The Narrow Gauge Question in New South Wales

by Jim Longworth

The Question

Narrow gauge railways are a type of light railway and were, in many ways, rather an engineering fad of the later half of the nineteenth and early years of the twentieth century. In Australia 3ft 6in gauge was adopted for main line government railways in Queensland, Tasmania, South Australia and Western Australia. Victoria had five 2ft 6in gauge branch lines with more than 121 miles of track.[1] These were built to reduce the cost of constructing new lines.[2] NSW had none. Why not?

The Narrow Gauge argument

During the narrow gauge era, railways down to 15in gauge were widely promoted as a means of cost reduction in England[3], America[4] and elsewhere across the colonial globe.[5] With respect to NSW it was argued that for the same construction cost/mile *would it not be better to have a substantial narrow* [gauge] *line than a cheap broad* [ie standard gauge] *one?.*[6]

Of the various narrow gauge lines around the globe, the Festiniog in Wales was arguably the most publicised, and demonstrated that locomotives could be successfully operated on a gauge as narrow as 1ft 11½in.[7] In particular, the cost of constructing the line was considerably less because of the possibility of using curves of smaller radius. This means that the line could go round the hills and heads of the valleys. The expensive alternative, to cater for a wider gauge, would be to cut through the ridges and to bridge the valleys, requiring heavy earthworks and bridge work. By reducing cost, it was argued that lines could be built to areas where building more expensive standard gauge railways would be prohibitive so no railway would be built at all. In addition to savings on civil engineering there was a basic tenet for locomotive worked lines that the narrower the gauge the more productive the locomotive became as its unproductive tare weight was minimised. The ratio of cargo weight to tare (or dead) weight also included the passenger or goods carrying rollingstock. Both the total value of the capital necessary to construct the line and the interest payable on the loan money would be reduced. Operational costs would likewise be reduced.

However, the claimed benefits from the use of a narrow gauge for common carrier railways had been largely discredited by the turn of the century. Any saving accruing from reduced grading and length of sleepers was slight (1 to 4%), and was overwhelmed by increased costs.[8]

Narrow Gauge proposals in NSW

So far as the NSW Government Railways were concerned, a Select Committee of the Legislative Assembly was appointed during February 1870 to *inquire into and report upon the best mode of facilitating inland traffic, and upon the subject of Railway Extension generally*, with the object of *the promotion of settlement and the development of the resources of the Country.* The committee recommended construction of a horse-hauled tramway of 3ft gauge, using 25lb/yd rails to extend the railhead of the then existing standard gauge line beyond Goulburn at an estimated cost of £1,500/mile. An alternative 3ft gauge line using 40lb/yd rail, employing 10-14 ton steam locomotives at £2,500/mile, compared to £8,000/mile for a conventional standard gauge railway, was considered but not recommended. The NSW Public Works Department also drew up a design for a 2ft 7in gauge tank engine, to work feeder lines to what were to become the main trunk lines,[9] but the design was never built.

Faced with the choice of *cheap railways or no railways at all,*[10] the Engineer-In-Chief, John Whitton countered the proposed horse tramway by surveying the line from Goulburn to Yass and preparing estimates for light standard gauge, 3ft gauge, and 2ft gauge.[11] Whitton claimed that *the two narrow-gauge lines would only be marginally cheaper, as the only savings were in the width of cuttings and embankments and in allowing slightly sharper curvature.*[12]

The industrial centre of Broken Hill once featured a considerable amount of 3ft 6in gauge trackage; not because the NSW Government had chosen a narrower gauge for its far western outpost, but rather because the South Australians had got there first (by 31 years, in fact). From 1888, until the coming of the trans-Australian standard gauge in 1970, the privately owned Silverton Tramway connected 'The Hill' with the South Australian Railways 3ft 6in gauge line just across the border at Cockburn, 35 miles distant. On a wet day at Broken Hill in January 1956, one of the original Silverton locomotives, a 'Y' class 2-6-0, shunts the yard, while a five year old 'W' class 4-8-2 makes a fuss in the background. Photo: Ron Preston

Advocates of narrow gauge often pointed to the success of the Festiniog Railway in Wales, which carried substantial loadings on a gauge of only 1ft 11½in. Of particular interest was its use of 'Fairlie's Patent' articulated locomotives. In this early view, the first of the Festiniog's 'Fairlies' LITTLE WONDER *(Fairlie Engine & Steam Carriage Co./1869) is seen at the head of a lengthy test train. Photo: Phil Belbin collection*

Narrow gauge, based on the Festiniog Railway in Wales, was also considered as a means to construct cheap railways.[13] Whitton acknowledged the success of the Festiniog system, but did *not consider a gauge of 2-feet could be used in this Colony for ordinary traffic, and nothing could justify the use of such a gauge upon any railway other than the one so exceptionally circumstanced as that of the Festiniog.*[14] The extension to Yass was built to standard gauge.

In order to reduce costs and so make a proposed line more likely to be approved, a 3ft 6in gauge alternative was proposed for the Eden to Bega standard gauge railway proposal of 1892. The Engineer-in-Chief (by then Henry Deane) had been much struck by the convenience of operation and comfort of several Queensland 3ft 6in lines, and thought the proposal would be satisfactory. However, the Commissioners objected and claimed the alteration of gauge would be a *national calamity*. The line would require different and unique rollingstock, so older standard gauge rollingstock could not be cascaded down from main trunk lines at no charge to the new line. In addition, bridges would have to be built to standard gauge dimensions in case the line was ever rebuilt to standard gauge. The line might one day be connected to the rest of the system at Cooma or Nowra, and costs per unit load would exceed those normal for a standard gauge line. Further, it would create a precedent for other parts of the state wanting lines where the estimated traffic may not be deemed sufficient to warrant construction of cheap standard gauge lines.[15] No line of either standard or narrow gauge was built to or between the towns.

Henry Deane had taken over the position previously held by John Whitton in June 1889, and in 1894 toured overseas. Deane paid *special attention not only to American methods, but to the light-railway system of Ireland and to the narrow-gauge railways of France constructed to the 60-centimetre gauge on the Decauville system.*[16] The 'light-railway' system of Ireland was a collection of eighteen systems, seventeen of which were been built to a gauge of 3ft.[17]

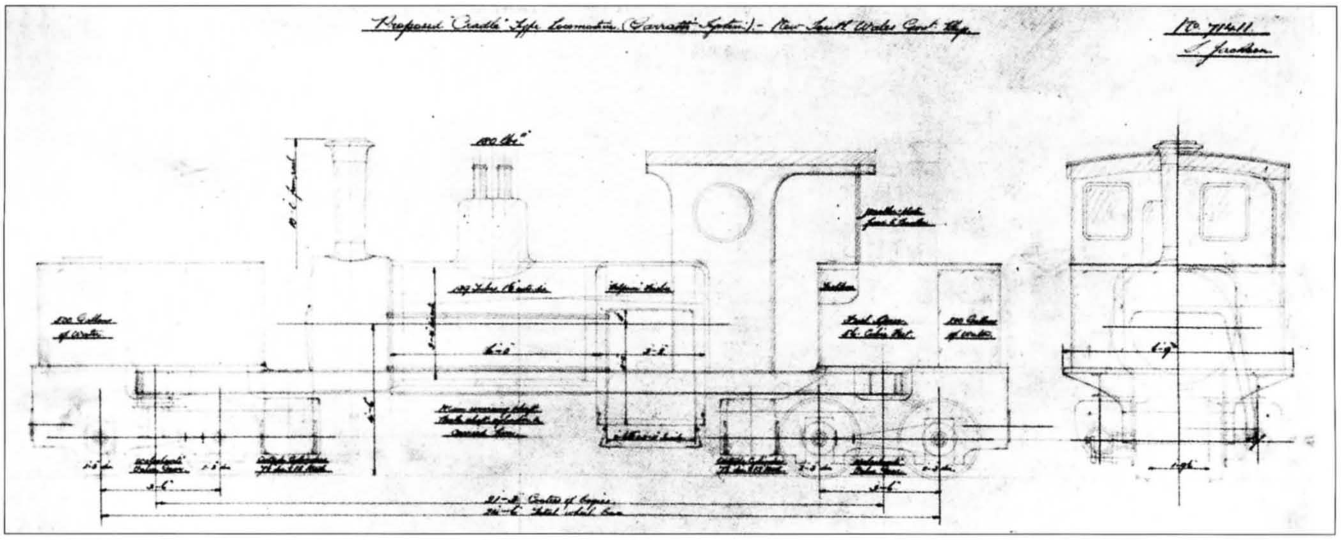
In 1909, a proposed line of 2ft 6in gauge was surveyed between Coramba and Dorrigo, for an estimated cost to construct of £190,500 compared to a standard gauge line, including two Shay locomotives, at an estimated cost of £239,073. The narrow gauge line was opposed by the Railway Commissioners, who asserted that *if a narrow-gauge line be built, rolling-stock suitable for that line, and that line alone, will require to be provided; and, in addition, special provision would have to be made for the repairing of such rolling-stock when necessary*. Other arguments against the narrow gauge proposal and in favour of the standard gauge one included:

1. The cost of transhipment at Coramba
2. Possibility of extending the line to connect with the northern line
3. Inability to readily interchange rolling-stock
4. Need to provide extra narrow gauge stock as a reserve to deal with maximum traffic
5. Extra cost of repairing narrow-gauge stock
6. Delay and damage to goods in transfer between the two gauges
7. On-going increased transportation costs especially after enough traffic had developed to justify a standard gauge line
8. Limitation on speed
9. Greater liability to overturning and derailment

The arguments in favour of a narrow-gauge line were:

1. Saving in the cost of construction
2. Reduced annual interest charge on borrowed capital
3. Cheaper working for very light traffic

The option of building a narrow-gauge line as a precursor to converting it to standard-gauge when traffic built up sufficiently, was discounted because *the reduction in the cost of constructing a narrow-gauge line instead of a broad-gauge* [ie, standard gauge] *one is mainly effected by putting in a sharp curvature. Consequently, the location of the narrow-gauge line would not be suitable for a wide-gauge* [ie, standard gauge] *one later on.*[18] The line was built from Glenreagh to standard gauge, though Shays were used on private narrow gauge timber tramways in the nearby forests.



In July 1907, Beyer Peacock & Co. Ltd submitted a design for a 2ft gauge 0-4-0+0-4-0 Fairlie locomotive to the NSW Government then, three months later, came up with the above proposal for a "Cradle Type Locomotive (Garratt's System)", possibly for the same (unknown) project. It was similar in size and appearance to the very first Garratts actually built, two years later, for Tasmania's North East Dundas Tramway, though the 'Thow pattern' cab gave it a distinctive NSW Government Railways flavour. *Phil Belbin Collection*

Designs for two different narrow gauge Garratt articulated locomotives were supplied by Beyer Peacock & Co. Ltd. Engineers during 1907 and 1908, for an as yet unidentified government line in NSW[19]. Neither was purchased.

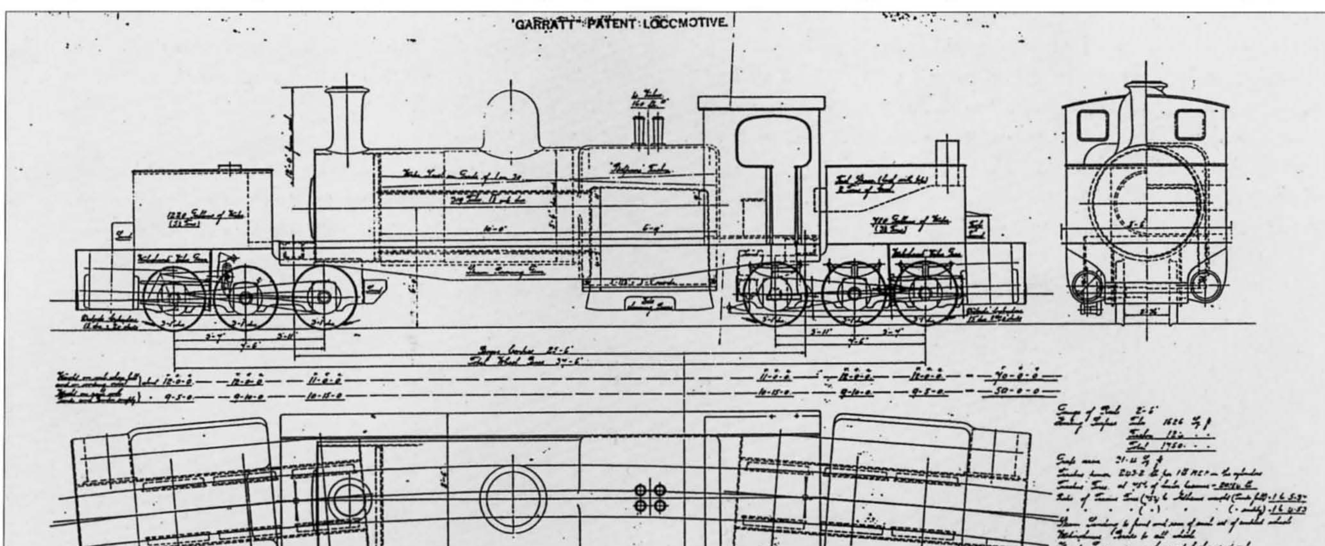
While the NSW main network was laid to standard gauge, a large number of short narrow gauge lines were built around departmental workshops and locomotive servicing facilities.[20]

Two Answers

So why were no narrow gauge government railways built in NSW? I suggest two answers, one technical, one sociological.

Adoption of cheap standard gauge so called 'Pioneer Railways' for *where the country is practically level and the traffic will be very light,*[21] successfully cheapened construction sufficient to avert the advantages offered by narrow gauge construction. Moreover, in country that is 'practically level' the advantages claimed by narrow gauge construction would hardly be identifiable. Much of the really mountainous terrain had already been crossed by that time, so minimising any cost advantages that would have accrued from constructing narrow gauge lines, while still incurring the full cost penalties. During his overseas tour, Henry Deane concluded that *the conditions in America, especially in the west, seemed most nearly to approximate to those of New South Wales, and it therefore seemed that the experience there gained would afford the* [most] *desirable type* [of economical railway].[22]

John Whitton, who held the position of Engineer-in-Chief during the era when narrow gauge lines were being promoted fervently across the globe, commanded incredible prestige and status. With his self-confidence, great technical ability, and monopoly on engineering expertise, he was able to out manoeuvre any narrow gauge proposals, proponents of which were unable to muster sufficient support to press their case. Later railway managers were unable to introduce such site-specific variations to the dominant technology. The NSW system was so firmly established as a standard gauge network, that building minor extensions in other than standard gauge was seen as being incompatible with the then existing system.



In 1908, Beyer Peacock put forward this design for a 2ft 6in gauge 0-6-0+0-6-0 "Garratt Patent Locomotive", intended for a proposed narrow gauge railway somewhere in NSW. *State Rail Archives*

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The contribution of Stuart Keane is acknowledged and appreciated.

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FROM THE ARCHIVES

Underground Tramway Efficiency

by Cyril W Gudgeon

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(published in the *Chemical Engineering and Mining Review,* 5 September 1919.)

In the average metal mine too little attention is given to track work; crosscut and level extensions are usually done by contract, the tram rails being placed and bedded by the contractors, as a rule poorly, and provided broken material can be trammed away more or less expeditiously usually everyone is satisfied. Apart from contractors, very often men are placed on track work who have but the slightest knowledge of what a roadway requires to be.

Some of the large rich mines, where one would expect to see good tramways, are often the worst offenders, tracks being too light for the tonnage output, the grade irregular, and very often stretches of line are completely under water.

A poor track means reduced man-efficiency, low output, constant repairs to line and trucks, dissatisfied truckers, and a high delivery cost per ton.

A interesting comparison is furnished by the Mt. Bischoff Extended mine, where the three main outlets for ore and waste rock are approximately the same length, and deliver the same class of material. The classification of these roads is poor, fair and good, the efficiency of the first-class road over the others being tabulated below. All tramming is done by contract labour, at so much per truck delivered, contracts being let in three-monthly periods, contractors being found wages work if at any time the ore supply is not sufficient to keep them fully employed. Good tallies are maintained by this system, each incoming contractor endeavouring to make a fresh record for his section. Steel trucks are used, with ordinary plain bearings. Steel rails are laid throughout, the gauge of the lines being 21in.

The three lines are detailed as under:—

	SECTION		
	No. 5 crosscut and level	**No. 6 crosscut and level**	**No. 9 crosscut and level**
Rails (steel)	12–14 lb. No fishplates.	14 lb. No fishplates.	20 lb. All fishplated
Sleepers	Rough half-round, irregularly spaced	Rough half-round, spaced 3ft. centres.	Sawn 6in.x 4in. spaced 2ft. centres well ballasted.
Turnouts	Revolving turntable, Geordy sheets.	Flat and Geordy sheets.	Fixed and movable points.
Grade	No fixed grade, line level in places.	About ½%. Grade irregular.	1% Regular grade.
Drainage	Not provided for. Grade too level, water over rails in places.	Fairly well provided for; sluggish in places. Track wet.	Well provided for; Track dry.
Curves	Too sharp and not well laid out.	Too sharp and not well laid out.	Laid out to carry heavy loads at speed.
Trucking runs			
Av. trucking distance per trip	2,520 ft.	2,304 ft.	3,472 ft.
Condition of road	Poor	Fair	Good
Trucks used & capacity	Box, 12 cwt.	Door, 12 cwt.	Door, 16 cwt.
Truckers on run	1	1	1
No. of trucks per trip	1	2	3
Work done and cost			
Trucks delivered			
per fortnight	348	732	892
per day average	29.0	61.0	74.3
rakes per day	29.0	30.5	24.8
Tons delivered			
per fortnight	208.8	439.2	713.6
per man-shift	17.4	36.6	59.5
Total distance hauled per man-shift	13.84 miles	13.31 miles	16.27 miles
Rakes delivered per hour actual running time.	4.19	4.41	3.59
Average speed.	2.01 miles per hour	1.94 miles per hour	2.27 miles per hour
Cost			
contacted price	4.5d. per truck	4.0d. per truck	3.0d. per truck
delivered	7.5d. per ton	6.66d. per ton	3.75d. per ton