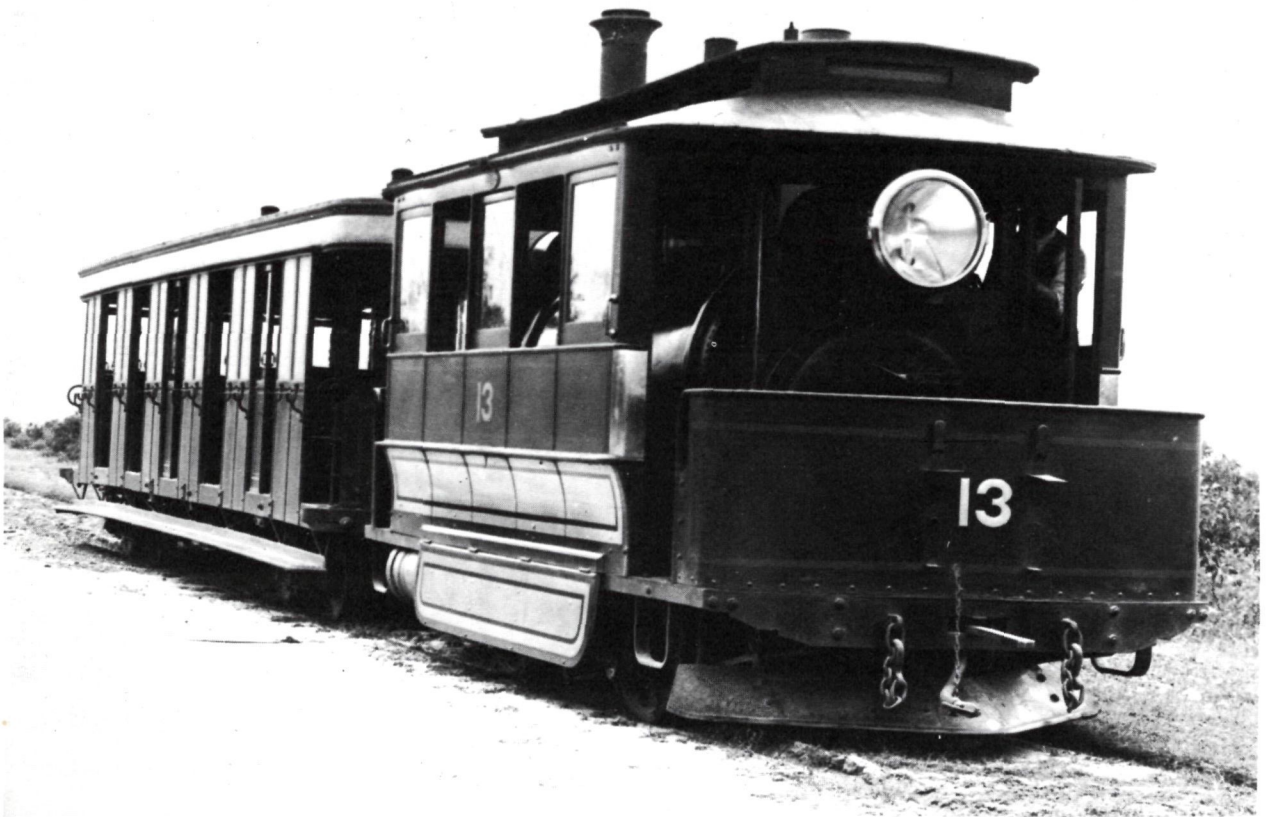


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TRAMWAY OPERATIONS IN THE ILLAWARRA

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FRONT COVER: *The feature article in this issue does not include the tramways that joined the Illawarra railway in the Sydney suburbs. Nevertheless, Baldwin type 11 in steam motor 13 illustrates the general appearance of these small locomotives early in their public service – further photos herein show them in Illawarra industrial service. Motor 13 and C1 type trailer are in Rocky Point Road on the Kogarah–Sans Souci tramway. This motor was built by Henry Vale in 1891 and went new to the Kogarah line. It is numbered in the railway loco series and became 125A in the tramway series in the 1905 renumbering. It was withdrawn after the Kogarah trolleybus conversion in 1937.*
-SRA Archives

BACK COVER: *Courier Mail photo*

FM 502

In a somewhat unusual move, this tram was dropped into Moreton Bay to join numerous old car tyres, bodies and other material being deposited there by the Underwater Research Group to form an artificial reef to encourage fish breeding. The lift was made by a RAAF Chinook helicopter but it was found that the body was too heavy and some parts had to be cut off.

Tramway Operations in the Illawarra District of N.S.W.

Compiled by K. McCarthy

Introduction

Tramway operations on the Illawarra and South Coast districts of N.S.W. belong to that "shade of gray" area which exists in the transition from a tramway to a railway. Most of the earlier private railway operations in the Illawarra district belong to this area, as the local press has many entries outlining the operation of picnic and other special passenger workings which fall into the tramway category. In addition some of the colliery railways in the district were constructed under "Tramway Acts."

In this treatment the examples are limited to the use of the former N.S.W.G.T. rolling stock in industrial operations.

The article is divided into three clear sections:

1. The government tramway proposals in Wollongong and Nowra which were the subject of government survey and enquiry.
2. The use of former NSWGT steam tramway rolling stock on industrial works.
3. The employment of former Sydney electric trams in shunting the PWDNSWGR sidings and adjacent plants at Port Kembla.

The problem in compiling this article was to know when to stop! In the late 1930's tramway steam motors were used on the construction of the Captains Flat railway, but this operation is well beyond the Illawarra-South Coast region.

Railway breakwater activity occurred at Moruya between 1923 and 1928 and again between 1948 and 1954 when PWD locos and rolling stock were in use. There is a suggestion that NSWGT steam motor 10A was at Moruya between 1907 and 1924. A tramway archive minute dated 25 November 1911 however states that this 9" motor was stored disused at Randwick Workshops and was to be scrapped immediately!

The possibility also exists that steam motors 58 (possibly ex Araluen) and another (possibly NSWGT No. 40), which became PWD 55 were employed in the Port Kembla district but no firm evidence has yet been uncovered.

The material dealing with industrial railway operation in this article has been confirmed in reliable archives sources, press reports and photographs, but readers should not be surprised if later research widens the field of industrial tramway activity in the Illawarra region.

Wollongong and the adjacent municipalities form the largest urban area in Australia never to receive a street tramway system. In spite of this, several tramway proposals were considered, at least twelve former Sydney and Newcastle steam tramway motors operated on industrial railways in this region and three former Sydney electric trams could be seen as late as 1956 shunting electrified railway sidings at Port Kembla.

Although the history of these tramway operations are sketchy, additional data, as well as photographs, have been discovered in recent years which now enables a fairly reliable story to be presented on the subject.

Conventional Tramway Proposals.

The Wollongong tramway scheme emerged largely as a result of the solution to the arguments which continued through the 1890's seeking the location for a major port development in the area. Four harbour proposals were considered at the turn of the century:-

1. **Wollongong Harbour.**⁽¹⁾ To be expanded by the excavation of a channel southwards from Belmore Basin into Tom Thumb Lagoon. (This lagoon has been progressively dredged since the mid 1950's to form the Port Kembla Inner Harbour). This expansion scheme was first proposed during 1887 and the Wollongong Harbour Trust, which functioned between 1889 and 1895 unsuccessfully tried to carry out this and other projects.
2. **Lake Illawarra.**⁽¹⁾ The Illawarra Harbour and Land Corporation was formed to construct a navigable channel from the ocean into Lake Illawarra and to develop jetty facilities on the western Dapto shore. Included in this proposal was the construction of a railway linking the jetties with the NSWGR at Dapto and the coal seams in the escarpment beyond. Considerable work was carried out on this scheme between 1890 and 1904. The feeder railways were constructed for a distance of 7½ miles at a cost of £42,000, a jetty was provided at Elizabeth or Tallawarra Point, the huge Dapto Smelters opened in 1898 and work commenced on the entrance works at Windang Island. The smelters closed in 1905, the harbour works were never completed and only two portions of the railway

worked commercially; the section between Dapto and the smelters and the part between South Kembla Colliery and Wongawilli.

3. **Port Kembla (3).** The Mount Kembla Coal Coy. constructed a jetty at Port Kembla in 1882 and the Southern Coal Coy. built their structure in 1889. Both companies constructed railways westwards from the jetties to collieries through Charcoal or Unanderra. The Port Kembla Harbour Act was passed in 1898. The Public Works Department commenced major port development during 1899 and breakwater construction started on 2 August 1901.
4. **Port Bellambi.**⁽⁴⁾ Bellambi was a coal shipping point between 1857 and 1952. Several jetties were located at Bellambi Point serving the nearby coal mines. From 1857 to 1864 horse drawn railways served this small port while steam locos worked the traffic between 1885 and 1952.

Bellambi was considered as a possible alternative harbour site to Wollongong in 1895. In March 1907 the principles of the Electrolytic Refining and Smelting Coy. inspected the Bellambi-Bulli-Austinmer area as well as Waterfall as sites for the establishment of their plant, but finally settled on Port Kembla. During June 1912 Mr. G. Delpratt, who was responsible for the establishment of the BHP steel plant in Newcastle during 1916, inspected Port Kembla as well as the Bellambi-Bulli region as possible locations for the steel works.

Port Kembla Harbour Development.⁽⁵⁾ The decision to develop Port Kembla as a major harbour facility caused Wollongong residents to demand some form of regular public transport to the port.

The direct route between Wollongong and Port Kembla was along the beach front. Coal trimmers using this route were forced to wade to work across the Tom Thumb Lagoon entrance while vehicles had to ford this point. During the mid 1890's these coal trimmers privately erected a footbridge across the channel but not until December 1900 was a wooden road bridge opened for traffic at this point.

During October 1899 the Colonial Government initiated the purchase of the loading facilities of the Mt. Kembla and Southern Coal Coy collieries while £5,000 was paid to the Wentworth Estate for land bordering the port area.

The Public Works Department formally took over the coal jetties in 1902 but immediately leased them back to the former owners. The Southern Coal Coy. lease was transferred to the North Bulli Coy. in 1905 and this undertaking as well as the Mt. Kembla colliery, continued to work the port until 1912 when the Public Works Department assumed responsibility.

Although a government worked Wollongong to Port Kembla railway was planned in April 1899, and a further proposal of September 1901 envisaged a government worked line along the beach front from Belmore Basin (Wollongong Harbour) to Port Kembla, nothing further was done. All access to Port Kembla continued to be along the NSWGR Illawarra line to Unanderra then eastwards to the port along the Mount Kembla or Southern Coal Coy's tracks.

The Australian Smelting Corporation announced in May 1906 that their large Dapto smelters would be re-erected at Port Kembla, while during March 1907 the Electrolytic Refining and Smelting Coy. (ER&S) purchased 53 acres at Port Kembla on which to erect a new plant. The transfer of the Dapto undertaking advanced no further than the construction of a new stack. The ER&S works, however, opened at Port Kembla on 5 February 1909.

PWD development at Port Kembla continued and during 1909 jetty No. 4 was opened to serve the ER&S and proposed ASC plants while in 1912 a low level coal loading jetty (No. 1) with belt delivery replaced the old Southern Coal Coy's wharf. A direct regraded road opened between Port Kembla and Wollongong in March 1907 using the bridge across the Tom Thumb Lagoon entrance and during that same month the Mayor of Central Illawarra Council emphasised the need to operate passenger services along the Unanderra to Port Kembla railway.

Tramway or Railway to Port Kembla.⁶

During April 1908 the "Illawarra Mercury" was able to report that the new Wollongong to Port Kembla railway would be soon constructed but the same newspaper during the following month stated that the Chief Engineer had abandoned the railway proposal and suggested that a steam tramway be constructed. This tramway would commence at "Cross Roads" the present intersection of Crown St. West and Mt. Keira Road, proceed eastwards along Crown Street through the Wollongong business area to the beach. From there the track would turn southwards via "The Green", Showgrounds, (old) Racecourse, crossing the lagoon entrance bridge to reach Port Kembla.

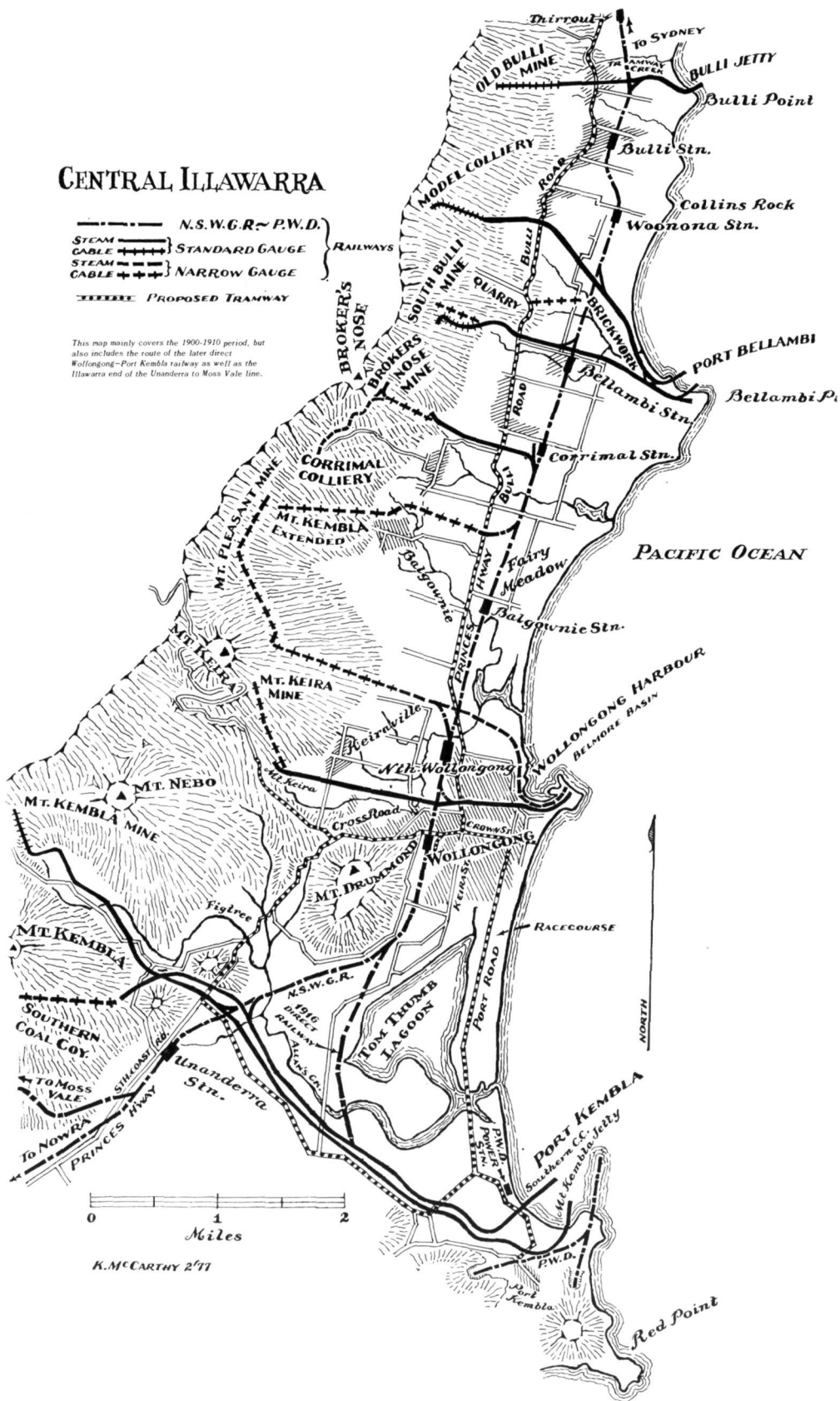
It appears that the Mayor of Wollongong had proposed the Crown Street portion of the tramway as the Chief Engineer suggested during October 1908 that there would be a better chance of the Wollongong Harbour to Port Kembla portion being approved if the Crown Street line was dropped from the schedule.

A meeting held at Unanderra during early December 1908 urged the construction of the tramway, being undertaken from Wollongong to Port Kembla,

CENTRAL ILLAWARRA

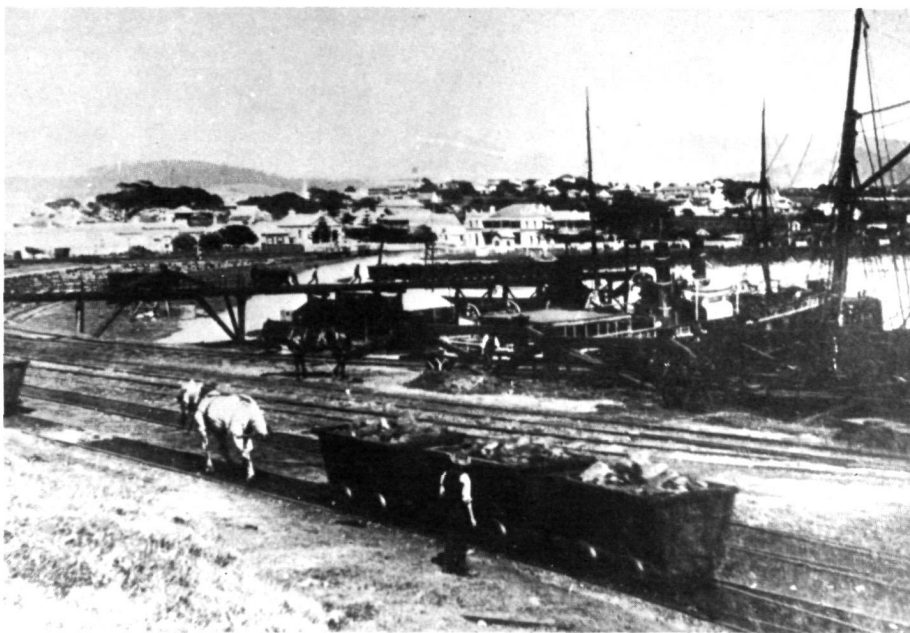
- - - - - N.S.W.G.R.~P.W.D.
 STEAM CABLE + + + + + STANDARD GAUGE
 STEAM CABLE + + + + + NARROW GAUGE
 ----- PROPOSED TRAMWAY

This map mainly covers the 1900-1910 period, but
 also includes the route of the later direct
 Wollongong-Port Kembla railway as well as the
 Illawarra end of the Unanderra to Moss Vale line.



0 1 2
 Miles

K. MCCARTHY 2/77



Horse shunting of Mt. Pleasant Colliery 3ft 8½in gauge hopper waggons at the coal straits, Belmore Basin, Wollongong Harbour, circa 1890.
-Late W.A.Bayley collection, Wollongong City Library

through their suburb but nothing further was heard of the Port Kembla railway or tramway in the local press until May 1910 when the Railway Department suggested that a railway be constructed from a junction near North Wollongong. The North Wollongong Beach portion of the 3ft 8½in gauge Mount Pleasant Colliery Tramway would be converted to standard gauge for this project and a new standard gauge track would be built southwards, from Wollongong Harbour to Port Kembla along the beach front.

During the same month the "Illawarra Mercury" described in considerable detail the delays being experienced by goods traffic along the private Unanderra to Port Kembla railway and that facilities were still not available for passengers.

A Comprehensive Tramway System.⁷

Local progress associations and councils had meanwhile developed comprehensive local tramway proposals. The main route would be established from Wollongong Beach westwards along Crown Street and Mt. Keira Road to the Mount Keira township. The northern route would branch at the Crown and Keira Streets intersection and extend north along Keira and Flinders Street then Bulli Road to Thirroul. The southern route was to branch from Crown Street along Corrimal Street past the (old) Racecourse along Port Road to what is now Darcy Street at the ER&S plant.

A further loop tramway was planned to leave the Mount Keira line at the "Cross Roads" and proceed southwards along the main South Coast Road (now Princes Highway) through Figtree to Unanderra. The tracks would then turn eastwards at Five Islands Road and advance parallel with the existing Mt. Kembla and Southern Coal Coy's colliery lines to Port Kembla. At the developing village the tramway would connect with the direct Port Kembla route along Flinders Street near the PWD power house site. (Constructed in 1913).

Later developments envisaged branch lines from the main northern route to Keiraville from the gas works, to the mining village of Balgownie from Fairy Meadow and others in the Corrimal and Bulli areas.

The Tramway Advisory Committee visited Wollongong in May 1911 to consider the Wollongong tramway proposals. During early July 1911 the Works Department advised Wollongong Council that a surveyor would reach the district in the near future to survey the proposed routes. The Tramway Advisory Committee, however, expressed doubts that enough traffic would be available, even on the Wollongong to Port Kembla route, to support the proposed district tramways. The Railway Commissioner also stated at this juncture that his undertaking would operate passenger trains on the colliery railways between Unanderra and Port Kembla if sufficient traffic was offering. This could not be

considered until those railway lines came into the possession of the Government Railway Department. The Wollongong Mayor suggested that a public meeting be called to discuss the whole railway and tramway matter.

This meeting was held in Wollongong on 25 July 1911. This gathering was of the opinion that the Tramway Advisory Committee "appear to have come to the conclusion that the proposed tramway was not advisable" and that another route for a railway between Wollongong and Port Kembla would be proposed.

The meeting was also told that the Government Railways intended taking over the colliery railways between Unanderra and Port Kembla but as this would take at least nine months a direct beach side tramway could be constructed in that time between Wollongong and the port. Another alternative suggestion was that a steam tram service could operate from Wollongong Station to Port Kembla along the main Illawarra railway and the colliery line.

The meeting concluded that the direct Wollongong to Port Kembla tramway link was the most important consideration and approved the motion by Mr. Beatson that a deputation be sent to the Minister for Works to urge its construction.

The Tramway Survey.⁸

The press revealed in February 1912 that the detailed survey of the tramway had been completed. The survey was carried out by Mr. McGowan of the Public Works Department and dated 22 March

1912. The two routes considered were Wollongong to Port Kembla 1 mile 36 chain plus 4 miles 61 chains (Wollongong Beach to Crown Street West and Wollongong to Port Kembla) and Wollongong to Thirroul of 8 miles 20 chains.

"The South Coast Times" for 16 February 1912 expressed the hope that the government would have the Wollongong tramway work started immediately the report was completed. The article added that the construction had been urged for years and the idea had been passed on to the Decentralization Committee when it sat in Wollongong several years before.

The whole tramway matter was a live issue during 1912 but the "Illawarra Mercury" for 2 August 1912 reported that although the Tramway Advisory Board had rejected local tramway proposals the government would purchase the Unanderra to Port Kembla railway. The Railway Engineer suggested that a passenger tram could be used on the railway. The same newspaper reported on 18 October 1912 that the government had taken over the colliery railway eastwards from Unanderra.

The surveyor's report revealed that the Wollongong to Port Kembla tramway would amount to 4¾ miles, would follow the existing beach side road and was estimated to cost £27,000 or £5,500 per mile. At this stage the railway between Wollongong and Port Kembla through Unanderra covered a distance of 6 miles. The Wollongong to Thirroul tramway would be 8¼ miles in length and cost £50,000. Although surveyed along Bulli Road, the report emphasised that this tramway "practically



South Bulli Colliery jetty at Port Bellambi with locomotive 3 (Manning Wardle 912 of 1884) shunting full standard gauge hoppers to the pier head, circa 1908. - Hall & Co.

follows the railway lines" for the entire distance. The total estimate for the entire system would be £77,000.

The report recommended that as the roundabout Port Kembla railway connection already existed, a steam tram motor or light railway engine should be used from Wollongong station. This service could be provided at little expense other than placing the colliery railway into order, a task which would have to be eventually carried out in any case.

This report revealed that the government had purchased the Southern Coal Coy. railway at a cost of £33,000 and arrangements had been made for the Public Works Department to use this railway when required. The report stated that as the Wollongong to Thirroul district was served by the NSWGR tracks any passenger provisions made to Port Kembla should be worked in conjunction with a Thirroul service.

As no move had been made to establish a rail passenger service to Port Kembla a Tramway League was formed at Unanderra to press for the construction of the Wollongong to Port Kembla tramway through Figtree and Unanderra instead of along the direct beachside route. The League's first meeting was held on Monday 11 November 1912 and the alternative scheme of tram operation along the existing railway was again discussed with stopping places at Mt. Drummond (Coniston) and Figtree.

Later the same month the Wollongong Council voted against giving support to the Unanderra tramway scheme as it was felt that such support would be seen as an agreement to the passenger service proposal along the indirect railway route. This would destroy any chances for a tramway along Crown Street Wollongong and the direct beachside link to Port Kembla.

Private Tramway Proposals.⁹

During 1912 a Mr. Christensen made representation to Wollongong Council for permission to construct an electric tramway along the proposed northern and southern routes. The council was unsure of its legal position; whether it could build such a tramway itself or give permission for a tramway to be built in its district without an Act of parliament. Mr. A. Bluett, Secretary for the N.S.W. Local Government Association stated that councils in N.S.W. had no powers, either to build tramways themselves or to give tramway rights to others in their municipalities.

In August 1912 the Wollongong Council agreed to co-operate with Mr. Christensen in obtaining the necessary tramway Act, but he would have to initiate the application himself.

Earlier, on 3 February 1912 Alderman Wiseman, the Mayor of Wollongong, switched on an electri-

city generating plant installed in Wollongong by Mr. Christensen. The ceremony was conducted from the balcony of the Commercial Hotel and the surrounding shops were brilliantly lit. The double cylinder 56hp steam engine driving a 110 volt dynamo was reported as being capable of lighting the whole of Crown Street. No large scale reticulation of electricity in Wollongong occurred until November 1921 when power was supplied from the PWD power station at Port Kembla.

The Final Proposal.¹⁰

Further details of tramway proposals were featured in "The South Coast Times" on 13 December 1912. Mr. J. Jones MIMÉ had prepared a report and map for the Wollongong and District Citizens' Association. The report included current population figures of the villages to be served by the scheme and revealed that the trunk routes would cost £60,000 to construct. Of this figure £35,000 would be required for the 11½ mile circular southern routes serving Port Kembla while the balance would finance the 8 miles of track to Thirroul.

Mr. Jones' report concluded:-

"There is an agitation .. to have a tramway service along existing railway lines . between Wollongong and Port Kembla .. There is no reason why such a service should be denied as the cost is infinitesimal and the scheme can be put into operation in a week or so and it would be of considerable benefit to those who have to go daily to and from Port Kembla .. by means of bicycles, traps, horses, coaches etc...

"Nothing will be accomplished unless the people themselves wake up and agitate and organize and there can be no more fitting time than the immediate future when a general election is most imminent".

Wollongong to Port Kembla Direct Railway.¹¹

Very little was heard of further tramway proposals and the "Illawarra Mercury" for 16 March 1915 reported that the proposed scheme to operate passenger trains along the Southern Coal Coys. colliery railway between Unanderra and Port Kembla had been abandoned and that a new railway was to be constructed directly from Wollongong to Port Kembla skirting the western shore of Tom Thumb Lagoon. This would only require new construction of 2 miles 66 chains.

Construction commenced during July 1915 while reports during March 1916 indicated that the new railway neared completion. The first official locomotive trials were carried out on 31 July 1916 but the "Illawarra Mercury" for 22 July 1916 expressed doubts as to whether or not a passenger service would be immediately introduced.

This fear was well founded. During February

1918 a petition bearing 1,000 names was compiled requesting the inauguration of the long promised railway passenger service. A public meeting was held during April followed by a deputation to the Railway Commissioner in May. This deputation was sent away with the answer that as the new railway was controlled by the PWD a passenger service could not be provided until the line was handed to the NSWGR.

Port Kembla travellers could finally look to the future with some optimism as construction work commenced on Port Kembla station during July 1919 and a press report revealed that passenger services were expected to commence on 1st October 1919. This, however, did not occur until Monday 5 January 1920.

To work the passenger service PWD Hudswell Clarke 0-6-0T locos No. 28 and 29 (Builders numbers 863 of 1908 and 1006 of 1912) were fitted with air brakes. At first the passenger service operated from the Port Kembla line junction at Mt. Drummond (Coniston) but from 29 April 1923 the trains worked right into Wollongong station dock on a separate track parallel with the single main line to Bomaderry, between Wollongong and Mt. Drummond. On 15 July 1941, with the opening of the railway duplication between Wollongong and Port Kembla North, the twin tracks between Wollongong and Mt. Drummond became down and up lines of the duplication.

Although official records indicate that the NSWGR took over operation of the Wollongong to Port Kembla passenger trains from 1 January

1921, the "Illawarra Mercury" of 18 April 1924 recorded complaints dealing with the old locomotives and overcrowded carriages on the Port Kembla railway. This possibly indicates that PWD locos were still occasionally used on the service after 1920.

The PWD continued to operate the Port Kembla industrial sidings and jetties with their locomotives until 1 January 1949 when the undertaking was transferred to the NSWGR. The former PWD engines, however, continued to handle the bulk of the traffic until 1963.

In May 1920 a motor bus service started operating between Wollongong and Port Kembla and by that stage motor bus services were serving the other areas included in the tramway plans of eight years before.

Although not revealed in Wollongong press reports, even if a favourable financial return could have been expected from tramway construction it is doubtful if the NSWGT would have progressed with the scheme. By 1911-12 there was an extreme shortage of steam tramway rolling stock in N.S.W. The planned time schedule for the conversion of existing steam routes to electric traction was delayed by the need to manufacture additional electric rolling stock than at first planned due to the increase in patronage on the converted routes. This, coupled with the shortages of World War I, meant that the final large scale conversion, that of the Newcastle tramways during 1923, was approximately 15 years behind schedule.

The shortage of steam rolling stock was so acute



Unanderra Coke Works, Australian Coke Co., circa 1900. This view looks eastwards from Cobbler's Hill from the Main South Coast Road (now Princes Highway) between Figtree and Unanderra. The main NSWGR crosses the photo horizontally while the track crossing diagonally is the Southern Coal Co. railway. To the right of the Mt. Kembla signal box is the Mt. Kembla Colliery railway crossing. The loco shed can be seen to the left. This housed the locos which were later transferred permanently to Corrimal colliery. The proposed Wollongong to Port Kembla steam tram operation along existing railways would have junctioned from the NSWGR at this crossing. -C.B.Thomas collection

that it was only with difficulty that adequate items could be found for the opening of the Sutherland to Cronulla tramway in June 1911. At this stage expansion of the steam system in Newcastle and traffic increases on the other steam routes had to await the electrification of other lines. During the 1916-1923 period the NSWGT undertaking was placed in the embarrassing position of having to construct 7 new steam tram motors to the original 1879 Baldwin general pattern to provide adequate motive power for tram routes which should have, by that stage, been converted to electric operation.

Bomaderry-Jervis Bay Tramway Proposals.¹²

Another tramway proposal for the South Coast district of N.S.W. was considered by the Parliamentary Standing Committee for Public Works between 23 December 1908 and 4 March 1910. This was a proposal to connect the railway terminus at Bomaderry with Huskisson on Jervis Bay.

The last section of the Illawarra Railway between North Kiama (Bombo) and Bomaderry, on the northern bank of the Shoalhaven River, was opened for traffic on 2 June 1893. This portion was intended to be the first section of a £804,000 railway extension between Kiama and Jervis Bay but the £224,820 portion to the Shoalhaven River was the only part to be built. By terminating at Bomaderry, the rail head was 1½ miles from the town of Nowra. The estimated cost for this short rail link was £75,000 of which £60,000 would be required for the construction of a railway bridge across the Shoalhaven.

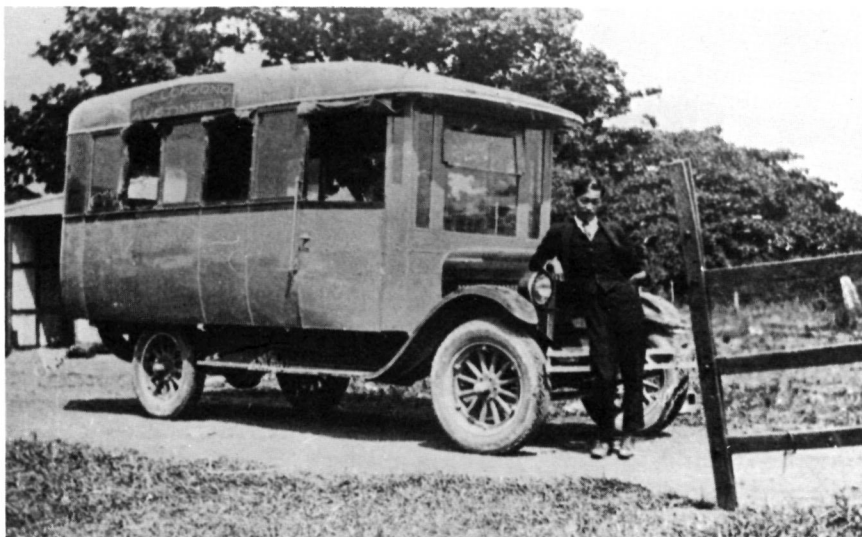
During the 1900-01 period the railway extension

proposals beyond Bomaderry were again rejected by the Minister for Works. The 15½ miles extension to Jervis Bay was at that stage expected to cost £147,752, or £8,955 per mile. The ruling grade was planned as 1 in 60 with 16 chains being the minimum radius curve. This estimate included £50,150 for a railway bridge across the Shoalhaven River.

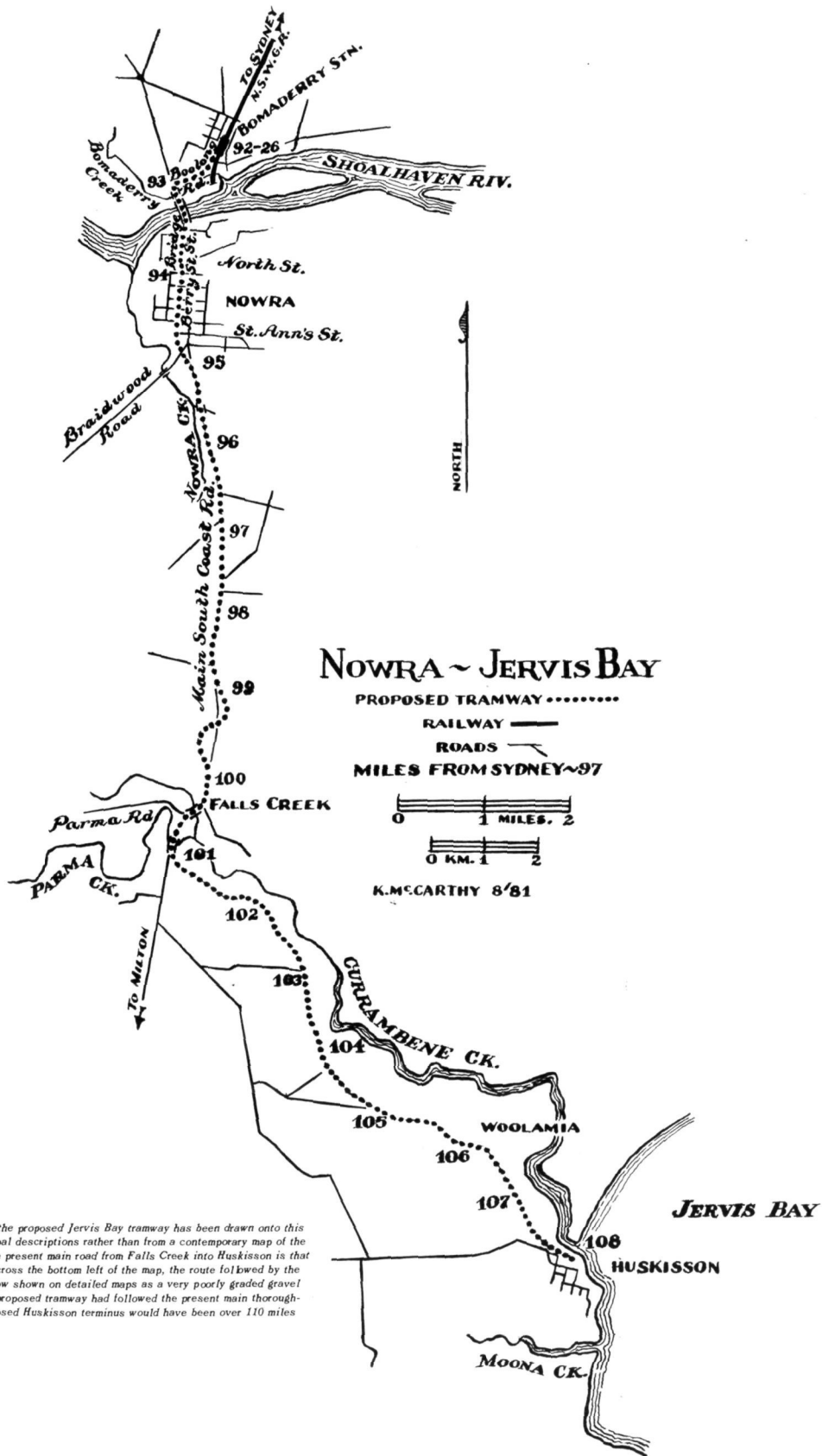
Renewed agitation in the Shoalhaven District in 1907 resulted in the formation of a committee charged with assembling facts as to whether a railway or a tramway should be constructed southwards to Jervis Bay. The Minister for Works received a deputation when visiting Nowra and on this occasion he suggested that the extension be in the form of a light railway which could cross the Shoalhaven on the existing road bridge using steam tram motors or light railway locomotives as motive power.

Route Description. The 1908-10 hearings considered the case for the construction of a steam tramway to Jervis Bay which would commence in the Bomaderry Station Yard 92 miles 26 chains 80 links from Sydney. The planned route would then proceed along Boolong Road on the north bank of Bomaderry Creek to the Main South Coast Road (Princes Highway) along which the tramway would travel south into Nowra crossing the short Bomaderry Creek Bridge and the longer iron truss bridge spanning the Shoalhaven River to enter the township along Bridge Street.

The proposed tramway would then continue southwards through Nowra along Berry Street to the southern edge at St. Ann's Street from where the



A 1920s motorbus operated on the Wollongong to Austinmer service by Dion's Bus Service, at the Woodhill Street Fairy Meadow depot. This bus operated over the planned northern tramway route from Wollongong. - C.Dion collection



track would turn southeastwards across open ground to cross the Braidwood Road and skirt the banks of Nowra Creek. The Main South Coast Road would then be rejoined and followed to the 99 mile peg from Sydney.

From that point the tramway would deviate from the formed road recrossing it several times before bridging the Currumbone and Parma Creeks at $100\frac{1}{2}$ and $100\frac{3}{4}$ miles from Sydney. The planned line of route would then curve southeastwards, for the final 6 miles, from the previous southerly course to terminate near the northwestern part of the township of Huskisson, 107 mile 46 chains and 80 links from Sydney. The tramway would have 1 in 30 as the ruling grade with 5 chains as the sharpest curve radius.

Estimated Costs. The estimated cost for the 15 miles and 20 chains of steam tramway was £59,863 or £3,923 per mile exclusive of bridge strengthening and land purchases. This estimate included £15,835 for road bed and sleepers, £1025 for 60lb. rail at £7-0s-6d per ton, £8761 for earthworks, £4998 for culverts and timber bridges, £4492 for junctions and sidings, £7667 for general engineering requirements and £1084 for Commonwealth duties.

The costs of operation included £2905 interest at $3\frac{1}{3}\%$ pa and £2576 pa running expenses giving a total of £5481 pa. Revenue was only expected to yield a return of £1248 pa.

Nowra Bridge. The Nowra Bridge had been opened for traffic on 1 August 1881 by Hon. J. Lackey, Minister for Works. The iron trusses were constructed by the Edgmoor Iron Coy. of Delaware U.S.A. and one span was exhibited at the 1879 Sydney Exhibition. The total bridge length was 1124 ft 6 in made up of 8 through Whipple wrought

iron trusses, 7 with spans of 126 ft each and one amounting to 199 ft. An additional 40 ft plate girder span completed the bridge which provided a roadway 19 ft between kerbs.

At the time of construction this was the largest bridge in N.S.W. and remained in regular use until October 1980. Since that date the bridge has been reopened for traffic during times of heavy holiday road use to ease the congestion on the new adjacent concrete structure.

The bridge was not capable of carrying a $56\frac{1}{2}$ ton "A" class (Z19) steam railway locomotive unless strengthened at a considerable cost. On the other hand only £4100 was required to prepare the bridge for steam tram traffic.

Outcome of the Tramway Investigation. Traffic prospects for the proposed Jervis Bay tramway were not optimistic. By 1908 the population of Nowra had fallen to 3077 from a peak of 5504 in 1902. The main goods traffic was expected to consist of pit props for Illawarra coal mines obtained from an area within 10 miles of Bomaderry. This traffic would last for 40 to 50 years. At this stage the cost of transferring material by horse drawn vehicles over the $1\frac{1}{2}$ miles between Bomaderry Station and Nowra was 5 shillings to 6 shillings per ton while passengers were charged 6d for the journey. The cost of transshipping timber for the ship building industry between Nowra Wharf and Jervis Bay was £1 per ton.

The last 8 miles of the proposed tramway would traverse unproductive land while the town of Huskisson at that time consisted only of 13 houses and a hotel. The report concluded that the tramway would, at that stage, serve very little benefit and the Standing Committee, under the Chairmanship of Hon. Frederick Flowers, voted 6 to 1 that the



The first two Whipple through trusses at the southern end of the Nowra bridge crossing the Shoalhaven River, 1880. - S.Cocks

tramway not be constructed.

During 1911 and 1916 the Public Works Committee again investigated the construction of the Bomaderry to Jervis Bay railway extension but the matter was deferred until the planned Canberra to Jervis Bay railway details were finalised.

To the present day the subject of the Bomaderry to Jervis Bay or Ulladulla railway extension is occasionally revived in the news media. Passengers and freight to the now thriving centre of Nowra must still be transhipped by road across the Shoalhaven River from the railhead.

Illawarra Tramway Operations between 1887 and 1956.

Although the two South Coast tramway schemes did not reach fruition, former New South Wales Government Tramway rolling stock did operate in special situations in the Illawarra and adjacent regions.

"John Bull" at Wollongong.¹³ The steam motor "John Bull" was built by Beyer Peacock of Manchester (B/No. 2464) to the design of William Wilkinson of Wigan in 1885. This unit was delivered to the Sydney Tramways in 1886 for comparison trials with the standard American Baldwin steam motors.

"John Bull", the name by which this motor was known in Sydney, proved to be uneconomical in fuel consumption while such refinements as exhaust emission control devices and speed governors further restricted the motor's performances. These devices were required by British Board of Trade regulations but not by NSW laws.

The engine returned to Beyer Peacock's works during 1889 where it operated as works shunter No. 2 for the next 60 years. This steam motor is still in service at the Crich Tramway Museum at Derbyshire England having been rescued for preservation in 1962.



Nowra bridge construction nearing completion in 1881. The larger 199ft truss span is closest at the Bomaderry shore. - A. Tronier



Looking south through the wrought iron Whipple trusses of the Nowra bridge prior to the fitting of the road decking. - A. Tronier

Although no press accounts have been discovered so far to verify its presence, the popular belief exists that "John Bull" worked in the Wollongong district prior to its return to Britain.

The Wollongong to Clifton section of the then isolated Illawarra railway opened for traffic on Queen Victoria's Jubilee Day, 21 June 1887. The southwards extension to North Kiama (Bombo) followed on 9 November 1887 but it was not until 3 October 1888 that the progress of tunnel construction enabled the Illawarra railway to be extended through to Waterfall thus opening direct railway communication with Sydney.

Some accounts suggest that "John Bull" was employed hauling passenger trains along the isolated Illawarra railway, but with 9½ in diam. x 12 in cylinders its power for such a task would have been extremely limited.

Another version of the story suggests that "John Bull" worked for the NSWGR on the Wollongong Harbour branch railway. The government railways, however, did not take over this eastern portion of the Mount Keira Colliery Tramway for harbour access until late 1889 and the triangle connecting track was not opened until 10 April 1890.

A third story suggests that this steam motor was employed during 1887-8 on harbour improvement works at Belmore Basin in Wollongong. Although this would have been a suitable task for "John Bull" the major works carried out in Belmore Basin during that decade occurred during the 1881-5 period. The formation of the Wollongong Harbour

Trust in October 1889 and the inauguration of major breakwater extensions in 1890 belong to the period when "John Bull" had returned to England. It is therefore difficult to find justification for this steam tram motor's presence in the Wollongong district.

Steam Tram Motors at Bulli Colliery.¹⁴

Initial work commenced on the (Old) Bulli Colliery tunnel in 1861 and the standard gauge tramway, linking the colliery incline with a jetty, opened on 2 June 1863. The full wagons were worked by gravity to the jetty and returned to the foot of the incline by horse haulage.

The coal company purchased its first steam locomotive in 1867 and when it entered service in August of that year it was the first railway steam loco on the illawarra Coast. This unit, and a second one, which entered service during January 1869, were 0-4-0ST engines built by the Sydney firm of Vale and Lacy. The first locomotive was the 2nd unit built by that firm while the other was their 4th engine.

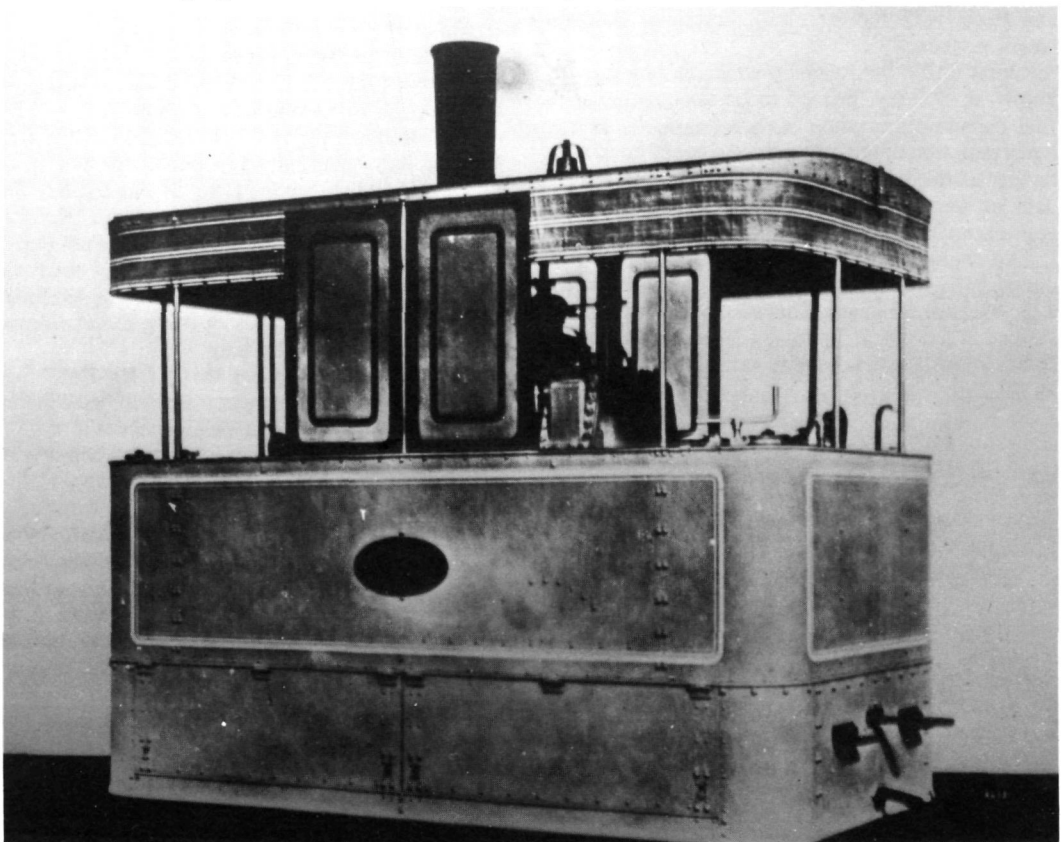
The Illawarra coast has no natural harbours. The havens at Wollongong and Kiama were excavated

in basins protected by short breakwaters while the now major Port Kembla Harbour is enclosed by large breakwaters and dredged from the former shallow Tom Thumb Lagoon basin.

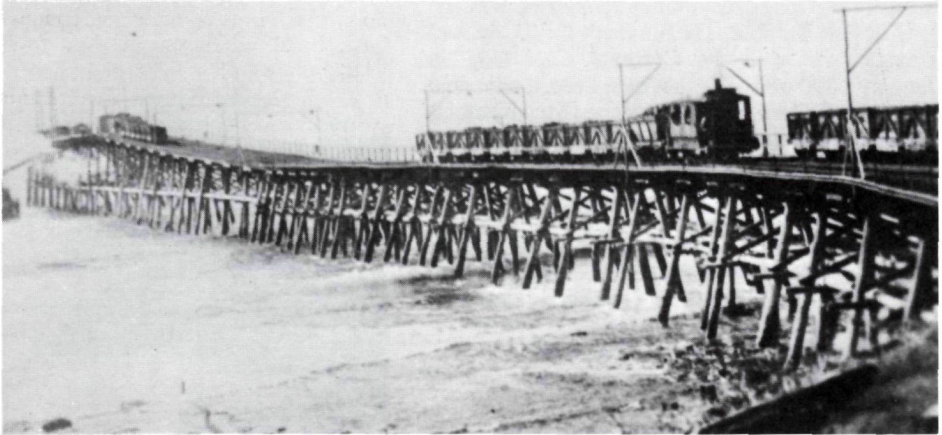
The early Illawarra coal companies built their own jetties, generally located in the lee of neighbouring headlands which provided some protection from southerly gales. The jetties and ships were, however, at the mercy of storms from the easterly and northeasterly quarter and press reports reveal repeated jetty destruction and ship wrecks at these locations.

During the period of one hundred years in which the Bulli Colliery operated steam locomotives a total of ten engines were owned by the undertaking. Of this number, two were former Sydney steam tramway motors employed, due to their lighter weight, on jetty shunting.

Steam Motor 21. The first steam tramway motor to arrive at Bulli was Sydney No. 21. This was a Baldwin engine (No. 5451 of 1881) which had arrived in Sydney on 12 June 1881 on the "Twilight". Built as an 0-4-2ST loco with 11"D x 16" cylinders, it was converted by 1887 to the standard Sydney 0-4-0ST wheel arrangement in the Rand-



Builders photo of 0-4-0 Beyer Peacock steam motor 'John Bull'



Steam tram motor 21 shunting box type and one hopper type coal waggons on Bulli Jetty, circa 1908. - Late W. Bayley collection

wick Workshops.

Motor 21 was noted on 2 July 1906 as being stored in Randwick Yards and classified as being unsuitable for conversion to the new one man-dual control form. The loco was sold to the Bulli Colliery during the following month and delivered by sea to Wollongong.

This steam motor never received the tramways "A" classification and retained number 21 while in colliery service. At Bulli the tram was fitted with heavy wooden buffer beams and the unusual arrangement of metal spring buffers with wooden dumb buffers mounted above. The front sheet metal apron was replaced with a pipe railing similar to that carried by the original four Sydney motors of 1879. This was possibly altered to assist in the coupling of coal hoppers to the motor.

Motor 21 was withdrawn from traffic at Bulli in 1934 and scrapped at the colliery two years later. **Steam Motor 62A.** The second tram motor at Bulli

Colliery was former NSWGT No. 62A. This was an 11" motor and while of similar dimensions to No. 21 it was built as and remained an 0-4-0ST unit. This steam tramway engine arrived in Sydney on 15 March 1884 on the "J S Stowe" being Baldwin No. 6983 of 1884.

No. 62 was transferred from Sydney to Newcastle during 1902 and between that time and 1906 was exchanged between that northern tramway and the main Sydney system on several occasions. Sydney tramway archives state that this motor was stored at Randwick Workshops by 2 July 1906, but Newcastle reports of that period suggest that it was working in that city. A reference of 5 August 1906 indicates that this motor had been renumbered 62 "A" but it retained its single control, two man operation layout.

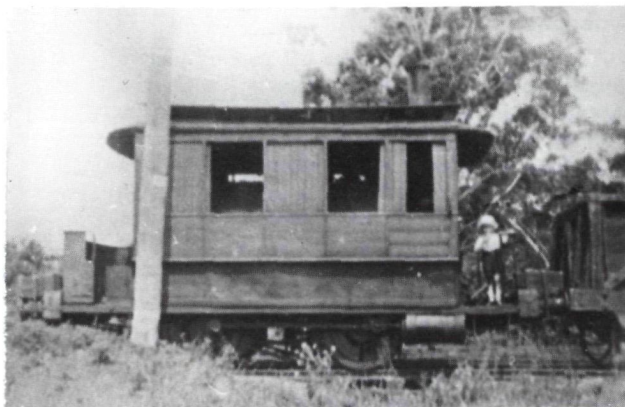
Motor No. 62A was purchased by Bulli Colliery during June 1907 with the body in an extensively damaged condition. The new body constructed at the colliery was similar to the original but had an elliptical roof replacing the clerestory style. At the same time buffing gear similar to that carried by No. 21 was fitted at Bulli.

By 1928 motor 62A was stored out of use at Bulli in the crude loco shed, but work commenced during 1929 on overhauling the unit for further use. This work was not completed as the arrival of a NSWGR F class loco enabled the tram to be released for scrapping.

Steam Tram Motor 69 at Port Kembla.¹⁵

As already mentioned, the Public Works Department took over the Mount Kembla and the Southern Coal Coy. jetties at Port Kembla in 1902 but immediately leased these facilities back to the original owners.

On 1 January 1906 the North Bulli Colliery



Steam motor 21 at Old Bulli colliery in the 1920s. - K. Magor collection

received the lease of the former Southern Coal Coy. jetty at Port Kembla. The Southern Coal Coy. had amalgamated with the Corrimal Coal Coy. in January 1890 and after that date little, if any, coal was mined from its Unanderra (Mt. Kembla) colliery, their jetty being mainly used for the shipment of Corrimal Coal. After 1906 the Corrimal Company exported coal from the former Mt. Kembla wharf as well as from the Bulli jetty.

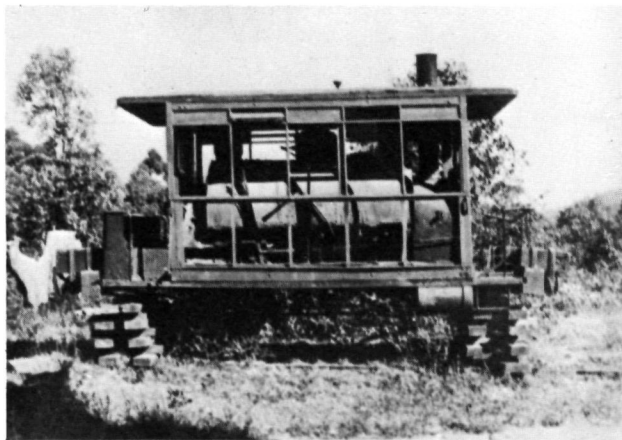
The North Bulli Colliery and coke ovens were located at Coledale station. To carry out jetty shunting at Port Kembla this company purchased steam tram motor No. 69 from the Randwick Tramway Workshops during June 1907.

This 11" 0-4-0ST motor (Baldwin 7080 of 1884) arrived in Sydney on 6 June 1884 on the "S. Gilmore" and entered tramway traffic on 7 July 1884. The unit was transferred to Newcastle on 11 January 1903 but returned to Sydney on 28 January 1906. A report dated 2 July 1906 shows this motor as stored at Randwick Workshops.

The North Bulli interests fitted the engine with raised buffer beams and railway style couplings prior to entreing service as a shunter at Port Kembla. This motor was not converted to dual control one man operation, but may have received number 69 "A" prior to disposal from the tramways.

From 1 July 1912 the PWD terminated the jetty leases at Port Kembla and took over shipping and shunting operations in that region. The North Bulli Coal Coy. sold the tramway steam motor to the PWD who renumbered the unit PWD 33 in their locomotive lists. The engine was housed at the PWD Unanderra shed and continued working as a jetty shunter until 19 June 1917 when PWD 33 (ex 69) returned to Randwick Workshops for a complete overhaul and a new boiler.

This motor returned to Port Kembla for a short period and during July 1919 was transferred to



Steam motor 62A at Old Bulli colliery in 1929, when the motor was partially dismantled for an overhaul which was never completed. - K.Magor collection

Harrington N.S.W. to assist in breakwater construction. During October 1933 PWD 33 transferred to similar work at Port Macquarie. Later reports suggest that PWD 33 (ex 69) was sold to Joseph Edwards, machinery merchants of Sydenham in 1948 and cut up for scrap. This may be correct but the writer inspected motor 5A in Joseph Edwards yard in January 1948 and again in January 1949 and no information was obtained from the most co-operative employees about a second motor being in the yard or having been processed by the firm at that time. It is possible that PWD 33 has been confused with steam motor 5A.

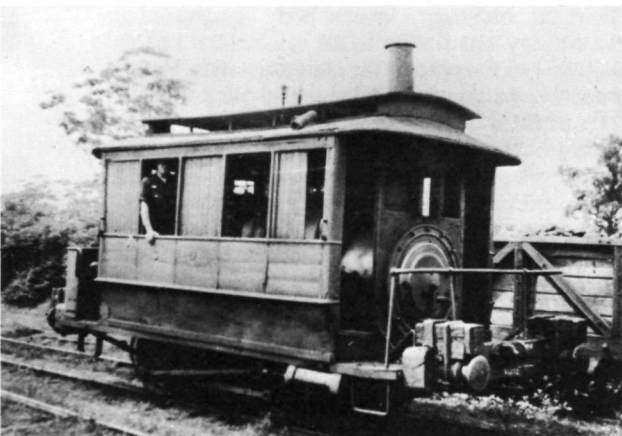
Confusion also emerges in PWD steam motor research due to the fact that NSWGR steam motor No. 33 became PWD 16, while NSWGT motor No. 69 became PWD 33. Thus the number "33" has caused trouble with researchers over the years!

Unknown Steam Tram Motor at Araluen.¹⁶

The details presented here are part of a more comprehensive manuscript dealing with the Araluen gold fields written by John Shoebridge over ten years ago.

Araluen is situated at the junction of Moruya River and Araluen Creek, 38 miles by road from Moruya, 15 miles from Braidwood and 31 miles from the closest railway station at Tarago which in turn is 161 miles from Sydney on the Goulburn to Bombala railway line.

Although the Araluen gold field was discovered in 1851 the main rush did not take place until 1868 while a more permanent settlement emerged from 1872. Alluvial gold was first won from shallow timbered shafts, followed later by primitive open cuts along the routes of buried creek courses. Horse



Steam motor 21 shunting on the Bulli colliery railway in the 1920s. - K.Magor collection

scoops removed the washdirt from these creek beds and gold was extracted in batteries with water delivered by extensive systems of water races.

Goldwinning revived in 1899 with the launching of the dredge "Pioneer" by the New Zealand firm of Tulloch and Hughden. By 1906-7 at least ten dredging plants were operating in the valley.

These steam dredges required an artificial pond of not less than 15 feet of water depth in which to work while their buckets could not reach deeper than 40 feet. Difficulty was experienced in areas of sticky clay and large boulders.

In October 1906 a syndicate of local mining interests formed the "Araluen Steam Shovel Gold Mining Company (No Liability)" to initiate a different form of mechanised working. This company acquired 50 acres of land at the upper end of the Redbank area and placed an order with the Sydney firm of Gibson Battle, the agents for Ruston Proctor Ltd., for the supply of a 10 h.p. rail mounted steam shovel with the expected delivery period of 4 to 5 months.

By the end of January 1907 plant was being delivered along the Shoebridge track from Moruya while 350 ft. of railway track had been constructed on the leases; standard gauge for rail haulage of top cover and wash dirt and broad gauge for the steam shovel. Early in March 1907 the Gibson Battle erecting team arrived in Araluen and commenced the assembly of the 2½ cubic yard capacity steam shovel which had been landed in sections from the steamer at Moruya wharf and delivered to the valley by road teams.

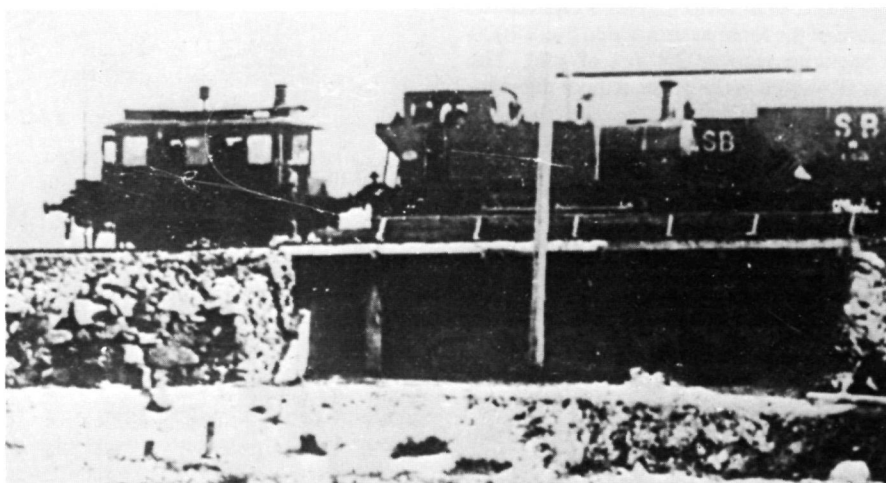
Acceptance trials of the steam shovel navy were held on 27 and 28 April 1907 to the satisfaction of the engineer and directors.

Railway dump trucks were delivered to Tarago railway station and transported down the mountain by five teams, the last being delivered at Araluen by 27 March 1907. A locomotive was also received and underwent steam tests for the first time on 20 April 1907.

This locomotive was a standard nine inch steam tram motor from the N.S.W.G.T. The wooden cab was retained at Araluen but the engine received modified couplings and a raised wooden headstock with dumb buffers. The original vacuum brakes were retained on the goldfields. A total of sixteen dump trucks of standard contractors side and end dump design were received but two or three underframes were never fitted with bodies, being retained to carry rails and timber.

The directors held a meeting on 9 May 1907 stating that they were well pleased with the operations so far. The navy had been tested "in very stiff ground" and the costs were below estimates, while the time schedule had been adhered to. It was anticipated that the washdirt would be located at the shallowest point of 16 feet where a seam thickness of 6 to 8 feet was expected. It was hoped that the washdirt thickness would increase to 20 feet further up the property. The tram motor was expected to haul 5 trucks per trip from the open cut up a 1 in 30 grade. By June 1907 work had progressed to a stage which enabled the railway operations to start.

At this juncture the company discovered that while the dump trucks followed the track without derailment the wheels of the tram motor would not negotiate the first set of points. The engineer had not allowed for the fine tramway flange contours and narrow wheel treads!



Steam motor 69, PWD 33, at the shore end of the former Southern Coal Co. jetty at Port Kembla, circa 1914. / C.B.Thomas collection

After some fruitless experiments in which the locomotive was off the track more than it was on, operations were suspended, the workmen discharged to await the delivery of a new set of locomotive wheels from Sydney. These were rushed from Tarago station by Hugh O'Reilly's team and fitted to the steam motor which was lifted by shear legs. After two weeks of idle time, operations recommenced and the derailment problems were solved.

During the first week of July 1907 the embankment subsided and the engine was off the road for two days before it could be replaced with jacks. During this stoppage a second track was laid down the incline to enable one rake of wagons to be filled on one side of the navvy while the other train was being hauled up to the dump.

By August 1907 the directors were advised that no productive work was yet in sight. On reaching the planned working level it was revealed that a previous open cut had already worked across the area!

During August water seepage became a problem and a pulsometer with a 20 h.p. boiler was purchased to handle the problem. At this stage the floor of the open cut was found to be too soft to support the heavy navvy tracks which had to be constantly repacked with timber.

Finally on 17 September 1907 wash dirt was reached and extraction commenced. The floor in this region, however, was found to be of heavy clay-shale nature and the steam motor could not haul the required number of trucks up the slippery incline. The trouble was aggravated by the subsidence of the 40lb. rails. After a further week's struggle the plant was closed and the men discharged on 25 September 1907.

Although transportation problems were blamed for the closure of the local papers stated that £7000 had been spent to recover 25 dwt of gold. The closure was attributed in the press, to poor management.

The board of directors considered the events and decided that further funds should be raised and additional plant purchased. The steam motor was to be replaced by a stationary engine and wire rope haulage. After making checks on the quality of the wash dirt the board confirmed its decision on 21 October 1907 and increased the original £12,000 capital by a further £2400.

On 14 April 1908 it was reported that the steam shovel plant had been overhauled and would be restarted in three weeks and be on washdirt by June. The navvy commenced work again on 15 June 1908. Mr. G. Gordon, a new loco driver, was engaged and as no further difficulty was experienced in hauling trains from the pit, the fixed haulage wire plan was forgotten. During the shut-down the track had been improved and the working load

reduced to four dump trucks per trip.

At last the mine was in full production employing 25 men over three shifts. This continued until August 1908 when the gold bearing strata had thinned to 1 foot in thickness due to a geological disturbance and the floor became uneven requiring hand grading to allow the navvy tracks to be extended.

At this time the navvy tracks were laid up to the centre of the working face and the standard gauge rails were at each side, the dump truck trains being placed on alternative sides of the steam shoven to be filled. The undertaking moved from one problem to the next. The thickness of the pay seam varied, the pit became a quagmire in wet weather and clay mixed with the paydirt caused problems at the washing sluices.

After considerable litigation the adjacent leases, first requested in 1906, were obtained in 1908 and the plan moved into the six feet seam area by September. The average week resulted in 15 ozs of gold being washed up. This result, however, was not encouraging when compared with the adjacent dredges. The steam shovel required a team of 30 men at this stage for the 15 oz weekly yield, while the dredges each employed an average of 12 men for a weekly yield of between 18 and 20 ozs.

Following a wash up of only 9 ozs. for a week's work, the steam shovel plant closed on 14 October 1908. The machines were greased, the steam motor placed in its shed and the eight remaining men, with the manager, departed by Christmas.

On 23 January 1909 the directors resolved to discharge remaining debts, to liquidate assets and to wind up the company.



Former Sydney steam tram motor stored on the 'Steam Shovel' leases at Araluan in 1911. The mountain outline suggests that this view is looking west across the Araluen Creek valley just behind what is now the Araluen Hotel.
-Town & Country Journal

An auction was held by J.E. Green and Coy. of 110 Pitt St. Sydney at 11.30 am on 11 February 1909 for the sale of the following material:-

Two gold dredging leases of 39 acres and 10 acres.

One Ruston Proctor 10 h.p. steam navvy with 1½ cu. yd. bucket.

16 h.p. Marshall double cylinder 16 h.p. portable engine.

One 20 h.p. boiler.

One saddle tank locomotive with tip wagons and rails.

Pulsometer, tools stores and sundries.

At this sale the portable engine and pumps were sold but the navvy passed in at £1,900 and there were no offers for the steam tramway motor.

The "Dreadnought" dredge of the Araluen Consolidated Coy., the undertaking which had acquired the leases, moved into the "Steam Shovel" area during June 1909 while the old steam navvy stood rusting beside the flooded pit and the locomotive slowly corroded in the shed.

Several parties inspected the plant over the next few years, including representatives from the Takapuna Steam Ferry Coy., an undertaking which operated steam trams on the north shore of Auckland Harbour. A deal was not concluded and

the steam motor now stood exposed to the weather with the dump trucks after the loco shed had collapsed.

In November 1909 Poole & Steel purchased the steam shovel and this was transported in pieces by teams to Moruya wharf from where it was shipped to the firm's Balmain yard to be refurbished and resold.

Mr. J. O'Toole purchased the steam motor in 1914 and had it hauled back up the hill to Tarago where it was loaded on a railway truck and transported away from the district.

The main mystery of this account is the identification of the steam tram motor. Contemporary accounts give its identity as 11" motor number 58 which was built by Baldwin (No. 6855 of 1883) and arrived in Sydney on the "City of Sydney" on 29 November 1883. By 29 June 1906 this motor was shown as having been written off at Randwick Workshops for use as a source of spare parts. References on the Araluen story, however, clearly state that the tram motor was a 9" one, that is one fitted with 9 inch diameter cylinders.

This indicates that it would possibly be one of the following seven steam motors of this cylinder dimension which entered service on the NSWGT Sydney lines during late 1881 and early 1882:-

Baldwin B/No.	Sydney Number.	To Newcastle	Newcastle Number	Returned to Sydney.	Unified No. c.1906*	Notes
5530	27	1891	9N	1902	111A	
5718	28	1891	10N	1902	10A	At Randwick to be scrapped 25-11-1911
5720	30	1891	11N	16-11-02	112A	
5634	31	1891	12N	6-11-04	113A	Last 9" motor in tramway service.
5642	32	1891	13N	24-2-01	114A	
5636	29	1894	14N	11-11-00	115A	
56641	33	1894	15N	17-6-00	.33A	To PWD as No. 16

Note * Unified fleet number awarded to each steam motor but not necessarily carried by all units in this list.

As the disposals of motors 28/10A and 33/33A are known this narrows the field of which motor was transferred to Araluen to five units. 31/113A would be the most likely contender if both recency of operation and running condition are considered.

On the other hand it is difficult to expect the 9" motors to haul loads of 4 or 5 loaded dump trucks up a 1 in 30 grade ... It is hoped that the mystery of the Araluen locomotive's identity and ultimate disposal will be solved at some later date.

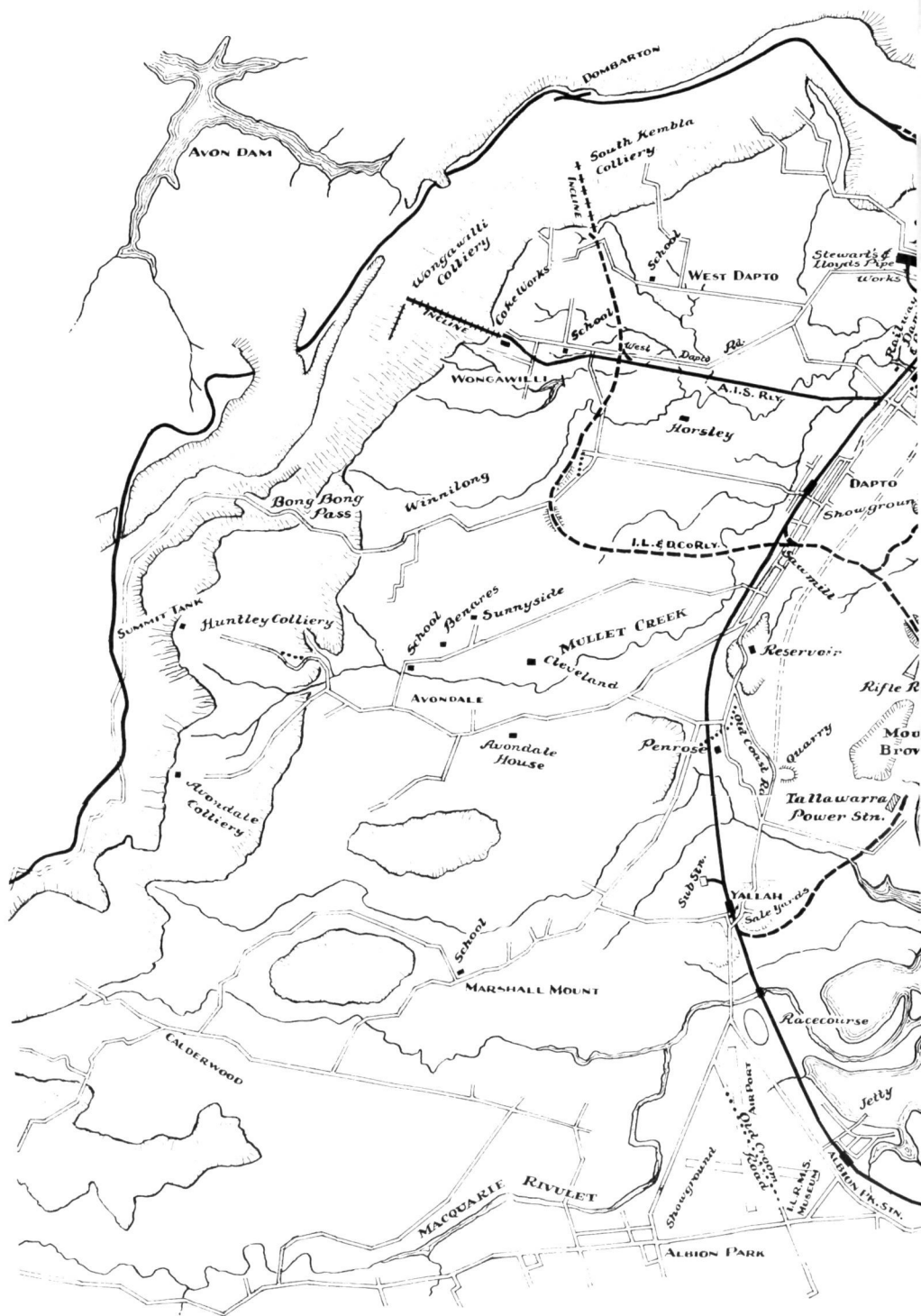
Steam Tram Motor No. 9A at West Dapto.¹⁷

The Illawarra Harbour and Land Corporation railway was constructed beyond Dapto to tap the coal seams on the southern face of Mount Kembla

During the period between December 1895 and July 1902, when the level crossing of this railway with the main NSWGR Illawarra line (south of Dapto station) was opened for traffic, little if any traffic used the private tracks between Dapto and the West Dapto terminus.

Between October and December 1916 a 2¾ mile private branch railway was built from Brownsville, westwards to the foot of an incline serving Wongawilli Colliery. G. & C Hoskins constructed this railway and banks of coke ovens to process coal from the Wongawilli mine and transport it to their Lithgow steel works.

This new railway crossed the Dapto to West Dapto IH&L Corp. tracks on the level. A local



story persists that the IH&LC would not immediately grant Hoskins authority to cross their disused railway formation. This obstacle was overcome by Hoskins diverting their new railway near the proposed crossing onto the parallel West Dapto Road alignment as a tramway. Road traffic was permitted to cross the IH&LC railway on the level thus Hoskins trains could legally reach Wongawilli by using the roadway!

During 1924 a company was formed to work the Mount Kembla seam through a mine known as South Kembla Colliery. The IH&L Corp. railway between the Hoskins crossing near Wongawilli and West Dapto was rebuilt and an incline constructed up the southern foothills of Mount Kembla. The line connected with Hoskins Wongawilli railway at marshalling sidings near the site of the above mentioned crossing.

In 1928 the South Kembla colliery proprietors purchased tramway steam motor 9A from Newcastle to shunt their railway. Motor 9 was an 11" 0-4-0ST unit built by Baldwin (No. 5174) of USA in 1880. This tram engine entered service in Sydney on 19 December 1880. It was transferred to Newcastle on 22 November but was back at Randwick Workshops with a broken frame during January 1907. The repaired loco, by this time renumbered 9A, returned to Newcastle on 10 March 1907 but was one of three sent to Sydney on 16 August to assist with the heavy traffic expected during Fleet Week (the visit of the USA "Great White Fleet") on the electrified Sydney tramway system.

Three steam motors returned to Newcastle on 30 August 1908 but the Newcastle Superintendent complained that number 90A, instead of number 9A, had been returned north by mistake and the former was not in as good an order as 9A! This complaint was lodged due to 90A having blocked tubes and missing firebars on arrival at Newcastle.

It appears that 9A remained on the Sydney suburban systems. During June and August 1911 it operated on the Parramatta to Castle Hill tramway and on 28 October 1911 this motor 9A was transferred from Parramatta to Randwick Workshops as its boiler pressure was due to be reduced from 120lb. per sq. in. to 115 lb. per sq. in; 140 lbs. was the standard operating steam pressure on tramway motors. During the next few months 9A worked electric tramcar transfer runs to St. Leonards and Meadowbank and during 1912 a new boiler was installed enabling 9A to again operate at full pressure.

Around this period motor 9A was again transferred to Newcastle. Records indicate that it was most certainly back in this northern city by November 1921. During routine overhaul on 10 August 1927 this steam motor received a Pyle steam turbo-

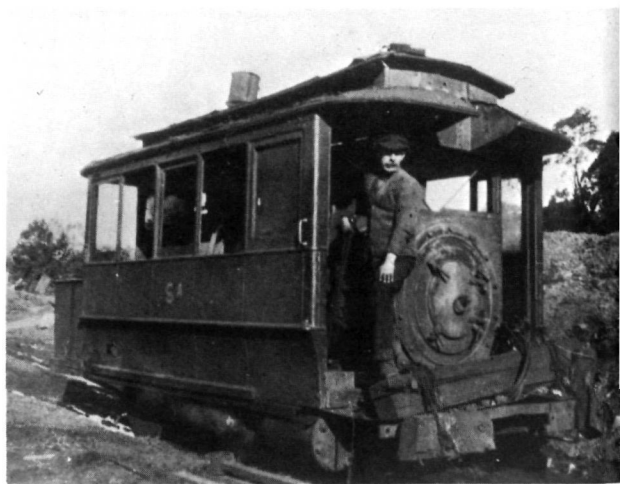
generator and electric headlamp from 79A while the boiler pressure was reduced from 140lbs. to 130lbs. on 19 June 1928.

On 22 October 1928 this steam motor was withdrawn from traffic for a major ("A" type) overhaul. As the traffic needs of the two remaining steam lines to Speer's Point and West Wallsend could be handled by better tram locos, 9A was sold to South Kembla Colliery and loaded onto a railway well wagon at Newcastle on 30 November 1928.

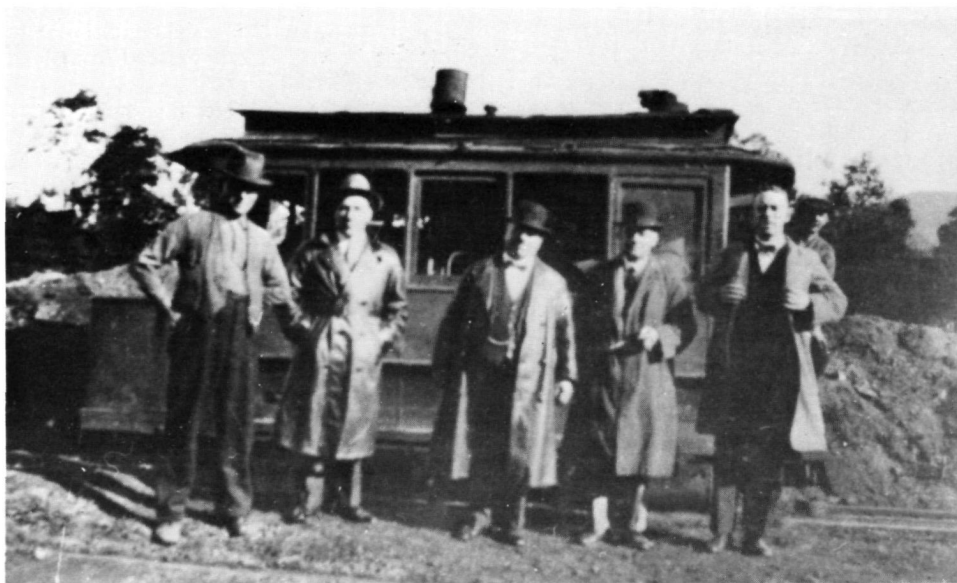
Photos taken of 9A at West Dapto show it in a somewhat decrepit condition by the early 1930's. The headlamps were missing, the smoke stack had rotted away and the sleepers which had been attached to the end aprons as make-shift buffer beams, were fitted in such a way that they did little to absorb shunting shocks.

During 1932 the 0-4-0ST locomotive "Wallaby" was hired from the Australian Iron and Steel plant at Port Kembla to shunt the South Kembla colliery branch railway. "Wallaby" returned to Port Kembla in 1935 when the colliery closed and the steam motor, as well as the surface plant, was scrapped or dismantled. "Wallaby" a Hawthorn Leslie locomotive (No. 2988 of 1913) is now preserved at the Illawarra Light Railway Museum Society's Albion Park museum but 9A was in no fit state to perform further work after 1935.

TO BE CONTINUED



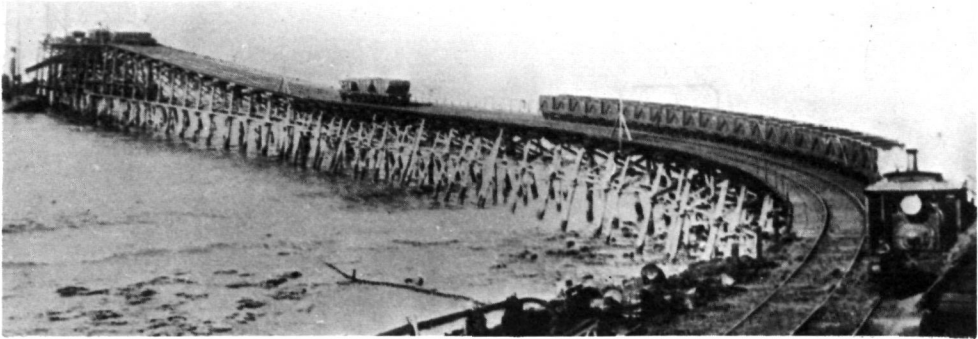
Steam motor 9A shunting at the foot of the South Kembla colliery incline at West Dapto, circa 1932. / Late C.C. Singleton



Steam motor 9A at West Dapto, South Kembla colliery. This view possibly dates from January 1932, as the man in the centre has been recognised as Mr. Cam the principal of the trawler firm which purchased the colliery at that time. - K. Magor collection

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IM 13-12-1887 Proposed channel to lagoon.
IM 4-9-1888 Wollongong Harbour taxed to capacity.
IM 30-5-1889 Details of jetties along coast.
IM 14-11-1895 Harbour Trust dissolved after 6 years.
- SMH 10-12-1892 Illawarra Harbour project.
SMH 3-8-1899 Illawarra Harbour & Land Corp. Bill.
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IM 30-5-1896 Harbour delegation to Works Minister.
IM 6-11-1901 Harbour construction difficulties.
IM 26-9-1895, WA 18-7-1896, IM 16-1-1896, IM 26-5-1896, IM 18-8-1896 Smelters under construction.
IM 5-4-1899, SCT 22-12-1900, SCT 13-6-1903, SCH 12-2-1904, SCH 11-11-1904, IM 11-8-1905 Smelters working.
SCH 24-3-1905, SCT 18-2-1905, SCT 4-3-1905, SCT 8-4-1905, IM 30-1-1912, IM 21-1-1913 Smelters closed and dismantled.
SCH 12-2-1904 Illawarra Harbour scheme history.
SCT 29-7-1911 Details of IH & L Corp. plant and value.
IM 26-9-1895, IM 22-2-1896, SCT 4-2-1921, SCT 27-5-1930 IH&L Corp railways.
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IM 27-5-1910. Delays on Port Kembla railway.



Steam tram motor 21 at Bulli Jetty, circa 1908. This view shows both the box and hopper type coal waggons. - Late W.Bayley collection

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A motorbus of the 1930s operated by Dion's Bus Service on the Wollongong to Austinmer service, the district to be served by the planned northern route of the tramway from Wollongong. Seen in Woodhill Street Fairy Meadow. -C.Dion collection

CITY SECTION

TRANSPORT NEWS FROM MELBOURNE

TRAMWAYS

On Wednesday 16 September, Z3 trams 151-155 commenced running on route 19 - North Coburg - City. As at late September 177 was the highest number Z3 in traffic with 184 having been received from the builders at Preston workshops. The Tourist Tramway service recommenced after its winter recess on 4 October from Wallan Road Hawthorn to Batman Avenue City.

The Clifton Hill tram/bus modal interchange was completed in late August for the Elsternwick and West Heidelberg bus routes and East Preston tram. Track relaying in mass concrete was carried out in August and September between 100m short of the Mont Albert Terminus and Iramool Street Balwyn. Toorak Road between Chapel Street and South Yarra Railway Station was completed by 16 August.

On Sunday 16 August, no trains ran on the Port Melbourne and St. Kilda Beach lines as part of the announced cut backs. Passengers were ushered on to adjacent trams and buses and heavy loadings were reported on some vehicles.

CHOGM

The Commonwealth Heads of Government Meeting (CHOGM) was held in Melbourne between 30 September and 7 October. As part of the security arrangements changes were made to traffic movement, parking, tram and bus services. The Chief Commissioner of Police and the Town Clerk placed large advertisements in all Melbourne's daily newspapers setting out exactly what was required of the public and supplemented with maps, drawings and a telephone number to ring for more information.

The main context of the advertisements were that a motorcade route from the Wentworth Hotel in Collins Place and Hilton Hotel in Wellington Parade to the Exhibition Building in Carlton would be created and that no parking would be allowed on the route and no traffic would be allowed in those streets during motorcade movements except for a free bus service. The MCG carpark was opened and a tramways free bus service ran from Wellington Parade along Clarendon, Albert, Lonsdale and Exhibition Streets to Collins Street between 6.30 a.m. and 9.30 p.m. on the weekdays. As a result six AEC Mk VI buses were taken out of storage to supplement existing services.

The only change to normal tram services was that westbound trams in Collins Street did not stop at Exhibition Street during motorcade movement periods between 8.30-9.30 a.m., 12-30-1.30 p.m., 2-15-3.00 p.m. and 5.30-6.30 p.m. on weekdays. The only change to tramway bus services was that the West Heidelberg-City bus route, from the first bus departure to 7 p.m. was diverted at Rathdowne Street and Pelham Street, and ran via Pelham, Lygon and Russell Streets to their normal Bourke Street terminus. On return journeys they did a U turn at Bourke Street and took the same route back to Rathdowne Street.

On the opening day trams did not run in Swanton Street between 11.45 a.m. and 12.45 p.m. and between 3.30 p.m. and 4.30 p.m. during motorcade movements at the Melbourne Town Hall.

During those periods City bound trams shunted at Flinders and Lonsdale Streets. Westbound trams in Bourke Street stopped just inside the Mall instead of at their regular stop on the other side of Swanton Street. As a result of CHOGM more passengers were carried by M&MTB vehicles over the fortnight.

NEW PUBLIC TRANSPORT FARE STRUCTURE

In preparation for the change over the new fare structure on 4 October the Ministry of Transport undertook a huge advertising campaign in Melbourne's daily newspapers, TV and a brochure drop to about every household in a bid to familiarise the travelling public with the new ticketing system. The blue brochure titled "The New Train, Tram and Bus Ticketing System Made Simple. (Almost)" is a comprehensive foldout double sided affair with three maps of rail, tramways and fare zones and detailed drawings of most of the new tickets to be used and their cost. Special attention is given to the new "Travelcard" for multi modal travel. This ticket can be bought on the tram, bus or railway station and can be used on any mode of transport in the zone(s) stated on it on the day of issue. This ticket replaces the "Day Tripper" and "Metro Cards".

The MMTB will still be issuing regular cash fares, Section Savers, City Section Concession cards - 8 rides for \$2, City Plus One section cards - 5 rides for \$2 and Monthly Travel Permits for \$30.00 and then the price of each journey is then

only 10 cents. All MMTB tram services are in zone one and all MMTB bus services except the Doncaster buses beyond Manningham Road and Station Street are also in zone one and beyond the above, zone two. The central zone is part of zone one which covers the original City Section Plus One section.

The following is the new fare structure:-

Travelcard Central - \$1.00
 Travelcard Zone 1 - \$2.00 (including Central)
 Travelcard Zone 1 & 2- \$2.60
 Single Journey Tickets

No. of Sections	Adult	Child/Pensioners
1	30c	20c
2	50c	30c
3	60c	30c
4 & 5	70c	30c
6 to 10	\$1.00	30c
11 +	\$1.20	30c

NEW SUBURBAN SILVER TRAINS.

The first of VicRail's new suburban silver and orange trains entered service on Monday 28 September. The new train is the first of fifty on order that will cost \$108.5 million. The contract for the construction of the new trains was awarded to Comeng Holdings' Victorian subsidiary, Commonwealth engineering (Vic.) Pty. Ltd. at Dandenong in mid 1979.

The new train entered service on the Burnley lines which include Glen Waverley, Alamein, Lilydale and Belgrave. The Chairman of VicRail Mr. Alan Reiher admitted that the new trains would not run in the northern and western suburbs which include St. Albans, Broadmeadows and Upfield till a significant amount of work is carried out increasing spacing of the track centres, mainly at several level crossings, which would be carried out over the next 15 to 18 months in time for the opening of the northern loop of the underground. A significant

increase in interior room has been achieved by increasing the width over the waist of the cars by using curved sides, which in turn has caused the loading gauge problems.

The contract provides for 200 motor cars and 100 trailer cars. The six car configuration will be motor-trailer-motor-motor-trailer-motor and they have a maximum passenger capacity of 1332. The trailer cars can carry up to 250 passengers and the motor cars 223. Total seating is 604. Airconditioning is a key new feature with equipment of the latest design providing temperature control in both summer and winter. The cars have a heavy duty brown pile carpet on the floor and 40cm up the walls. The interior walls are moulded fibre glass and fluorescent lighting is provided between the air outlets. The seats are made from moulded fibre glass and foam rubber and covered with heavy duty wool cloth. Fold up seats are also provided near each door.

Special attention was applied to interior decor which will be varied throughout each train to provide a restful and pleasant atmosphere, and also to ride qualities including sound proofing. Each train will be fitted with a public address system and communications equipment. Other features are power operated doors, air suspension, four motors per motor car, and large panoramic double glazed tinted solar control windows. Maximum passenger safety has been ensured by operating these trains as three-car units at night. The crew can isolate two cars so that passengers are confined to one car under the control and protection of the train crew.

Delays of several months have plagued earlier production targets but it is now believed that five six-car trains will be provided in the first year and ten six-cars in subsequent years until the contract is completed. With the delivery of the new order VicRail will operate three separate fleets of trains - 56 blue Harris trains, 59 silver trains and 50 new silver and orange trains.



SW6 957 fitted with the distinctive new style aluminium sliding doors.
 (Refer to TW August 1981.) - Collins Street terminus. - K.S.Kings

★ Museum Notes and News

TENTH ANNIVERSARY OF BALLARAT CLOSURE

Commerative Gathering Saturday 19 September 1981 Ballarat Tramway Preservation Society

The formal proceedings of the day began in mid afternoon when BTPS President, Frank Hanrahan, called all present to a temporary dais and introduced various speakers including BTPS secretary Richard Gilbert and the Mayor of Ballarat, Councillor Hancock. Local parliamentarian Mr. T. Evans was then invited to address the gathering; Mr. Evans said, during his speech, that 'the society's tramway now played a significant role in being a viable attraction in area tourism'.

Mr. Evans was invited to step onto the front platform of four wheel 14; and to the acclamation of all present, he notched up the controller and as 14 moved forward it broke through a ribbon; thus two objects were achieved: the commemoration of the tenth anniversary of the closure of the SECV Ballarat tramway system, and the Society's new building was officially declared open.

After the ceremonies, guests boarded four special trams, 38, 27, 671, 661, for one and half round trips in 'The Parade', after which afternoon tea was served in the depot.

The Society's board and members are pleased to acknowledge the presence of members from kindred societies and officials from the M&MTB and SECV.

In the evening, a social gathering of members was held at the Criterion Hotel, where a function room was booked. After the evening meal, Bob Prentice and Ian Hanson showed films.

W3 IN SERVICE

On 19 September 1981 Ballarat become the first museum to place a W3 in service when 661 commenced operating. Members worked to a late hour the prior night, installing the last fittings in the car interior. After a few trips along the line the consensus of opinion was that 661 is faster than the other four motor car - W4 671. The last task to be completed is the fitting of two rear vision mirrors in order to facilitate the driver's vision for the off side loading in Wendouree Parade.

MAINTENANCE

Maximum traction car 40 could not be used for the tenth anniversary commemoration due to problems which have developed in the bogies. The body will be lifted and the bogies dismantled. Some new parts will then have to be made and installed.

Also requiring attention is car 33 which has to be lifted so that rettyred wheel and axle sets can be in the truck.

Due to flange problems car 14 will not be operating in Melbourne during the 1982 Transport Cavalcade; 27 will be the replacemnet tram.

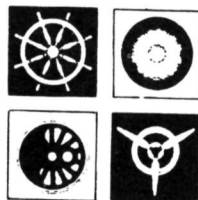
W4 671 has had its former carbon shoe trolley-poles lengthened and they now track satisfactorily.

With Mr. T. Evans M.L.A. at the controls, 14 breaks the ribbon. 19.9.81. - William F. Scott



GLENORCHY . . .

Tasmanian Transport Museum Society



Development of the Museum continues to be central to Society activities. The aim of completing a major portion of our works programme before public opening has been subject to some frustrating delays caused by bad weather and a sometimes inadequate and hard pressed workforce. Nevertheless development has continued with some significant achievements.

It is now obvious that the opening planned for November 1981 will not be realised but the Society is hopeful of settling on a new date for late 1982.

A major factor in the Museum's development is the continuing support given by the Tasmanian Government through the Tourist Department which has made a grant of £10 000 in this financial year. A significant boost to Society finances is given by funds raised by bottle collections which to date have raised £10 000.

STATION PROJECT

The reconstruction of the station building is now complete with the re-erection of the verandah and construction of a new chimney and access ramps. The overall project however is still several months from completion and attention is now concentrated on repainting the building and reconstituting the interior. A major alteration to the original layout will be the display room created by removing a dividing wall between two of the original rooms. Already the wall has been removed and a new window installed prior to lining the room with plasterboard and building display cabinets.

TRACK

A 25m section of sunken track has been successfully installed between the railway and tramway layout. The track gang has taken delivery of and revitalised the body of an E class railway box waggon. This has been set up alongside the track for the storage of materials and equipment.

TROLLEYBUS

After 14 years in storage Hobart Leyland Canton trolleybus 74 was moved to the museum. Motive power was provided by members' four-wheel drive vehicles pushing from behind. The 1km journey was accomplished without incident.

DISPLAY

Society members participated in a display of vintage farm and steam machinery at this years Royal Hobart Show. Principal exhibit was Harry Diers 1915 Marshall portable steam engine which provided power for a chaff cutter and steam for a variety of smaller engines. Other exhibits included petrol and oil engines as well as three tractors - a Fordson, John Deere and Lanz.

FUTURE DEVELOPMENTS

Plans have been approved by the local council for an addition to the Electric Traction Building for steam technological exhibits. Plans are also being prepared by the council for a permanent toilet block at the museum.

Hobart Canton Trolleybus 74 on delivery run to Glenorchy museum. - R.Hills



BYLANDS . . .



Tramway Museum Society of Victoria

TOUR

On Sunday 30 August 1981 the Society held a special tour called 'Chocolate and Cream'. As the M&MTB is finally disposing of L class cars 101, 102, 103 and 105, but retaining 104 and 105 which were recently used for the Squizzy Taylor and are painted chocolate and cream. It had been hoped to line the six L cars up across the front of the old shed at Malvern depot where they were built, but the four cars to be disposed of had already been moved to Thornbury and placed in storage — one on each track at the front of the shed! It was arranged to position the two cars on adjacent tracks and thus the six members of this popular class were together for the last time.

In keeping with the tour name all the chocolate and cream cars on the MMTB system were lined up together at Malvern depot for photos. Tourist cars X2676 and V214 were brought over specially from Camberwell depot; Birney X217 resides at Malvern.

A barbeque lunch was held at South Melbourne football ground siding and all told the days outing was quite successful and enjoyable.

BYLANDS

During September the SECV were able to erect their poles as the ground had dried out sufficiently to allow their vehicles to gain access. The substation is now in its final stages of completion with work due to start soon on the underground conduit from the transformer pole.

After many months out in the open at the north end of the main shed, X2680 is back inside behind closed doors as the leading car on 1 road. This was

achieved by moving all the cars down on that road and placing the Brill radiax truck frame outside and angling bogie cable trailer 192 across the Ballarat wheel lathe.

The Society was approached about placing privately purchased W2522 at Bylands and an agreement was subsequently reached and the car arrived on Friday 4 September 1981. While at Bylands this car will be available for the Society's use.

KILMORE HORSE TRAMWAY

In late July of this year the Shire of Kilmore Council approached the TMSV about a project to connect the township of Kilmore and the Bylands tramway museum site by an electric tramway. This would be a long term plan which would also involve the Victorian Government.

As an initial development two self contained and complementary projects would be undertaken. Firstly, a horse drawn tram service would be established in Kilmore's Hudson Park next to the Northern Highway in conjunction with the Kilmore Council's development and beautification scheme for the park, and secondly, construction of a second tramcar storage shed at Bylands to house nine cars and to allow for future extensions as funds permit.

Discussions on these projects have now reached a stage where work will commence by the end of the year. In the case of the Hudson Park horse tramway, 150m or so of track will be laid by society members in late October and November and construction of a two car lock up shed by the Kilmore Council would see the service commence in early December. The two horsecars will be transferred from Bylands.

FERNY GROVE . . .

Brisbane Tramway Museum Society



TRACKWORK

The section of track between the points turning off to Samford Road and the turnout directly in front of the main gate has been reconstructed using grooved rail with bolted joints and tie bars. This work was necessary due to the failure of two welded joints through metal crystallisation.

In the first steps taken to construct the revised terminal layout, the unused inner terminus turnout has been lifted.

WORKS

Work has commenced installing a public address system between the signal box and the front gate, the display area in the workshop and the depot buildings, as well as providing power and lighting cable to the signal box. A trencher was hired and trenches dug between the workshops and the caretakers house and from there to the signal box. Conduit was laid and the trenches filled. A backhoe was hired to finish the section across the terminal track and hard packed roadway. Electricians John Hudson and John Lambert are expected to complete the wiring in the near future.

ELECTRICAL

Work by this branch has concentrated on erecting the wooden overhead troughing over roads 1 and 2 in number one shed. Troughing over road 3 had been erected in 1974 prior to an open day for members. Overhead, complete with ears, salvaged from Ipswich Road depot was used, further enhancing the authenticity of number one shed as a genuine 'ex tram depot'.

Extra fluorescent lighting has been installed in the substation building to provide better lighting conditions for continuing work on the extra mercury arc rectifier cabinets and high speed circuit breaker system.

RESTORATION

Internal straphangers have been rechromed and refitted to drop centre 277.

Work on drop centre 341 is progressing well. The roof has received its final coat of paint and the trolley bases are being scrapped down and cleaned for repainting. The end aprons, destination box fascias and headlights have been refitted, the headlights re-wired and original style anti climbers (bought from the M&MTB) fitted to the bumpers. Undercoating has commenced on one end and most other panels have been sanded and filled.

A signwriter is being engaged to prepare destination and advertisement panels on the roof brackets.

The sanding of wooden panels on drop centre 231 is continuing.

Workshop manager, Peter Burden, has advised that the next full restoration project will be FM400, which will be restored to its original 1938 condition.

TRANSPORT CAVALCADE

The week of 22/23 November 1981 has been declared 'Transport Week' and the various forms of transportation will be highlighted on different days during this period. Saturday 28 is 'Bus Day' and the BCC has asked the Society to participate.

The highlight of the day's activities will be a transport cavalcade of historic vehicles and, at this stage the Museum intends to include buses 80 and 241, trolleybus 1 and tram 65.

BBC Transport Department assistance is being sought to provide a tow motor for the trolleybus, a lowloader for 65 and some repainting work on 24 and trolleybus 1.

The cavalcade will end with a mardi-gras on the bank of the Brisbane river at South Brisbane where the Society hopes to have a bookstall and display.

PARRAMATTA . . .



Steam Tram & Railway Preservation Society

RESTORATION

Work on car 74B continues at a good steady pace. Both side sills have been replaced together with the headstocks. This has enabled the truss rods to be tightened giving the car a much straighter appearance than it has possessed for quite some time. At present work is progressing on replacing and/or repairing the roof support members. The replacement process in particular requires much skill in wood shaping and morticing. It is considered to be most fortunate in having the skills of Wal Saeger available to do this most demanding work.

KA car 778 (Camden/Yass type tramcar) went to the SRA Apprentice training school at Chullora in March last. Work on this car is progressing at a steady pace.

Of much satisfaction to the Society was the definite identification of this car. The exact identifica-

tion of this car has been a matter of conjecture for many years, despite the fact that there probably were no more than four such vehicles built. The number 778 was found on an internal door lock fitting.

PUBLIC RISK INSURANCE PROBLEMS

A recent planned bus operation in Parramatta Park in conjunction with SPER was thwarted by a city council demand for a public risk insurance cover on the operation of £5 000 000. A premium quoted for this sum was in excess of £200, making the venture uneconomical to pursue.

RECIPROCAL TRAVEL RIGHTS

The Society is pleased to announce that an agreement has been made with the South Pacific Electric Railway to allow each others members to enjoy reciprocal travel rights on the respective tramways. Membership cards will have to be produced to obtain this benefit.



ALBION PARK ...



Illawarra Light Railway Museum Society

LOCOMOTIVES

During 1977 the ILRMS purchased a 2ft gauge Fordson petrol/kerosene four wheel loco from Fairymead Sugar Mill. This was in a somewhat sorry state when it arrived at Albion Park on 25 February 1978. Cleary Brothers workshop made a generous offer in 1979 to overhaul the engine. During August 1981 the reconditioned engine was refitted to the restored frame and running trials were carried out on 8 August. Further work and some modifications are needed before this loco enters regular service. It was built by Malcolm Moore in the 1930s using a transmission by Day's Engineering Co. of Melbourne.

By late September standard gauge 0-6-0T 'South Bulli No. 2' (Hudswell Clarke 297 of 1888) had been painted black. The red trim is yet to be applied.

ROLLING STOCK

During August roll up canvas side curtains were fitted to open sided end loading saloon No. 1.

On 12 September four wheel fire fighting tank car constructed by Tony Madden was hauled around the museum on clearance trials. A removable petrol driven pump has since been fitted to this car.

Queensland railmotor trailer P119 was hauled on to the main line for photographs and running trials on 26 September. This car looks most attractive in its rich brown and cream colour scheme. Reconditioned bus seats, fitted back to back, accommodate 39 passengers with adequate leg room. The interior is most striking being cream with brown trim with heavy duty green carpet on the floor; the new polished ceiling features figured ply. Work has commenced on the manufacture of a pair of long wheel base air braked bogies for this car.

On 26 September also, car 2 which is based on an International bus body of circa 1918 was hauled from the compound for display and clearance trials. The

exterior of the body is nearing completion while work continues on the interior. The local glass firm of Ted Mant and Sons has been of considerable assistance in the restoration of P119 as well as 2. When the bus body was received in 1977 the only glass remaining were broken pieces of rough cast green in the clerestory windows. Ted Mant has matched this and although they had to charge for the glass, at cost price, all labour in cutting the glass with curved corners was donated. When the new bogies are complete for P119, the released Ruopak bogies will be fitted to car 2, with steel chassis members, steel bumpers, steps and draw gear.

TRACKWORK

The parallel loop being constructed in the station yard was far enough advanced on the 13 September open day to accommodate locos and rolling stock.

On 15 August the Society was fortunate to receive a load of 45lb rail and point parts from Old Bulli Colliery. The Collieries section of AIS and Jim Costigan are thanked for making this donation available.

In late September, ILRMS Secretary, Tony Madden visited Queensland to supervise the loading of 10 tons of 42½lb rail made available by the QR from the Millmerran branch near Toowoomba. QR made 30 tons available but as ANGRMS required similar plant for their line at Woodford ILRMS allowed them to take 20 tons. The 10 tons will provide enough rail for 240m of track and this, with 45lb rail already obtained locally and from Tasmania, provides adequate material to complete the main line circle as well as replacement of the 25lb rail in the compound at a later date.

LEASE EXTENSION

The lease extension, which will more than double the museum area to 4.6ha, was finalised in late July and is now back at the Lands Department for final notation.

Queensland railmotor trailer P119 with Ruston diesel loco. 26.9.1981.

