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LIGHT RAILWAYS

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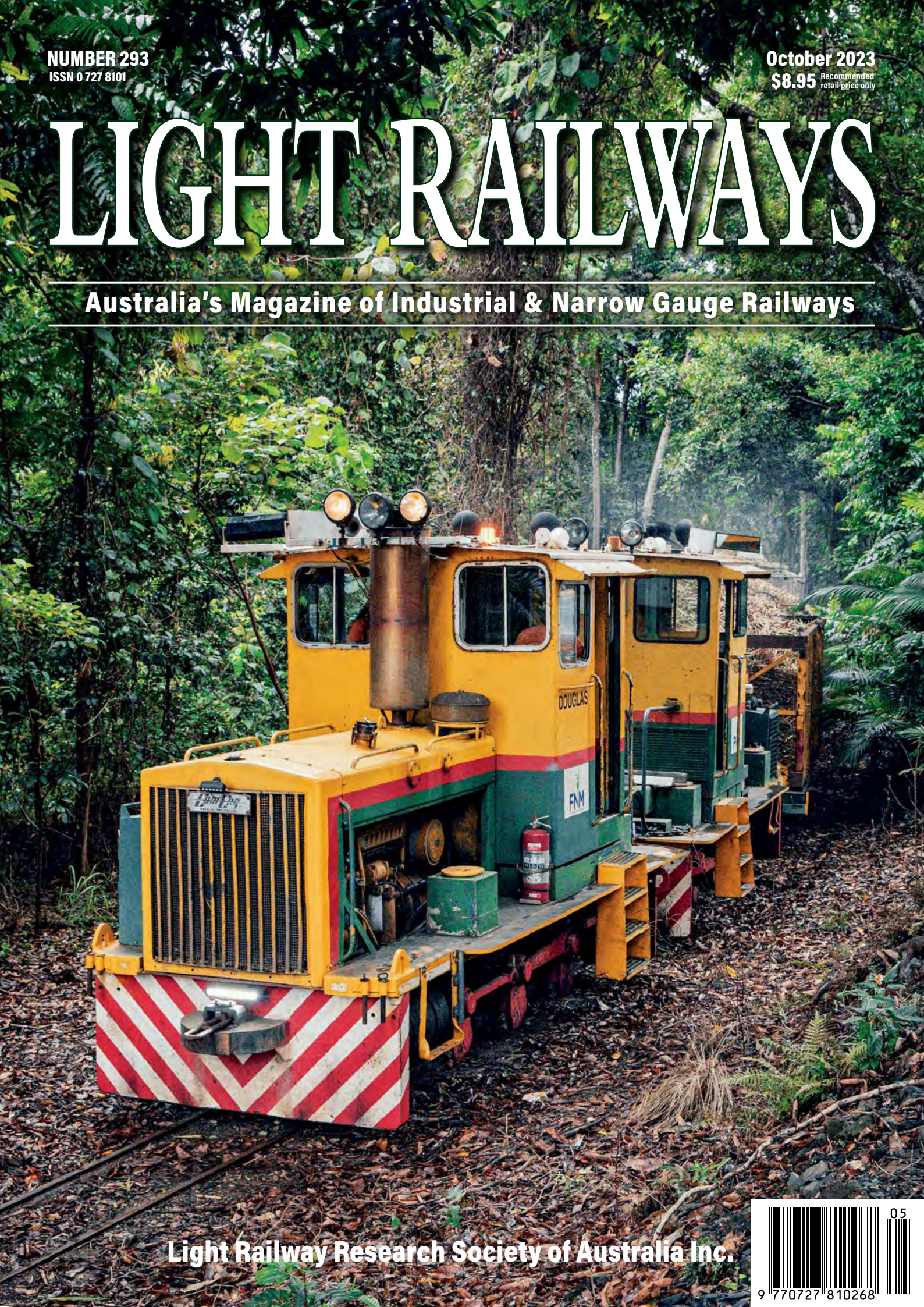

Light Railway Research Society of Australia Inc.

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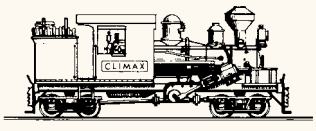
Contents

Editorial

In this edition we present a wide variety of topics from across Australia. David Jehan tells the story of the activities of the Sugar Research Institute in Queensland and its studies into the engineering aspects of sugar cane tramways and of the improvements to operating procedures that have resulted from that research. In a personal odyssey, Andrew Forbes relates the story behind the building of his steam locomotive *Douglas*, from early concepts right through to its assembly and operation on the Kerrisdale Mountain Railway.

Thirdly, Jim Longworth and Ross Mainwaring cover the tramways associated with the Excelsior Colliery on the Illawarra coast in NSW. In 'Looking Back' we feature an initial installment covering some of the jetty tramways along the coast of Western Australia. Incidentally, last month I visited one of the places featured, Port Gregory, and was disappointed to not even find a sleeper or dogspike. And the 'jetty' there now is nothing like that in our Looking Back photo!

Also included is a tribute to Bruce Macdonald, one of Australia's most notable engineering and light railway preservationists. Bruce passed away in June and his legacy extends far wider than the field of light railways and includes mainline steam, steam trams, traction engines, and stationary engines. Bruce was also the author of several books and a contributor to *Light Railways*. Indeed, he suggested the society's current name. *Richard Warwick*



Light Railway Research Society of Australia Inc. A14384U
ABN 27 859 154 705
PO Box 21 Surrey Hills Vic 3127
www.lrrsa.org.au

Front Cover: *Com-Eng 0-6-0DH multi-unit locos* Douglas *(AL2562 of 1963) and* Faughy *(AL4190 of 1965) pass through some forest along Mossman Mill's Wharf line on 2 August. Photo: Steven Jesser*

Editor: Richard Warwick
PO Box 21, Surrey Hills Vic 3127
editor@lrrsa.org.au
Associate Editors: Mike McCarthy, Frank Stamford and Phil Rickard
Field Reports Editor: Peter Evans
fieldreports@lrrsa.org.au
Industrial Railway News Editor: Chris Hart
industrial@lrrsa.org.au
Research Editor: Stuart Thyer
research@lrrsa.org.au
Heritage & Tourist Editor: Andrew Webster
heritagetourist@lrrsa.org.au
Distributor: Are Direct
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COUNCIL
President: Bill Hanks (03) 5944 3839
Secretary: Nick Sheridan 0421 058 945
New South Wales Division
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Imperial to metric conversions:

1 inch (in)	25.40 millimetres
1 foot (ft)	0.305 metre
1 yard (yd)	0.914 metre
1 chain	20.11 metres
1 mile	1.61 kilometres
1 ton	1.01 tonnes
1 pound (lb)	0.454 kilogram
1 acre	0.405 hectare
1 horsepower (hp)	746 Watts
1 gallon	4.536 litres
1 cubic yard	0.765 cubic metres
1 super foot (sawn timber)	0.00236 cubic metre

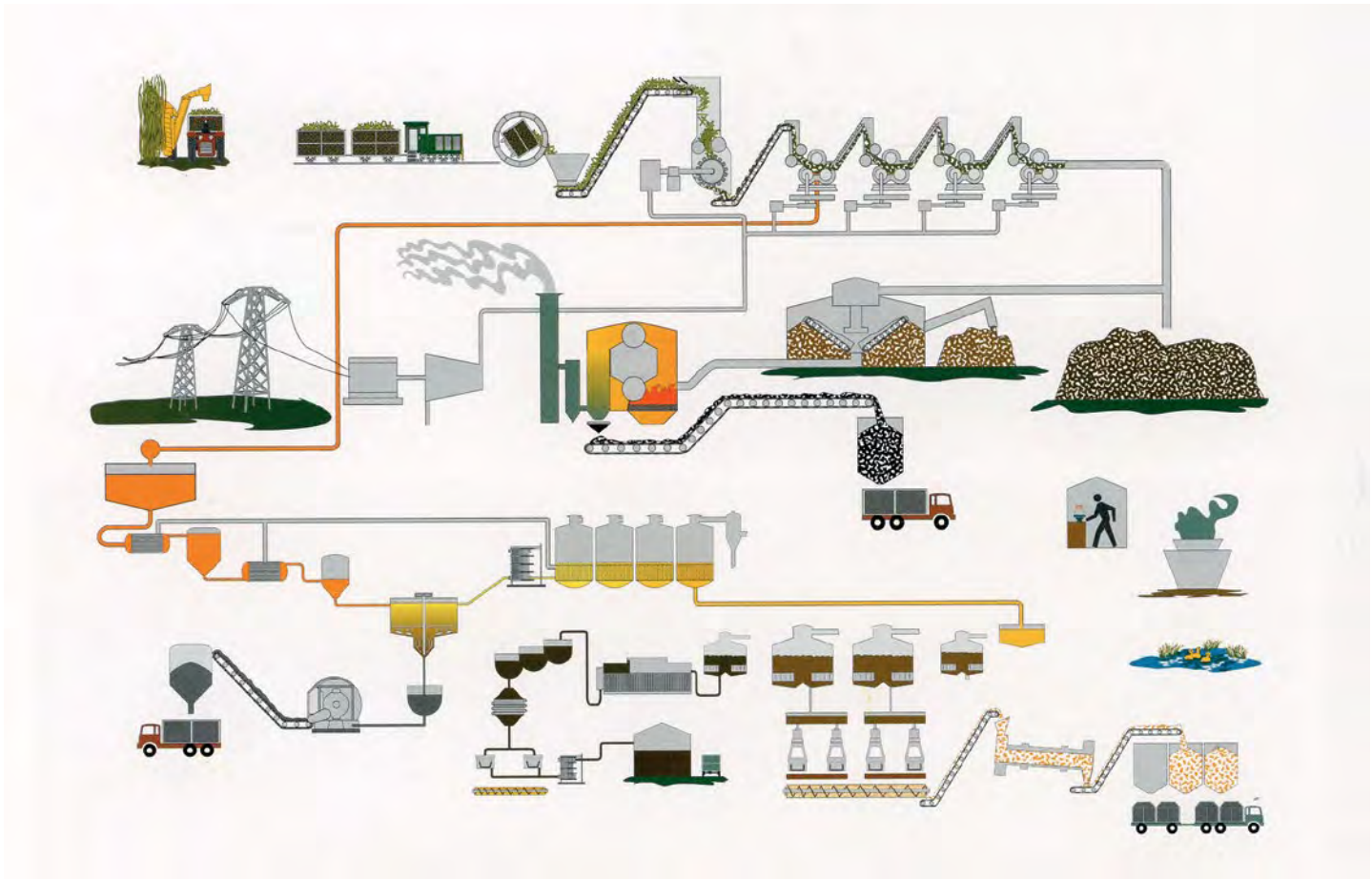
The Sugar Research Institute and its role in cane railway development

by David Jehan

The Sugar Research Institute (SRI) was established in 1949 and was a private research and development organisation owned jointly by all the sugar mills in Australia. Its location in Mackay, North Queensland, was central to its member mills and helped to ensure an intimate understanding by the research staff of the industry's technical challenges. Research activities were directed towards the operations of sugar mills and carried out by a staff consisting principally of about 40 engineers and chemists. Its ten-acre site included office accommodation, laboratories, a library, computer facilities and a conference hall. There was also a residence for the director of research.

Research interests ranged from the harvesting and transporting of cane through to the manufacture of crystal sugar. The Australian sugar industry enjoys a position of technical excellence in the world and the SRI played an important part in the Australian industry's development. (Noting the SRI were not involved in the biological

Top: *The Sugar Research Institute building in Mackay.*
Below: *A diagrammatical representation of the sugar making process from cane harvesting to shipping of final product, which encompassed all the areas of research covered by the SRI.*



aspects of cane growing or the transport and storage of the finished product).

Approximately 85% of the annual sugar cane crop of 36 million tonnes is hauled from the cane fields to the processing factories on narrow gauge railways during the 24-week harvesting season which occurs between June/July and November/December each year. The total rail 'network' in Queensland is approximately 4200 km nearly all of which is 610mm (2ft) gauge.

By the mid-1970s mechanical harvesting of sugar cane had fully replaced manual harvesting and so wholestick cane wagons had virtually disappeared. Most mills now used four- or six-tonne capacity bins for the transport of chopped cane. The industry's networks of rail lines, fleets of locomotives and cane bins represent a capital investment of many millions of dollars.

Recognising the importance of reducing cane transport costs, SRI spent considerable effort and resources on cane railway engineering problems, aiming to find cost-effective ways of reducing the huge capital and maintenance costs associated with cane railways.

Following on from I.R.Crellin's comprehensive article 'Australian Sugar Tramways – The Challenge of the 1980s' which appeared in LR66 of October 1979, this article outlines the work carried out by SRI's operations research and engineering staff on these narrow-gauge railways.

Remote Control Brake Wagons

In 1968 the typical sugar cane train consisted of a single diesel-hydraulic locomotive of 18 tonnes hauling a rake of up to 120 cane wagons/bins (at this point trains were often a mix of 70% wholestick wagons and 30% chopped cane bins). These vehicles were always loose coupled with clearance between buffers of up to 300mm, which meant the last vehicle could have up to 30 metres to run if the locomotive stopped suddenly. As each vehicle ran into the one ahead a shock wave travelled along the train. Derailments, uncoupling and damage often resulted.

SRI researchers investigated this and showed that greatly improved braking performance could be achieved by placing a brake wagon behind the last vehicle in the train. The institute used radio links to control the brake wagons at the end of the loosely-coupled train. This gave the driver greater ability to slow the train and prevent the wagons bunching up and reduced the potential for derailments or train separation. The system worked well, using radio transceivers. The industry adopted the SRI brake control gear in favour of earlier developed equipment which had not proved itself sufficiently reliable.[1]

Initially, shoe brakes were used on the brake wagons, later disc brakes were utilised on some vehicles with mixed results. Wheel skidding became a problem in some applications which became a focus of further research.[2]

Drawbar Load Measurements

As the problem of maintaining a continuous supply of cane to the mills increased, so engineers looked at the three major factors which limited the load a locomotive could haul. These factors were the locomotive's tractive effort, the rolling resistance of the train and its braking characteristics. Early work to measure a locomotive's hauling capacity was carried out using a ring dynamometer attached to a sliding drawbar which was built into a whole-stick cane wagon chassis suitably weighted down. The wagon was placed between the locomotive and the trailing load of full wagons. The aim of the research was to identify the parameters for determining the size and power of future locomotives. [3]

SRI researchers developed a tractive resistance formula in 1971 which has been used as the basis for all calculations and many of the

SRI developed a remote control system for cane railway brake wagons which could be controlled by the driver of the locomotive using radio control technology. This photograph taken in 1972 shows a Clyde Engineering-built brake wagon fitted with the SRI remote control equipment at the rear of a train consisting of 110 four-ton bins hauled by a single diesel-hydraulic 0-6-0 locomotive on the South Johnstone mill rail system. Photo: SRI via I.R.Crellin

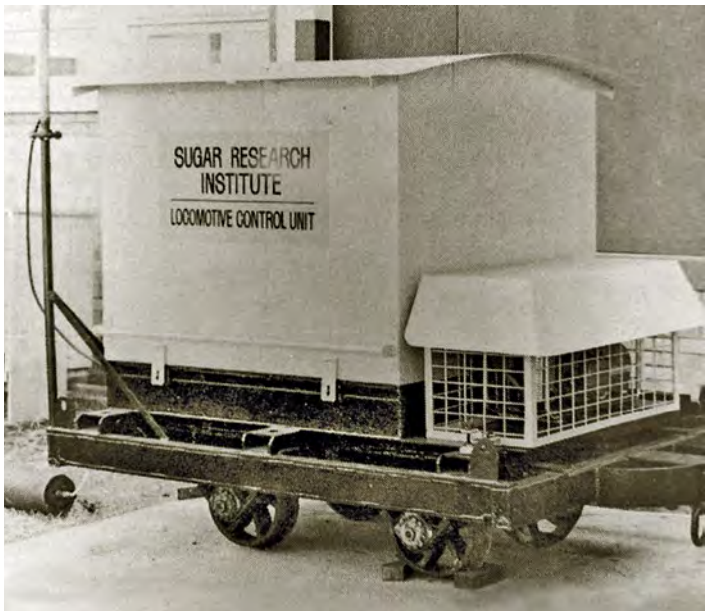
institute's program models, including the track-train dynamics model and a train-running simulator developed in 1975. The simulator could be used to calculate specific train parameters including run times, maximum locomotive loads and braking distances. Given advances in track and rolling stock in the intervening years, the tractive resistance formula's results are conservative by today's standards. The original formula, however, is still used by researchers and mill traffic personnel to calculate the required locomotive size and power for a specific duty.[4]

The load measurement work advanced in 1981, when SRI researchers adapted a strain gauge-based force monitor to measure the locomotive drawbar forces. The monitor proved to be a reliable piece of test equipment and was used to gather rolling resistance data for modifying the tractive resistance formula.[5]

Locomotive Load Monitor

The tonnage hauled by a locomotive is directly proportional to the power and mass of the locomotive. When the load exceeds the adhesive mass of the locomotive, wheel slip occurs, resulting in loss of forward motion. At many mills, arbitrarily-imposed locomotive load limits frequently meant that locomotives were not being used to their capacity, especially as average wagon masses varied throughout the season.

SRI researchers developed a load monitor which could be attached to the drawbar of a locomotive between the coupling and the first wagon. The monitor gave locomotive drivers a visual indication of the tractive effort being developed by the locomotive for any configuration of train consist. The monitor was based on the drawbar dynamometer used in earlier SRI work to evaluate locomotive performance.[6]



Above: *The prototype design of a slave locomotive control system using PDP-16M mini-computers was mounted in this small wagon located adjacent to a locomotive. It was used to prove that distributed power could work in the cane railway environment. Photo: SRI via I.R.Crellin*
Below: *In 1975 E.M.Baldwin & Sons built three bogie diesel-hydraulic locomotives for Bingera mill, these being* Oakwood *(B/No. 5800-1-5-75),* Givelda *(B/No.5800-2-6-75) and* Delan *(B/No.5800-3-7-75). These three 26-tonne bogie locomotives were built with enlarged cabs designed to accommodate the slave locomotive control equipment. This equipment was located in a large cabinet on the back wall of the cab, seen here through the cab door.* Oakwood *pictured leading* Givelda *acting as the slave locomotive located two-thirds down the length of the train. Picture taken near Drinan, October 1996. Photo: Craig Wilson*

An extension of the development was the application to brake van control which was first tested in 1995. A load monitor fitted to the drawbar between the last vehicle of a train and its brake wagon automatically applied and released the pneumatic brake system according to whether the monitor was detecting draft or buff forces. This operation occurred with intervention of the locomotive driver.[7]

Slave Locomotive Control

One of SRI's more successful and enduring projects was its work on development of a slave locomotive system (distributed power) for cane railways. The work began in 1974, when Gibson and Howes (later Bundaberg Sugar Limited) contemplated closing Gin Gin mill and requested SRI to investigate whether cane might be hauled efficiently from that mill area at Wallaville to the Bingera mill. The mills' locomotives were required to haul longer and heavier loads, which increased the difficulty in braking and the likelihood of derailments and coupler failures.[8]

The SRI researchers believed that for the cane haulage from the Gin Gin mill to the Bingera mill to be viable, a radio remote control system had to be developed. They believed that greater locomotive power for a single train would produce hauling economies and would not be inhibited by the need to upgrade drawgear and infrastructure.

The sugar industry's locomotives in the 1970s were almost universally rigid framed with six coupled wheels (0-6-0) and used torque converters coupled to reversing gearboxes. The locomotives were designed as low-speed shunting units and served the industry well while hauls were short with frequent stops. SRI had questioned the design of these units, given the changes in cane railway operations that were occurring.

In the mid-1970s the first diesel-hydraulic cane field locomotive with lock-up torque converters entered service and enabled the diesel engine power to be used at the high-speed end of the operating range, allowing for long express hauls. At the same time, cane bin capacities were increased by some mills from four to six tonnes.[9]

The principles of heavy haulage had been established many years previously on the iron ore railways of the Pilbara region of WA and elsewhere. SRI engineers knew that haulage could be improved if motive power could be distributed throughout the train by placing a second similar slave locomotive about two-thirds of the way along the train. The slave locomotive in this position is almost self-regulating in most hauling situations. On uphill grades, the slave unit hauls the trailing part of the train (usually one-third of the total consist) and pushes some of the bins ahead. The driver controls the speed of the train using the throttle of the lead locomotive. Similarly, braking on a downgrade the speed of the train can be controlled by the brake setting on only the slave locomotive. The presence of a slave locomotive could also prevent the 'stringing out' of bins behind the locomotive, which has the potential to break couplings.[10]

Prototype design of a slave locomotive control system was undertaken by SRI's systems research group using PDP-16M mini-computers. Mounted in a small wagon, the equipment received instruction from the lead locomotive by radio. The success of this small vehicle proved that distributed power could work on cane railways.[11]

Testing of this equipment continued in 1975 and 1976 on the Wallaville-Bingera run. The system was extended to allow the driver to control all the slave locomotive's essential functions. The system also permitted the driver to select a 'lost contact interval', the time lapse between the loss of radio contact and automatic shutdown of the slave locomotive. Areas of difficult radio contact, such as cuttings, could then be negotiated by allowing the system to maintain operation of the slave locomotive in a suitable constant condition until reliable radio contact was restored.[12]

Early in 1977 the development involved the replacement of the PDP-16M computers with a more modern microprocessor (Intel 80/10), substitution of the 240-volt power supply with a specially-designed DC power supply and modifications to some of the transmission and receiving circuits. In the 1977 crushing season, testing demonstrated the operational integrity of the development.[13]

In the following season, the new system was installed in locomotives used for cane haulage from Wallaville to Bingera mill, a run of about 35 kilometres with adverse ruling grades of 2% (1 in 50). The successful operation of the trains of a gross mass of about 700 tonnes over this difficult terrain was the culmination of a co-operative effort between SRI, Bingera mill and the locomotive builder, E.M. Baldwin and Sons (EMB).[14] EMB had supplied three 26-tonne bogie locomotives for the project with enlarged cabs designed to accommodate the slave locomotive control equipment.[15]

Once the work was confirmed, the researchers were commissioned by Moreton mill to develop a similar system to provide additional safety for trains hauling bins from a remote yard to the mill via the centre of one of Nambour's principal streets. The hauling was a hazardous operation, as bins occasionally uncoupled and rolled back down the busy street to the yard. The safety of the haulage operation was enhanced by coupling a locomotive at the end of the train behind the last bin with slave control equipment.

Multiple-Unit Locomotives

In 1979 SRI researchers demonstrated that multiple-unit locomotive operation was a practical means of using small, lower-powered locomotives close-coupled and under the control of one driver. Trials were conducted at the Isis mill, where two Clyde Engineering DHI-71 locomotives were coupled. The multiple unit's function was found to be very efficient, and the drivers experienced little difficulty in adapting to the small changes required in driving methods.

The practice of coupling locomotives could be used to get better use from existing smaller units or to substitute for larger locomotives during breakdown periods. Isis mill opted to permanently couple two 0-6-0 locomotives, removing the cab from one unit.

Locomotive Design

SRI investigated the possibility of utilising electric traction on cane railways in 1979. Simulations were carried out in regard to both catenary and battery-based systems. However, although found to be technically feasible, the capital cost of moving to either method of electric traction was found to be far greater than continuing with conventional diesel-hydraulic traction.[16]

EMB developed its very successful bogie diesel-hydraulic locomotive in 1972, and by the end of 1976 twenty-three units had been delivered.[17] The introduction of bogie locomotives to sugar industry conditions was relatively smooth except for problems associated with the design of gearing for the axle mounted final reduction gearboxes. SRI conducted a study on gearbox design and made recommendations.[18]

Top: *SRI staff adjust instrumentation during an experiment to measure track-train dynamics. The instrumented wagon contained power supplies and a digital computer to log the information used on many railway research projects over several years, including measurement of wheel-rail forces, bearing and coupling forces. Note the trailing wagon in the foreground heavily weighted with two huge pinions from cane crushing equipment. Photo: SRI* ***Above:*** *In 1981 SRI developed a solid-state remote sensing system that could read barcode numbers at one to two metres. This system replaced an earlier SRI bin number registration design. Photo: SRI*

Track-train Dynamics

The introduction of larger, more powerful locomotives such as the EMB bogie diesel-hydraulic units had resulted in longer trains travelling at higher speeds. This led to a marked increase in derailments that occurred in specific locations.

Concerned about this, Victoria mill co-operated with SRI to conduct an investigation in order to discover why so many derailments occurred in normal haulage operations. The researchers travelled on a fact-finding mission to BHP Melbourne Research Laboratories (now the Institute of Railway Research at Monash University) and to the Mt Newman railway in the Pilbara region of WA, to study the nation's longest trains then operating in the mining industry. Subsequent experimental work focused on track and management of wheel forces, wheel sets and track gauge. Part of this work included instrumenting a cane bin wheelset at the Victoria mill and some sections of track.[19]

This was fundamental work, provided the sugar industry with vital new information. The track-train dynamics experiments continued for several years and provided SRI with basic data which was later applied to many different aspects of cane railway research.[20]

Cane Bin Identification

An automatic cane bin number identification system was developed by SRI, this used barcodes placed on each bin with readers located at the weighbridge. This allowed cane transported to be credited to each respective grower in the area. An alternative system using a small transponder attached to each bin was also tested.[21]

The Big Bin

Most mills operate a fleet of four-wheel cane bins of between 4- to 6-tonne capacity; the size of bin being determined by the cane growers in the area, rather than the mill.

These small vehicles have served the industry well over many years and have an important advantage in that they can be taken off the rails and into the fields on tractor/trailer units where they are filled directly by the mechanical harvesters. On the other hand, since a modern harvesting machine can deliver cane at a rate of about 100 tonnes per hour, the transport operation infield can become rather hectic because the tractor/trailer units rarely carry more than two four-tonne capacity bins. At a typical mill the bins must be weighed and tipped at rates well in excess of 125 four-tonne bins per hour because crushing rates often exceed 450 tonnes of cane per hour. Modern, automated handling equipment cannot accomplish cycle times for weighing and tipping much better than 100 operations per hour and so many mills must tip two wagons at once. Harvesting operators do not necessarily provide cane in rakes containing an even number of wagons and the logistics of the automatic handling equipment is complicated by this.[22]

In the late 1970s SRI undertook a series of studies to determine an optimal bin size for the future. A bin capacity of 20 tonnes was considered the maximum likely to be required and, whilst conforming to Queensland's road regulations, a length of about 12m was considered to be the maximum. A four-wheel arrangement with steering wheelsets was favoured in lieu of a bogie design in order to maximise the internal volume and minimise the tare weight of the vehicle. [23]

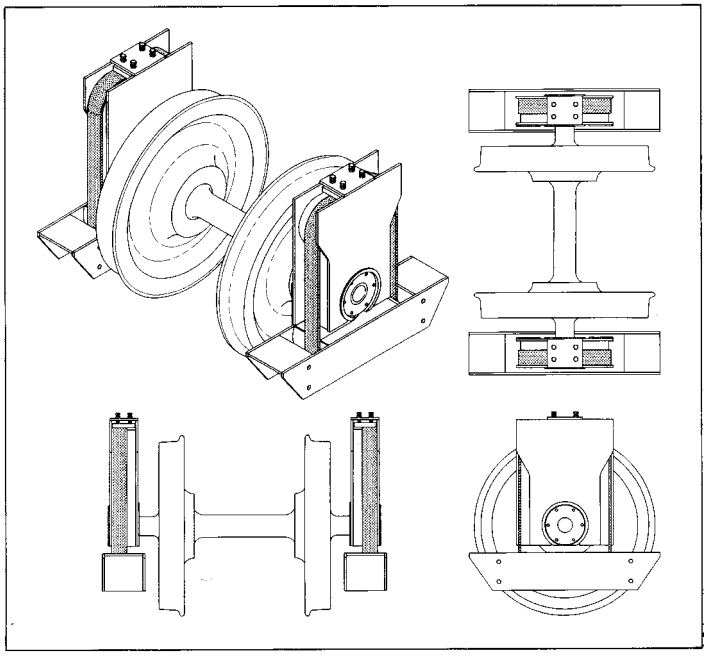
A prototype bin of 9.6m wheelbase was built and tested with some success. Based on the experience gained from this exercise, two Queensland manufacturers (Walkers Ltd of Maryborough and NQEA Australia Pty Ltd of Cairns) built fully-developed prototypes for testing. The requirements for the vehicle bodies (which were of approximately 16 tonnes capacity) were specified by SRI. These bins, four in all, were tested during 1988 at the Marian mill.[24]

Later, these concepts were applied by Sugar Research and NQEA Australia in a collaborative project to develop a 'family' of bins from 12- to 20-tonne capacity. One 20-tonne capacity bin underwent running tests at the Farleigh mill in 1988 and 1989 with a full 20-tonne load of gravel and completed the equivalent of several seasons' work without significant mechanical or structural problems. Two further prototype wagons of 15-tonnes capacity (partly financed by Mackay Sugar Co-operative) were also placed in normal service at the Pleystowe mill during 1989.[25]

Despite the relative success of the prototype big bins, the concept was not embraced by the industry. The main objection being the huge capital cost involved in the construction of a fleet of such vehicles and the associated modifications needed to infrastructure such as the tippers and indexing equipment to accommodate them at the mills.

The first large bins in operation were the 10-tonne 'Canetainers' used by the Mossman mill, which were developed by Freighter Industries. Noting that the adoption of these vehicles was done by this mill when they changed from whole stick to chopped cane in the early 1970s.

Above: *The 20-tonne prototype wagon built by NQEA stands in the yard at Farleigh mill in 1988 prior to being filled with gravel to simulate a full load of chopped cane for running tests.* ***Below:*** *A drawing of the innovative wheelset arrangement for the Big Bin developed by NQEA and SRI. Photos: NQEA Australia*



Improved Willison Couplings

Half-sized Willison couplings are used by many of the mills in Queensland. As longer trains became common, the incidence of coupling failure increased dramatically. SRI staff studied failed couplings and, following a finite element analysis, recommended design changes which strengthened future couplings.

Track Evaluation Vehicle

Maintenance and renewal of track has always been a major item of expenditure for all railways. SRI knew that a cost-effective method of evaluating the condition of track would lead to more effective expenditure of an operator's maintenance budget. Although commercially available track measuring equipment was available for narrow-gauge railways, it was expensive and did not load the track in a way that reflected the operational experience on the cane railways.

In 1977 a single-axle vehicle was built, suitable for towing behind a locomotive. The twist in the track relative to the locomotive and the gauge was recorded on paper tape at one-metre intervals along the track for subsequent computer analysis. The gauge-measuring equipment was designed to apply a significant lateral load to both rails that might move under ordinary operating conditions. In 1979-80 a computer program was written to plot the data collected by the vehicle for several kilometres. The vehicle incorporated a paint marker which could indicate the track where the gauge or twist was unsatisfactory. By 1984 several member mills had used the unit to survey their existing railway systems. The vehicle's use was discontinued in 1984, but by then the unit had demonstrated that measuring track geometry parameters and using the results for planning track maintenance tasks was an effective way of managing resources. The tool, however, was not suited to everyday use and was ultimately superseded by the availability of modern on-line tamping machines equipped with computerised geometry-measuring systems which, with the addition of a detachable gauge-measuring axle, could double as a track recording vehicle.[26]

Track Design

Various aspects of track and infrastructure design was undertaken by SRI, this included computer-aided track design. This work included consideration of rail bending stress, sleeper bending stress, ballast pressure and subgrade pressure.[27]

The timber sleepers and dog spikes of the early days were proving to be increasingly inadequate for modern day cane railway operations. SRI collaborated with sleeper manufacturer Austrak Pty Ltd and the fastener manufacturer Pandrol Australia to develop and test a completely new concrete sleeper and fastener system. Photo: Chris Hart

This crossing between the Queensland mainline 1067mm gauge system and the 610mm Macknade mill network shows just how advanced canefield railways have become. Photo: Chris Hart

Work on designing an improved rail sleeper better able to handle the increasing duty began in 1984 at SRI. This work led to studies of the fastener systems. The institute collaborated with sleeper manufacturer Austrak Pty Ltd and the fastener manufacturer Pandrol Australia to develop and test a completely new concrete sleeper and fastener system more suited to the needs of present-day cane railway systems. Several designs were developed before extensive in-track testing of a prototype was carried out over several seasons. The industry adopted these sleepers and fastenings over the next decade, during which time further modifications were made.

Derailed bins frequently caused significant damage to track and bridge decks, in particular open-top timber bridges. SRI provided a design for guard rails to be located at bridge approaches to guide a derailed bin wheel across a bridge by stopping the wheelset's sideways movement.

SRI developed a switch mechanism which allowed trains to operate safely through a turnout from the trailing direction. The design of 'trailable points' for sugar industry railways was based on technology used in government railway systems and tested at Plane Creek during the 1994 and 1995 crushing seasons. The work was aimed at minimising the time lost while crews operated the turnout switches at mainline junctions, passing loops and catchpoints then walked the length of a train to return to the locomotive.

Other research work was undertaken in relation to rail welding techniques, hole boring in sleepers and the design of removable cattle grids.

Cane Railway Scheduling

Work on cane railway scheduling optimisation began in 1965 and progressed continuously. This was particularly important work as sugar cane differs from other bulk commodities such as coal and iron ore in that it is a "time-dependent" load. Once harvested, the sugar content in the cane starts to reduce making it critical to get it to the mill for processing as soon as practical. The mills generally aim for 90% of cane to be crushed within 16 hours of being harvested.

The early work had been carried out manually, but in 1973 SRI researchers developed a computer programme which assisted the scheduler by performing much of the necessary tedious calculation and record keeping and allowed easy checking of the total schedule.

The model checked that locomotive runs provided for all empty

Mourilyan mill No.5 Clyde DHI-71 (B/No.66-491 of 1966) fitted with Theimeg remote control equipment, pictured in the mill yard in 1993. This was the first locomotive to be fitted with this type of control equipment and SRI was heavily involved in this trial. Photo: Chris Hart

bins required to be delivered to grower's sidings and that all full bins were promptly collected. As well, the program provided 24-hour plots of the mill yard stocks of empty and full bins, estimates of the cane age at crushing, number of bins required and complete locomotive running sheets. The locomotive runs, however, were still determined by the skill of the traffic officer.[28]

In 1980 SRI's systems engineering group collaborated with the James Cook University Computer Centre to develop a computer-based automatic system, which used the earlier desk-based methods as a basis for the development. Further improvements by SRI researchers enhanced the locomotive run generation, allowed for locomotives of different mass and power and recognised siding capacity limitations.

By 1989 SRI had developed four major programs to study cane railway transport, including the computer-assisted scheduling system, the tramway cost model and the train running simulator, which gave mills a means to evaluate their cane transport requirements and proposed changes to the transport system. The early computer-aided scheduling system and its later version, the Automated Cane Railway Scheduling System (ACRSS), were also used, from time to time, to schedule road transport systems.[29]

Later work on the automatic scheduling system was carried out with Central Queensland University in co-operation with SRI researchers and funded by the Sugar Research and Development Corporation. The work aimed to produce schedules which more closely reflected operational practises at mills, including the use of a generic algorithm in the runs sequencing phase of the program.

Related to this was the development of the Animated Cane Transport Scheduling System (ACTSS), a tool for checking transport schedules. The program, which had its origins in the suite of computer programs developed in 1973, ensured that schedules were feasible by simulating the day's transport operation and flagged any problems that occurred. The ACTSS included an animation phase where the simulated schedule could be displayed on a computer screen.[30]

SRI developed a program called Traffic Officer Tools (TOTools) which was developed to help traffic officers with their daily operations. It replaced the paper-based daily ledgers with a spreadsheet-style computer program and helped them manage all aspects of cane transport, including bin deliveries and collections and harvesting operations. TOTools became the interface for entering schedules into the ACTSS. An important advantage of the system was the shorter training time required for mill staff to use the simulator.[31]

During 1997 the programs were further modified, and the researchers prepared a spreadsheet-style computer program and tested it in parallel with existing systems. The revised program was installed for use by several mills for the 1998 crushing.

Remote Control Locomotives

Remote control locomotives (RCL) technology had been in use since the 1980s in Europe and North America. The term 'remotely

controlled locomotives' or 'remote control locomotives' refers to a locomotive which, through the use of a radio transmitter and receiver system, can be operated by a person not physically located at the controls within the confines of the locomotive cab. (Not to be confused with distributive power, in which a slave locomotive positioned mid-train is controlled by the leading locomotive as previously described in this article.)

The advantages of RCL technology are that trains can be operated by a single person who can manually drive the train to a particular location, switch the locomotive to RCL mode and shunt the train remotely by using waist-mounted controls from the side of the track. It has particular advantages in the loading and unloading operations on some rail systems, where the operator can stand adjacent to the wagons being filled or emptied rather than remaining in the cab of the locomotive some distance away, thus allowing wagons to be positioned or 'spotted' with great accuracy.

The first to trial this technology in the sugar industry was the Mourilyan mill in the early 1990s. The equipment used was from the German supplier Theimeg who had proven systems in service overseas. SRI were heavily involved in the installation of this equipment onto a Clyde DHI-71 diesel-hydraulic locomotive.

Although this trial was successful the Mourilyan mill chose not to continue with the technology. However, other mills have since adopted RCL technology with some success.

Hot Axle-box Detection

The institute developed a hot axle-box detection system using infra-red thermometers for temperature measurement of cane bin wheel bearings. The detector reliably pinpointed axles which had become hot as the train passes. The system was similar to that used by other rail operators.

Initial work was carried out at Invicta mill in the 1984 season and work to develop a reliable system was done in 1985 and 1986 at Marian, Farleigh and Invicta mills. When a hot axle box is found an alarm sounds in the rail control office and the driver of the train is alerted by radio.

Guide to Cane Railway Engineering

A most notable achievement has been the progressive production of four volumes of the Guide to Cane Railway Engineering, a comprehensive set of reference documents containing research results, applications and designs for many aspects of cane railway construction and maintenance. The guide has been strongly supported by SRI member mills because frequent updates and additional material for each section reflect current cane railway maintenance procedures and practices.

Australian Standard for Rail Safety Management

In 1996 SRI assisted with the development of a six-part Australian Standard for Rail Safety Management for track gauges exceeding 600mm. The standard was developed by working parties of engineers representing most Australian government and private railway systems and addressed all railway safety management issues.[32]

Code of Practice for Cane Railways

In 1997 SRI began development of a code of practice for cane railway activities, carried out under the auspices of the Australian Sugar Milling Council. The activities include railway operations, locomotives, bins and other rolling stock, civil engineering infrastructure and flashing signal systems and level crossings. The deregulation of Australia's mainline railway systems forced them, and subsequently the cane railway operators, to produce documentation to cover all aspects of their activities.[33]

Site Closure and Redevelopment

On 1 July 2005, Sugar Research Limited, trading as Sugar Research Institute, became affiliated with Queensland University of Technology, providing stakeholders with access to research and consulting facilities. Many of the SRI researchers transferred into this organisation.

The Mackay facility was closed and by June 2006 the sale of the property was finalised with the research work of the Institute being transferred to Brisbane, although some staff continued to work in the Mackay area. The building was then advertised for sale. It was subsequently refurbished and adapted for use as a secondary school by Catholic Education – Diocese of Rockhampton, it is now known as the Catherine McAuley College which opened in 2022.

Conclusion

Clearly the Australian sugar industry and its narrow-gauge rail system would not have evolved into the efficient materials handling system that it is today were it not for the continuous research and development activities of the SRI.

Acknowledgement

This article has been prepared with the editorial assistance of Mr Robert (Bob) James – Senior Railway Engineer SRI who served the industry for five decades.

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One man's journey in steam - building the locomotive *Douglas*

by Andrew Forbes

Editor's note:

Following the publication of the photo of his recently-completed locomotive *Douglas*, on the cover of LR 289 in February, Andrew Forbes contacted me to see whether I would be interested in publishing an article describing the development and building of the locomotive. Given the reputation and status of the locomotive I responded very positively and duly visited Andrew at the Kerrisdale Mountain Railway, accompanied by LRRSA president Bill Hanks. Andrew provided a lot of materials that he had documented over the journey and we have worked together to prepare this article. I trust that you enjoy reading Andrew's journey.

Background

The building of *Douglas* is the culmination of a lifelong ambition to build my own steam locomotive. I think that I was born with steam in my blood as a result of the influence of my father, Douglas Forbes. I clearly remember when I was five years old and a student at Brighton State School in suburban Melbourne, I drew a schematic drawing of James Watt's steam engine and the teacher was most impressed. I had diligently studied all of my grandfather's encyclopaedias that related to steam engines and was able to translate that knowledge to a drawing on the blackboard. In the 1950s steam power was still in regular use on the Victorian Railways and every boy dreamed of becoming an engine driver, such was its allure. As time passed by and steam locomotives were replaced by diesels, it became apparent that the little boy of the 1950s would not be able to get his coveted job as a steam locomotive driver on the VR.

None-the-less, as the years progressed, my love of engines and engineering in general remained as a latent force in my mind. I was thrust into the workforce when I was 16 years old and I spent my spare hours at home making steam-powered gadgetry. When I was 18 I built my first steam boiler and proudly located it in the backyard of the family home and attached various engines to it to run on weekend steam ups.

My next project was the "Invincible Steam Tractor" which is essentially a steam powered mini-traction engine as shown in the photograph. I was able to collect various parts for it from the scrap bin at the VR's Newport Workshops' Reclamation Department. The R-Class locomotive No. 747 was the source of many parts including the Duplex stoker engine which was used on the drive transmission, the throttle lever which has become the hand brake, the screw reverser which has become the steering wheel. I was also able to use the boiler water gauge glasses, and the Nathan 5-chime whistle.

In 1978 my wife and I purchased a block of land at Kerrisdale in central Victoria (about 80km north of Melbourne) with the aim of setting up home and, eventually, building and establishing a small railway for tourists. I started to collect rail-related paraphernalia by purchasing old railway track and sleepers, and built a shed that would ultimately become the locomotive shed. I collected rails from a variety of sources including 20 lb/yd rail from, variously, the Cheetham salt works, Denys Steinhauser from Wodonga, the Smithfield munitions depot north of Adelaide, and point levers from Thornleigh in NSW.

As time marched on, family and business commitments hindered much progress on the actual railway until 1994, when we were able to start work on its establishment. At this time the family was running its local agricultural business known as Douglas Engineering.

In 1990 an old boiler and various engine components were purchased, and work commenced on a set of axles and wheels. Whilst we had the makings of a steam locomotive, other priorities of building the railway took precedence.

Between 1994 and 2007 the Kerrisdale Mountain Railway was established and continually improved upon. Various items of rolling stock were purchased and renovated and a 2 ft-gauge operating railway became a reality. The full details of the railway, its rolling stock and its operation will be covered in a separate article that will be published in *Light Railways* in due course. The Kerrisdale Mountain Railway and Museum Inc was officially opened in November 2007 using its two main items of motive power – a Malcolm Moore and a Ruston Hornsby – but no steam locomotive. The railway ran regular trains on Sundays and was available for group hire on an occasional basis. Also, as part of the railway a museum had also been established and had displays of vintage and veteran steam engines and other related equipment.

The genesis of *Douglas*

As already intimated, the long term aim of building a steam locomotive was never far from my mind, and in around 2010 when the railway had been established and was very successful, the time had come to get serious about it.

I had always had in my mind what I wanted to build and what it would look like. In the 1970s and 1980s I had started to put my thoughts on paper and the design developed over time – clearly the gradient of the railway called for special consideration. In 2010 I prepared various sketches and design drawings and calculations. I had also collected various parts that could be used in the locomotive.

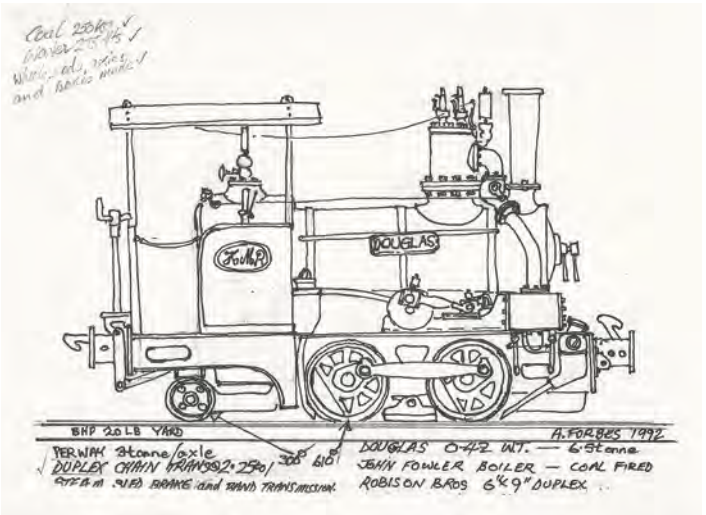
My initial thoughts are shown in the 1992 and 2010 design sketches below:

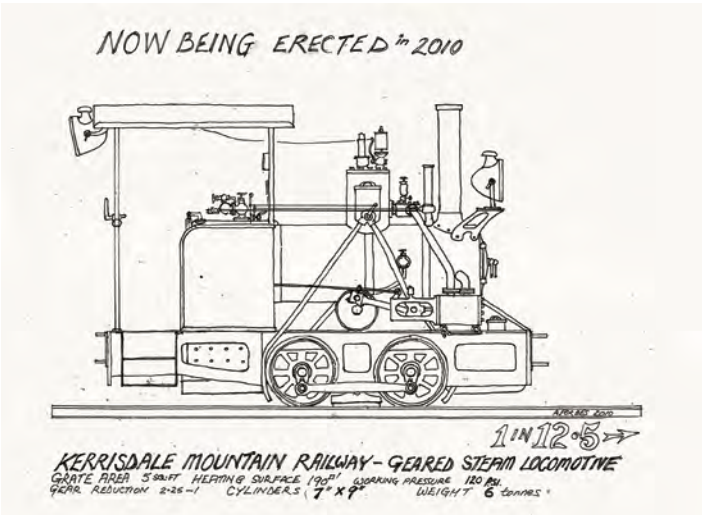
Building *Douglas*

As part of running my agricultural machinery business over many years I had built up a well-fitted-out workshop. About half of the workshop machinery and equipment was obtained from a family engineer, great uncle George Crook and the other half as a necessary adjunct to our past engineering business exploits.

Over time I had gathered a wide range of parts that could be used in the building of *Douglas*. The "old" parts that have eventually been used include the following:

- Smoke box door from a former John Fowler locomotive dated 1883
- Fly Wheels that were disc cranks from a Ruston Hornsby 30-tonne face shovel engine (that Dave Mickle had collected many years ago) that we back-engineered to 21st Century tolerances and effectively made it 100% mechanically new
- Headlight that was manufactured by Pyle National and came from a Victorian Railways D³ class locomotive





- Lubricator from a former NSWGR 30-class locomotive
- Gauge glass and steam brake valve from a VR A2 class locomotive

In 1992 the wheels, axle boxes and coupling rods were made by us in the workshops by profile cutting and fabricating them as a weldment, then machining them to the correct wheel profile.

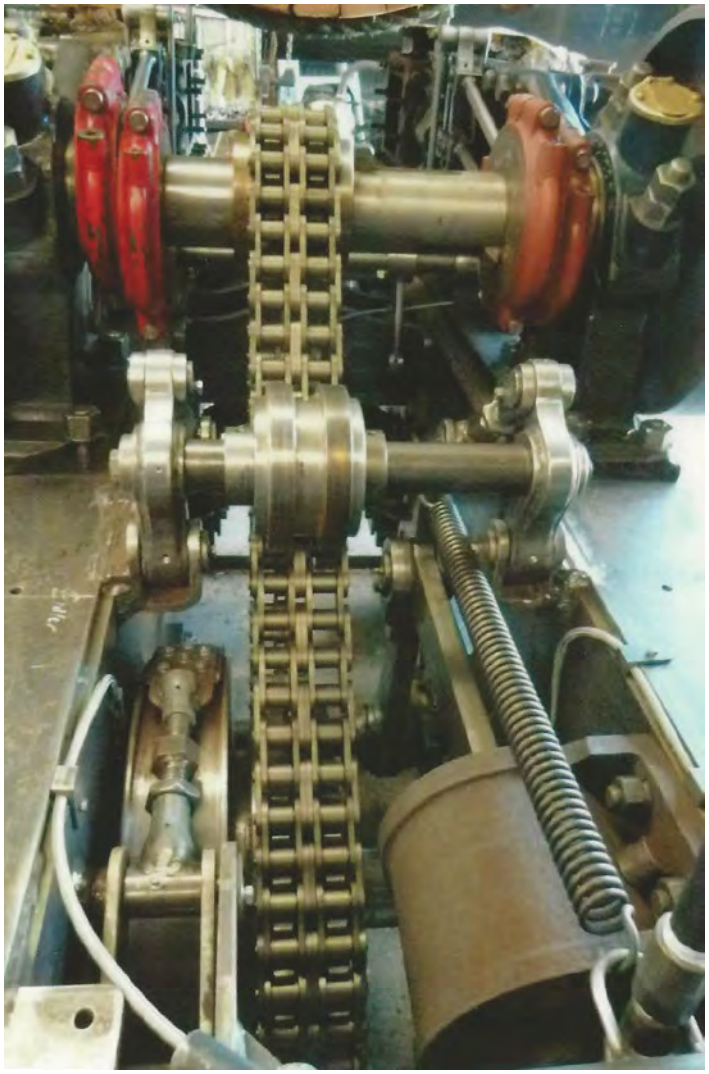
I had acquired an old steam engine boiler from a John Fowler locomotive. The boiler was cleaned out and an agreed procedure was made by the boiler inspector to be implemented which required it to be stripped it back to bare metal for a thorough inspection. The boiler was in a very poor condition and as it was made from wrought iron, I decided to abandon any attempt to restore it, and start from scratch using mild steel to build a new boiler and fire box.

Having acquired all of the necessary 12 mm mild steel plates in February 2012, I marked it all out and engaged Shear Form of Dandenong South to bend and shape it as required. The next step was to weld it all together in the workshop and then get the final product inspected to ensure that it met the requirements of AS 1228-2006 "Class 2 boilers" – this was necessary to obtain Worksafe registration in the long run. By August 2012 this work was completed. As shown on the attached photos all of the fabrication work was carried out in the workshops at Kerrisdale.

The main frame for the locomotive is essentially made of 12 mm-thick mild steel plate shaped accordingly and bolted together with M24 bolts to form the frame. In July 2014 the back end of the frame (that I termed the 'tuning fork' on account of its shape) was then fitted and the base of the locomotive was now ready to attach all of the other equipment. At this stage I could then attach the wheels and their related gearing and springs.

By November 2016 the transmission was ready to be installed. The system that I had designed consisted of the following:

- The Duplex steam engine 7 in x 9 in cylinders to drive the new crankshaft and chain sprocket down to the axle sprocket, a reduction drive of 2.25 to 1 being utilised to smooth out the torque to avoid wheel slip
- New 1½ in heavy duty Duplex 65,000 lb chain has an idle wheel tensioning mechanism adjacent to the axle sprocket. This acts like a very large transmission band brake. This applies



a braking force to all four wheels and can stop the train on its own, but it is mainly used as a static brake. To the right of the chain sprocket is a 7 in steam brake (Perry) cylinder that actuates the steam sled brakes between the wheels – the Dynamic Brake.

This system was then tested at 240 rpm to ensure that it all worked as planned – which it did perfectly.

Having finished the frame and installed all of the wheels and the transmission system, it was time to attach the boiler to the frame. This was achieved in January 2018 and it was finally starting to look like an operational locomotive instead of a collection of pieces scattered around the workshop.

Once the boiler had been attached, a long process of fitting-out and attaching the electrics and footplate controls was commenced. This process took until March 2020 when it was ready for testing the whole engine in steam. Having assured myself that it all worked as planned, it was time to pull some of it apart and get it painted and for the boiler cladding to be installed. The cladding consisted of kiln dried hardwood that I cut individually to fit together, like the old time coopers making wine barrels.

By August 2020 it was finished and it was time for some celebrations. It had been tested under steam and it seemed to run well. I decided to use the free time available in 2020 during the COVID-19 lock downs to paint the locomotive, a task which eventually took 12 months.

Back in 1992 my calculations resulted in the design for a 0-4-2, whereas by 2010 my calculations led to a design for an 0-4-0. However, I understood that the 'balance' of the whole locomotive needed further consideration as the addition of various 'extras' such as the super power firebox, rocking grates, steam dome, cyclone ash pan and a larger footplate had changed the location of the centre of gravity from where I had calculated it. The solution was fairly straightforward – and easily accomplished (!); a trailing truck would

be included at the back to change the balance. So, in February 2021 work on the trailing truck commenced to a design that I had prepared. The truck was fabricated in the workshop and it was ready to be installed by March 2021. The whole locomotive, including the new trailing truck was then tested under steam and successfully run on the tracks up the hill to the summit station.

The project was now complete and I was very happy with the final product.

You may be wondering why the locomotive is called *Douglas*. I named it *Douglas* after my father – the man who had inspired me to build it and who gave me my life-long interest in railways and, particularly, in steam machinery. The number on the headlight, 518 represents the month (May) and year (1918) of birth of my father.

The locomotive now regularly runs on the Kerrisdale Mountain Railway in Victoria. At this stage I do not have safety accreditation to use the locomotive to run passenger trains, but that is the long term aim. The trains on the railway are operated by either the Malcolm Moore or the Ruston Hornsby locomotives that are safety accredited. The railway operates on a regular basis (usually Sundays) and it is available for group bookings. If you are interested, please refer to our Facebook page for current details of opening hours, dates and other important information – a warm welcome awaits all.

Looking south-west in the 'Down' direction at Excelsior colliery, undated. Photo: ARHS collection 197762

Excelsior Colliery, Thirroul

by Jim Longworth and Ross Mainwaring

Ryan and Carroll

Coal was first discovered in the Thirroul area during 1895 in the bed of a creek off Fords Rd. Located below the Bulli Lookout and northwest of Thirroul railway station, a tunnel into the 'Bulli Seam' of coal was opened during 1905 under the management of Thomas Ryan and P Carroll. Initial tunnelling showed good promise, the seam giving 6 ft of clean good quality coal. Early on coal was disposed of by being carted around through the local district and selling to local small-scale customers. However, mining seems to have been off-and-on and the mine finally closed.

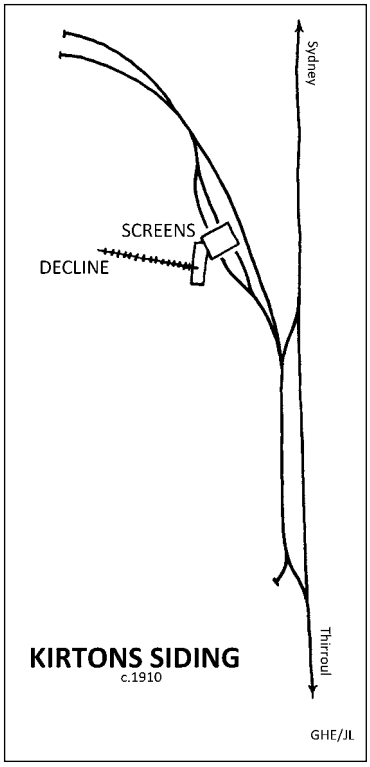
A decline was surveyed from the mine down to the government railway line between Thirroul and Austinmer stations during July 1905. However, the proprietors merely supplied local trade, owing to delay in coming to terms with property owners through which the decline was to pass. Preliminary work started during August, but does not seem to have progressed far. T Ryan lodged abandonment papers for the colliery with the NSW Department of Mines during August 1906.

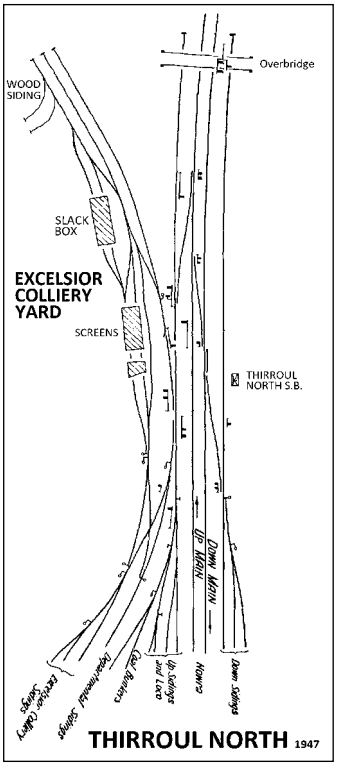
John Stephen Kirton acquired the operation with the intention of reopening the mine during October 1906, and in October 1907 he and a Mr Earnshaw gave notice as to reopening of the mine. Initial haulage of coal was by horse drawn wagons down to Thirroul railway station for loading into government railway wagons. Under such heavy traffic the road became a quagmire, and badly needed metalling.

Kirton's Sidings

During July 1909 the Railway Commissioners provided the colliery with a survey plan for connecting the colliery with the Illawarra line at the 40 mile peg. The siding had been applied for nine months

Looking south in the 'Down' direction into the Excelsior Colliery yard with the slack coal box on the right in 1969, the company's standard gauge wooden coal wagons, built by Goninan, were painted Indian Red and lettered 'EK' (Earnshaw and Kirton) in white. There are thought to have been at least 20 of them. Photo: ARHS collection 459289





previously, however, the owners wished to know the cost before they would commit to the proposed scheme. At the end of August 1910, agreement was reached with the Railways for the construction of a siding to load company coal north of Thirroul station.[1] When the Thirroul station yard was redeveloped to accommodate the locomotive depot in 1917, the southern end of the colliery yard was rearranged to make space.

Excelsior No.1 Colliery

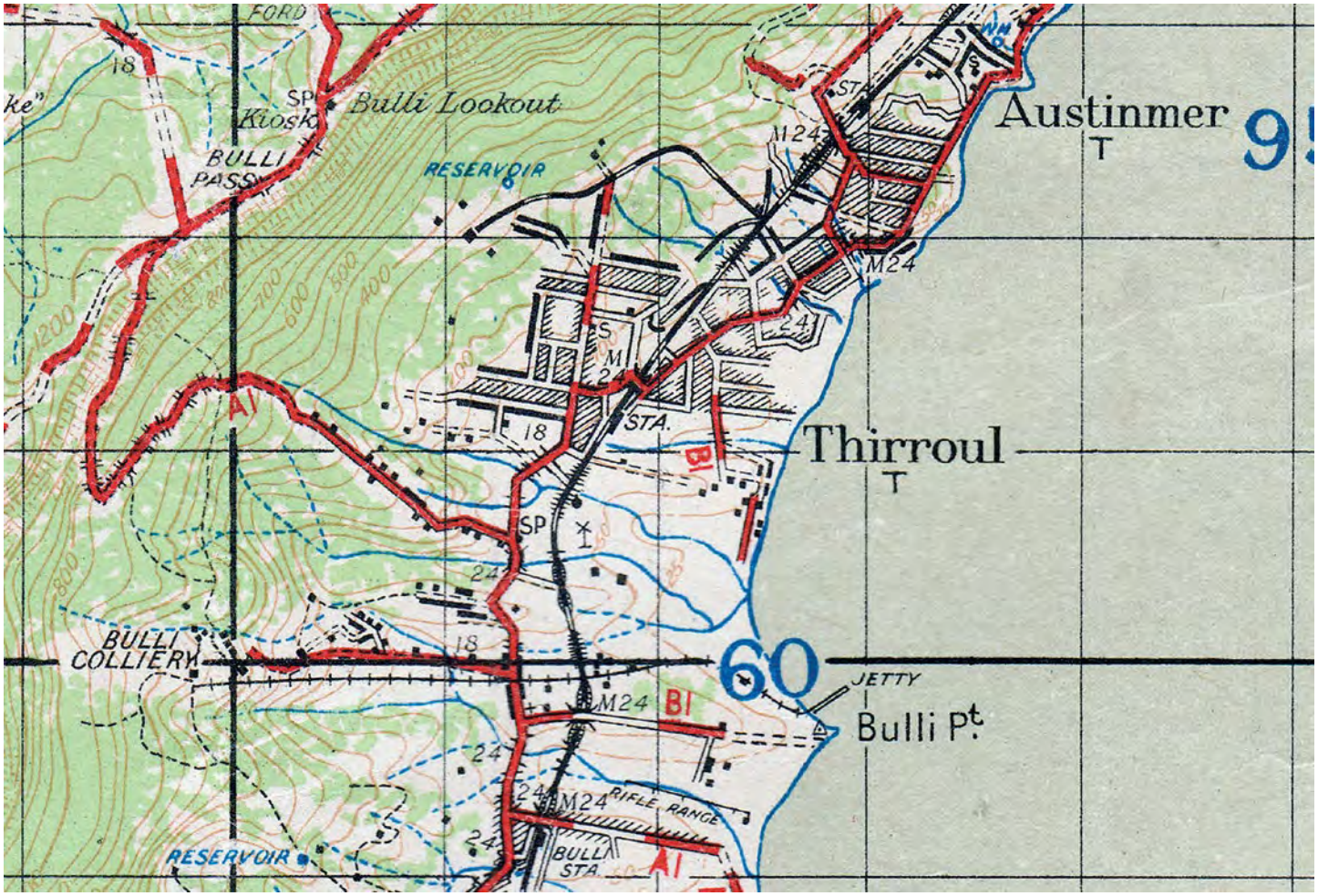
A good seam of steaming coal was opened up, increasing in height to 7 ft with the bottom two feet comprising natural coke. This coked coal (cindered) was smokeless when burnt and the heat generated was intense.[2]

Some equipment for the mine was procured second hand from the Cataract Dam construction work. By November 1907 coal was being won at the mine and Mr J Gibson was the first manager. By August 1909 installing a skipway decline from the mine downhill to the government railway had again been proposed. Coal was still being hauled by horse to the station and about 70 tons daily were railed to Sydney. City factories were the main customers as the coal and coke combined decreased the volume of smoke that was produced during combustion. Work of building a single track 2 ft gauge skipway commenced that month, being undertaken under contract by a Mr W Montgomery.[3]

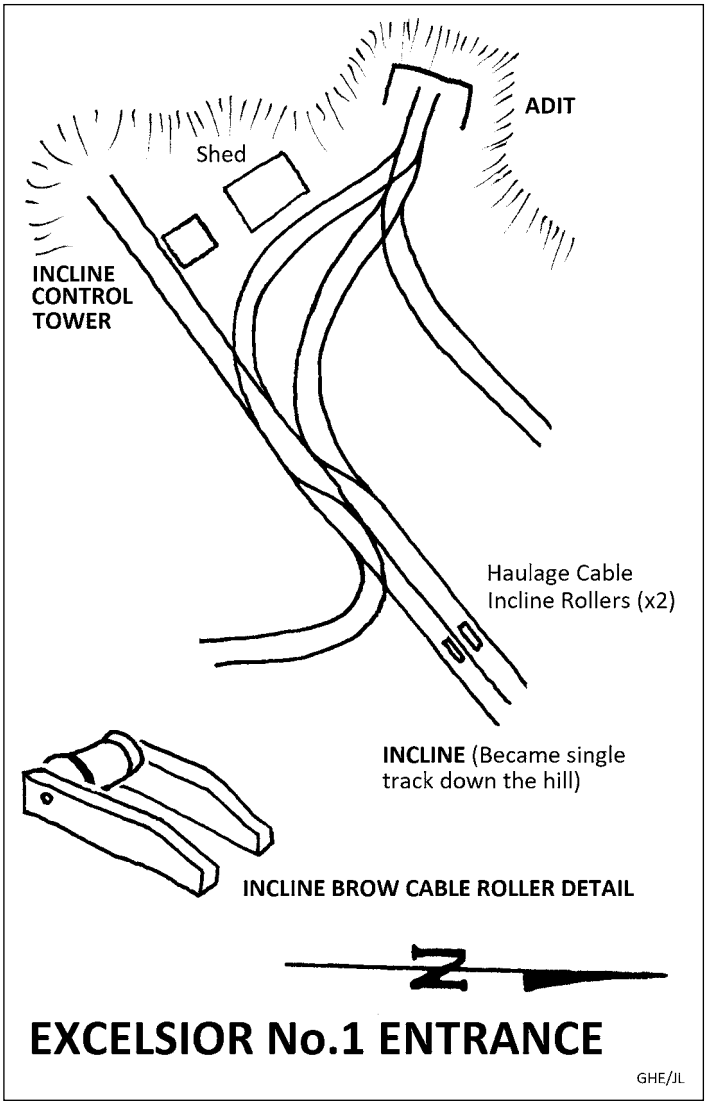
During May 1911, the company submitted a proposal to Bulli Shire Council to construct a subway for the skipway under the northern end of, presumably, Phillip St in Thirroul. It would cross the road at an angle of about 45 degrees, the roadway being 12 ft wide, and the subway to be about 8 ft wide. The outcome is unknown, but the skipway, 67 chains long, was in operation by the final week of April, 1911.[4]

One-ton capacity wooden skips were pulled out of the mine by a horse and on arriving at the surface were weighed on a weighbridge. A rake of three loaded skips was attached to a haulage rope, which was wrapped around a large haulage winch drum at the top of the decline, from where gravity lowered the skips down. The speed of the descending skips was regulated by a hand operated band brake fixed to the side of the winch drum. Steam for the steam powered winch was supplied by a Lancashire type boiler.

Looking north in the 'Up' direction along the Illawarra line with the Excelsior Colliery screens on the left and Thirroul North Signal Box on the right. The cliffs along the edge of the Illawarra Escarpment form a sharply defined skyline, undated, Photo: ARHS collection 053918



Left: *An early photograph of Excelsior No.1 Colliery pit top with the Illawarra Escarpment in the background. The colliery was close to the 400 ft level contour. Visible in the tunnel entrance is a skip of coal. Horses were used to move the full skips from the coal face to the surface yard. The building to the left of the tunnel may have housed the weighbridge scales. Further to the left, the winding mechanism for the main and tail incline haulage is located beneath the wooden tower. The top of the incline haulage is at lower right, from here the rail track ran down the hillside in a mainly north-easterly, then easterly direction to the screens at Kirton Siding beside the Government railway. The top portion of the decline consisted of four rails. The centre two rails were so close together that skips travelling on the two adjacent tracks would not have been able to pass each other. Vertical skip axle stops, before the two rollers, on the brow of the decline, were to prevent skips from running away down either track, An up-coming empty skip upon breasting the top of the incline was detached from the steel rope by a 'rope-boy' and spragged. A horse then pulled the skip back underground. The buildings and chimney at left rear may have been the mine's ventilation arrangement, Photo: Unkown source* ***Left below:*** *Location of the No. 1 colliery entrance below Bulli Lookout and town reservoir, and route of the skipway down to Kirton Siding, 1942, 1in:1mile military map, north to top.* ***Below:*** *Example of a 'Tommy Dodd' vertical roller to guide the haulage rope around a curve, behind the photographer, on the South Bulli Colliery decline. Photo: EA Downs* ***Right:*** *Plan of the adit area and top of the decline based on the above photograph.*



Worked on the direct haulage system, the single track 2 ft gauge skipway followed a somewhat meandering route down from the mine. So-called 'Tommy Dodd' vertical rollers kept the rope curving around the meanders. Descending the hillside flanks in a north-easterly direction for about a quarter mile, it then curved due east running along the top of a timbered ridge for about 10 chains, crossing on the level the road to the town water distribution reservoir. Heading north-easterly and before reaching Flanigans (or Flanagans) Creek a trailing connection led to a 100 ft long siding, turning west to serve an adit from which coal was extracted from the '4 ft Seam'. Flanigans Creek was crossed on a log bridge in two sections, each about 48 ft long, supported on random rubble abutments, soon after which Phillips Street, then a bush track was crossed, either by the subway or on the level. Skirting the hill slope for a quarter mile, a shallow cutting was entered after which a gaunt, spindly bridge of rough-hewn logs was crossed. Locally known as 'Skeleton Bridge' it was about 150 ft long and 40 ft high, crossing a tributary of Flanigans Creek. Retaining its steep down-grade and heading south-east the skipway passed along the southern slope of a foothill to the company screens at Kirton Siding.

At the mine, the Rope Boy would climb into the first empty skip that had come up the incline. When the rope slackened he would take it off the hook on the skip, and then climb out of the skip and sprag up the set.[5] The engine driver would judge when loaded skips had reached the lower terminus of the decline by the number of rope turns remaining on the winch drum. At the screens, the skips were un-clipped from the rope and individually run into balanced side-tipping tipplers. Each skip was restrained in its position by

angle irons fixed just above the wheels. Once back in its horizontal position, an incoming loaded skip pushed the empty one out of the tippler and took its place. The empty skip gravitated down round a curved track into the Clipping Shed ready to be re-attached to the haulage rope. Once a rake of six empty skips had accumulated, they were hauled back up the decline to the mine tunnel. The screen hands were in electric bell communication with the engine driver at the mine winch.

Being of only a single track meant that haulage could only be undertaken in one direction at a time, so limited the rate of coal transported to the screens. Nevertheless, the decline's maximum capacity was 250 tons per day. Miners employed on the contract system totalled 32, whom working the bord and pillar method of coal extraction were producing 120 tons per day.[6]

A decision to close No.1 colliery seems to have been taken during 1945. Electricity was discontinued during 1946; though a little output continued. The decline was last used in July 1946 for cinder coal.[7]

Excelsior No.2 Colliery

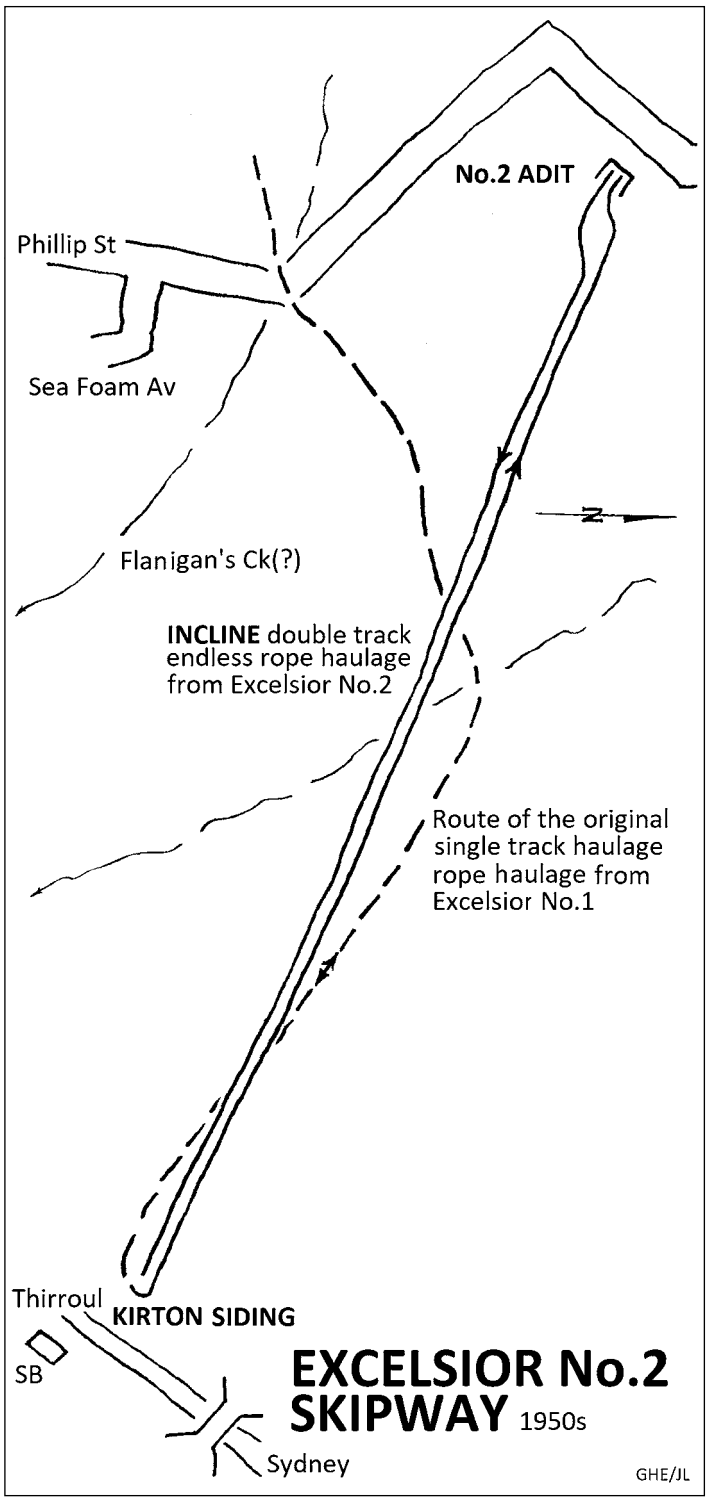
During August 1912 a new tunnel was begun on 'Maddens Farm' at the top of Phillip Street not far from J S Kirton's house. This new mine was to be known as Excelsior No.2 colliery and was to work the Bulli seam. Eight men were employed on this work, and Mr Rees Bevan was appointed manager. The new No.2 mine was completely separated from the old No.1 mine by a large basaltic dyke.

In November 1912 an application for a tramway from this new tunnel down the hillside to the screens at Kirton Siding was lodged.[8] This tramway was the same principle as that of No.1 colliery – direct haulage. The rope winch was driven by an electric motor installed near the tunnel entrance. A boiler house supplied steam to a compound engine that drove an electric generator producing AC current in the adjacent power house.

During January 1914 a new haulage engine was installed for the tunnel and £6000 was to be spent equipping the colliery.[9] While the two skipways might have been kept separate, they were combined near their bases with both feeding loaded skips into the same set of screens. Full skips descended from the mine by gravity directly to the screen house. Care had to be taken when skips were running over the lower section of the combined decline. A pointsman was suitably housed in a small cabin near the junction point to control traffic, and a 2-wire bell code system carried signals between the screen house and pointsman. An observer noted: 'the working of the rakes of skips, each at the end of a tail-rope [sic] and travelling at high speed, was extremely fascinating to watch.'[10]

A meeting of shareholders in the Excelsior Colliery Ltd in June 1917, resolved to voluntarily wind-up the company, and sell its assets for £85,000 fully-paid shares in a new undertaking the Excelsior Collieries and Coke Works Ltd, about to be formed with a nominal capital of £200,000 in £1 shares. Adding 'Coke' to the company name acknowledged that the mined coal was of excellent coke making quality.[11] It built no coke works in the Illawarra, but the company did take over the Broxburn Maitland Colliery, aka, Ebbw Main and New Greta Colliery in the Hunter Valley, and later the North Bulli Colliery, a few miles to the north of Excelsior Colliery.

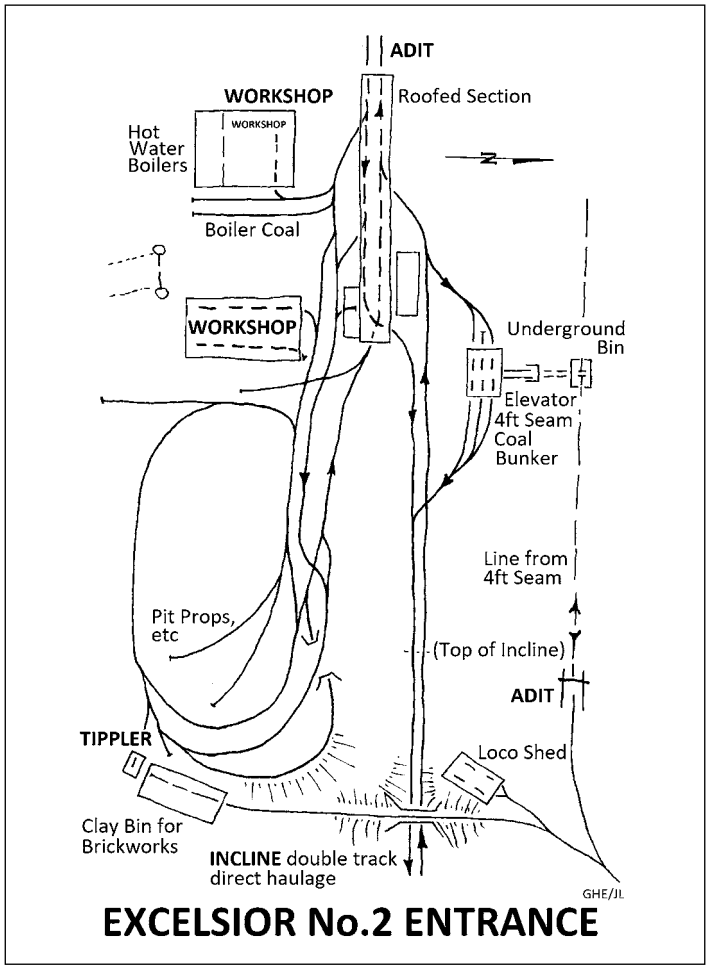
Tracks outside the No.2 tunnel were arranged in a series of circular loops with short dead-end spurs branching off to connect workshops, repair yard, store, and timber yard. Horses, under charge of 'wheelers' were used underground to pull the loaded skips to an endless rope haulage where young men – 'clippers' – clipped them onto the rope which brought them out to the surface. On arrival at the surface, other 'clippers' removed the skips from the rope and ran

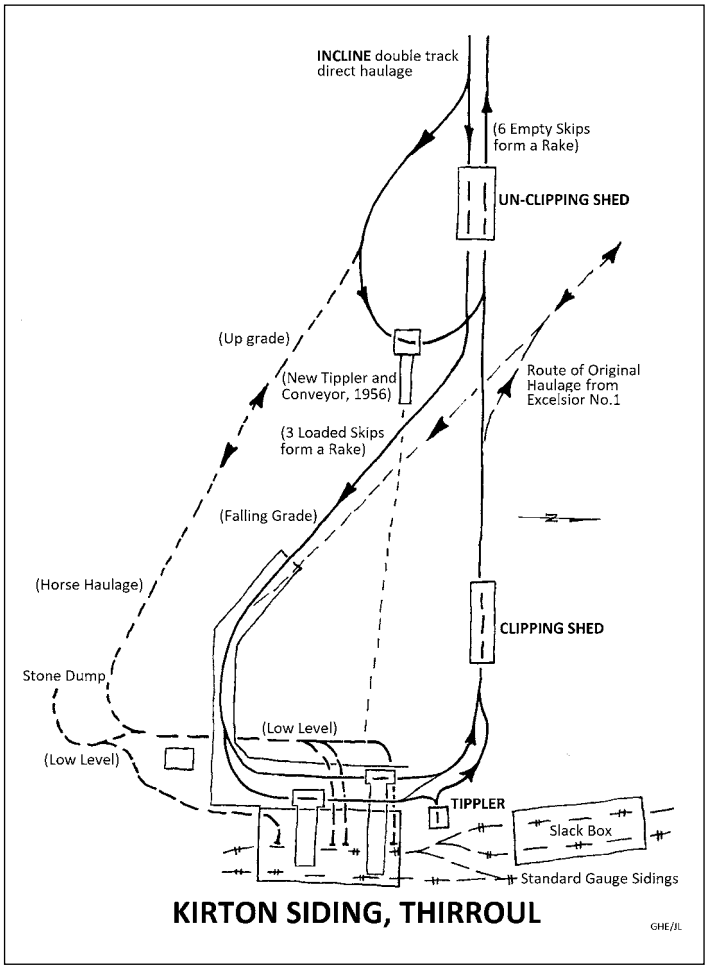


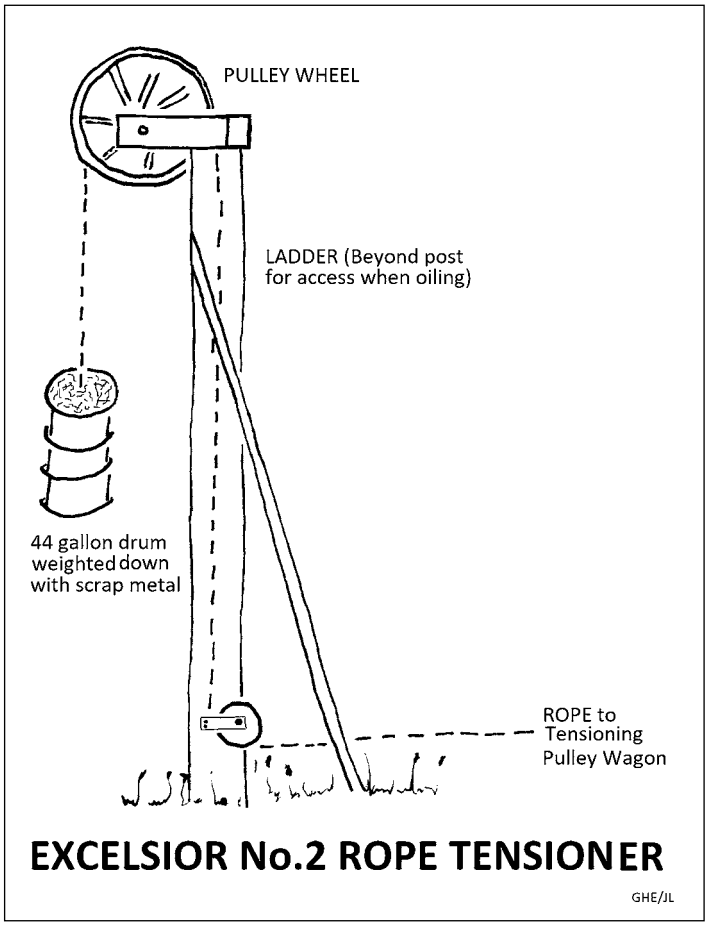
them over a weighbridge so their weight could be determined for the contract miner's pay. The skips were then attached to the rope on the decline for their journey down to the screens. Horse stables were situated about midway between No.1 and No.2 pits.

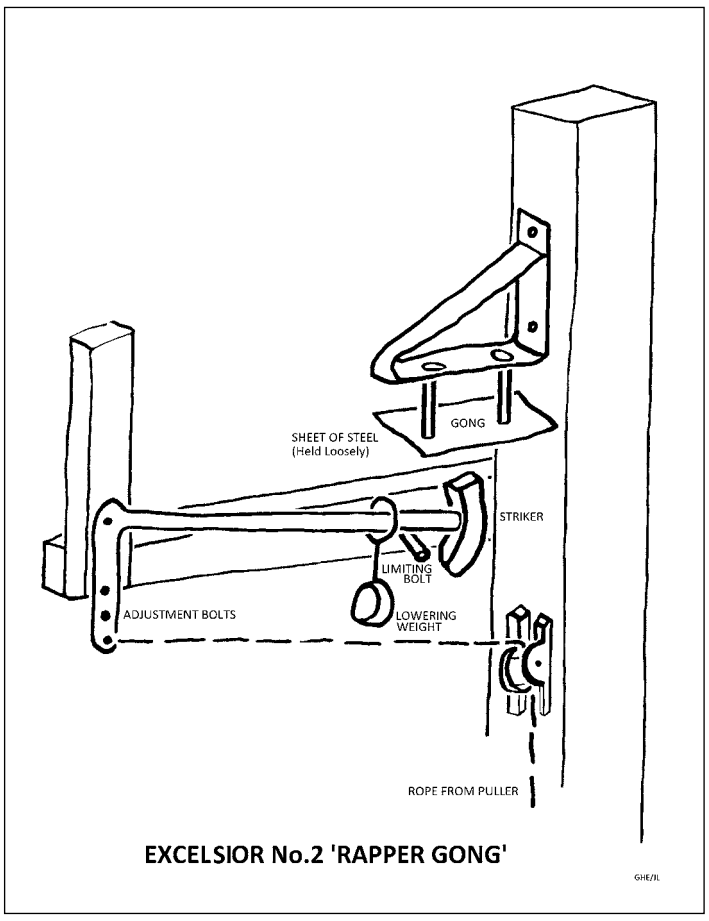
The Illawarra Fireclay and Brick Company of Bellambi were customers of the Excelsior mine, purchasing the coked coal (cinder) to generate gas for its brick kilns. This technique was highly successful.[12] Excelsior also supplied coal by tender to the Railway Department. As Thirroul locomotive depot was a neighbour, coal could be supplied at 14s 9d per ton delivered in company wagons directly to the coal stage.[13] In April 1938, 4000 tons of Excelsior coal was exported to Hong Kong via Port Kembla. During 1942 work began constructing a new endless rope haulage (as illustrated) to replace the direct haulage down to the screens. An embankment some 20 ft high was bulldozed into position on the hillside.[14]

Looking down the endless rope skipway from No.2 Colliery, 1953, Australian Coal, Shipping, Steel and the Harbour, 2 November 1953. There seems to have been a spill of coal covering the track for the descending full skips. Photo: Ross Mainwaring collection









Rapper Gongs varied in their detail arrangement. All operated in essentially the same manner. On pulling a length of wire, strung from convenient posts, a striker hit a loose metal plate suspended horizontally. Three types were recorded by GH Eardley in January 1956. Each number of strikes conveyed a different meaning.

Over the years two workers were killed by moving skips, which were mistakenly thought to be running on the other track, one in 1937 and the other in 1944. The November 1937 accident was due to carelessness by two men walking home down the No.2 colliery decline. They heard a full set coming from behind, but without looking they stepped across to No.1 skipway. The leading skip struck both men, with the surviving witness being struck in the back, thrown onto the skip, and carried along for 40 ft before he fell off to the side. The other man, John Wigham, was fatally injured. The colliery manager, John Daniel Bowdler stated there were warning notices along the skipway prohibiting walking along same.[15] The latter accident to Henry William McCauley was most unfortunate. He was a retired employee of 26 years standing and on this fatal day in March he visited the mine office on business. After leaving the office he was watching construction of the new incline when he was struck and killed by a moving set of skips on No.1 skipway.[16]

Colliery Modernisation

In around 1943, work started on opening a new adit, slightly lower than the No.2 tunnel to access the Balgownie seam (aka '4 ft Seam'). It was equipped with a line of wider gauge, 3 ft 6 in. A 5½ ton Atlas storage battery electric locomotive was imported from the USA to reduce the time spent by the miners walking to and from the coal faces, so increasing their output.[17] A train consisted of 12 cars, each with a capacity of 10 men. The distance to their workplaces was in excess of two miles. It was also proposed, but never accomplished, to use diesel locomotives pulling 10-ton mine cars to do away with the archaic endless rope haulage underground.

Due to changing over from steam to electricity the company offered to sell its surplus old steam plant including its heavy duty direct and endless double haulage equipment.

The new Balgownie working contained considerable quantities of excellent fireclay. A group of brick-kilns was established on-site just above the refuse and chitter dump. By 1953, working in combination and both mines operating one production shift per day, 38 pairs of miners were sending out 500 tons of coal per shift. Fifty pit horses hauled skips underground between working faces and arterial headings, where the skips were attached to an endless rope haulage for transport to the surface. The horses were stabled on the surface each night.[18] Back in August 1944, the men had struck over the smell of horses along the underground travelling road. As 1961 wound on, Jack Meehan, Colliery Blacksmith, saw fewer and fewer horses in need of shoeing.

During 1957, a new coal washery was built at Kirton Siding using machinery supplied by Parbury, Henty Ltd, an English company. This modern plant required an alteration to the skipway from Excelsior No.2 in that a new skip unloading bin was necessary. Coal also arrived at this bin by road transport from the company's two other mines (Excelsior B and North Bulli No.2) and two outside mines which sold their output to the Excelsior company. Washed coal was to be exported to Japan as a trial.[19]

Unfortunately commissioning of the washery and additional underground equipment came too late as due to a loss of export orders to Japan and domestic sales to the Port Kembla steelworks and Railways Department, closing the mine was announced at the end of August, 1961.[20] More than 200 men were given a month's notice of termination of employment. The mine was too old, and it was nearly three miles to the coal face, so could not compete with the more mechanised collieries with their more efficient transport systems. A handful of men (one with 45 years' service) were retained to clean up the site. The final act of closure was to brick in the tunnel portal, which was completed by 23 March 1962, and a Notice of Closure was sent to the NSW Department of Mines.[21]

Above: *Bricking up the mine portal with an Atlas battery electric locomotive standing by, March 1962, facebook, accessed 12 July 2023. (Some of the men in the photograph are gradually being identified by name – check facebook for latest results.)* ***Below:*** *An intact dry-stone wall supporting the No.1 skipway not far from the convergence points with No.2 skipway above Kirton Siding screens in May 2023, It has been 77 years since a set of coal skips passed this way. Photo: Ross Mainwaring*

Remains

The Excelsior No.1 skipway has mostly been obliterated at the mine end by housing estates. Layered accumulated coal is the only meagre clue in the dense bushland west of Phillip Street. Eastwards from there thick leaf litter conceals the formation until the cutting just before the 'skeleton bridge' is located. The spindly wooden bridge is long gone; but the section from here to the screens more easily reveals its presence by spilt coal.

The No.2 incline is slightly easier to trace by its broad, high embankment. The bridge across the same creek as crossed by No.1 skipway is long gone, leaving only a deep ravine. The screens at Kirton Siding were demolished and Thirroul yard track-work has been reconfigured. Locating most of the mine entrances has proved elusive, only discoloured mine water reveals their one-time presence. Thick forest and rehabilitation earthworks have obliterated most features of the mine site.

Top left: *Excelsior No.2 skipway at the lower end looking east towards Kirton Siding. This location was near where the pointsman had his cabin to change the points for No.1 (coming in from the left) or No.2 colliery haulage roads. Spilt coal defines the route through the scrub, April 2023, Photo: Ross Mainwaring* ***Left:*** *Excelsior No.2 skipway rail beside incline, April 2023. There are two fishbolt holes in each end. The rail measures 2 9/16in tall and 2 3/8in across the foot which equates with 20lb/yd BHP rail. Photo: Ross Mainwaring* ***Above:*** *Excelsior No.2 skipway haulage rope on the incline, April 2023. The rope was probably about 1 1/4in diameter when new. Photo: Ross Mainwaring*

Editor's Note:

The author of this article, Jim Longworth, has undertaken extensive research into the tramways and railways associated with a number of collieries in the Illawarra area of NSW. He is currently preparing this material to be included in a new book titled "Transporting the Black Diamond – Volume 2" that will be published by the ARHSnsw in due course. This book will be a follow up to the book titled "Transporting the Black Diamond – Volume 1" by Gifford Eardley published in 1968 and that has long been out of print. The new book covers all of the Illawarra Colliery railways not included in Gifford Eardley's 1968 book. If you can provide any assistance to Jim on material that could be included in the new book, please contact the Editor who will pass it on.

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Burra – 100 years old!

by Brad Johns

On 17 May 1923, a small 2 ft-gauge steam locomotive was ordered from R & W Hawthorn, Leslie and Co Ltd., Newcastle-on-Tyne in England, destined for the Corrimal Coal Company in NSW. That company had advised its requirements to its Australian agent, Austral Engineering Supply Co. Ltd of Kent Street in Sydney, who in turn had sent specifications to an English agent, Wanborough and Gunter, of Birmingham, who placed the order with Hawthorn Leslie. The locomotive, weighing just 7½ tons in working order, was an 0-4-0 saddle tank, builder's number 3574 and was to carry the name *Burra* (short for Kookaburra).

On 26 November 1923, after being shipped from the United Kingdom, *Burra* arrived at the Corrimal Colliery, seven km north of Wollongong, to start her working life in the Illawarra region. Joining several other locomotives, she operated on a one-mile-long coal skip haulage line along the 400 feet contour of the Illawarra escarpment. The tramway linked the mine entrance to the top of a self-acting incline that took the skips down the steep hillside.

After twenty years' use, *Burra's* boiler was in poor condition and a new boiler was ordered from Clyde Engineering Co in Sydney. Clyde Engineering received particulars of the new boiler on 12 December 1944 and engineering drawings of the new boiler were prepared and the boiler works commenced on 28 February 1945. It was noted that there were problems in the fabrication due to its small dimensions yet the Department of Labour and Industry required full-size steam fittings to be utilised. In April 1946 the boiler was tested and delivered to Corrimal.

With its new boiler, *Burra* was again in operation, from 1946 until 1965 when the 2 ft-gauge contour tramway was superceded by an incline. Also worth noting is that in March of 1964, Australian Iron & Steel (AIS) purchased the Corrimal Colliery; by this time *Burra* was in limited use at the mine entrance.

Above: Burra *in service at the ILRMS at Albion Park with its Clyde built boiler. Note the small Clyde Engineering builder's plate on the side of the smokebox. The company regularly did this for boilers it produced. Photo: Brad Johns* ***Below:*** *Builder's photo of* Burra *at the Hawthorn Leslie works at Newcastle-on-Tyne in the UK. Photo: Tyne and Wear Archives and Museums (via Flickr)*

On 30 August 1967, *Burra* was withdrawn from service at Corrimal and was transported to the diesel workshops at AIS, Port Kembla, to be prepared for static display. *Burra* was placed on display on 27 February 1968 at the AIS Visitors Centre where she remained for the next ten years until donated to the then recently-formed Illawarra Light Railway Museum Society.

On 1 December 1978, *Burra* arrived at her new home at the ILRMS, Albion Park, about 18 km south of Wollongong. Throughout 1979 and1980 dismantling proceeded for her overhaul

Above: Burra *working at Corrimal in the 1960s. Photo: Andrew Figg (lost Wollongong - Tumblr)* ***Below:*** Burra *on display at the AIS Visitor's Centre at Port Kembla before its transfer to the ILRMS in 1978. Photo: Brad Johns*

and restoration. This restoration turned out to be a long-term project as other works at the time had been going on within the ILRMS fleet that had interrupted the project. On returning to the restoration of *Burra*, there were significant work required to the cab, coal bunkers, new tubes in the boiler, and its reassembling. *Burra* went on to have the boiler steamed on 7 December 1994; the following year main line trials began. On Sunday 8 October 1995 *Burra* was officially recommissioned and welcomed into service at Albion Park as number 4 on the ILRMS steam fleet roster at a special ceremony.

After a quarter-of-a-century of operation at the ILRMS, it was noted that the water tank that had been constructed back in 1945, needed replacement due to rust particles within the tank clogging the water feed injectors. The ILRMS applied for and was successful with grant funding via Transport Heritage NSW to construct a new stainless steel water tank. Following its construction and fitting during 2023, the locomotive was repainted with a livery a shade darker than that applied in 1995. It is expected that *Burra* will re-enter service in October 2023 and it is planned that on Sunday 12 November 2023, at the ILRMS Operational Day, the ILRMS will celebrate the 100th anniversary since *Burra* arrived at Corrimal.

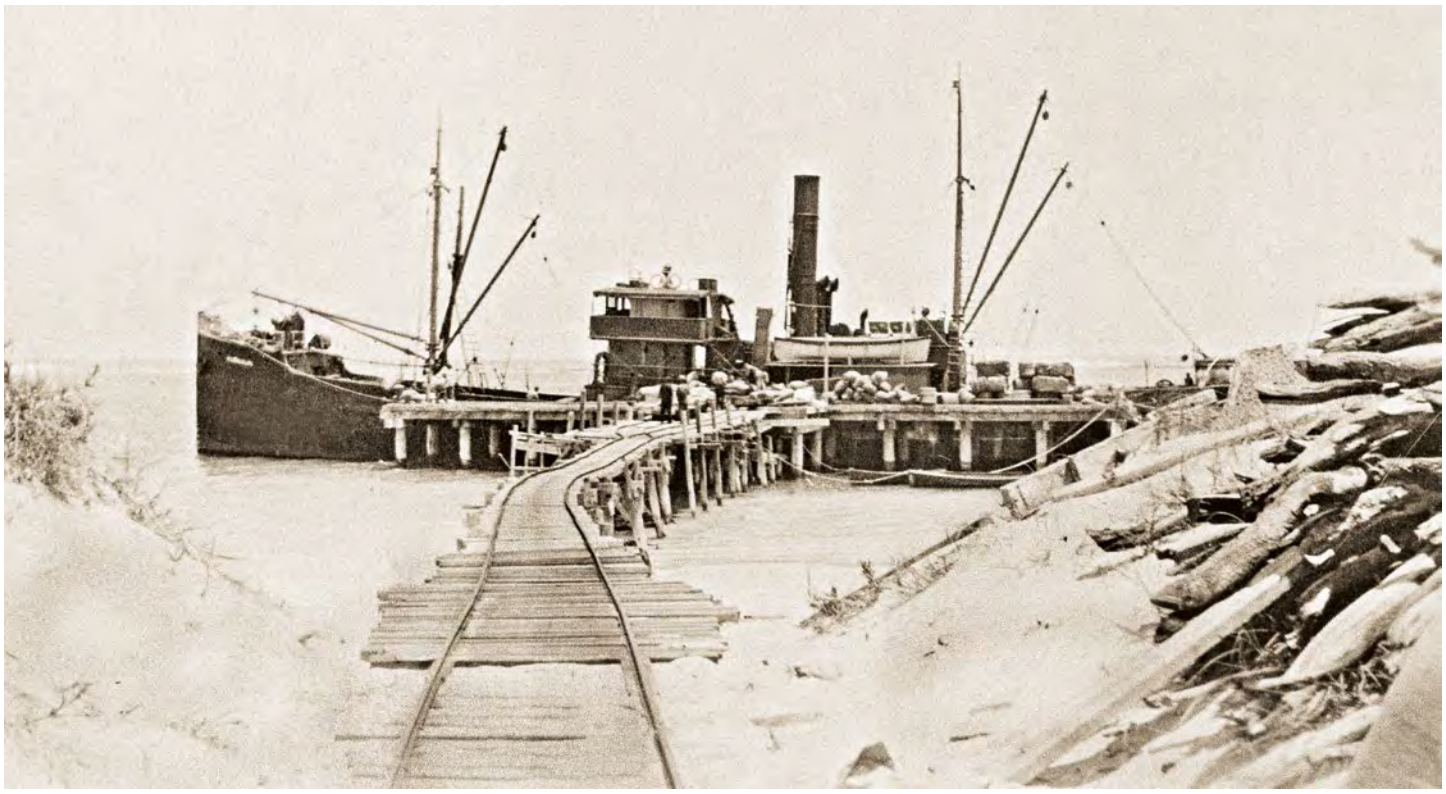
As a long-serving member of the ILRMS, I would like to acknowledge the works of the early members who negotiated with AIS for the donation of *Burra*. Also, I would like to acknowledge the late Ken McCarthy for recording in both *Light Railways* (especially No. 60, April 1978) and *Trolley Wire* magazines, the history of *Burra* and the Corrimal Colliery. I would also would like to acknowledge the management committee of the ILRMS for its support and dedication and to the project team that will now see *Burra* steam well into the future. Also, thank you to Transport Heritage Grants for making the new tank possible. Happy birthday *Burra*!

Photos page 27: Top left: Burra *at Albion Park in December 1994 when it was first steamed after restoration. Photo: Brad Johns* ***Top right:*** Burra *at the ILRMS at Albion Park fitted with its new tank in July 2023. Photo: Brad Johns* ***Centre right:*** Burra *after its new paint job at Albion Park in July 2023. Photo: Brad Johns*

Principal Dimensions.
Cylinders dia: 8 inches.
Cylinders stroke: 12 inches.
Wheels (Dia. of coupled): 2 feet.
Wheel-base - total: 4 feet.
Water capacity: 140 gallons.
Fuel capacity: 10 cubic feet = 0.23 tons.
Heating surface – total: 136.4 square feet.
Grate area: 2.95 square feet.
Working pressure: 160 lbs per square inch.
Total weight in working order: 7.46 tons.
Tractive force taking 90% of the w.p: 4608 lbs.
Tractive force taking 75% of the w.p. 3840 lbs.
Approximate shipping space: 614 cubic feet.
Approx gross weight packed for shipment: 6.875 tons.
Code Word: BURRA

WESTERN AUSTRALIAN JETTY TRAMWAYS – PART 1

Notes by Phil Rickard



Above: **Port Gregory.** *The earliest mention of salt harvesting in the area, north of Geraldton, is in 1853 when the brig* Hero *arrived in Singapore with a shipment of lead from the Geraldine mines plus a sample of salt from the Hutt Lagoon. The lagoon, some 16km long and up to 2½ km wide, is separated from the Indian Ocean by a narrow strip of land. Our photo shows the Port Gregory Salt Co's jetty in about 1923, that venture being the third in just a few years. The salt from the lagoon was processed and bagged on site and sent by a tramway about one km in length to this rickety jetty where we see the ss* Kurnalpi *loading. For more details see David Whiteford's article in* Light Railways *No.134, October 1996. Photo courtesy: State Library of WA, Image b4887431_4*

Below: **Wyndham.** *July 1927. Ambling across the tidal salt marshes, heading for the main jetty on Cambridge Gulf (just visible in the background),* Kate, *a much-travelled 0-4-0T (T Green b/n 132/1889) heads a lengthy train of some twenty trucks loaded with animal hides. They have come from the nearby meat works and are export loading for the mv* Kangaroo, *destined for Fremantle. Wyndham, over two thousand km north east of Perth, is the most northerly of WA's ports to have had a tramway. Originally having 2 ft-gauge on the 'town' jetty it, like several others, was replaced with a new jetty, 3 ft 6 in-gauge tracks and locomotives around the time of the Great War, coincidental with the rising export trade in beef. Photo: State Library of WA, Image b4743671_2*

***Above*: Cossack**. *In July 1886, in response to the requirement of Roebourne, the Pilbara's main administrative town, the WA government passed the Cossack-Roebourne Tramway Act. By mid-1887, a horse-powered 2 ft-gauge tramway, about 8½ miles in length, was completed, giving access to a rudimentary shipping place – Cossack. Unfortunately, it soon proved unsuitable for the increasingly larger vessels and in 1909 the tramline was extended five miles to a jetty at Point Samson. Steam locomotives were also introduced. By 1913, the Cossack stub was abandoned. Above, from the horse-drawn era, a 'train' is ready to depart Cossack for its 1¼ hour trip to Roebourne. See* Light Railways *Nos.52 and 57 for more details. Photo: State Library of WA, Image b3914867_3*

***Below:* Point Samson**. *As noted above, the Roebourne – Cossack Tramway was extended to Point Samson in 1909, junctioning half-a-mile from the declining port of Cossack. Concurrent with the opening of the Point Samson extension, control passed from the WAGR to the Western Australian PWD and an Orenstein & Koppel locomotive (b/n 2271/1906) was introduced in May 1909. It was joined by another O&K (2303/1907) in August 1911. Our delightful 1923 photo of Mr and Mrs Baron and daughter, posing with a loco (thought to be 2271) was taken just two years before the 1925 cyclone destroyed the jetty, leading to the locomotives being sent south. Behind Mrs Baron is a truck laden with wool bales, presumably for the docked vessel whilst a pile driver seems to be in position for undertaking repairs. Photo: Michael Terry, National Library of Australia, nla.obj-149052028*

INDUSTRIAL RAILWAY NEWS

Please send contributions to:
Industrial Railway News Editor: Christopher Hart
15 Dalrymple Street, Ingham 4850
Phone: (07) 47766294
email: industrial@lrrsa.org.au

Special thanks to contributors to the *Sugar Cane Trains/Navvy Pics 2ft* Facebook page.

QUEENSLAND

FAR NORTHERN MILLING PTY LTD, Mossman Mill
(see LR 292 p.32)
610 mm gauge
A cane bin toppled off road transport at the Port Douglas entrance roundabout on 20 July.
Douglas Shire News Newsport 20/7/2023

CAIRNS KURANDA RAIL SERVICES, Cairns
(see LR 289 p.30)
1067 mm gauge
This operation runs a fleet of ex-Emu Bay Railway Walkers B-B DH 11 class locos. 1101 (638 of 1970), 1105 (642 of 1970) and 1106 (658 of 1971) are in service for hauling bulk cement wagons between Pacific National's Woree yard and the Cement Australia siding near Cairns Station. 1101 was seen on this duty in mid-July and 1106 on 3 August. Also, at the depot are 1103 (640 of 1970) which will be refurbished and placed in service at some point in the future and 1102 (639 of 1970) which has been used as a spare parts reservoir.
Joseph Dietz 7/23; Klondyke Loco 7/23; William Thomson 7/23; Sean Stanton 8/23

MSF SUGAR LTD, Mulgrave Mill
(see LR 292 p.32)
610 mm gauge
After many years, Clyde 0-6-0DH 16 *Kamma* (56-96 of 1956) has finally had a bottom-end repaint and the front headstock is no longer in gray primer. Clyde 0-6-0DH 25 *Cucania* (63-289 of 1963) was spotted in the mill yard on 9 July and it has now been fitted with a Mulgrave Mill cab. Clyde 0-6-0DH 13 *Hambledon* (64-316 of 1964) was seen working the Redlynch area lines in mid-July and early August. The bodywork of Clyde 6-wheeled brake wagon BV18 (CQ132 of 1965) was repainted during the slack season. It has been painted yellow with a broad green band along the top and includes the unit's identity in fluorescent yellow against a black background on each side. It is paired up with Clyde 0-6-0DH 19 *Redlynch* (65-435 of 1965). Clyde 6-wheeled brake wagon BV19 (CQ1319 of 1969) was seen paired up with Walkers B-B DH *Gordonvale* (595 of 1968) early in August. An infilled wooden bridge exists on the Little Mulgrave line where the line runs in between the Mulgrave River and the Gillies Range Road.
Klondyke Loco 7/23; William Thomson 7/23; Doug Witteveen 7/23; Steven Jesser 8/23

MSF SUGAR LTD, South Johnstone Mill
(see LR 292 p.32)
610 mm gauge
EM Baldwin B-B DH 25 (6470.1 1.76 of 1976) is back in service following a rebuild during the slack season. It now has a Mulgrave Mill style cab and hood and carries the MSF Sugar green-over-yellow livery.
Luke Horniblow 8/23; Darren Smith 8/23

TULLY SUGAR LTD
(see LR 292 p.32)
610 mm gauge
Walkers B-B DH 9 (618 of 1969) collided with a haul out on 22 July. For the Tully Show on 28 July, the mill lined up most of its locomotives at the mill boundary fence for viewing by the passing public. The line-up consisted of EM Baldwin 0-4-0DH 1 (6/1082.3 2.65 of 1965), Com-Eng

Mossman Mill's Com-Eng 0-6-0DH multi-unit locos Douglas *(AL2562 of 1963) and* Faughy *(AL4190 of 1965) cross the South Mossman River at Junction bridge on the Wharf line on 2 August. Photo: Steven Jesser*

Mossman Mill's Com-Eng 0-6-0DH multi-unit locos Cook *(AL3372 of 1964) and* Ivy *(AL4181 of 1965) travel down Mill Street in Mossman on 2 August. Photo: Steven Jesser*

Cairns Kuranda Rail Services Walkers B-B DH 1101 (638 of 1970) crosses Draper Street in Portsmith with empty cement wagons for the Pacific National Woree rail yard in Cairns on 13 July. Photo: William Thomson

0-6-0DH multi-unit locos 11 (AD1347 of 1960) and 16 (AH4484 of 1964) and what appeared to be all of the Walker's B-B DH locos. Com-Eng 0-6-0DH locos 12 (AD1351 of 1961), 15 (AK3574 of 1964), and 17 (AH52100 of 1966) were sighted in storage during July. Multi-unit locos 11 and 16, resplendent in their new paint job, were seen in service during June and July. Walkers B-B DH 586 of 1968 was seen in the locomotive shed on 22 July and early August with its rebuild still underway.

Tully Sugar Limited 7/23; Mick-Jodi Hunt 7/23; Geoffrey Heritage 7/23; Brian Bouchardt 7/23; Luke Horniblow 6/23; Cindy Zulkarnain 7/23; Steven Jesser 8/23

SUGAR TERMINALS LTD, Lucinda

(see LR 290 p.32)

610 mm gauge

The QSL branding has disappeared from the sides of Com-Eng 0-6-0DH (G1023 of 1958).

William Thomson 7/23

WILMAR SUGAR (HERBERT) PTY LTD, Herbert River Mills

(see LR 292 p.32)

610 mm gauge

Macknade Mill's EM Baldwin 6-wheeled brake wagon MKD 2 (7065.5 6.77 of 1977) was transferred to Victoria Mill on 19 or 20 June and remained paired up with EM Baldwin B-B DH *Selkirk* (6750.1 8.76 of 1976). EM Baldwin B-B DH *Townsville II* (6400.2 4.76 of 1976) and EM Baldwin 6-wheeled brake wagon VRA 3 (4692.1 4.73 of 1973) were transferred to Macknade Mill from Victoria Mill on 20 June. Assembly of thirty-two new sugar bins and one hundred and fifty new 11-tonne bogie cane bins at the Macknade Mill truck shop commenced in July. The sugar bins are numbered in the 3XX series and will be used by both mills. The bogies for these were manufactured at Wilmar's Pioneer Mill workshop. The cane bins will be added to the Victoria Mill fleet. Victoria Mill's Wilmar B-B DH *Brisbane* (built in 2022) underwent trials early in the crushing season followed by a period of inactivity during part of July and into August. During this period, its Wilmar Pioneer Mill bogie brake wagon VRA 19 (built in 2022) was seen paired up with Walkers B-B DH *Clem H.McComiskie* (630 of 1969). Commissioning of the *Brisbane* recommenced during August.

Editor 6/23, 7/23, 8/23; Luke Horniblow 8/23; Wilmar Sugar Australia Linkedin website 8/23

WILMAR SUGAR (INVICTA) PTY LTD, Invicta Mill, Giru

(see LR 292 p.33)

610 mm gauge

Newly-rebuilt Walkers B-B DH *Giru* (625 of 1969) and its Invicta Mill bogie brake wagon *Giru* (built in 1994) were seen in service on 17 July. Invicta is crushing some cane from Inkerman Mill this year.

Jace Klaka 6/23; Luke Horniblow 7/23

WILMAR SUGAR PTY LTD, Pioneer Mill, Brandon

(see LR 292 p.33)

1067 mm gauge

Ex Plane Creek Mill Clyde 0-6-0DH D1 (56-101 of 1956) has been scrapped from the Wilmar locomotive storage area. Clyde 0-6-0DH *Maidavale* (62-266 of 1962) retains a Detroit Diesel 6-71 motor which is a rarity in the industry these days. Pioneer is crushing some cane from Inkerman Mill this year.

Jace Klaka 6/23; Brian Bouchardt 7/23; Luke Horniblow 7/23

WILMAR SUGAR PTY LTD, Inkerman Mill, Home Hill

(see LR 292 p.33)

610 mm gauge

The remains of Com-Eng 0-6-0DH *Alma* (FE56110 of 1975) have disappeared and are believed to have been scrapped. Cane from near the mill has been transported by road to the north side of the Burdekin River where it is loaded into rail bins for crushing at Pioneer Mill and Invicta Mill.

Jace Klaka 6/23; Brian Bouchardt 7/23; Josef Menich 7/23

Mulgrave Mill's Walkers B-B DH Mulgrave *(612 of 1969) alongside Parry Road on its way north on 2 August. Photo: Steven Jesser*

Mulgrave Mill's Clyde 0-6-0DH 18 Barron *(64-379 of 1964) crosses the QR catchpoints at Aloomba on 25 June. Photo: Doug Witteveen*

Above: *Marian Mill's Eimco B-B DH* Farleigh *(L254 of 1990) on the Pioneer River bridge at Mirani with empties for Castor on 10 July. Photo: Will Heinemann* ***Below:*** *Marian Mill's EM Baldwin B-B DH 16* Charlton *(9562.1 6.81 of 1981) crosses a wooden bridge in the Septimus area on 10 July. Photo: Thomas McIntosh*

WILMAR SUGAR (PROSERPINE) PTY LTD, Proserpine Mill
(see LR 292 p.34)
610 mm gauge
The Pioneer Mill bogie brake wagon built in 2022 and paired up with Walkers B-B DH 14 (681 of 1972) had been numbered 14 by 13 August.
Steven Jesser 8/23; Tom Badger 8/23

MACKAY SUGAR LTD, Mackay mills
(see LR 292 p.34)
610 mm gauge
Farleigh Mills EM Baldwin B-B DH *Foulden* (7220.1 6.77 of 1977) was out of service for most of August with its place at the mill being taken by Clyde 0-6-0DH *St Helens* (61-234 of 1961) from the Pleystowe Depot. Spare locomotive Clyde 0-6-0DH *Victoria Plains* (66-490 of 1966) replaced the *St Helens* at Pleystowe. Construction of the Walkerston Bypass between the Mackay Ring Road near Paget and the Peak Downs Highway west of Walkerston will include three new road overpasses of Mackay Sugar's cane railway network.
Steven Jesser 8/23; Big Rigs website 21/6/2023

Millaquin Mill's Bundaberg Foundry B-B DH Elliott *(002 of 1991) in Calavos on 1 July. Photo: Thomas McIntosh*

WILMAR SUGAR (PLANE CREEK) PTY LTD, Plane Creek Mill, Sarina
(see LR 292 p.34)
610 mm gauge
Former locomotive Clyde 0-6-0DH D1 (56-101 of 1956) has been scrapped from the Wilmar storage area at Pioneer Mill.
Luke Horniblow 7/23

BUNDABERG SUGAR LTD, Millaquin Mill
(see LR 292 p.34)
610 mm gauge
Tractors are used to haul bins from the full yard to the feeding station at the mill.
Ross Huntington 8/23; Ben Green 8/23

CENTRAL QUEENSLAND UNIVERSITY, Bundaberg campus
(see LR 258 p.26)
1067 mm gauge
The use of rail vehicles in simulated accident scenarios has been wound up and stock disposed of. Ex-Queensland Railways English Electric Australia Co-Co DE 1603 (A.064 of 1963) was moved to the North Bundaberg Railway Museum on 11 July. Ex-QR National Lander carriages MCS 1535 and MBS 1481 were scrapped on site in 2022 and MBC 1448 was moved to Maryborough Whistlestop on 12 July. MBS 1481 had been advertised for sale prior to scrapping.
Terry Oakley 9/22; 7NEWS Wide Bay 7/23; Graham Nicolson 7/23; Patrick Bourke 7/23

ISIS CENTRAL SUGAR MILL CO LTD
(see LR 292 p.34)
610 mm gauge
Walkers B-B DH locos 3 (600 of 1968) and 5 (617 of 1969) were servicing the Childers transloader on 12 July and 11 July respectively. The Wallaville line is back in use this year after experiencing problems last year which necessitated the use of road transport. Clyde 0-6-0DH 9 (75-812 of 1975) was seen stored in the mill yard on 1 August.
Bob Walker 6/23; Austin Harrison 7/23; Brian Bouchardt 7/23; Gavin Bidgood 8/23

DOWNER EDI, Maryborough
(see LR 290 p.34)
1067 mm gauge
Work's shunting locomotives Walkers B-B DH locos 1104 (641 of 1970) and DH73 *Hugh Boge* (718 of 1974) were seen at work on 29 June, 1 July and 17 July.
Bruce Saunders 6/23; Greg Bennett 7/23; Luke Horniblow 7/23

NEW SOUTH WALES

BLUESCOPE STEEL LTD, Port Kembla Steelworks
(see LR 292 p.35)
1435 mm gauge
Seen working at Cringila on 29 June were English Electric Australia Bo-Bo DE D27 (A-040 of 1960) and National Railway Equipment Bo-Bo DE PB3 (209-PB3 of 2014). D27 and General Electric Australia Bo-Bo DE D40 (A-241 of 1972) were seen at their depot on 8 August.
Brad Peadon 6/23, 8/23

GOULBURN RAIL HERITAGE CENTRE, Goulburn
(see LR 263 p.30)
1435 mm gauge
Seen stored here on 30 May were Walkers B-B DH 7319 (678 of 1972) and Goninan Bo-Bo DE (024 of 1967). The latter was ex-Manildra Shoalhaven Starches, Bomaderry at an unknown date and originally D2 at Southern Portland Cement, Berrima.
Gregorio Bortolussi 5/23; John Browning 8/23

MANILDRA SHOALHAVEN STARCHES PTY LTD, Bomaderry
(see LR 291 p.35)
1435 mm gauge
Goninan Bo-Bo DE (024 of 1967), previously here, was spotted stored at Goulburn Rail Heritage Centre, Goulburn on 30 May.
Gregorio Bortolussi 5/23

MANILDRA NAMOI FLOUR MILLS, Gunnedah
(see LR 279 p.36)
1435mm gauge
Clyde Co-Co DE MM02 (64-342 of 1964) was seen out in the open at Gunnedah on 23 June.
Phil Harrison 6/23

MANILDRA FLOUR MILLS PTY LTD, Manildra
(see LR 292 p.35)
1435 mm gauge
The incorrect builder's number was given for Goninan Bo-Bo DE MM03 in the previous issue. It is 015 and not 4970.
John Browning 8/23

VICTORIA

Traralgon
762 mm gauge
Four 762mm gauge diesel tunneling locomotives were noted in December 2022 stored on a pair of semi-trailer vehicles in the Traralgon area. Three were built by FM Baldwin Engineers in Sydney, originally to 610 mm

Above: *Four 4wDH tunnelling locos stored on semi-trailers in the Traralgon area on 29 December. Two are FM Baldwin model 8T294 built in 1994, one is FM Baldwin model 12TRA295 built in 1995 and one is Clayton Equipment (UK) B1864E of 1979. Photo: Jack Daly* ***Below:*** *Goninan Bo-Bo DE 49 (013 of 1961) at Cockburn Cement in Parkeston on 11 August. Photo: Barry Trudgett*

gauge. Two are 4wDH built in 1994 (FMB model 8T294). They were weighted up from 8-tonnes to 11-tonnes when rebuilt by OnTrak Engineering in Sydney in 2004. The third FM Baldwin unit is a 4wDH 12-tonne rack/adhesion locomotive (FMB model 12TRA295) built in 1995. The other locomotive is a 4wDH from Clayton Equipment (UK), B1864E of 1979, originally supplied to an agent in the USA. In 1995, all four locomotives were at work on the Katoomba - Lawson - Hazelbrook sewerage tunnel construction in NSW for the McConnell Dowell Australia - Obayashi Joint Venture. They came together again in 2007 when used by McConnell Dowell Constructors on the Bogong Hydro-Electric Scheme in Victoria. They were acquired by the present owner in Melbourne following the end of that contract.

Jack Daly 6/23; John Browning 8/23

WESTERN AUSTRALIA

COCKBURN CEMENT LTD, Parkeston

(see LR 269 p.38)

1435 mm gauge

Goninan Bo-Bo DE 49 (013 of 1961) was in use here on 27 September and 11 July. Goninan Bo-Bo DE 50 (014 of 1961) has continued as a spare parts locomotive and by 11 August, both hoods and their internals had been removed. Both of these locomotives were formerly at BHP's Newcastle Steelworks.

Kieran Wright 9/22; Barry Trudgett 7/23

OVERSEAS

FIJI SUGAR CORPORATION

(see LR 292 p.35)

610 mm gauge

Both sides of the Fijian government have agreed that rail is the cheaper method of transporting cane to the mills. Once another study is completed, reviving of the rail system in areas where the cost of transportation is a major factor will begin. There is an allocation in the budget for more chopped cane bins. At Labasa Mill, damage was incurred to the wooden transoms of the Qawa River bridge in an empty cane truck derailment early in August.

Also early in August, Clyde 0-6-0DH 21 (64-385 of 1964) was derailed at a set of points. Two Clyde 0-6-0DH locos were at Nasea Levu on 13 August. Clyde 0-6-0DH 8 (DHI-8 of 1955) was seen bringing in a rake of chopped cane bins and whole stalk trucks around 1 July.

FBC News 15/7/2023; Ravendra Venktaiya 8/23

SITE VISITS IN SYDNEY

by David Jehan

In an effort to tear people away from their computer screens and get them out into the real world, the NSW Division has recently been able to facilitate visits to two former industrial sites in Sydney.

Balls Head Coal Loader and Quarantine Boat Station, Sydney Harbour

On 20 June 2023 twenty LRRSA members and friends inspected these facilities at the invitation of North Sydney Council. The tour was conducted by Mr David Banbury - Project Manager, North Sydney Council and Professor Max Irvine – Structural Engineer, PMI Engineers.

The key function of the coal loader was to transfer coal from small coastal vessels to the large ocean-going ships, which were the key operation of the Union Steam Ship Company, operating world-wide.

A unique part of this operation was a cable tramway out-loading system which commenced operations in 1923. This system was designed and constructed by Mead Morrison of Chicago, USA. Its track was laid to the narrow gauge of 20 in, with light weight 35 lb rails. While this was possibly the smallest commercial size available, the tramway hoppers were of substantial size with a capacity of 4 tons each. Initially 34 hoppers were provided but one was set aside to use if one of the others needed repairs. The 33 hoppers in use allowed ships to be loaded at a rate of about 900 tons per hour.

The cable tramway was powered by a 125 hp 450 V General Electric motor, and each hopper car was equipped with a grip mechanism that gripped the cable between the rails under the hopper. The process was automatic, although there was a manual grip lever on each car, for use in emergencies.

One hopper car remains onsite at Balls Head (No.6), restored by North Sydney Council along with a travelling feeder. Two other hoppers (Nos 24 and 31) are preserved at ILRMS at Albion Park.

The cable tramway was replaced by a conveyer system in 1976 and operations continued until 1992. The site now operates as the Coal Loader Centre for Sustainability, under the control of North Sydney Council.

The group also visited the nearby Quarantine Boat Station where remnants of a short narrow-gauge tramway which used a four wheel flat top wagon to move materials from the jetty to the facility was seen.

Above left: *The base and underside of the surviving travelling feeder, perched under the roof of Tunnel No.1 on its wheels and hopper No.6 on the floor under the feeder showing the cable grip mechanism.* ***Left:*** *General view of the Balls Head Coal Loader where the coal was stored prior to being loaded into the cable tramway located in tunnels below for transfer into large ocean-going ships.* ***Above:*** *Interior of the coal unloading facility located above the boilers at the Ryde Pumping Station now restored by Sydney Water.*

Ryde Pumping Station, West Ryde

On 17 July 2023 fifteen LRRSA members and friends inspected these facilities at the invitation of Sydney Water, noting negotiations for this visit had commenced in 2019 just prior to the Covid-19 lock-downs. The tour was conducted by Mr Phil Bennett - Lead Heritage Adviser, Sydney Water and his assistant.

Ryde Water Pumping Station No.2 was opened in 1921 and was originally powered by steam until its conversion to electric power in 1976-81. At its completion Ryde Water Pumping Station No.2 was the largest water pumping station in Australia. While much of the plant and equipment has been removed and replaced, the boiler house and its coal unloading facility remains intact.

The pumping station was supplied with coal by rail via a standard gauge connection with NSWGR at West Ryde. The Metropolitan Board of Water Supply and Sewerage, as it was known, had its own small fleet of locomotives which then shunted coal wagons up and into the unloading facility which fed the large boilers below.

Ryde Pumping Station is listed on the New South Wales State Heritage Register and received an Engineering Heritage National Marker from Engineers Australia as part of its Engineering Heritage Recognition Program.

Left: *Exterior of the Ryde Pumping Station showing the main building which houses the pumping machinery which services a large part of Sydney with drinking water.* ***Below:*** *LRRSA members and friends at the Ryde Pumping Station showing the concrete viaduct and boiler house in the background. Photos: David Jehan & Ross Patterson*

Ebb and flow – Beech Forest rail traffic patterns (LR 291)

It has been very interesting to me to read the well-written article by Norman Houghton on Beech Forest in the June 2023 issue of *Light Railways.*

My wife and I served with the Bush Church Aid Society of the Church of England as the local minister there from March 1955 to August 1961 (seven winters!). I know the place well. I had ten centres in which I conducted services with most of the Great Ocean Road in my territory.

I did 156,000 miles (equivalent to 6 ½ times around the Earth) on those roads which were then on the old Country Roads Board standard of 20 bends to the mile on a 1 in 20 grade.

In the photo "Main St looking west", the butcher's shop on the left was still in action with Peter and Jack Deppeler in charge. The old 'Club' building was long gone, but the corrugated iron building was being used as a garage.

I still keep in touch with some of the people from Beech Forest and along the Ridge who are now mostly retired and living in Colac.

The vicarage was in Southern Street, just down from the spot where the rail came up and around to go into the station grounds near the back of the Shire Hall.

(Rev) Thomas F Morgan
Romsey, Victoria

Maylands Brickworks (LR 291)

Looking at the available evidence, the suggestion that Metropolitan Brick constructed home-made locomotives because its F.C.Hibberd "Planet" locomotives had been found to be underpowered for the work could be a little off the mark.

Following its introduction to Perth by Lou Whiteman in 1937, the "Y" class Planet locomotive became the standard type used in local clay pits. Three were purchased by Metropolitan Brick in 1950-1951 for its Maylands and Helena Vale brickworks and worked at these locations successfully until replaced by the locally-built machines. It seems that the Planets were well thought of because in ARHS Bulletin 377 (October 1969), Ted Woodland, a Perth local, said that they were ideal for the type of work required at Maylands, which was hauling six loaded wagons from the clay pit to the bottom of an incline. This is difficult to reconcile with Geoff Murdoch's 1973 statement, following the replacement of the Planets, that at Maylands they were "grossly underpowered" for their task of hauling a rake of six loaded trucks.

The first of the three new locomotives was probably constructed in 1970. Early that year one, apparently not quite finished off, was photographed in use during an ARHS visit. Geoff Murdoch reported that two were in use at Maylands in 1973. This suggests either that the third had not yet been built or that it was in use at Helena Vale. Helena Vale brickworks reportedly closed in June 1974. The three locally-built locomotives were superficially similar to the Planets and each had subtly different features as demonstrated by Mitchell Henderson-Miller at https://maylandsbrickworks.blogspot.com/ This online source contains some very interesting information about the Maylands brickworks and its rail operations.

The Holden 186 engine fitted to the new locomotives was approximately twice as powerful as the Ford 10 fitted to the Planets but it appears that the new units were only expected to haul up to 10 loaded wagons.

The obvious solution to locomotives judged to be underpowered is to fit larger engines and yet this was not done over a period of nearly 20 years. I would suggest that the new locomotives were built because the original Planets were substantially worn out after 20 years' service working in harsh conditions. Their light construction may well have resulted in ongoing wear and tear issues affecting the chassis, reflected by the fact that gusset strengtheners had been fitted in the side channel members of the frame. A discarded Maylands Planet chassis I observed at the Bennett Brook Railway some years ago had a broken back. Interestingly, Whiteman Brick also resorted to building replacements for their Planet locomotives in-house at about the same time as Metropolitan Brick.

I would love to see a comprehensive history of the three Perth locomotive-worked brickworks lines published at some time in the future.

John Browning
Annerley, Q.


"PLANET" 8 h.p.

PETROL or DIESEL

LOCOMOTIVE

WEIGHT 1½ TONS

GAUGE 18"-30"

LENGTH 8' 0"

MIN. CURVE 20' 0"

Wheel Base	2' 6"
Wheel Diameter	15"
Fuel Tank Capacity	4 galls.
Buffer Height	13" to 16"
Max. Width	3' 6"
Min. weight of Rail	10 lbs./yd.

ENGINE: Four-cylinder British Petrol side-valve, pressure-type lubrication to main crankshaft and con-rod bearings. Thermo-syphon cooling assisted by fan and radiator. Coil and battery ignition as standard.

CLUTCH: Single dry plate with very low unit pressure.

GEARBOX: 3-speed synchro-mesh in unit construction with reverse box giving equal speeds in either direction.

AXLEBOXES: Cast iron with roller bearings in renewable liners, supported in heavy horn guides with volute springs to give flexibility on uneven track.

WHEELS AND AXLES: Chilled iron wheels, 15" diameter on tread.

BRAKE: Operating on all wheels.

BUFFING AND DRAWGEAR: Standard type comprises central link buffer with spring fender.

CAB (with roof) Not fitted as standard but can be supplied at extra cost.

PERFORMANCE

Speed in M.P.H. at normal engine revs. 1,500 R.P.M.	Tractive effort in lbs. at rail.	Haulage capacity behind draw-bar in tons up gradients on straight track (rolling resistance taken at 22 lbs./ton).					
		Level	1/200	1/100	1/80	1/50	1/30
2½	670	28	20	14	12	8	5
4½	455	19	13	9	8	5	3
8½	274	11	7	5	4	3	1½

The above figures are suitable at Sea Level, with Temperature at 80°F. Mechanical Efficiency taken at 80%.

APPROX. SHIPPING SPECIFICATION (18"-30" gauge):

ONE CASE. NETT WEIGHT: 1 TON, 10 CWT. KILOS 1525. GROSS WEIGHT: 1 TON, 17 CWT. KILOS 1882

THE ABOVE MODEL CAN BE SUPPLIED AS FOLLOWS:—

PETROL—10 H.P. DIESEL—5/8 H.P. and 7/9 H.P. DETAILS ON APPLICATION.

4

Looking Back – Ocean Island or Nauru (LR292)

I have just read Looking Back in LR 292 that featured the question "Ocean Island or Nauru?. The photos are superb, even if the locations are not known.

I was a little surprised to see, in the top photo on page 31, the term "crossover" used. A crossover connects two parallel tracks - the object in the photo is a "crossing". But what interests me most, and is not mentioned, was that the crossing appears to have no flangeways for traffic heading left-to-right across the photo. Would trucks be "bumped" up and over the running rails when travelling across the image?

John Dennis
Via email

2022 JLN Southern Award

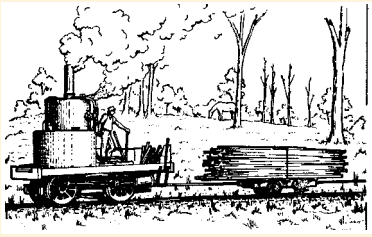
The three judges reported that, as ever, *Light Railways* has had another great year, with many excellent articles, covering a variety of themes. Along with the Zoom meetings, the magazine binds the society together across Australia and worldwide. *Light Railways* also carries our history message to the wider Australian community. The Judges also advised that they consider doing the judging of the JLN Southern Award is both an honour and a responsibility.

After rating the criteria, the top-scoring article was Mike McCarthy's 'Red Cliffs pumping station light railway' that was published in both *LR* 283 and 284. It covered the technical aspects and history thoroughly, and had an outstanding coverage of the importance to Victoria's economy. Water supply is even more vital today than when the tramway was operating, and floods are still making headlines.

The judges also commended Ross Mainwaring and the editorial team for bringing John Shoebridge's article on the Tomago coal field "Failed dreams and broken promises" to completion posthumously.

We applaud Mike McCarthy on taking out the award for 2022 and thank our judges, Dr Ruth Kerr, Roderick Smith and David Whiteford, once again, for their efforts in assessing the work of the many contributors.

The award was established through the generosity of well-known Australian railway historian, the late Jack Southern, and was first presented in 2014 to recognise the most outstanding article published during each calendar year.



LRRSA NEWS

MEETINGS

LRRSA members' Online meetings

The LRRSA holds regular members meetings Online via Zoom conferencing on the dates below. Members wishing to "virtually" attend will need to pre-register by responding to an email inviting you to attend or via our website lrrsa.org.au. After registration, details of how to join the meeting will be provided by email closer to the various dates. Dates not suit? Presentations are available on Youtube a couple of weeks after each meeting. Why not check our website for links to past presentations?

October 2023 members' Zoom meeting – 1972 ARE Visit to Indonesia

Date: Thursday 12 October 2023 at 8.00pm AEDT

Continuing the Indonesian theme of the past couple of meetings; in August 1972 the Australian Association of Railway Enthusiasts ran two 3-week tours to Java, Madura and Sumatra. At that time Indonesia was alive with an amazing variety of steam locomotives. Frank Stamford was on the first of these tours and will present photographs and commentary on some of the highlights of the extensive visit.

Subjects covered will include: Surabaya Steam Tram, other steam trams, Cepu Forestry Railway locomotives, Mallets in the mountains, Ambarawa Rack Railway, elderly and odd locomotives, West Sumatra rack railway, oil palm railways, North Sumatra Railway, and others. Certain to be a fascinating 'tour'!

December 2023 members' Zoom meeting – Clyde Engineering Company Limited

Date: Thursday 14 December 2023 at 8.00pm AEDT

David Jehan will present on the Clyde Engineering Company Limited which was registered on 30 September 1898 in New South Wales. It was one of the iconic Australian engineering firms whose history spanned just over a century and was one of the few locomotive and rolling stock builders in the world that transitioned from steam to diesel to electric traction.

The talk will cover the first five decades of the company's operation, which is best described as the "steam era". During this period, which covers two world wars and the great depression, the range of products made was exceptional.

The company built 533 steam locomotives mainly for the railways of NSW, but also for most states in Australia. They also built and overhauled steam locomotives and boilers for numerous private operators.

Brisbane: "No meeting"

It has been decided to cancel the Brisbane meetings until further notice. But why not join us online for a meeting via Zoom?

Sydney: Development of the Lithgow State Mine Heritage Park

Ray Christison will talk on the development of the Lithgow State Mine Heritage Park from 1990 to the present time. A brief history of the NSW Western Coalfield and abandoned industrial sites in Lithgow along with town's cultural heritage tourism will be discussed. The museum has an extensive collection of light railway and industrial railway heritage and the challenges of conserving such collections will be recounted. Ray has been long associated with the museum and is a noted author of Lithgow mining history books. Certain to be a fascinating evening!

Location: Club Burwood RSL, 96 Shaftesbury Road, Burwood, in the 'Private Room', Brasserie Restaurant. Free parking in RSL car park. Only 10 minutes easy walk from Burwood railway station. Please contact Ross (0415995304) or David (0400347127) if you need to be signed in upon arrival. It is highly recommended to arrive early and enjoy a meal with other LRRSA members.

Date: Wednesday 25 October 2023 at 7:30pm AEDT

Melbourne: "No meeting"

Online meetings via Zoom will be hosted from Melbourne and will feature presenters from far and wide. See details at top of this list.

Adelaide: "Bi-monthly meeting"

The next meeting will include a discussion on the video of NZ rail including Glenbrook and rail carting by John Meredith. Also, Roland Earl will present on the Eritrean railways. Any news of light rail matters – particularly in SA, NT and the Broken Hill area – is welcome. As accommodation is limited, interested persons should contact Les Howard at sa_group@lrrsa.org.au for details if you have not been to a meeting before. A small but friendly group!

Location: 1 Kindergarten Drive, Hawthorndene

Date: Thursday, 28 September 2023 at 7.30 pm CT

Thorald Bruce Macdonald OAM

29 January 1928 – 22 June 2023

It was with great sadness that in LR 292 we announced the passing of Bruce Macdonald OAM on 22 June at the age of 95. Surely Australia's most notable engineering and light railway preservationist, he was a mechanical engineer with an extensive practical knowledge of steam machinery, and a deep appreciation of its history. His legacy extends far wider than the field of light railways and includes mainline steam, steam trams, traction engines, stationary engines, and O gauge model trains. He also contributed to the history of light railways in Australia in his professional life.

Bruce Macdonald, founder and curator of the Marsden Museum of Historic Engines, Goulburn, on the footplate of John Fowler 16089 on 6 February 1972. Photo: Leon Oberg

Bruce was an only child who was brought up in Strathfield. His father was a NSWGR guard. Unusually, although not a Catholic, Bruce was educated by the Christian Brothers at Strathfield. He took pride in his convict ancestry with two of his convict forebears reputed to be the first white couple to be married after the arrival of the First Fleet at Sydney Cove. Another ancestor, his great grandfather, was a convict assigned to the Haydons at Murrurundi in 1832.

After leaving school Bruce started work in 1944 as an apprentice toolmaker with Australia's largest forging business. His employer recognised his potential and he was propelled through various positions and tertiary education to finally become the company's development engineer responsible for technical innovation.

In 1948 he met the love of his life Dorothy (Dot), and they married in 1949. They had four children, Ian, David, Neil and Heather. Dot, his inseparable companion, passed away in February 2009, aged 80.

Bruce had joined the fledgling ARHS at the age of 16. He quickly took an interest in more than mainline railways and steam trams. One of his early memories of industrial railways was of the brickworks incline at Brookvale. He soon realised that industry and construction were areas where superannuated locomotive relics were to be found and in 1952, at the age of 24, he arranged for two such items, Baldwin steam tram motor 84 (owned by the Railway Construction Branch) and Z16 class 4-4-0 1630 (then with Nepean Sand & Gravel at Yarramundi) to be donated to the ARHS for preservation. The offer was not able to be accepted and both locomotives were scrapped.

This experience must have fired Bruce to greater efforts because in 1953 he personally acquired one of the ComEng works shunters, Baldwin steam tram motor 103A, and moved it to his back yard in Strathfield, restoring it to operating condition. It can now be seen operating at the Valley Heights Rail Museum.

Bruce's interest was not just practical but extended to history. He described this, which he called "a true love of railways" most eloquently in the Introduction to his book *Iron Work Horses.* He wasted little time in developing his knowledge, corresponding widely, collecting photos, documentation, and anecdotes, and making field trips. Jim Longworth points out that Bruce's 1956 publication *Blue Metal and River Stones: A Synopsis on Quarry Railways* was arguably the seminal work in recording the history of industrial railways in Australia. It was produced in a time frame of six weeks, obviously only possible because of prior years of patient research and study. Bruce's first article in the ARHS *Bulletin* appeared in 1967 and dealt with the Federal Capital construction railways of Canberra. His early letters to the

Bulletin and *Light Railways* were about industrial railway locomotives and in 1970 his magisterial *Krauss Locomotives in Australia* (written with Charlie Small) appeared in the *Bulletin*. He later updated this in LR 153 in 2000 as *Krauss Locomotives in Australia: A close look at their characteristics and an overview of their migrations.* It was his 1968 suggestion that was the catalyst for the Victorian Light Railway Research Society to become the LRRSA.

In the meantime, he had been far from idle in terms of steam preservation. In 1957, he became aware of the survival of the 1883 Appleby beam engine at the Goulburn Waterworks pumping station. Camping out on site with a colleague, many hours were spent in a voluntary capacity working on its restoration. "We came down one weekend a month to undo about 40 years of accumulated neglect," was how Bruce later put it. The beam engine was steamed again for the first time in 40 years in 1958. There is little doubt that without Bruce's dedication and skill, the engine and very likely the buildings themselves would have been lost in the ensuing years. The engine is now the only operational beam engine in Australia that remains in its original location.

Bruce's professional life took an interesting turn in July 1961 when he began to work for Arthur Esgate, a colourful figure who had started up a machinery agency known as "Transport & Industrial Index". Bruce himself had suggested the "Index" name in a conversation with Esgate in 1960 and was hired to handle liaison with customers. Bruce was a friend of Ernest Baldwin, another steam enthusiast, and as a result in 1962 was responsible for giving E.M.Baldwin & Sons the opportunity to launch into locomotive work in producing a small cane locomotive that Esgate had obtained an order for. Contact with the sugar industry made Bruce increasingly aware of the rapidity of dieselisation and the of large numbers of narrow gauge steam locomotives made redundant as a result.

Bruce soon tired of what he considered to be Esgate's unethical business practices and in August 1962 set up his own agency "Industrial, Mechanical & Contracting Equipment". During its brief period of existence he dealt in ex-Snowy Mountains Scheme rail equipment and sent locomotive work to E.M.Baldwin & Sons before rejoining Australian National Industries in late 1963. In 1966 he was appointed Sales Engineer with E.M.Baldwin at Castle Hill and reputedly was active in promoting the bogie locomotive concept for canefield use.

As a fervent steam man, Bruce later reflected on the irony that in this period his various employments forced him to be involved with diesel locomotives, which, as he said, "in those days were the enemy".

Bruce's ongoing volunteer efforts at the Goulburn pumping station led to such a level of interest that in 1968, Goulburn City Council was persuaded to open the site as the Marsden Museum of Historic Engines, appointing Bruce as fulltime curator-engineer. Bruce, Dot and their family moved to the pumping station cottage where they lived for 10 years.

The first 2 ft gauge locomotive at Goulburn was one of two that had been found by Bruce and some friends abandoned in the quarry loco shed at Kiama in 1956. The Davenport loco was taken to Parramatta Park, where tram motor 103A was now housed, while the Fowler came to Goulburn in August 1958 to provide steam for the beam engine. In 1957, the first traction engine was acquired, a 1925 John Fowler that had been used in the construction of Canberra.

After this, Bruce embarked on a major campaign to save a large number of narrow-gauge steam locomotives, traction engines and other significant items of steam machinery, often at considerable financial cost to himself. Much of the equipment came to Goulburn but in some cases he acted as an intermediary. The opening of the Goulburn museum in 1970 saw the inauguration of a half-mile 2 ft gauge passenger steam railway. Between 1956 and 1976, Bruce saved more than twenty 2 ft gauge steam locomotives as documented in LR 69 & 72 by Ken McCarthy, most of which, thankfully, survive. The culmination of this crusading work was his acquisition of the globally-significant indirect drive Fowler that had been stored in a machinery merchant's Melbourne warehouse for more than 50 years.

Main line locomotives also featured in Bruce's preservation efforts. He took a major role in arranging for ex NSWGR 4-4-0 1210, the locomotive that had worked the first train into Canberra, to be placed on display there in 1962, and in arranging for the 1975 donation by the Australian Government to the Canberra Railway Museum of ex NSWGR Beyer Garratt 6029 for the princely sum of $1. Both were subsequently returned to steam, with Bruce spearheading the restoration of 1210 for the 1988 bicentenary. In 1973, he also arranged for the very historic Mersey tank loco to come to the NSW Rail Transport Museum, now based at Thirlmere.

Bruce had a vision for Goulburn of an extended narrow-gauge line linking historic sites and the development of a "vintage village" attraction. Restrictions in Council financing and a lack of support for the vision eventually led to Bruce and Dot deciding to leave Goulburn and disposing of much of the collection. They moved to Canberra in 1978 where Bruce became involved with a museum project at Yarralumla Brickworks. Unfortunately, this did not come to fruition. In 1980 the 1925 Fowler road locomotive and a 1913 Austral-Otis steam roller were purchased for the National Museum while the remaining narrow-gauge locomotives were sold at auction. Following this, Bruce was heard to vow that he "never wanted to own another locomotive that could not be picked up in one hand"!

Returning to an earlier interest in O gauge trains, he built up an outstanding collection from more than 30 Australian and New Zealand manufacturers, now in the National Museum, as well as discovering some rare and neglected British items that were returned to their country of origin. He wrote the book *Spring, Spark & Steam: An Illustrated Guide to Australasian Toy & Model Trains* (2005), focussing on Australasian O gauge railways and the companies that manufactured them.

Bruce had stayed on at the Yarralumla Brickworks as Liquidator's Manager to administer the property and when the government took it over he became a public servant, first with the Commonwealth and then with the ACT Government until he finished up in 2002. In his "retirement" Bruce travelled widely with Dot and kept up lively communication with his many friends and a vast number of contacts. He served as a consultant and advisor to a number of interest groups and major museums such as the Powerhouse Museum and the National Museum of Australia. He served as an Expert Examiner under the *Protection of Moveable Cultural Heritage Act 1986.* He was generous and enthusiastic in sharing information and providing photographs for publication.

In the 2014 Queen's Birthday Honours Bruce was awarded a Medal of the Order of Australia (OAM) for service to the preservation of engineering heritage. It was said that through his intervention he had rescued approximately 1,000 tonnes of historic steam engines of various types!

In his later years he authored two further books that are invaluable references for those interested in light railways. These were *Iron Work Horses: An Overview of Industrial Steam Locomotives in Australia* (2014) and *The Steam Tram in Australia & New Zealand* (2018). He realised that he was the last of his generation of enthusiasts and although he did not always suffer fools gladly, he was encouraging and thoughtful in his conversations with those he considered to be sound in interest and commitment.

It is difficult to sum up the achievements of such a man, but it has been said that no other individual did as much to save for preservation a vast array of steam machinery for the education and enjoyment of future Australians. As a person he was a keen observer, intelligent, committed, visionary, generous, full of boundless energy, optimistic, non-judgmental, a mentor, and a faithful friend. He was rightly described as a "national living treasure". We shall not see his like again.

Sincere condolences are extended to Bruce's children, grandchildren and great grandchildren.

John Browning with thanks to Frank Stamford; Richard Horne; Peter Evans; Mike McCarthy; Bruce Belbin; Leon Oberg; Jon Henry; Jim Longworth; David Jehan; Bob Gallagher; Stephen Buck; the late Craig Wilson; the Goulburn Waterworks Historic Museum; National Museum Australia; Powerhouse Museum; Engineering Heritage Australia; Canberra Railway Museum; Hornby Railway Collectors Association of Australia; the Goulburn Post; and especially "Bruce Mac" himself.

Treasury tunnel tramways, Adelaide, SA

Gauge currently unknown

Some of Adelaide's most interesting spaces lie underneath the city streets, and one them is directly beneath today's Adina Apartment Hotel Adelaide. In 1839 a one-storey building was constructed on this site to house the province's public offices, including the Treasury. This original building was mostly demolished to make way for two- and three-storey additions that were constructed between 1858 and 1907. The tunnels underneath the Treasury building were constructed in 1850 and, pre-dating the existing building, are believed to relate to the discovery of gold in Victoria and the need to store bullion brought back by South Australian diggers. The Treasury vaults are reputed to have held nearly 13 tonnes of gold between February 1852 and February 1853 alone.

There are two tunnels underneath the building, one that runs to the Adelaide GPO on Franklin Street so that government mail could be delivered, and another is thought to lead under Flinders Street to the Torrens Building on the corner of Wakefield Street and Victoria Square. The latter has been blocked for many years. The tunnels and connected basements were also used to store everything from important state documents to printing materials until the early 1900s. These days, the spaces play host to regular art exhibitions and events, inviting modern day explorers to enjoy the underground world in its best light.

Images from James Chuang 04/2023, text abridged from https://www.adinahotels.com/en/blog/article/hidden-tunnels-in-adelaide

Top: *The exterior of the Treasury building in Adelaide as it is today. Photograph by James Chuang* ***Above:*** *Tunnel interior, with evidence of rails still existing beneath the bitumen floor. Photograph by James Chuang*

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QUEENSLAND

ATHERTON—HERBERTON HISTORIC RAILWAY INC., Herberton

1067 mm gauge

Our H&T Editor, Andrew Webster made a visit to the railway in July 2023 to inspect its operation first-hand. The railway was part of the tablelands railways which ran from Cairns to Forsayth with various branchlines coming from it. One of these was the line that ran from Mareeba to Ravenshoe. When this line shut down in 1986, various preservation efforts were made. The one from Ravenshoe to Tumoulin ran for a few years but inspection this year found that the station at Ravenshoe was basically the town caravan park, although all the infrastructure of the railway was still there, including their steam locomotive, a 4-6-4 tank locomotive, number 112 of 1925 from Ipswich Railway Works, named *Capella* and now numbered 268. It was the same as it had been at his last visit in 2017. At the other end of this project, Tumoulin, there was a neat little station building with some chairs around but the rail was completely overgrown, as it is all the way between the two stations. I heard that there is to be an attempt to run trolleys on the line in the future.

Further north is the town of Herberton which is the head-quarters of the Atherton—Herberton Historic Railway. The yard has been transformed since Queensland Rail days with an extensive workshop and new and improved

Beautifully restored 1905 Peckett *0-4-0ST steam locomotive, number 1069 of 1905, Peckett Works, Bristol, UK, and the equally beautifully restored 1913 wooden carriage at Herberton in July 2023. Photo: Andrew Webster*

Overview of the yard at Herberton yard in July 2023. Photo: Andrew Webster

station buildings. The trip north from this station to the small stop at the Historic Village is nothing spectacular, leaving the Herberton station then going under a bridge in the town itself (which they call a tunnel and then continuing to the Historic Village. There are things to see along the way and the volunteer guide points these out. After stopping at the Historic Village, the train then reverses to Herberton Station with a volunteer standing at the back of the carriage directing the train. The train consists of the locomotive and one carriage and takes about twenty minutes for the four kilometre round trip. The best place to ride is at the front of the carriage where you can watch the driver and fireman at work.

The train consists of the beautifully restored 1905 Peckett 0-4-0ST steam locomotive, number 1069 of 1905, Peckett Works, Bristol, UK, and the equally beautifully restored 1913 wooden carriage, BL 769. This appears to be sufficient for their needs at present as there are plenty of services during the day and no-one missed out on a ride. Visitors can also ride on the *Tinlander*, a collection of trolleys and small carriages, called a Section Car, that probably gives a better view along the way than the wooden carriage. This service was not running during his visit but he did see the *Tinlander* itself. Also at the station is a small and interesting museum and a refreshment and souvenir room selling excellent snacks and railway memorabilia and other items. At the conclusion of the train trip, the indefatigable Judy Cooper, the railway's secretary, acts as tour guide for the workshop tours. In the workshop, among other projects are the restoration of the second Peckett, 1174 of 1905, the restoration of a second carriage, and most exciting of all, the restoration of two 2000 class railmotors, numbers 2024 and 2031. These are the same type of railmotors that are used on the *Savannahlander* which runs from Cairns to Forsayth and return.

The line from Herberton to Atherton is about 22 kilometres in length but only two kilometres at the Herberton end is currently available for use by the Peckett locomotive. The plan is to re-sleeper the line from the Historic Village to Moomin, a small stop a further five kilometres towards Atherton. This will depend on funding as is the case with so much of the preservation scene in Australia. A little further on from Moomin is a long cutting leading to a long and impressive tunnel through the ranges. This tunnel is easily accessible to those able to walk along railway lines. Andrew managed to walk most of the line over the weekend he was there and basically the line is in good shape.

BUDERIM—PALMWOODS HERITAGE TRAMWAY INC., Buderim.

762 mm gauge

The Board of BPHT had its monthly meeting on July 12 but it is still waiting for confirmation from Sunshine Coast Council that its plans for the Krauss locomotive display have been approved. It will then be full steam ahead with the civil works and the Board can then launch the fundraising campaign for the display building.

Buderim – Palmwoods Heritage Tramway Facebook page, 12 July 2023

FRIENDS OF ARCHER PARK STATION AND STEAM TRAM MUSEUM, Rockhampton

1067 mm gauge

Fortunately, the Purrey steam tram is back with its first operations on Sunday 6 August 2023. There were two tour groups booked and lots more patrons came. A new tram-crew appeal has also been posted on Facebook advertising for both conductors and tram drivers. The section car had been in operation on Sundays while the tram was out of service with mechanical issues. It is unfortunate that with the tram off the track for three months, patronage since the start of April had dropped to half the normal amount.

Newsletter, August 2023

VICTORIA

WALHALLA GOLDFIELDS RAILWAY, Walhalla

762 mm gauge

After featuring on the "Back Roads" programme on the ABC recently, the railway has reported a large increase in patronage. The President reported, "Following great coverage on the Back Roads program which aired nationally on ABC TV recently, our ticket booking service

Work on the Perry locomotive showing its boiler in place in the workshops of the ILRMS at Albion Park, NSW. Photo: Brad Johns

was temporarily overwhelmed by the large volume of people seeking to book a trip on our scenic railway. The local accommodation providers I spoke to also reported a similar increase in bookings and enquiries".
If readers have not seen the programme, it is available on ABC iview.
Dogspikes and Diesel, August 2023

RED CLIFFS HISTORICAL STEAM RAILWAY, Red Cliffs
610 mm gauge
Red Cliffs Historical Steam Railway (RCHSR) was established in 1992 by a group of people interested in preserving and operating the steam locomotive that once hauled coal and briquettes from the Red Cliffs railway siding to the State Rivers and Water Supply Commission pumping station on the Murray River which featured in recent articles in *Light Railways.*
The ride on the 1.5 km narrow gauge railway is on part of the former Victorian Railways branch line from Red Cliffs to Morkalla. The principal attraction is the Kerr Stuart steam locomotive *Lukee* built in 1901 (builders number 742) and restored to operating condition after being in static preservation in Red Cliffs since 1953.
Red Cliffs Historical Steam Railway operates on the first Sunday of each month from 11:00am till 3:30pm. except January and February. The railway also operates on Easter Saturday, the Victorian Labour Day weekend and King's Birthday weekend on the Sunday.
Red Cliffs Historical Steam Railway website.

JACK'S MAGAZINE, Maribyrnong
762 mm gauge
Andrew Webster visited Jack's Magazine beside the Maribyrnong River during the open weekend in July and inspected the 2 ft 6 in railway previously used at the site. The railway was connected to the river along an embankment and was used to transport explosives from the small wharf on the river up to the magazine and then within the magazine to the various sites within it. The rail encircled the magazine although at present most of this section is buried beneath the soil with some of it revealed for the open day. The local guide said that all of it was intact except for a small section on the western side where the examining buildings are located. A tractor was used to transport the wagons around the site; it was the same tractor that is now in the Puffing Billy Museum at Menzies Creek. This was a Clarkat Aircraft Tug that had been converted to run on rails. It was one of eleven machines shipped on 13 April 1943 to the Lathrop Holding and Re-consignment Depot in Lathrop, California. It was used at Jack's Magazine, Maibyrnong, Victoria and later on at Coal Creek Historical Village, Gippsland, Victoria, before becoming part of the Puffing Billy collection.

Jack's Magazine is open for tours on Sundays but they have to be booked online via the working heritage website info@workingheritage.com.au
Andrew Webster 14 August 2023 site visit.

TASMANIA

RAILYARDS HERITAGE PRECINCT, Launceston
610/1067 mm gauge
For more than a century, Inveresk in Launceston was the geographic and operational centre of the Tasmanian Government Railways, but by the 1990s the station had been demolished, the workshops had closed, and the roundhouse was abandoned. The site is now an arts, entertainment, sport and heritage hub, but still with some interest for the light railways' enthusiast.
The Queen Victoria Museum and Art Gallery's (QVMAG) railway collection includes former Mount Lyell 2 ft gauge Krauss (b/n 6067 of 1910), No. 10 on that company's roster. In preservation, this locomotive was the second of two Krauss engines which operated on the Second River Tramway near Karoola, to Launceston's northeast, up until the early 1990s. The railway was relocated to Sheffield in 1993, but this larger Krauss is not believed to have operated there, and when the Inveresk QVMAG opened in 2001 No. 10 was returned to the museum and put on static display. It currently carries the number 2 from its time at Second River. The mechanical condition of this locomotive when last operational was considered to be a 'bit rough' but the boiler was sound, according to the person who last drove it in the 1990s.
The Don River Railway has a Launceston volunteer base just behind QVMAG, using two of the former Launceston station sidings, where carriages are restored. A 40DL

Top: *The former Mt Lyell Krauss pictured at QVMAG in Launceston on June 23, 2023 once operated trains alongside the Sheffield Krauss on the Second River Tramway near Karoola. Both locos still wear the paint scheme and numbers they carried on the SRT.* ***Right:*** *Pete Martin shunts the* Krauss *onto the turntable at Sheffield station ahead of the last run of the day on July 1, 2023. Volunteers had earlier spent several hours polishing the locomotive and the winter sun nicely rewards their efforts. Photos: James Shugg*

The former Ida Bay Hunslet is slowly coming back together more than two decades after she last ran. July 2, 2023 outside the Sheffield workshops. Photo: James Shugg

Ruston diesel locomotive from 1949 is the resident shunter. This loco is believed to have been delivered new to the Burnie Marine Board, before being sold to Cornwall Coal in the Fingal Valley. It entered preservation in the 1970s, and at some point was fitted with a cab from a Malcolm Moore mining locomotive (which had been set aside when that locomotive was rebuilt by the TGR into one of its U class shunters). If the carriage workshops are not open, it is possible to peek inside through a small hole in the door.

The Launceston Tramway Museum is based the other side of the QVMAG building in one of the original tramway sheds. This operation is quirky and innovative enough to justify inclusion in *Light Railways* magazine. Beautifully restored Launceston tram No. 29 carries passengers on demand around the former railyards between the tram shed, the old round house and the DRR carriage restoration workshops. It runs on electricity provided by a diesel generator on a small wagon which it pushes or pulls around its roughly triangular circuit. A benefactor of the museum in Japan supplied 3 ft 6 in gauge wheelsets with railway tyre profiles to allow safe operation on the old TGR yard network. The museum has also restored and restyled a former TGR WG ganger's speeder which it plans to use for daily track inspections.

James Shugg

REDWATER CREEK RAILWAY, Sheffield

610mm gauge

Work has continued reassembling ex-Ida Bay Railway Hunslet 0-4-2T b/n 1844 of 1936.

A new radiator has been procured for the Malcolm Moore diesel, and it is proposed to repaint this locomotive in a close approximation of its original army green, which would better match the paint scheme of resident Krauss b/n 5682/5800 of 1906. The Krauss continues to run trains on the first weekend of every month.

James Shugg

WEE GEORGIE WOOD, Tullah

610mm gauge

For the 2023/24 operating season, *Georgie* will operate trains on the second (not first) and last weekends of the month, from October to April. This change avoids a clash with the monthly running weekend of the Redwater Creek railway, which is 100 km away in Sheffield and shares some of the same volunteers.

During the winter hiatus, working bees replaced four dozen sleepers in the Ardyn St loop, continuing the work which has seen nearly 200 sleepers renewed along the 1.2 km track since April last year.

James Shugg

SOUTH AUSTRALIA

PICHI RICHI RAILWAY, Quorn

1067 mm gauge

The railway celebrated 50 years of train operations over the 22 and 23 July weekend. There was a members' train and dinner on the Saturday and on Sunday there was a 10 am *Explorer* running which was open to the public.

Half-a-century ago, on 22 July 1973, at a public meeting in Port Augusta's Cooinda Hall, Pichi Richi Railway Preservation Society was established with the objectives of preserving the historic dry-stone walls and the railway bridges along the original 1800s railway, which includes a section of the original *Ghan* line. Just 12 months after being established, the Society was running heritage trains along the old narrow gauge line, using original steam locomotives and heritage rolling stock. Over the past 50 years, the PRR in Quorn has become a key tourist destination in the Flinders Ranges of South Australia and in 2021 Pichi Richi Railway was awarded the Winner of the SA Tourism Award for Tourist Attraction.

In mid-2024, Pichi Richi Railway will be celebrating the 50th Anniversary of the Society's first passenger train which ran on part of the volunteer-restored "Old Ghan" line. The restored section of old narrow gauge Central Australia Railway between Quorn and Summit line was reopened by the Governor of South Australia, Sir Mark Oliphant, in 1974. This anniversary event will be marked with a steam festival, open to the public and will be widely publicised.

PRRS media release 21 June 2023.

WESTERN AUSTRALIA

BENNETT BROOK RAILWAY, Whiteman Park

610 mm gauge

Three days after the annual Ashley Day, the railway had an ONRSR audit on locomotive maintenance, and workers believe that the ONRSR was happy with the documentation and practices. BT1 is running after its yearly certification, when crews are available, and is getting closer to getting its front end upgrade. Workers would eventually like to fit a sander as during wet days it can be a little light footed. *Ashley* is running well but with worn wheels. The railway has begun talks with Key Source Rail about replacing these. The *Atlantic* Planet is continuing to be the diesel stalwart with works to be scheduled when time permits (electrical and rod bearings). On NG15 123 (ex-South African Railways 2-8-2) workers are starting again with the blast pipe and most washout plugs being fitted along with the smokebox door angle iron ring hardware. The olive sealing washers for the crown mounting will be lapped in next.

The *Great Boulder* No.8 Planet locomotive arrived in the mid to late 90s and was re-gauged back to 2 feet via funding from Western Australian Light Railway Preservation Association (WALRPA). After a prolonged period, the locomotive entered trials in the second half of 2012 with the Jones couplings fitted in March 2013. In approximately September 2014 the locomotive

entered regular use. Unfortunately, in the second half of 2015 the Dorman 6LC engine suffered a cracked rear cylinder head which necessitated WALRPA sourcing, after an extremely extensive search, two heads and head gasket kits and after having them overhauled at an approximate cost of $3000 (including injectors), a work for the dole volunteer assisted the locomotive department in a top end overhaul which was completed by Christmas Eve. In the years leading up to the end of 2017, operator error/complacency led to the generator failure from battery shorting and subsequently the "magic smoke" being let out, requiring a replacement alternator and eventually a rewired solenoid. The engine started having a combustion gas leak from the cylinders to the cooling system and occasionally over pressuring of the radiator cap, resulting in a small geyser. At the end of 2018 a certified ATEX oil and gas stainless steel spark arrestor was fitted. On the 9th of October 2020 the loco suffered an axle failure, stranding it at Zamia. The locomotive dept on 10 October jacked it up, placed it on wagons and transported it to WVJ.

At the end of February 2021 both axles were removed by members and the loco dept transported them to Key Source Rail for repairs. On 17 March the Museum was advised that one of the four wheels had a large crack in the centre and was not safe for use. However, WALRPA was not in a position to proceed with the quote but did proceed with the replacement rear axle. As at the time of writing the locomotive department has requested that WALRPA purchase a forklift so workers can fit the axle, primarily so that the locomotive can be safely transported to the shed and free up undercover space for the tamper track maintenance machine.

The Bennett Brooklet–June/July2023

OVERSEAS

NEW ZEALAND

BUSH TRAMWAY CLUB, Glen Afton

1067 mm gauge

In March this year SA Group member John Meredith was holidaying in New Zealand and visited the site of the Bush Tramway Club of NZ's operation at Glen Afton. John writes: Fortunately, a caretaker was present and offered to show me around inside the workshop/sheds, which was very kind of him. I took photos of some of the locomotives and rolling stock contained therein.

Above right: *Price E111 Geared Locomotive built in 1923 for the Selwyn Timber Co, Mangatapu by A & G Price of Thames. In 1935 it was purchased by Ellis & Burnand where it worked at Mangapehi and Ongarue. The loco came to the club in 1965 and cosmetic restoration for static display commenced in 2013. Built locally using 'Climax' style cylinders driving a cross shaft and gears to 'Heisler' style bogies. Photo: John Meredith* ***Right:*** *Dubs & Co Glasgow No 1171 of 1878. Used by the NZR until 1936, then purchased by the Taupiri Coal Co, Rotowaro, and later the Mines Dept. Purchased by the BTC in 1972, restored at MOTAT and ran at Glen Afton until an overhaul in 1985. Returned to service in 1996 and ran until an overhaul in 2003. Returned in 2005 and ran until the late 2000's when it was taken out of service due to major boiler issues. Photo: John Meredith*

125th anniversary of the VR's NA-class locomotives *Notes: Phil Rickard*

An anniversary worth recording is that 125 years ago the first two of the Victorian Railways' narrow-gauge NA-class locomotives went into service in late 1898. On 20 August, the ss *Amana* (3412 tons) docked in Melbourne[1] and amongst the cargo was hundreds of packages of 'railway material'.[2] Upon assembly by the Victorian Railways most of that material became two 2 ft 6 in-gauge NA-class locomotives – one simple expansion and one Vauclain compound.

The two locomotives had been constructed by the Baldwin Locomotive Works, Philadelphia, Penn., USA (builder's numbers 15936 & 7) and shipped, in packages, on the ss *Amana* from New York on 14 June – the vessel taking 61 days to reach Adelaide, her only port of call prior to Melbourne.

Originally known as Narrow Gauge A-class, soon abbreviated to NA, the Baldwins were numbered 1A and 2A whilst the next two locomotives, built wholly at Newport Workshops became 3A and 4A. Following assembly 1A was placed on the register on 26 September and commenced working construction trains on the Wangaratta – Whitfield line on 1 October 1898.

A number of spare parts were included in the packages which in 1900 were incorporated into the other two NA locomotives, built at Newport, destined for the soon-to-open Upper Ferntree Gully – Gembrook railway.

Our two photos, are courtesy of the Public Records Office of Victoria. 1A is shown working a construction train in late 1898 somewhere on the Whitfield line, whilst 2A is believed to be at Wangaratta after a hurried clean. Note the background had been 'erased' to try and create a clean image. For further details of the locomotives see *Steam Locomotives of the Victorian Railways* – Vol.1 (Cave, Buckland, Beardsell – ARHS – Vic 2002)

[1] *The Age,* Melbourne 22 August 1898 [1] *The Age,* Melbourne 20 August 1898