pretty landaulette'.⁹ This was a light cut-down version of a landau, retaining the rear half of the landau's two-part folding top.

The barouche was a fashionable style of large carriage owned by the better-off, particularly by wealthy ladies. It had an open body accommodating four passengers. The forward-facing seat was covered by a hood, and a leather apron could be drawn up to elbow height to give protection in poor weather; if this were done the rear-facing seat was not able to be used. It was pulled by two horses and was usually driven by a coachman.

Lady Catherine de Bourgh owned a barouche and offered to take Elizabeth Bennet with her when she next went to London. Another owner of a barouche was the wealthy Viscountess Dalrymple, who used it to travel round Bath. Henry Crawford, a charming but fickle bachelor allowed his to be used for conveying a harp from Northampton to Mansfield Park; no wagon or cart could be hired in the village or its neighbourhood because they were needed for the late hay harvest.¹⁰

Rich but vulgar Augusta Hawkins, who later married the ambitious young vicar Mr Elton, tried to impress others when she said that her sister and brother-in-law intended to come in the spring or

summer: 'They will have their barouche-landau, of course, which holds four perfectly.' This was an expensive four-wheeled carriage drawn by two horses – in effect, another version of a landau. She then mentioned it three more times in the conversation, stressing that it was perfect for seeing the countryside. (In the event, her relatives never came.)¹¹

A phaeton was a sporty light four-wheeled open vehicle seating two facing forward, drawn by one or two horses, and ideal for making short trips on fine days. Lady Catherine de Bourgh's daughter Anne had the use of a pony phaeton, a smaller version.¹²

Two-wheeled carriages

The vehicle of choice for the dashing young man was the curricule, a light two-wheeled, two-seat open carriage with a hood which could be raised in poor weather. Whereas a gig was pulled by just one horse, a curricule had two. For practical reasons they needed to be balanced in height and stride; to be fashionable they also needed to be the same in colour. This made a curricule particularly expensive to own. It was driven by its owner, often in a flamboyant way intended to impress onlookers. They were notorious for being involved in accidents, either caused by a problem with one of the horses or by the recklessness of the driver.

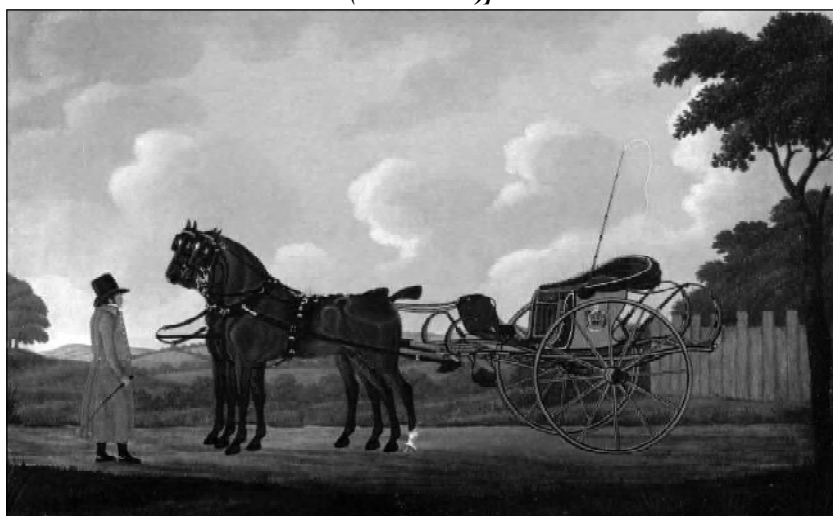
John Willoughby had a curricule (and a reputation for philandering), and took the impressionable sixteen-year-old Marianne Dashwood out for a morning ride.¹³ Not all curricule owners were irresponsible: the wealthy Fitzwilliam Darcy and William Elliot both had curricules displaying their livery. The latter was specifically referred to as a 'gentleman's carriage'. Henry Tilney, James Rushworth and Charles Musgrove also each owned one – all these were well-off young men.¹⁴

I am sure that arrogant John Thorpe would like to have owned one too. He had a gig which he drove 'with all the vehemence that could most fitly endanger the lives of himself, his companion, and his horse'. He said with great pride that it was equipped with a 'seat, trunk, sword-case, splashing-board, silver moulding, complete', and pointed out that it was 'curricule-hung', implicitly having better springing than most gigs. He added that he had bought it for fifty guineas and could have sold it the following day for sixty guineas, though this story was ruined by his companion pointing out that the purchase price did not include the horse whereas the offer he received did include it. He claimed that he had just driven the 23 miles from Tetbury to Bath in two and



Charles Towne (1763–1840), 'Chestnut Driven in a Gig' (1826). [Photo © National Museums Liverpool/Walker Art Gallery. Image released under the terms of the Creative Commons Attribution-NonCommercial licence (CC BY-NC)]

carriage before the railway era, and came in a wide range of styles and qualities. Edward Ferrars, discussing the possibility of entering the legal profession, said, 'Many young men, who had chambers in the Temple, made a very good appearance in the first circles, and drove around town in very knowing gigs.'¹⁶ Mr Collins, an obsequious clergyman, drove one, as did the comfortably-off Admiral Croft and the impoverished Sir Edward Denham. Elizabeth Watson drove her younger sister Emma to the town in an elderly small light gig called a 'chair', the only carriage the Watson family could afford.¹⁷



John Cordrey (c1765–1825), 'A Gentleman with his Pair of Bays Harnessed to a Curricule' (1806). [Yale Center for British Art, New Haven CT]

Gigs were driven by their owner. Although gigs usually carried two, a third could be squeezed in, as when on one occasion Anne Elliot accompanied Admiral and Mrs Croft. Mrs Croft criticised her husband's driving, 'but by coolly giving the reins a better direction herself they happily passed the danger'. Anne imagined this was 'no bad representation of the general guidance of their affairs' – another example of where Jane Austen is using a carriage to make a wider point about people's characters.¹⁸

a half hours; his companion said it was three and a half hours. He then took the somewhat naive Catherine Morland out for a day's excursion. (She wasn't impressed.)¹⁵

The gig, a two-wheeled, two-seat vehicle pulled by a single horse, was the most common sort of

Gigs could be hired. James Morland did so from a coachmaker at Bath. John Thorpe – not a reliable witness – said of it: 'the wheels have been fairly worn out these ten years at least' and of the body 'you might shake it to pieces yourself with a touch'.¹⁹

The posting system

An example of a long journey in a hired post-chaise was that undertaken by the out-of-favour Catherine Morland, who travelled alone from north of Bath to south of Salisbury, a distance of about 85 miles, taking eleven hours. After the first stage the post-master told her the names of the places she would pass through. Fortunately, 'her youth, civil manners, and liberal pay, procured her all the attention that a traveller like her could require'. Her mother obviously thought that Catherine had changed carriages too, and hoped that she had not left anything in any of the pockets, to which Catherine replied that she hoped so too. However, this is not consistent with an earlier statement that on the journey she stopped only to change horses – it also seems unlikely that such a complex journey could have been organised quickly and require no involvement of the passenger.²⁰

This is an example of the 'posting' system, references to which are frequent in the novels. Rather than use one's own horses for longer journeys, horses could be hired at an inn or posting-house and used for a dozen to twenty miles, then exchanged at the next posting-house. The man or boy who had accompanied the horses would then take them back. Thus one could progress quickly using a relay of horses. Each section was called a 'stage', hence the word 'stage-coach', where this method was used on timetabled public services. The inn need not be a large establishment: The Crown in the 'large and populous' village of Highbury was said to be 'an inconsequential house ... where a couple of post-horses were kept, more for the convenience of the neighbourhood than from any run on the road'.²¹ Robert Watson complained about the cost of the posting system, but he tended to complain about everything.²²

The impulsive John Willoughby did the most extreme journey mentioned in the novels when he travelled from London to north Somerset in a day, a journey of at least 120 miles, perhaps 130 miles. He said, 'I left London this morning at eight o'clock, and the only ten minutes I have spent out of my chaise since that time procured me a nuncheon at Marlborough.' (His nuncheon, an early lunch, consisted of cold beef and a pint of porter.) He arrived at his destination at 8pm, then later that evening went a further 'not 30 miles' to his house. He must have used the posting system to have achieved this in one day.²³

Henry Crawford went about 80 miles from Northamptonshire to London in his carriage, accompanied by young midshipman William Price (Fanny's brother) 'who enjoyed the idea of travelling post with four horses'. William's alternative would have been to travel by the mail coach overnight.²⁴

Diana, Susan and Arthur Parker travelled the 60 miles from Chichester to the fictional town of Sanditon in one day using post-horses; it is not clear whether it was in their own carriage or whether this too was hired.²⁵

Elizabeth Bennet and her friend Maria Gardiner travelled post in a chaise from Kent to London, changing horses half way at Bromley, so each stage was twelve miles. Lady Catherine de Bourgh said, 'I cannot bear the idea of two young women travelling post by themselves. It is highly improper.' Elizabeth responded that Mr Gardiner was sending a servant. Lady Catherine travelled in her own chaise using post horses when she later visited the Bennet family to tell Elizabeth that she must not marry Mr Darcy 'because honour, decorum, prudence ... forbid it'.²⁶

The Misses Steele, describing their journey from the West Country to London, said: 'We came post all the way, and had a very smart beau to attend us. Dr Davies was coming to town, and we thought we would join him in a post-chaise; and he behaved very genteelly, and paid ten or twelve shillings more than we did.'²⁷

George Knightly, though the major local landowner, kept a carriage but no carriage horses, 'having little spare money and a great deal of health, activity, and independence'. It is clear from elsewhere in the novel that he, like many gentlemen, generally rode everywhere. Presumably he hired carriage horses when he needed them. Emma Woodhouse (the heroine of the novel, but a snob nevertheless) thought that a man in his position should use his carriage more often.²⁸

A hackney coach was a vehicle kept for hire, usually a four-wheeled carriage drawn by two horses and having seats for four or six persons, and often a former privately-owned carriage. George Wickham and Lydia used one during their elopement, hiring it at Clapham.²⁹

The economics of carriage ownership

Keeping a horse was expensive. Fodder had to be provided, whether or not the horse was working. John Thorpe thought James Morland was a fool for not keeping a horse and gig of his own, but Catherine (James's brother) said he couldn't afford it. When

Elinor Dashwood's father died, the family income was reduced to £500 a year (we are not told what it was before), so the carriage and horses had to be sold. Her sister, Marianne, later had to reluctantly refuse the gift of a horse offered by John Willoughby – she hadn't thought about the need to erect a stable and the cost of employing a servant to look after it. Mr Perry (a doctor) could just about afford a carriage, and it was speculated that Mrs Perry would persuade him to do so out of care for his health.³⁰

Coachmen must have had a reputation for being opinionated and awkward, as the novels have several examples of the difficulty of keeping them happy. Lady Maria Bertram's coachman 'always complains bitterly of the narrow lanes scratching his carriage'. ('His carriage', not hers!) Henry Woodhouse didn't want to use his carriage for a journey of only a three-quarters of a mile because he thought the coachman wouldn't like 'to put the horses to for such a little way'. Tom Musgrave thought that Mrs Edwards' carriage could not be used the day after it had been used for the ball, or 'the old coachman will look as black as his horses'.³¹

Long journeys

Several episodes show how far people could travel in a day. Some have already been mentioned, so are not repeated here. Fitzwilliam Darcy remarked, 'What is fifty miles of good road. Little more than half a day's journey' – he would have travelled on horseback, of course. The Churchills travelled from Yorkshire to London (about 190 miles) in three days; they did the journey quickly because Mrs Churchill did not like staying in inns more than necessary. The Dashwoods travelled from London to the Somerset border near Bath (about 110 miles) in two days, staying overnight somewhere, perhaps at Newbury. Later they used Colonel Brandon's carriage to return to their home in Devon; the journey of 80 miles took two days. When Edmund Bertram returned with Fanny Price from Portsmouth to Northamptonshire in a carriage, they left just after breakfast and after 'a long day' spent the night at Oxford, a journey of about 80 miles. The second day's journey was shorter, about 50 miles, arriving at Mansfield Park 'long before the usual dinner-time'.³²

Stage coaches

There are few mentions of travelling by stage coach. Robert Martin, a successful tenant farmer, travelled to London and back by stage coach services. Mrs Jennings took Elinor and Marianne Dashwood to London in her post-chaise, but because it seated

only three, Betty, the maid, had to travel by coach. The post-chaise took three days for the journey of about 180 miles, staying overnight in inns; Betty's journey would have been much less comfortable but faster.³³

Fanny Price, the only Austen heroine who was not even of the minor gentry class, journeyed from Portsmouth to Northampton, where she was met by Mrs Norris. The mode of transport isn't mentioned, but it must have been by stage coach via London, which seems remarkable for a ten-year-old girl travelling alone. Later in the novel, Fanny's brother William, a naval midshipman, went from London to Portsmouth by stage coach.³⁴

Colonel Brandon went from near Exeter to Honiton by horse, and from there to London he went 'post'. Did this mean he used his own horse as far as Honiton then had a relay of horses from there to London; or did it mean that he took the stage coach to London?³⁵

Other mentions of transport

In the late eighteenth century in Bath there were 250 sedan chairs licensed for hire. (Jane Austen calls them just 'chairs'.) Each had to be 5ft 3ins tall and 2ft 2 ins wide, painted black. The inside of the chair was upholstered. Windows around three sides enabled the traveller to see out if they wished, but curtains allowed privacy and anonymity if required. The roof of the chair was hinged, enabling ladies and gentlemen to enter the chair without stooping. The fare for a journey within the city walls was sixpence.³⁶

Catherine Morland used a chair at least once during her stay in Bath: returning ecstatically from a ball, she 'danced in her chair all the way home'. Mrs Allen, with whom she was staying, used a chair when it was raining, claiming that umbrellas were disagreeable things to carry.³⁷

In the novels there are few mentions of the transport of goods. When a trunk was sent from Highbury (a fictional village 16 miles from London) to Bath, it was taken by the butcher's cart from the village to where the coaches passed. This shows that stage coaches would take small items for people who were not passengers, no doubt charging a premium price.³⁸ And when the Dashwoods moved from Sussex to Devon, they went by road but 'the furniture was all sent round by water' – perhaps from Shoreham or Arundel to Topsham or Exeter. Their new home was rented furnished, so 'furniture' here meant household linen, plate, china and books, plus Marianne's 'handsome pianoforte'.³⁹

Some final thoughts

Jane Austen's novels probably give a fair depiction of how travel was undertaken by the gentry classes at the start of the nineteenth century.

They do not give a comprehensive picture, as her heroines rarely spent time in cities. The principal exceptions were Elinor Dashwood, who had the use of the carriage belonging to Mrs Jennings with whom she stayed in London for three months, and Catherine Morland who stayed six weeks in Bath.⁴⁰ Nor do Jane Austen's novels make much mention of men who earned a living from a profession, trade or business and who needed to travel.

Her father was clergyman with a reasonable living – not rich by the standards of the day but not poor either. Jane would have experienced many of the journeys in southern England herself, and she could also rely on what relatives and friends had told her. She was writing for a contemporary audience so would not have made errors concerning such familiar matters as transport.

It is clear from her writings the extent to which the type of carriage (or carriages) owned showed one's wealth and social status, though many gentlemen preferred to ride for journeys of all lengths. The extensive use of posting is evident, as is the limited use made of the stage coach services by the gentry class.

Notes and references

The details about the types of carriages is derived from several sources, particularly the Oxford English Dictionary (on-line), *Looking at Carriages* by Sallie Walrond (1980), and *The Guide to the National Trust Carriage Museum at Arlington Court* (2016) and Wikipedia (accessed 16 December 2019).

With the exception of the unfinished fragment *The Watsons*, Jane Austen's novels are divided into chapters. Because page numbers vary according to the edition (of which there are dozens), the references below are to the chapter.

1. *The Watsons*; *Pride and Prejudice*, 29
2. *Pride and Prejudice*, 14, 28, 29 and 56
3. *Sanditon*, 2
4. *Pride and Prejudice*, 56; *Mansfield Park*, 8 and 20; *Sense and Sensibility*, 43; *Northanger Abbey*, 20 and 26
5. *Persuasion*, 1 and 2
6. *Pride and Prejudice*, 7 and 27
7. *Pride and Prejudice*, 46; *Emma*, 25; *Persuasion*, 12 and 13

8. *Sense and Sensibility*, 29; *Mansfield Park*, 21
9. *Persuasion*, 24
10. *Pride and Prejudice*, 37; *Persuasion*, 19; *Mansfield Park*, 6
11. *Emma*, 32
12. *Pride and Prejudice*, 14 and 28
13. *Sense and Sensibility*, 13
14. *Pride and Prejudice*, 44; *Persuasion*, 11 and 12; *Northanger Abbey*, 20; *Mansfield Park*, 9
15. *Northanger Abbey*, 7
16. *Sense and Sensibility*, 19
17. *Pride and Prejudice*, 30; *Persuasion*, 10; *Sanditon*, 8; *The Watsons*
18. *Persuasion*, 10
19. *Northanger Abbey*, 9
20. *Northanger Abbey*, 29
21. *Emma*, 24
22. *The Watsons*
23. *Sense and Sensibility*, 43
24. *Mansfield Park*, 27
25. *Sanditon*, 9
26. *Pride and Prejudice*, 37 and 56
27. *Sense and Sensibility*, 32
28. *Emma*, 26 & 45
29. *Pride and Prejudice*, 46
30. *Northanger Abbey*, 11; *Sense and Sensibility*, 5 and 12; *Emma*, 41
31. *Mansfield Park*, 8; *Emma*, 1; *The Watsons*
32. *Pride and Prejudice*, 32; *Emma*, 36; *Sense and Sensibility*, 42; *Mansfield Park*, 46
33. *Emma*, 54; *Sense and Sensibility*, 23
34. *Mansfield Park*, 2 and 27
35. *Sense and Sensibility*, 13
36. Catherine Pitt, 'Taking it sitting down', *The Bath Magazine*, 20 March 2016
37. *Northanger Abbey*, 10 and 11
38. *Emma*, 23
39. *Sense and Sensibility*, 5 and 6
40. *Sense and Sensibility*, 26–41; *Northanger Abbey*, 2–19

‘Virgin Rail’ – a new meaning?

Extracted by Andy Guy from the Western Times 4 May 1844, on the opening of the Bristol & Exeter Railway (1 May 1844).

HOW WILL THE RAIL AFFECT THE SPINSTERS?

One problem to be solved, and not the least interesting or important, is the effect which the Railway likely to have upon the prospects of the marriageable spinsters. We confess that we have been flattering ourselves with the belief that an increased intercourse with the more populous districts of England cannot but prove highly advantageous to the fair and lovely spinsters of Devon. Nature hath favored us above most counties; and as woman is the greatest blessing bestowed upon man, the pride and ornament of creation, it to be expected that we, who are so highly privileged as a community, have more than full average share of them. Our mild climate and sunny skies are favourable to the development and perfection of feminine loveliness. The consequence is that when that impertinent business of the census, which went through the length and breadth of the land, asking every daughter of Eve how old she was – when that census was made up, it was discovered that there was a very vast preponderance of ladies in the sum total. Now this, to say the least of it, is a very great blessing, and high and distinguishing privilege. But as we are not selfish enough to keep this great blessing wholly to ourselves – we wish it to be known, in the populous districts England, that young gentlemen who are on the look out for an eligible opportunity to settle in life, will find this railroad easy means of placing them in the very best of all possible situations for making a happy choice. Many circumstances conspire to make the fair sex predominate amongst us. In the first place, Devon is a highly privileged county, and, therefore, Dame Nature must necessarily have given them the majority here, as the best boon she could bestow on this fair and fertile region –

“Her ‘prentice han’ she tried on man,

“And then she made the lasses O !”

In the next place, many families coming into the country to retire, the sons fly off into the busier haunts of life; whilst the daughters remain to smooth the pillow of declining life, and watch, with that tender affection which belongs to the adorable sex, over the closing scenes of those to whom they are attached by the hallowed ties filial love and duty. From the causes just stated, and others which it is not necessary

to specify, we have a great many marriageable spinsters who cannot get the shadow of a chance, whilst relying the resources of the county, to enter into that station life which their mothers filled with much grace and glory. We have been for some time impressed with the knowledge of this fact; but it was not till we moved for returns from the several parishes, and which have been supplied with wonderful alacrity, that we became acquainted with the vast disparity between the totals of the two sexes. We will not publish them this week, as the statement of figures might defeat the object we have in view. Young men seeking to better their condition, might fancy that they could no sooner venture into a county so prolific of spinsters, than they would incontinently snapped up, and compelled to change their condition too precipitately. As our object is not to excite their personal apprehensions, but to induce them to come and see, we shall go into figures further than to give one example of the chances which exist for young men – we take at random, from the returns, the Statement of St. Leonard’s parish, adjoining Exeter, which is as follows:–

Marriageable Spinsters	125
Men	6
Balance in St. Leonard’s parish	19

Another account states that there are seven marriageable men in Leonards. Wishing to account for the discrepancy, we have enquired into the cause and find that the parish are divided as to seventh man, some thinking that he is too great a fool to be married, but this is not the opinion of the ladies; we think, therefore, that he ought to be taken into the account supplied to us, strange as it may appear, by an unmarried member of the Society of Friends, a gentleman much given to statistical enquiries, especially in matters of interest to the ladies. What special reasons he had for directing his earliest researches to the parish St. Leonard’s, we have neither right nor reason to enquire. It is sufficient for us that the return is true, and that is but a sample from the sack of returns with which we have been favoured. This enquiry hath been a labour of love to us, and we may say, in the words of, “The Little Warbler,” –

“How sweet’s the love, that meets returns.”

By these returns, we hope to bring about several first meetings, happy marriages, and blessed marriage experiences. And why should we not devote a portion of this Railway Double Sheet to so glorious an aim? Philanthropy hath all sorts of projects and persons under her protection. The lame, the blind, and the halt, are the objects of her care, the recipients of her bounty. Age, for whom life hath no longer charms – Decrepitude, for whom life but a prolongation of misery and pain, have their special patrons and protectors; but youth and loveliness – beauty of form and nobility of mind, the most glorious combination, have no special protector, no standing counsel to watch over their interest, and secure their rights. The poet, rapt in spirit, when contemplating the wonderful structure of our wonderful frames, exclaims –

“What a piece of work is MAN”

But how truly might he have said –

“What a precious piece work is woman.”

Shall we not then essay an effort to enable that chosen vessel to fulfil her mission, and get a husband if she can? Neither man nor woman is a perfect being, standing alone; and, even as generous wine overstaying its age, ceaseth to fulfil its mission of cheering up the heart of man, so the marriageable spinster, lingering on year after year in the misery of hope deferred, becomes acidified her gentle nature, and feline in her feelings. She turns away from man, to lavish her love upon – a cat! The revulsion of her whole nature re-acts man who hath fulfilled his mission “popping the question,” as it called in homely phrase – and as the decided old maid becomes a terror to all who approach her, so the bachelor is given up to greater torments – he falls into the saddest stage of *old boyhood*, becomes a perfect oddity – a mockery and reproach for all the good and the wise. A youth of excellent opportunities neglected, is followed an old age of slavery and despair. A heavier judgment overtakes him than falls to the lot the most doomed spinster. Heaven in its wisdom visits his sin of singleness with a heavier, a sadder punishment, a deeper, a mere direful degradation and disgrace. The spinster is too generally negative sinner. She has neglected the one solitary chance which fell to her lot, and her doom is indeed heavy and sorrowful for her slight offence. But the wicked old boy had every chance that the heart could desire. The freshest, and fairest, and loveliest of Heaven’s handy works were his to choose from. He neglected youth in its loveliness, and in its glory of generous confidence, and all imparting affection. But when old age

approaches, and children might have been smoothing his pillow, and wheeling his easy chair round to catch the sinking rays of a declining sun; when a faithful partner might have watching over him, and tending him in his helplessness and decay – he falls into the hands of a hireling, he is attended but not nursed, “done for” but not cared for, cursed when he would be caressed, preyed upon when he would be prayed for. Oh ! dreadful indeed is the fate of a bachelor, the self doomed, the soul degraded bachelor.

As the Railroad will bring people together, open our lovely valleys and sequestered nooks to the busy sons of the busier scenes of England; we hail it as a great blessing indeed. Believing that it will necessarily promote the solemnisation of marriage – it will tend to cure the canker of spinsterism – that will banish bachelorship and old boyhood – that it will redeem man from the slavery of celibacy, its cold comfortless horrors, and its eternal miseries, we have hailed the consummation of this great and glorious enterprize. The Railroad is the real road to bliss. It will bring many here single in circumstances and blank in prospects, who will depart with double being and a double blessing, and all over England we shall find reminiscences of Devonshire visits and Devonshire associations.

We foresee that many maidens will be speedily changing their names and conditions. We have one request to make, and as it is neither selfish nor unreasonable, we crave their earnest, their solemn attention. It is this. They will have known what it is to contemplate the dreary blank of constrained singleness, let them each determine to effect two matches at least within the first year of their own Union – let them do their best to extend the privilege of Devonshire union to their husband’s male friends, and by so doing they will greatly promote the happiness of their respective circles, and materially tend to restore the balance of power in this county by equalizing the numbers of the sexes. We make this appeal to them in truth and soberness. We have no sordid selfish feeling in the matter. We reserve a gratis column for the record of their unions, and the subsequent records of those interesting events in which sorrow and joy are so equally blended. We have nothing personal to gain by conjuring them to this course, save the internal joy which results from the consciousness of doing a good and righteous action. Further, to prove our disinterestedness in this matter, we offer, and we will cheerfully stand to it – to provide the first wedding ring which may be

required for the solemnisation of any union brought about by the agency of steam communication and the Railroad.

Some journalists, in order to provide a remedy for the ills of society, offer a premium for a prize essay on some particular theme, in illustration of some particular doctrine, or to enforce some specific theory. But we would ask our readers if they know a better specific – to compass man’s joy and woman’s hope, than ours. In very truth and soberness we repeat, that we are ready to offer, and we do hereby offer, under the conditions specified, A PRIZE WEDDING

RING, and the sooner we have to make the award the better.

The trains commenced running on Wednesday, we shall be ready attend to claimants by the Monday following. Three learned and reverend divines, who have all gone beyond a bachelor’s degree, will act as judges; and in case any dispute shall arise as to their decision, an appeal will lie before a tribunal of three thrice married widows, whose decision will be final.

Sadly, there seems to be no following report that the offer had been taken up.

Josias Jessop, civil engineer to railway engineer

Martyn Taylor-Cockayne

[[Based on a paper presented at the East Midlands Industrial Archaeology Conference (EMIAC 96), May 2019, Kirkby-in-Ashfield]

Josias Jessop was the second son of William Jessop (engineer) and his wife Sarah (née Sawyer) and was christened on 24 October 1781 at Birkin St Mary’s Church, Pontefract in Yorkshire which coincidentally was the same year as George Stephenson. Yet their backgrounds could not have been more different and I hope to give some insights into the life of this overlooked engineer and how he so very nearly eclipsed George Stephenson, but for a cruel twist of fate.

In 2012 I chanced upon two letters written by Josias Jessop in the National Library of Scotland in response to two letters from Robert Stevenson.¹ They were subsequently published as Occasional Paper 223 by the RCHS Early Railways Group without further comment.

In a letter of reply to Robert Stevenson of 15 September 1823 written from Butterley, Jessop begins:

Sir,

My brother [William] is away from home & not likely to return for some weeks. I therefore reply to your letter asking at which time Railways were introduced in this Country though I fear the little information I can give will not be very satisfactory – There use I believe is beyond the memory of man, but they were originally in very short lengths, from a Colliery to a Wharf or to an Iron Work or some similar purpose & were made of wood, the

wheels of the carriages having Flanches on them – the first improvement was by the addition of thin plates of Iron laid on the upper surface of the Rail which rendered it more durable & lessened the friction.

In these letters, Jessop continues by giving insights into his early career during his training under his father. In 1799, aged a mere 17 years, he carried out several experiments on a railway at Brinsley, Nottinghamshire owned by Joseph Wilkes and he also accompanied the Committee of the Grand Junction Canal Co to see some railways before they began theirs at Blisworth. The same year he also assisted Benjamin Outram to survey a line of railway from Merthyr Tydfil to Newport (for the Pen-y-Darren ironworks) and on 9 December 1799 accompanied his father William to survey a proposed line of canal from Croydon to the Thames at Wandsworth, which resulted in the Surrey Iron Railway. In his report William Jessop states:

Railways of wood or Iron have many years been in use in the northern parts of England, chiefly among the coal mines; it is but lately that they have been brought to the degree of perfection, which now recommends them as substitute for canals; and in many cases they are much more eligible and useful.²

Josias Jessop continues in his letters by saying:

In 1802 I took the levels & made an Estimate for one [railway] from the Wandsworth Railway [Surrey Iron Railway] to Portsmouth and had previously set out the Merstham Railway to the Chalk quarries at Merstham.

The Bristol Floating Harbour

Jessop was not only concerned with railways during this period; he was after all first and foremost a civil engineer. During this period he was also involved with the West India Docks project where he acted as assistant engineer to his father from February 1801. William Jessop had also been involved with planning the Port of Bristol during the period from 1788 to 1793 and again in 1801 to 1803, then becoming its consulting engineer thereafter. In 1804 having completed his journeyman training (seven years is the accepted training period for a journeyman) Josias Jessop was made resident engineer where he remained until the project's completion in 1811. Without doubt this was the project upon which Josias Jessop made his name and reputation. On completion of this mammoth project the board said of him: 'Mr Jessop acquitted himself in the important trust reposed in him with the most unsullied reputation and honour'. Now aged 30 and with his abilities as an engineer acknowledged, he became an independent consulting engineer.

Railway projects

After the completion of the Bristol Floating Harbour Project, Jessop returned to the family home, now located at Butterley Hall in Derbyshire, the former home of Benjamin Outram who had died in 1805. Outram had been travelling to London to see Edward Banks (later Sir Edward Banks) to negotiate the sale of certain lime quarries and works at Crich and Codnor Park in Derbyshire, but had died on the way. He had suffered from ill health for some while before. Edward Banks had a long standing professional association with Outram and the Jessops, acting as a contractor on many projects they had engineered including in 1803 the railway from Pinxton wharf on the Cromford Canal to the Pinxton collieries of the Reverend D'Ewes Coke for which he supplied 2,500 stone blocks, oak plugs and nails. He was also familiar with Outram's plate railway system which he developed in the 1790s and which is perceived as being the first universally accepted railway made of iron in Britain.

On 2 March 1807 the Butterley Company became a partnership consisting of the Wright family who owned two thirds of the shares and William Jessop who owned one third. Margaret Outram, widow of Benjamin, was originally a named partner, but was removed when Outram's debts became apparent. William Jessop's third son, William junior, had begun his career as an engineer, but on Outram's death had

re-trained to become an ironmaster under the tutelage of William Brunton, engineer, who was in overall charge of the whole Butterley works from 1808 until 1814. Between them, the Jessops and Brunton invented the cast-iron fish belly edge rails first used on the Belvoir Railway in 1813 and again on the Mansfield & Pinxton Railway in 1817 (and also within the Butterley ironworks). From this point on plate rails fast became a design of the past, though they continued in use into the 20th century (for example, on the Little Eaton Gangway which closed in 1908). Jessop states:

... for upwards of 20 years (1793 to 1813) the flanch'd [plate] rail was almost universally adopted, but experiment & experience has proved that the edge rail is much preferable.

He also states:

... the Loughborough Railway which was begun in 1790 under the direction of Mr Wm Jessop (my father) – The Rails were of Cast Iron of the description called Edge rails / the flanch being on the wheel, the tops of the Rails were elliptical that they might be always clean & run with as little obstruction as possible; but there advantages were more than counterbalanced by the destruction of the wheels which running on a small surface were worn out into grooves.

In 1812 and 1813 the Butterley Company constructed two locomotives, William Brunton's Universal Mechanical Traveller (Fig 1) and the Chapman brothers' chain-driven locomotive, patent number 3632 (Fig 2). A third type of locomotive built elsewhere at this exact time was Blenkinsop's cogged railway engine (Fig 3), all three engines being an attempt by individual engineers to overcome the issue of getting up and down hills by steam locomotive power. They all operated with varying success, but not enough to become generally accepted. Jessop states: '... this objection is avoided by the Newcastle mode of laying the Railways level or nearly so & having incline planes ...' and this became his preferred method for the laying of railways.

In 1817 Jessop was appointed as engineer for the Mansfield & Pinxton Railway, discussions for which had begun as early as 1809 during his father's lifetime. The route was surveyed by William Chrisop in 1813 and again in early 1817 when the original route was substantially altered at the Pinxton end. Jessop states:

The Mansfield Railway which I laid down in 1817, I Estimated at I think £26,800 for nine miles of double Railway including land and compensations; The labour & materials about £22,000 at which

price the Butterley Co. offered to execute the whole – it cost £32,000 including wharfs & warehouses at each end.

In addition (in 1823) the Butterley Company built a private line from a junction with the M&PR to their Portland Collieries complex (consisting of seven pits) at a cost of £10,000, a massive investment by them at that time and this in effect became an extension of the M&PR line. This line was some 3½ miles in length and terminated inside the Codnor Park ironworks. Proud of his work Jessop stated:

The greatest modern improvement is the introduction of inclined planes to overcome the great rises & falls by machinery – whereas the carriage is upward or downward, a Steam Engine, or a Breakwheel that the loaded waggons descending may take up the light ones, can be applied, leaving on other parts of the Railway such fall as shall equalise the labour of the horses in conveying either the loaded or the light waggons – In a well-constructed railway & waggons with large well-adjusted wheels an inclination of rather less than 4 inches in a chain say 1/200 is about right –

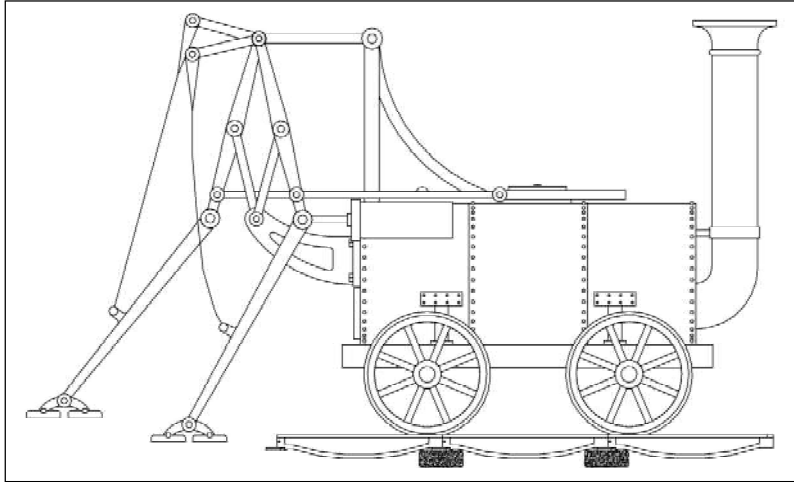


Figure 1. William Brunton's mechanical traveller built in 1813 by the Butterley steam engine manufactory that used mechanical 'legs' to overcome inclines. A half-size version weighing 2½ tons was tested and trialled on the Crich Railway before a full size version was manufactured and shipped to the Newbottle Collieries of John Nesham. In fact they built two engines weighing 5 tons each as the first was lost at sea. Drawing by Stuart Saint.

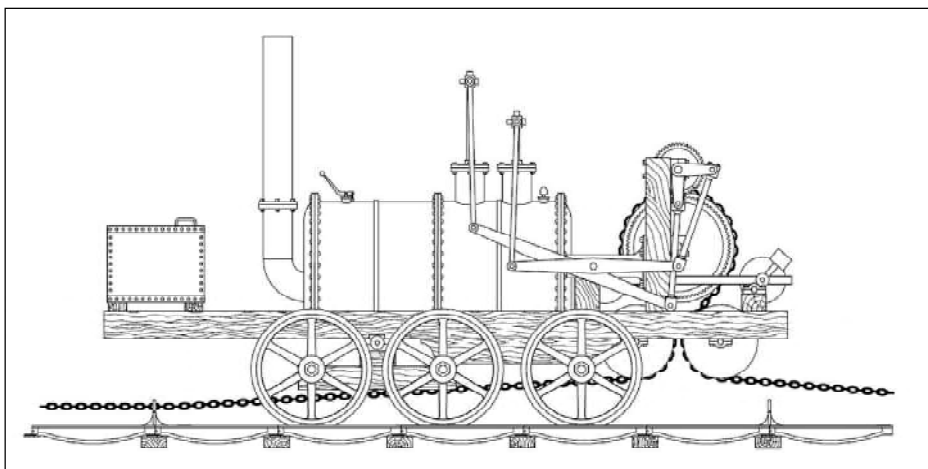


Figure 2. William and Edward Chapman's chain locomotive, patent no 3632 dated 30 December 1812. Built by the Butterley Company and used at Heaton Colliery in 1813. Drawing by Stuart Saint.

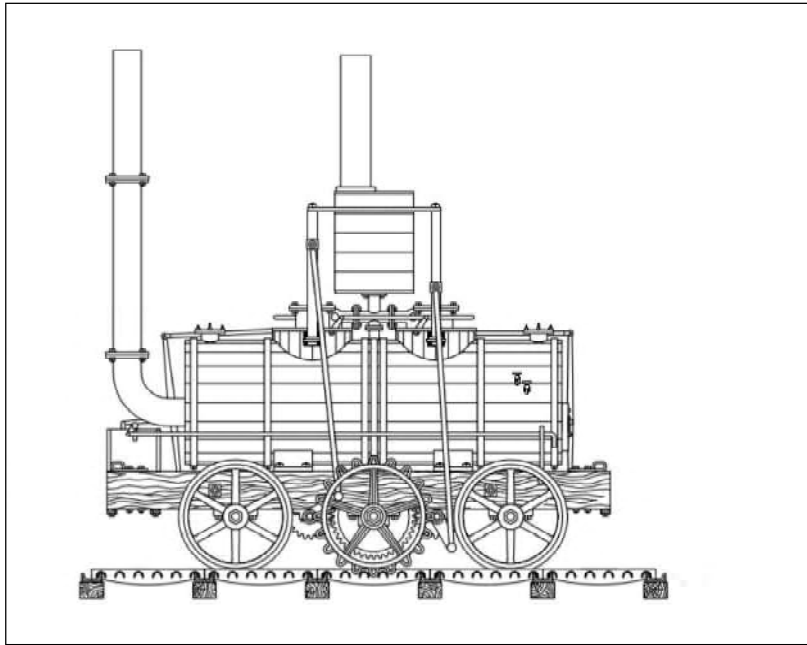


Figure 3. *Blenkinsop's engine that used a 'cogged rail' system as a means of traction to overcome inclines. Drawing by Stuart Saint.*

Railways having such planes are common near Newcastle, the Butterley Co. have one from the Cromford Canal at Codnor Park to a Colliery at Kirkby $3\frac{1}{2}$ miles long – which has three inclined Planes, each about $\frac{1}{2}$ mile in length – one with a Steam Engine in that allows the heavy waggons take up the light ones, the flattest plane is only 2.62 inches in a chain, in this two loaded waggons draw up two light ones & as the ascending rope becomes short, it is necessary to check their speed by a break on the wheel – this railway is recently finished & having had the experience of all who have gone before I conceive it is the best ever made.

In 1824 Jessop had landed his biggest railway contract to date, that for the Cromford & High Peak Railway. The railway was some 33 miles in length and was intended to connect the Cromford Canal to Manchester by the most direct route over mountainous terrain rising over 1,000 feet. A Newspaper (the *Newcastle Courant*) reporting on the progress of the Cromford and High Peak Railway on 14 August 1824 wrote that 'Railways seem to be the fashion of the day and will supersede Canals as their cost is so much less and they convey so cheaply'.

A map published in the *Derby Mercury* on 26 January 1825 shows the first proposed national railway system for England. The four main ports of London, Bristol, Liverpool and Hull are all connected with each other, either directly or via Birmingham.

This accompanied a prospectus of the Grand Junction Rail Road Company, which was headed by Sir Edward Banks and two of the three engineers appointed were Josias Jessop and William Brunton (the third being James Walker).

The opening paragraph of the prospectus states:

It cannot be necessary in the present age of improvements, and when the interests of society are so thoroughly understood, to make any comments on the importance of a safe, certain and cheap mode of transit for Agricultural, Mineral, and Manufacturing products from one part of the Kingdom to another; nor to point out the more economical as well as the more expeditious and certain mode of conveyance by Rail Roads than by Canals. After premising, therefore, that the object of the present undertaking is to open a Rail Road communication between the Eastern and Western Coasts, at their most important Ports and connecting itself by different branches (where necessary) with the great Manufacturing and Mineral districts of the Country, the outline of the Plan is submitted to the public.

The following is a small sample of other railway proposals that took place in 1824 and 1825:

- 20 November 1824. Manchester to Liverpool Railway – Engineer George Stephenson
- 19 January 1825. London Northern Railroad Company – Engineer George Stephenson

- 22 January 1825. Newcastle to Carlisle communication – Josias Jessop appointed in place of Thomas Telford who could not attend
- 29 January 1825. Grand Junction Railway Company – Engineers Josias Jessop, William Brunton and James Walker
- 7 October 1825. Birmingham & Liverpool Railway Company – Engineers Josias Jessop and George Rennie

Liverpool & Manchester Railway

Robert Stephenson, son of George, had left for South America in 1825. For George the timing could not have been worse as the Bill for the Liverpool & Manchester Railway was due to be heard in Parliament. George relied entirely on Robert on such matters as he (George) had a limited education. He was not a professionally trained surveyor nor a professionally trained civil engineer and was unable to do the calculations required for both these professions. Furthermore, he was also unable to present evidence in a competent manner. In short, his limited education was shown to be what it truly was when he appeared as a witness for the Bill and it was thrown out. The Railway Company then engaged George and John Rennie and they re-surveyed the line in conjunction with Charles Blacker Vignoles, a reputable military trained surveyor who later became associated with the Midland Railway Erewash Valley line. The required Act was obtained in May 1826, thanks to the evidence presented by George Rennie and Josias Jessop. The Rennie brothers were asked to become the Consulting Engineers, but stated that '... while they were prepared to work with Telford or Jessop, they were not prepared to work with Stephenson'. The Railway Company refused the Rennies offer and instead appointed Josias Jessop as consulting engineer on 21 June 1826, retaining Stephenson as principal engineer. Then, at this critical and potentially pivotal moment in history, Josias Jessop died on 30 September 1826, his death being attributed to 'exhaustion'.

Josias Jessop was first and foremost a civil engineer, whose training and knowledge of his craft was second to none. His legacy can still be seen today at Bristol most of all. His death in 1826, aged only 45, when he was on the brink of a stellar career left his story untold and we can only speculate, imagine or even dream of what great engineering feats he could have performed in the world of railway engineering. Jessop had never married and was buried in the Parish Church at Pentrich, Derbyshire alongside his father and mother (Fig 4).



Figure 4. The plaque in Pentrich church, Derbyshire commemorating William and Josias Jessop, engineers.

Jessop's brother, William Jessop junior, completed the Cromford & High Peak Railway which opened in 1830. He also surveyed a line for the 'Midland Railway' in that year from Cromford to Leicester (including an Arm to meet the Mansfield & Pinxton Railway). This proposal was not adopted and a further four surveys by three different engineers (including Stephenson) were carried out in 1834, 1836, 1844 and finally in 1845 by Charles Blacker Vignoles whose plan was adopted. The Erewash Valley line from Nottingham to Mansfield was completed in 1849 and incorporated the Mansfield & Pinxton Railway whose line was much altered.

William Jessop junior died on 26 April 1852 aged 69 from a disease of the brain and spinal cord, from which he had suffered for several years. He was also interred at Pentrich church along with his other family members. He (like Josias) had also never married.

References

1. National Library of Scotland, MS 10706/655, Robert Stevenson Letter Book, ACC 10706/79, ACC 10706/11 and 12)
2. Charles Hadfield and A. W. Skempton, *William Jessop, engineer* (Newton Abbot : David & Charles, 1979), p 175

Correspondence

Manchester to Leeds : the third-class experience, 1840

RCHS Journal no 237 (March 2020), p 52

I notice you include a letter from *Railway Times* of 1840 about 3rd class passengers travelling in waggons with pigs. If you ever wish to pursue this topic further, there is rich material available. For example, at the end of 1841, William Crawshay, the Chairman of the Northern and Eastern Railway, declared at a meeting of that line's shareholders that it was a scandal that gentlemen were travelling 3rd class. *Railway Times* of 4 December, 1841, reported:

The Chairman thought no railway establishment could be considered complete without two or three chimney sweepers with their soot bags. Whenever he saw an individual respectably dressed getting into a third class carriage he would send a sweep along with him. (Hear, hear, and a laugh.) When he saw so-called gentlemen squatting almost in a fishmonger's basket in a third class train, he thought it highly derogatory to their own station, and detrimental to the interests of the Company. (Hear, hear.)

This occasioned extended discussion in *Railway Times*, as well as in *The Times*, with many observers objecting to this proposed cruelty to 3rd class, but many expressing indignation that proper gentlemen would stoop to travelling in 3rd class carriages.

And there are nice passages from the writings of the French econo-engineers, primarily Dupuit, who were motivated to develop microeconomics by studying such examples

Andrew Odlyzko

Review : *The Mansfield Railway*

RCHS Journal no 237 (March 2020), p 63

I should like to draw your attention to a misleading comment made by Adrian Gray in his review of Robert Western's book on the Mansfield Railway. He refers to the possibility of reintroducing a passenger service from Mansfield to Ollerton but this would not involve in any way the former Mansfield Railway (later GCR and LNER) line, as he implies. It would run via the Robin Hood line, formerly Midland Railway line, to Shirebrook Junction and then over the old Lancashire, Derbyshire & East Coast line which currently gives access to the High Marnham test track.

Roger Brettle

Addition and amendment to earlier articles

The Railway at Uphill

RCHS Journal no 204 (March 2009), pp 38–45

Further information has come to light regarding the later life of Payne, the company's opponent in the dispute.

He was twice imprisoned for debt: a notice about the examination of Charles Henry Payne in connection with his bankruptcy described him as late a prisoner in the gaol at Wilton [Taunton] (*Taunton Courier*, 14 January 1846) and in a case concerning his assets, particularly a pension he had been granted as Commissioner of Bankrupts for Bristol, it was said he had been in prison since November 1846. He would seem to have been as uncooperative as he could and had refused to sign affidavits concerning his assets (*Bristol Mercury*, 3 May 1851 among others) so that his estates could not be sold. These appeared in many papers in February 1848, where he was described as an insolvent debtor. In August 1852 they were again advertised for sale and presumably he now gave in, probably returning to practice at the Bar. He died at Wimbledon, aged 72, on 31 August 1863, described as a barrister-at-law of Middle Temple, formerly Commissioner of Bankrupts for Bristol (e.g. *Western Daily Press*, 4 September 1863). Throughout this deferential 'Esq.' was always added to his name.

Frederick Manning : a notorious Great Western criminal

RCHS Journal no 231 (March 2018), pp 232–4

Note 8 should have read: 'The hotel was at corner of the Parade and High Street; those with long memories of the town might remember the Devon and Somerset Stores, since demolished, as a survivor, shorn of its top storey. It was more usually associated ...' (as in original).

Michael Quick

Reviews

***The Corris Railway: the story of a Mid-Wales slate railway* — Peter Johnson**

208pp, 225x290 mm, 200 photographs (80 colour), 20 maps & diagrams, 12 tables, hardback, Pen and Sword Transport, 47 Church Street, Barnsley S70 2AS <www.pen-and-sword.co.uk>, 2019, ISBN 978 1 5267 1753 5, £30 + £4.00 p&p (or £25.00 + p&p from Rheilffordd Corris Railway shop)

The author's latest in a prolific output of books on Welsh narrow-gauge railways is another outstanding, comprehensive opus. The slate quarries at Corris and Aberllefenni were located in the Dulas Valley in Merionethshire, approximately six miles north of Machynlleth. Slate, initially delivered by road to a wharf on the Afon Dyfi, west of the town and ten miles from the sea, was transhipped to small vessels for onward passage to the coast at Aberdyfi. From here larger boats were used for onward export. Unsurprisingly, transport developments at quarries elsewhere in north Wales encouraged investors in the local concerns to abandon this cumbersome process in 1850 in favour of a railway line. This well-researched volume describes the birth pangs of the scheme with details of alternative routes, extensions and branches. The 2ft 3in gauge line was materially complete and open in April 1859. Use of locomotives attracted a monetary fine, so originally it was worked by gravity, horses returning the empty wagons uphill. In 1874 public pressure resulted the establishment of a semi-official passenger service in open wagons but soon using purpose-built carriages. The line was re-laid in 1878 to regularise this amenity and permit the use of locomotives.

There are abundant details of the personalities, accidents and operational matters under various

ownerships, up to a time of eventual decline and closure in 1948. The remaining locomotives and some rolling stock were transferred to the nearby Talyllyn Railway. The final chapter is concerned with fifty years of effort by the Corris Railway Society to preserve memories of the line by opening a museum and, from 2002, running steam trains again on a gradually lengthening track.

The multiple illustrations are initially evocative monochrome shots which, as the narrative proceeds and approaches preservation, morph into first-rate colour photographs. As in his Ffestiniog volumes the author has sought the final resting places of key personalities in the story and includes several pictures of tombstones. Minutiae such as this add to the appeal. Appendices encompass the relevant Acts of Parliament, locomotives, Board of Trade returns and mileage, and there are both bibliography and index.

The endpaper maps are confusing. The whole line is illustrated using an early edition of a large scale OS map, split into four, although continuity between sections is not easy to confirm and the presence of non-railway topographic detail makes it difficult to place unfamiliar locations in context.

JOHN HOWAT

***Modern Locomotives of the UK* — Pip Dunn**

256pp, 287x220 mm, 274 colour photographs, hardback, Crécy Publishing, 1A Ringway Trading Estate, Shadowmoss Road, Manchester M22 5LH <www.crecy.co.uk>, 2019, ISBN 978 1 91080 963 1, £25

'Modern' in the context of this book means post-privatisation. The first locomotives of the new era having arrived in 1998, there has already been quite a lot of change affecting the use of the new assets, some leading to unfulfilled potential. The five wholly new classes are examined in turn, followed by reviews of major rebuilds of sometimes quite elderly vehicles, including the High Speed Train power cars. The latter are the only units dealt with here built new

for regular conventional passenger work, although any uses of the classes here on passenger workings are fully covered. The book is clearly aimed at the modern traction enthusiast, but gives an overview of changes in the (chiefly) non-passenger market over the last two decades. Appendices list the changing ownerships and identities of the locomotives and the photographs are of excellent pictorial quality.

MATTHEW SEARLE

***British Railway Infrastructure since 1970: an historical overview* — Paul D Shannon**

176pp, 225x290 mm, 200 photographs (chiefly colour), 20 maps & diagrams, 12 tables, hardback, Pen and Sword Transport, 47 Church Street, Barnsley S70 2AS <www.pen-and-sword.co.uk>, 2019, 978 1 5267 3479 2, £25

Paul Shannon has produced a work which uses colour and monochrome images to follow the changing face of railways in England, Scotland and Wales after the end of steam traction, when there was a considerable heritage of railway infrastructure in existence. He has provided many images from his own collection that reflect the change from nineteenth-century technology to the present. It is a comprehensive photographic study of stations, signal boxes, freight terminals, depots and yards for the last fifty years, which is supported by text that discusses the developments up to 2018. There is a diverse collection of station images with diesel and electric locomotives and units in most views and there are

many snippets of information for those interested in modern transport from someone who visited these places to record the moment. There are summaries of principal passenger line closures and openings and also a table of main line electrification schemes since 1970. The discussion regarding freight services is of particular use. Such is the scope of this book that author has been concise with his facts, but key information has been provided. There is a brief bibliography and index, but reading this book and seeking out information is aided by the way it is laid out.

RAY SHILL

***The Railway Revolution: a study of the early railways of the Great Northern coalfield 1605–1830* — Les Turnbull**

172pp, 300x210 mm, 165 colour figures (maps, drawings, photographs) 6 tables, softback, North of England. Institute of Mining and Mechanical Engineers, Neville Hall, Westgate Road, Newcastle upon Tyne NE1 1SE in association with the Newcastle upon Tyne Centre of the Stephenson Locomotive Society, 2019, ISBN 978 0 9931151-5-8. £15

In part this is a memorial to Alan Clothier who had encouraged and participated in research into the transport of coal from the pits developed in Northumberland and Durham down to the River Tyne for loading onto sailing vessels for transport to London and elsewhere. The transport was closely linked to local agriculture and the availability of its vehicles and animals (horses and oxen) to convey the coal to the staithes. Wooden tramways evolved to assist the process and it had been considered that these had rotted away or been replaced by iron, but a significant find was made at Willington in 2013 and further discoveries are still in progress to the west of Newcastle.

As is usual in works of this type, the reader has to appreciate the topography of the area and that the main rivers discharge into the North Sea via channels with steep banks and that even minor streams may have to be crossed by considerable structures, only some of which have survived. To a great extent local measures were used to assess the output of the pits: fother for mass and Michaelmas for time. Climatic patterns dictated much activity.

There are four chapters: ‘The first railway revolution’ (that is the development of timber railways); ‘The first great western railways’ (that is those wooden railways linked to coal pits to the south west of the Tyne); ‘Pages from an engineer’s

notebook’ (Richard Peck who lived and worked in what is now the City of Newcastle) and ‘Towards the second railway revolution’ (the introduction of iron rails and steam locomotives). Part Two is a directory of the early (1605–1830) railways which extends north to the Wansbeck and Blyth and south to the Wear. This is followed by a concise bibliography and indexes of railways and people (both of which follow a slightly eccentric two-column arrangement).

This is a book of tantalizing glimpses. For instance passengers were admitted to an early railway tunnel and were conveyed in horse-drawn wagons and reference to this was made in Akenhead’s *Guide to Newcastle* published in 1807 (see page 87 in book under review). On page 63, when discussing the massive embankment ‘which still impresses today’ on Wrightson’s Waggonway, the reader is directed to a plan for it rather than to an image of what still exists and a quote from a returning grand tour grandee comparing it to the Via Appia adds nothing.

The directory lacks references to current locations, but is still a potentially highly valuable guide to what may still be observable on the ground and should be invaluable for those seeking to establish a home in the area. The author’s assertion of a ‘railway revolution’ is largely justified.

KEVIN JONES

***The Grand Crimean Central Railway* — Anthony Dawson**

96pp, 234x165 mm, 75 illustrations, softback, Amberley Publishing, The Hill, Merrywalks, Stroud GL5 4EP <www.amberley-books.com>, 2019, ISBN 978 1 4456 7104 8, £14.99

The Crimean War is often said to be the first ‘modern war’. One of its firsts is that it was the occasion for the first railway directly serving the front line. This well-researched book traces its development in considerable detail, illustrated mostly by contemporary engravings. The railway came about when the Allied army, having won its first battle at the river Alma, failed to seize Sevastopol by coup de main, thus condemning it to a siege, more than a year long in the event, putting pressure on its weak supply system, especially for the British forces.

The idea of a railway linking the trenches besieging Sevastopol with the port of Balaclava came from the railway contractors Samuel Morton Peto and his partner Thomas Brassey through the Secretary of State for War, the Duke of Newcastle. Peto was to be responsible for building the railway at cost and making arrangements for the rails, sleepers and other materials, plus the necessary construction personnel (350 navvies and platelayers, 230 other workmen and 26 salaried staff). Building the line was a task for civilians; operating it when complete was a matter

for the military, namely the specially formed Land Transport Corps, a precursor of the present Royal Logistic Corps.

Work began in February 1855 and was completed within two months, despite the scepticism of elements within the Army and of some newspaper correspondents. It proved to be a boon, conveying guns, ammunition and other supplies to the fighting troops and, in the opposite direction, wounded soldiers. Motive power at first was by horses, but before the end of 1855 five steam locomotives were sent out, while stationary engines were necessary to work two steeper inclines. The railway was the direct ancestor of the narrow-gauge rail links on the Western Front in the Great War.

The story of this groundbreaking railway is well told and in fair detail, drawing on newspaper and Parliamentary reports and various military archives; there is a bibliography of these and of secondary sources. This volume can happily be recommended to railway and military enthusiasts alike.

PHILIP SCOWCROFT

***The Early Pioneers of Steam; the inspiration behind George Stephenson* — Stuart Hylton**

224pp, 250x155 mm, 67 illustrations, softback, The History Press, 97 St George's Place, Cheltenham GL50 3QB <www.thehistorypress.co.uk>, 2019, £16.99

When this reviewer was at school many years ago, the subject of ‘history’ started in 1066 with William the Conqueror and the Battle of Hastings. The time before then were the ‘Dark Ages’, uninteresting, supposedly poorly documented and frankly boring. Very much the same thing happened in the history of railways, which for a long time seemed to have begun with George Stephenson and the Stockton & Darlington Railway, to be quickly followed by the Rainhill trials, *Rocket* and then Isambard Kingdom Brunel. More recently, however, many books about this period have been published, by forensic engineers like Michael Bailey, reports of meetings typified by the Early Railway Conferences sponsored by the RCHS and popular booklets such as *Early Railways* by Andy Guy and Jim Rees in the Shire series.

This current book by a well-published historian is an easily readable and wide-ranging text-book that

covers early steam engines, railways and locomotives, as well as brief biographies on other important railway pioneers – promoters and financiers as well as engineers. A later chapter discusses the role of early railways, both in the UK and abroad, and on the spread of the industrial revolution in general. Particularly relevant and interesting to this reviewer are chapters on ‘The role of Parliament’ and ‘Lessons learnt from the canal mania’ in which the author covers topics ranging from financing to labour relations and safety precautions.

The extensive illustrations are well chosen, though the reproduction is only of newsprint quality. There is a good index and ample bibliography. This book reveals nothing new, but tells an excellent story of the ‘Dark Ages’ in a modestly priced package.

MILES MACNAIR

***An Atlas of the Railways in South West and Central Southern England including the Channel Islands from 1731 to the present day* — Stuart Malthouse**

432pp, 297x210 mm, 59 sectional maps, 146 illustrations, hardback, Crécy Publishing, 1A Ringway Trading Estate, Shadowmoss Road, Manchester M22 5LH <www.crecy.co.uk>, 2019, ISBN 978 0 7110 3871 4, £40

This regional atlas aims to provide railway maps that extend the range and detail of information normally provided on British railway atlases, showing all railways and covering changes through time. In a preamble of 130 pages the author explains the rationale behind his approach, defines terms, gives a list of secondary sources and sets out a chronology which defines 44 groups of railways used in the map keys.

The maps comprise 59 sections at a scale of 1:125,000, some with larger scale insets of complex areas, and cover an area south and west of a line from the Bristol Channel and Severn Tunnel to Wallingford and the Isle of Wight, including the Channel Islands. Three types of railway are shown. ‘Public Railways’ are marked using colour coding and different styles of line to distinguish the original owning companies. Passenger and goods stations and topographical features such as junctions, tunnels and viaducts are also marked. ‘Private Railways’, mainly industrial, are shown in red and identified by a red letter. The locations of ‘Small Public Systems’, mainly short pleasure lines, are shown with a green square symbol and identified by a green letter. Each map is accompanied by a key identifying all the railways marked, with separate chronologies for each railway type covering ownership changes and gauge

conversions. Station names and dates of opening, closing and renaming are shown only where there is room on the map, as are topographical features. Where there is no room, they are identified on the maps by numbers, with the names and other details appearing separately in the key. The illustrations are mainly black-and-white photographs and relate in subject or location to the adjacent text or map. At the back are four indexes, one for each type of railway and one for stations and topographical features.

This book is the product of considerable work in collecting, organising and presenting material from secondary sources and, as the author recognises, there will be errors and omissions. However, it is not easy to use. Most users will skip the lengthy introductory text and look for the maps, but the key map is on pages 132–3 and the conventional signs and abbreviations are on pages 80–3; neither are easy to locate. The maps do not themselves show change through time, since this information is largely contained in the lengthy keys that surround them.

This is a work of detail and as such will be a useful reference source for those interested in the railways of the region. The inclusion of industrial railways and the numerous small public systems is particularly welcome.

TIM EDMONDS

***Midland Railway Outpost: Lancaster–Morecambe–Heysham* — Martin Bairstow**

112pp, 250x195 mm, 132 colour photographs, 2 maps, hardback, Willowherb Publishing, PO Box 160 Manchester M9 9AN, 2019, ISBN 978 0 993567 85 8, £21.95

The author dedicates this book to the photographer Peter Sunderland, and the many fine images in this book emanating from the latter’s camera, especially of marine subjects, make this dedication fully justified. The quality of all the images, mostly full page studies, presented here is exceptionally good, and they are notable for capturing not just a train in a landscape but also a wealth of contemporary social life.

The title of the book, as the author acknowledges, is misleading since the Midland Railway via these lines and its port at Heysham accessed a significant part of its empire in Ireland. This and the subsequent

history of the routes portrayed, including the lost opportunities and decline of later years, is succinctly described in the well written captions. We travel initially on the original route from Wennington via Lancaster and Morecambe to Heysham; then view the full panoply of shipping that used that port, and finally follow the present illogical route via Carnforth, including the Glasson Dock branch.

This is a delightful book – a map showing all the routes described would have been helpful but the only real niggle is the odd spacing of steam engine wheel classifications.

WILLIAM FEATHERSTONE

***The Diary of William Southern Clark, 1854: Cardiff steals a march* — edited by Richard Watson**

172pp, 210x148 mm, 25 plates, softback, South Wales Record Society, c/o West Glamorgan Archive Service, City and County of Swansea, Civic Centre, Swansea SA1 3SN <www.southwalesrecordsociety/publications>, 2019, ISBN 978 1 9998326 4 3, £18

W S Clark was one of several individuals who brought the engineering experience of the Northumberland and Durham coalfield to Glamorgan. As mineral agent to the land-owning Marquess of Bute, Clark was joint engineer with Edward Highton on building the Rhymney Railway, the Bute estate's device for transferring Rhymney valley coal exports away from the Newport route of the Rumney tramroad to the Bute estate's own new (East) dock at Cardiff. Clarke's 1854 diary records his meetings with representatives of other railways which would connect with the several possible routes of his railway. Negotiations with landowners, surveyors, share purchasers and iron company representatives are also recorded. At the new dock

and tidal harbour he oversaw installation of coal tips to his own design. Alongside this wide-ranging brief, the Ely Harbour and Railway scheme and later Ely Dock (which was to culminate later still in the Penarth Dock) were given equal effort. And throughout the same year Clark was overseeing the sinking of what was to become the Bute Colliery at Treorchy.

Richard Watson has annotated Clark's diary extensively and provides an introduction drawn from his 1997 thesis that sets the whole in a wider context. Biographical notes of selected personalities, a bibliography and an index (disappointing when you come to use it) complete this 32nd publication of the South Wales Record Society.

STEPHEN ROWSON

***South Wales Valleys. Railways and Industry in the Tondy Valleys: Bridgend to Treherbert* — John Hodge and Stuart Davies**

260pp, 280x220mm, c350 photographs and 4 maps and plans, hardback, Pen & Sword Transport, 47 Church Street, Barnsley S70 2AS <www.pen-and-sword.co.uk>, 2019, ISBN 978 1 5267 2725 1, £30

***South Wales Valleys. Railways and Industry in the Tondy Valleys: Ogmere, Garw & Porthcawl branches* — John Hodge and Stuart Davies**

222pp, 280x220mm, c350 photographs (some colour) and 4 maps and plans, hardback, Pen & Sword Transport, 2019, ISBN 978 1 5267 2659 9, £30

For these two volumes John Hodge has found a knowledgeable local collaborator in Stuart Davies. They cover the mid-Glamorgan valleys whose coal output was carried initially on broad-gauge metals to Porthcawl docks. At the end of the nineteenth century docks were opening at Barry and Port Talbot, meaning Porthcawl could no longer compete in the inevitable GWR rationalisation; the considerable coal production was diverted to these other ports and to supply power stations. A chapter puts the coal movement from these valleys into context with the rest of the coalfield through the subsequent years. Detailed procedures for preparation of coal trains are described. Gradient profiles, point to point times, freight targets and a 1957 shed movement for Tondy are all in appendices. Passenger services are separately described with detailed coverage of each class of steam locomotive and carriage stock that worked them over the years (diesel traction is omitted). Tondy depot is given its own chapter that includes decennial steam locomotive locations from

1901 to 1961. It was one of the first south Wales depots to be dieselised yet even at the end in 1964 it had no diesel locomotive allocated.

Thus the six opening chapters of volume 1 set the scene in 80 pages and then we are away, travelling each of the routes. The vast majority of the photographs are from the 1950s and '60s and the focus is overwhelmingly on describing train workings. Alongside the captions, historic details of collieries are included but their domains are rarely visited in the images. The number of photographs is staggering yet one is left with the feeling there has been little discernment in their selection and that is underlined by the captions (sometimes repeated for consecutive images) that rarely mention what else a photograph might show outside the railway's boundary, for example the massive coal washery at Tondy. Many images are of railway enthusiasts' excursions. As usual, there are no text references and no source bibliography.

STEPHEN ROWSON

***The Barry Railway: its docks and successors* — Brian P Mills**

272pp, 305x220mm, 246 colour photographs, 7 maps and plans, hardback, Bryngold Books Ltd, 100 Brynau Wood, Cymla, Neath SA11 3YQ <www.bryngoldbooks.com>, 2019, ISBN 978 1 905900 51 0, £35

Following my generous review of John Hodge's book *Barry: its railway and port* (*Journal* no 234, March 2019, p 444) I received six pages of errors and caption corrections from Brian Mills. Now we have Mills' own book and it couldn't be more different. The railway and dock history is told by illustrating its infrastructure over the years from a railway engineer's point of view, not a locomotive enthusiast's. The majority of photographs are by the author, the earliest being from 1958 and latest 2018 and almost none of them shows a train. The introductory 76-page up-to-date historical narrative and the extended captions to each photograph consistently display Mills' lifetime enquiring enthusiasm. Examples of subjects explained are: the docks hydraulic system and its conversion from steam to electric power; the dry docks and operation

of the rolling bridges and caissons; the fresh water supply to the docks; the above-ground electricity power supply; the coal hoists, their operation and the life history of each. The dock signalling is explained too and we learn that the many 'signal cabins' shown on dock maps were called 'control cabins' on the ground and that some did not even operate signals. Not just the docks but the whole Barry Railway system including the Vale of Glamorgan Railway is covered (in colour).

Brian Mills has sunk his own money into this private publication in order to preserve his life's love for posterity. It would have benefited from section headings in the text and a comprehensive index but anyone with a serious interest in the history of Barry and its railway system will want a copy.

STEPHEN ROWSON

***Cambrian Railways Gallery* — David Maidment & Paul Carpenter**

186pp, 280x225 mm, 278 photographs (73 colour), 5 maps & plans, hardback, Pen and Sword Transport, 47 Church Street, Barnsley S70 2AS <www.pen-and-sword.co.uk>, 2019, ISBN 978 1 5267 3603 1, £30

Formed by an Act of 1864, the Cambrian Railways was an amalgamation of a number of local railway companies that had been established in north and central Wales, across the border within England and the coastal area around Cardigan Bay. Its routes were mainly rural linking a number of small market towns, villages and coastal resorts. Wrexham was the only large industrial town served by the Cambrian. The Shropshire market town of Oswestry was chosen as the location for the Company's headquarters and locomotive works. At the 1923 grouping, the Cambrian was merged in to the GWR and then, upon nationalisation in 1946, the GWR's former Cambrian routes became part of the Western Region of British Railways. Although this book is predominantly a collection of photographs it also includes a reasonable amount of text. The first chapter provides a brief history of the Cambrian up to 1922. A later chapter contains a collection of photographs illustrating the environment within the Oswestry locomotive works around 1910. Also included are the reminiscences of former railway employees who worked on former Cambrian Railways routes and the Oswestry works between the years 1938 and 1975. In conclusion there is a modern history describing past attempts at preservation and the more recent heritage museum activities and preserved railway operation at Oswestry.

The majority of photographs are displayed in large format. Each is accompanied by a caption describing the subject and location. The photographs have been selected from a number of sources, the majority coming from the collection of the late R W (Bob) Mille, who with co-author the late Rex Christiansen, wrote the two-volume history of the Cambrian Railways published in the 1960s. An interesting innovation is the inclusion of twelve photographs that have been enhanced by Andrew Dyke from his own collection using the modern technique of colourisation. This converts a monochrome photograph to colour by digitally building up layers of colour shades resulting in a naturally coloured image. A bibliography is included, but there is no index.

David Maidment, a retired career railwayman is the Founder Ambassador of The Railway Children charity and he and his co-author Paul Carpenter have generously agreed that all royalties from this book will be donated to that charity. This graphic content of this book is produced to a very high standard and the combination of a large number of good quality photographs, complemented by informative text provide a useful addition to the history of the Cambrian Railways.

GERALD LEACH

***The Story of London's Underground* — John R Day and John Reed**

240pp, 282x225mm, 319 photographs (143 colour), 75 drawings, plans and prints (42 colour), hardback, Capital Transport Publishing Ltd in association with London Transport Museum <www.capitaltransport.com>, 2019, ISBN 978 1 85414 440 9, £25

First published in 1963 to commemorate the centenary of the oldest underground railway in the world, this authoritative title has now reached the twelfth edition. A new reader must therefore benefit from the research and refinement that has subsequently been incorporated into the new volume.

Production standards are of the highest quality and a vast selection of appropriate and interesting illustrations support comprehensive text accounts. Some may regard the dense layout of that text, with paragraph separation largely absent, as reducing readability. That belief may be somewhat offset by the comprehensive index and bibliography provided.

While trains and stations perhaps command precedence, conception, construction and development, governance, operating policies,

staffing, passengers and advertising are all given significant attention. Even experienced students of the history, development and operation of the London system are likely to find the fact packed volume useful and accessible. A newcomer to the subject, if they digested the contents, would probably rightly believe that they were an authority.

It is regrettable that London's latest project, the delayed Elizabeth Line, did not open in time to be fully adopted into the story, but many other recent changes, upgrades and commemorations have been included. While not of coffee table status, this is a quality publication which encourages casual examination, leading to detailed perusal when one of the illustrations catches the reader's interest.

ANGELA & BRIAN JONES

***History of the North London Railway. Volume 2, Stations of the City Extension* —**

J E Connor and D L Hanson

172pp, 296x210 mm, 289 photographs (3 colour), 66 plans & drawings, softback, North London Railway Historical Society, from Mrs P Connor, 7 Bristol Road, Colchester CO1 2YU <www.nlrs.org.uk>, 2019, ISBN 978 0 9932219 1 0, £25 (plus £5 p&p)

A nostalgic delve into areas of east London, many of which have subsequently undergone massive transformation. The co-authors had previous personal attachments to the area which is covered by a comprehensive range of well reproduced photographs. Their active North London Railway Historical Society meets in central London and intends to continue to promote interest in the lines, many of which have now been adopted into London Overground. The long-closed main line terminal, Broad Street, and its operation and demolition, is given a significant place in the narrative and is covered by many photographs, plans and drawings.

Readers may find some aspects of the overall impression provided by many of the photos and detailed accompanying text downbeat, as most of the areas portrayed in the main period covered were drab and industrial. The book records aspects of a railway that had a low-key existence, not utilising

splendid locomotives or rolling stock, nor serving any attractive destinations. The air of dereliction displayed is perhaps amplified by the comparative lack of visible human activity. This is not a criticism, as the authors have been diligent in creating a historical record which is well researched and carefully assembled, providing some surprises in the level of detail revealed.

Following a helpful introduction, the book is divided into two main sections. The first provides a concise historical overview of the line's history with a relevant map, while the second much longer section is devoted to stations, including the previously mentioned Broad Street. There is a brief listing of contents, but no index. Overall, this is a profusely illustrated review of places and events, which capture many memories of another era.

ANGELA & BRIAN JONES

***A New Illustrated History of Her Majesty's Railway Inspectorate from 1840* — Ian Prosser and David Keay**

184pp, A4, 280 illustrations, hardback, Steam World Publishing, 4 Milnyard Square, Orton Southgate, Peterborough PE2 6GX, 2019, 978 0 9927398 1 2, £35 (post free in UK)

It is quite remarkable that the Railway Inspectorate has been in existence for some 180 years and that one of its original proponents was none other than George Stephenson. It had then three principal roles – advice, inspection of new lines and accident investigation. On the advice front the Inspectorate was a keen advocate of ‘railway time’ but also pressed for absolute block working, interlocking of points and signals, and reliable brake systems. However, it is accident investigation that gets the most public coverage and it is this that the authors concentrate on.

The authors of course deal with some of the historic accidents such as Tay Bridge, Quintinshill, Harrow & Wealdstone, Lewisham and Hixon but move on to more recent serious accidents such as those at Southall, Ladbroke Grove and Hatfield during a particularly grim period at the turn of the century.

The railways in the UK are now safe and the death of a passenger in an accident rare but working on the railway is still hazardous and accidents still occur at level crossings (many of which are being removed) or involve trespassers and suicides.

The book is well written and interesting but the typeface chosen by the publisher is rather small which makes some pages of text a challenging read. The book is profusely illustrated with colour and monochrome photographs with detailed captions which clearly demonstrate the destructive force of even a low speed collision between two (or more) trains. Sometimes there are rather too many photographs of the same accident. There is only so much that can be learnt from a photograph of a pile of twisted metal and it might have been helpful to have included some more diagrams to explain the circumstances leading to the accident. It would also have been interesting to know how the inspectors carry out their investigations into accidents.

The book is not referenced and there is no bibliography but more seriously there is no index. The publishers say that one can be downloaded from their website but this is hardly satisfactory for a book of this price.

RICHARD COULTHURST

***Seats of London: a field guide to London Transport moquette patterns* — Andrew Martin**

192pp, 160x160 mm, 287 photographs (chiefly colour), softback, Safe Haven Books Ltd, 12 Chinnocks Wharf, 42 Narrow Street, London E14 8DJ in association with London Transport Museum <www.safehavenbooks.co.uk>, 2019, ISBN 978 1 9160453 1 6, £12.99

It has from time to time been observed that, whilst many enthusiasts obsess about the exterior of transport vehicles, the interior environment, although the most important to passengers, usually goes unnoticed. Now the literally fundamental basis of London Underground and road transport travel – the seat cover patterns – receive their full due. The author's name will be known to many as writer of the Jim Stringer railway detective novels, and his writing skills have enabled what could have been a dull niche monograph to be witty and entertaining as well as informative, interspersing descriptions of

the various designs with accounts of the manufacture of moquette and asides both factual and (occasionally) quirky. Of course, given the strong LT design tradition, most of the patterns, all illustrated in colour, are well worth looking at with the fresh eyes which this book will inspire. You will also be glad you don't have to sit on plastic as in Provence or New York. For those willing to give a chance to a novel topic (for example, those inspired by *Tiles of the Unexpected* (2007) to examine Underground tiling), this will be well worth a browse.

MATTHEW SEARLE

***Railways* — Christian Wolmar**

223pp, 135x205mm. 42 illustrations, hardback, Head of Zeus, 5–8 Hardwick Street, London EC1R 4RG, 2019, ISBN 978 1 7885 4984 4, £18.99

To bracket the emergence of the railway phenomenon with such trophies of civilisation as the Magna Carta, Book of Kells and Eroica Symphony – subjects of other titles in Head of Zeus’s Landmark Library series – shows bold thinking. It also signals the publishers’ deft subversion of the ‘two cultures’ divide. In *Railways*, Christian Wolmar – always a stimulating writer – presents a lucid and engaging account of the far-reaching effects that trains have had upon society.

Having explored the conditions which brought railways into being, he gives a full-blooded account of their worldwide impact. Over nine succinct chapters, he discusses topics as diverse as railways’ influence on nation-building; systems of production and distribution of wealth; the frequently unscrupulous activities of early railway magnates; the growth of commuting and leisure travel; railway architecture; the (somewhat belated) introduction of safety measures and the role of trains in war. Sceptical that there was ever a ‘golden age’ of rail-

travel, he concludes with some robust reflections on its present-day advantages in terms of speed, safety and environmental impact. It is a formidable agenda which he despatches with great flair and a keen eye for the revealing detail.

There are some glitches. The chapter numbers on the contents page are bewilderingly inconsistent with chapter numbering in the text; Gresley’s LMS counterpart was William Stanier, not ‘Stanley’; and the observation upon the LNWR’s 1895 8½ hour journey time from London to Aberdeen – ‘Given that today’s fastest service [...] takes only ninety minutes longer, this was a remarkable achievement’ – baffled me until I surmised that the word ‘longer’ should actually be ‘less’. Nevertheless, with its lavish production values and impressive illustrations – among them, some wonderful early pictures – *Railways* is an attractive volume. A useful bibliography and index support Wolmar’s authoritative commentary.

VICTORIA OWENS

***Luxury Railway Travel: a social and business history* — Martyn Pring**

366pp, 252x180 mm, 139 illustrations (87 colour), hardback, Pen and Sword Transport, 47 Church Street, Barnsley S70 2AS <www.pen-and-sword.co.uk>, 2019, ISBN 978 1 5267 1324 7, £35

The author’s background in high-end tourism marketing is reflected in the first half of this book which analyses the history of the topic in the context of the contemporaneous international luxury market, making good use of a variety of sources and well-chosen illustrations. Given the generally British focus of the book, a short section on modern luxury trains in Russia and Japan reads like an extract from another work altogether, and coverage of the UK heritage railway sector would have been more appropriate. It would have been interesting to explore the railways’ ambivalence in the use of avant-garde design for the luxury market, as can be detected

from the illustrations.

The later chapters, rather oddly described as appendices although comprising nearly half the book, give more conventional histories of the services – not all luxury ones – linking London with Scotland, Cornwall, Bournemouth and Brighton.

There is an adequate bibliography and index, but proofreading by someone more knowledgeable in railway history would have prevented some infelicities in the text.

MATTHEW SEARLE

***Leighton Buzzard Light Railway* — Sidney A Leleux**

272pp, 271x210 mm, 269 photographs, 24 maps, softback, Oakwood Press, 54–58 Mill Square, Catrine KA5 6RD <www.stenlake.co.uk>, 2019, 978 0 85361 743 3, £37

The Leighton Buzzard Light Railway is unusual for an industrial line in having been created as a private company (given that it served more than one sand quarry owner) and in having been almost from the beginning wholly worked by internal combustion. Its reincarnation as a steam-worked heritage railway is thus slightly ironic although it is pleasing to observe that it gives proper attention to its industrial inheritance.

It is a measure of the increasing interest over the years in narrow gauge and other railway byways that, while this work began life in 1969 as a modestly-produced slim volume in the old Oakwood Press

format, in this third edition it has blossomed into the publisher's new large format (a little under A4 size) and very much thicker, nicely produced with ample illustrations and an index. As well as updating the preservation story, largely based on the operating society's magazines, this edition includes features on local quarries and other rail-operating industries not connected to the LBLR, and on the standard-gauge wagons and canal boats used to carry the product away. Written by an author who has known the line intimately over half a century, this must be the definitive work on an idiosyncratic railway.

MATTHEW SEARLE

***The Cleobury Mortimer & Ditton Priors Light Railway* — M R C Price**

96pp, A5, c100 photographs plus 3 maps and other illustrations, softback, Oakwood Press, 54–58 Mill Square, Catrine KA5 6RD <stenlake.co.uk>, 2019, ISBN 978 0 85361 742 6, £13.95

Oakwood Press's book about this south Shropshire railway when first published in 1963 had 28 pages; the third edition of 1995 had 88 pages. This new edition is identical to the latter except for a different cover picture and the addition of two appendices. One lists the locomotives known to have been operated by the Admiralty on the railway. The other, longer, appendix gives the history of the Ludlow &

Clee Hill Railway, a joint London & North Western and Great Western line on the opposite side of the Clee Hills. Almost seven miles long, it included a half mile section graded at 1 in 20 and Britain's longest standard-gauge self-acting cable worked incline.

PETER BROWN

Brief Notes

***Cromford & High Peak by Rail and Trail* — Vic Mitchell and Keith Smith**

96pp, 240x174mm, 137 illustrations, 30 maps and diagrams, hardback, Middleton Press, Easebourne Lane, Midhurst GU29 9AZ, 2019, ISBN 978 1 910356 35 7, £18.95.

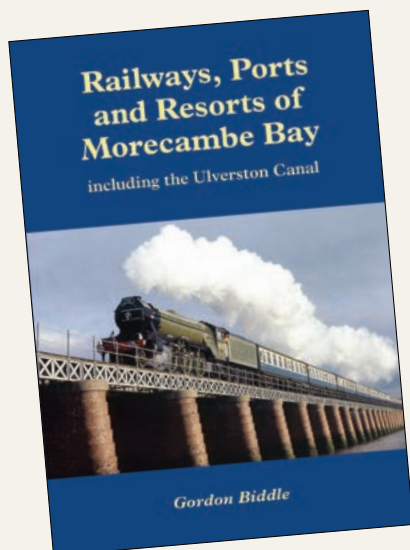
Although there are fewer illustrations than usual in books of this series, this is hardly surprising given that closure of much of it took place over a hundred years ago. Those pictures selected are interesting and enjoyable. Treatment is a little uneven – north of Dowlow is largely neglected, and the maps are not always helpful. Space could have been found for some of the C&HPR's other unique features if the illustrations of Hindlow and Edmondson tickets, both irrelevant, had been omitted.

***Green Diesels in View* — Michael Welch**

112pp, 250x215 mm, 135 colour photographs, hardback, Rails Publishing <www.capitaltransport.com>, 2019, ISBN 978 1 85414 439 3, £22

A photographic survey of every class of post-nationalisation diesel locomotive and DMU to wear green livery, with lengthy and informative captions on each. The photographs are pin-sharp and show much interesting background detail of the infrastructure (signals, track layouts, structures) of what was essentially still a steam-age railway in the 1960s and 1970s. The cover illustration – a 'Hymek' at Clarboston Road on a single-coach train from Fishguard – is a vivid reminder of a lost world.

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Gordon Biddle has written fourteen books on railway civil engineering and architecture as well as inland waterways. He is a founder member of the RCHS, its first secretary, and now a vice-president. He lives at Silverdale, overlooking Morecambe Bay.

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