

WELSH HIGHLAND

£1.00

HERITAGE

Issue No. 34

ISSN 1462-1371

December 2006

Eleven Shillings a Week!

In April 1879 one Mr Owen Pugh of Barmouth was seeking employment with the Cambrian Railways. So he wrote to the General Manager in Oswestry who replied as follows:-

“Sir, I could now give you (starting) on 21st inst. the situation of signalman at Croesor Crossing near Portmadoc until something better turns up. Let me know if you accept.”

The letter is signed by a Mr Lloyd followed by a postscript –

“Present wages 11/- per week”.

Perhaps this final somewhat terse afterthought should provide a guideline to remuneration for this position in 2009?

and 7' 6" wide with a door at one end facing the WHR. Height to the roof apex is 9' 6". It is appreciated that as these dimensions are based on photographic evidence they can only be approximate - but realistic.

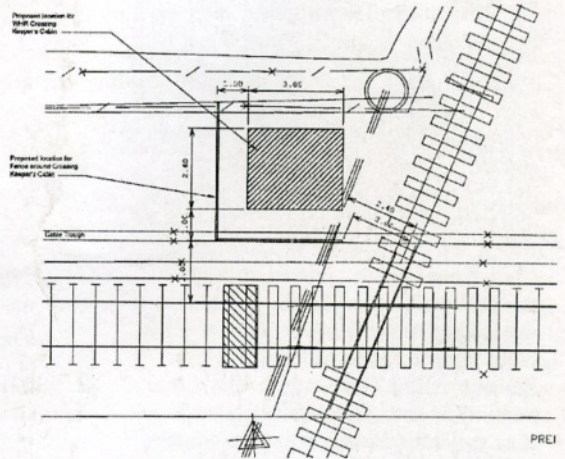
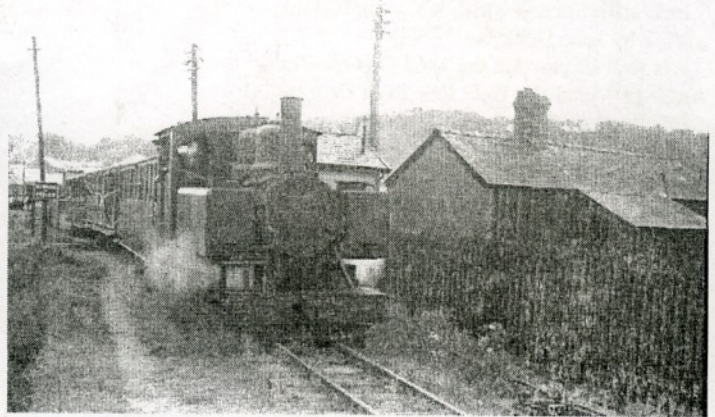
The building was of timber construction with a slate roof, standing on three courses of brickwork. There were two sets of sliding windows facing the standard gauge, and one set facing the WHR.

The basic drawing is now being detailed and sectionalised in such a way that an estimate of cost can be obtained. This task is being undertaken by Stuart Baker and John Kimber. A location plan for the concrete base has already been produced and it seems likely that the replica building would sit more or less in its original position. The box of electronic wizardry controlling the 'safer than safe' use of the crossing will stand on the concrete base, from where it will control the trains both large and small in all directions. It clearly needs a cabin to protect both it and the incumbent crossing keeper - how 'nice' it would be if that protection were to be a replica crossing cabin, thus adding a detail of great historic interest on this wonderful railway journey.

The newly formed Welsh Highland Railways Association has vouchsafed £4,000 towards the cost. Perhaps the

the operating company can be persuaded to chip in.....?

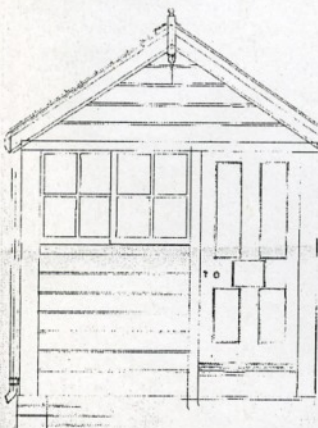
Furthermore - as the photograph shows - there was originally a fence, some 30 yards long between the crossing cabin and the gated WHR. The Heritage Group, in conjunction with WHR Ltd., have offered to replicate this fence, and if the gates protecting



the crossing were to be constructed of timber as per the original it would complete this little vignette and would immeasurably enhance that original Welsh Highland atmosphere.

Drawing (left John Kimber; plan (above) Stuart Baker; Photo courtesy FR archives Both plan & drawing may be subject to final amendment

At the Heritage Group AGM in 2004 Andy Savage asked if a set of drawings could be produced depicting the original Cambrian Crossing Keeper's Cabin. In the absence of the original drawings it was suggested that they could be 'worked up' from photographs. John Kimber took up the challenge, and having been presented with all known photographs of the



cabin from different angles, he produced a basic drawing. This depicted a building 9' long (parallel with Network Rail)

The Creassy Embankment

The 1923 Welsh Highland Railway was a multi-headed hydra of miscellaneous schemes, abortive engineering works, and add-ons all cobbled together to produce that one 25 mile route that would have linked Caernarfon with Porthmadog..... if the final Caernarfon section had been tacked on. As it was the line had to make do with terminating at Dinas some three miles short of its final destination.

But it's the Porthmadog end that receives so little attention and which has prompted this work by John Hopkins.

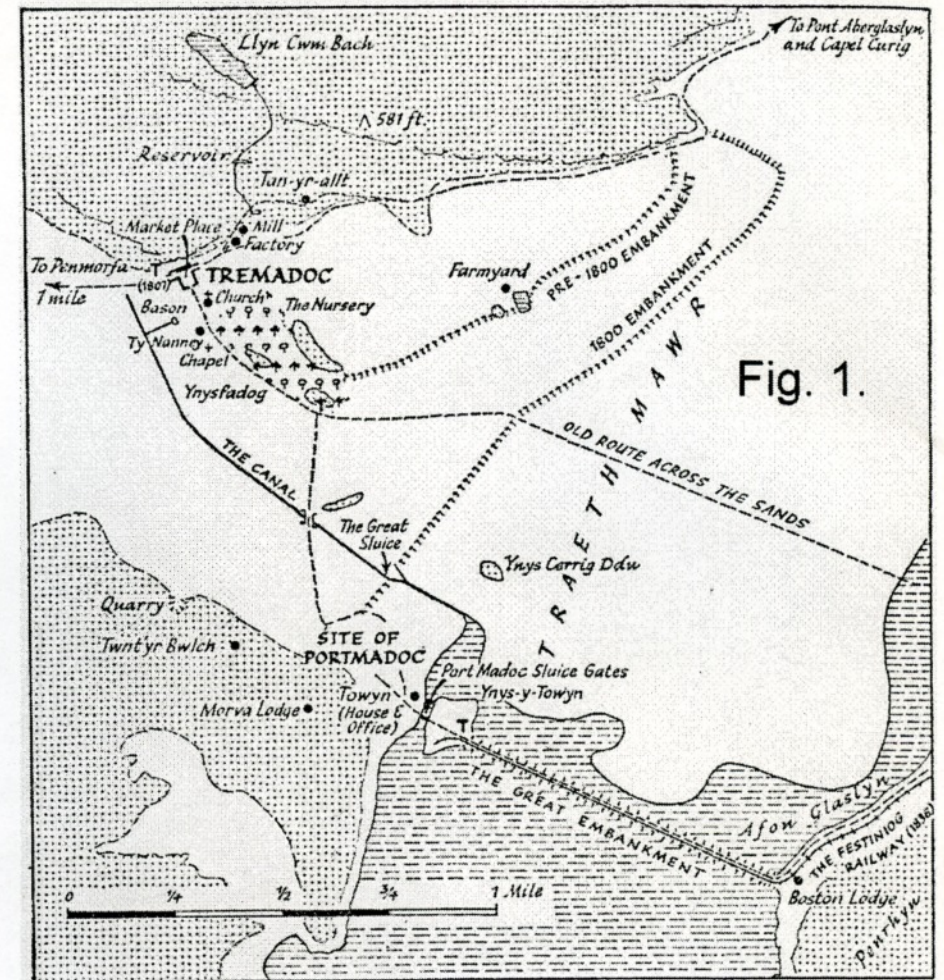
It is well known that the 1864 Croesor Tramway provided the final link from Croesor Junction into the heart of Porthmadog. But how was the route of the Croesor defined across the swampy marsh of the Traeth, that great flat area of the reclaimed Glaslyn estuary from Tremadog to Pont Aberglaslyn and over to Minffordd. Simple - in the great engineering tradition of light railways it was plonked onto an existing feature. It is that unexplored feature which is the subject of John Hopkins' article.

In 1811-12 William Madocks built 'The Cob' - the grand dyke that secured the flatlands of the tidal Glaslyn Estuary known as Traeth Mawr. What is less well known are Madocks' two earlier attempts to defy the tidal waters of the Glaslyn. Of particular significance to the WHR is the second of these two embankments generally known after the name of its engineer, James Creassy.

This then is John Hopkins' story of the Creassy, its origins, its route and its significance to the WHR.

In 1798 Madocks purchased the Penmorfa estate including Tan yr Alt, the house standing above what is now Tremadog. In order to defend and extend its southern boundary he erected a sand-built barrier that ran roughly from the shore line at Portreuddyn Farm to the then islet at Tremadog on which the newly restored St Mary's Church now stands. Indeed the line of this first work can still be seen today as the footpath (seen best on a OS 1:25,000 plan) from the main road (A498) near Prenteg leading southwest to Farmyard Farm. The path shows substantial survival of the embankment, up to some 2 metres or so above adjacent field levels. It then runs south west of the farm almost to Ynys Hir by Bodawen. Viewed from Tan-yr-allt (by kind permission of the owner), there appears to be a section of surviving embankment in the fields on private land between Bodawen and Farmyard Farm.

The success of this first two mile long embankment led Madocks to build a bigger and better one in 1800 (the "Creassy"). This ran from "Portreuddyn Corner" on the shore line



to its southern-most terminal on the promontory of Moel-y-Gest (near the centre of Porthmadog High Street). The line of these two embankments are detailed in Fig. 1, which is taken from Elisabeth Beazley's defining book on Wm Madocks.

Fig. 1 also shows the "Old Route across the Sands" reflected today in the lane that leads

Meticulous research by John Hopkins reveals the location of 'The Lost Creassy' and its influence on the WHR

from Bodawen on the Tremadog road (A487), to Pen-y-Mount level crossing and then on past the Town Football Club with the remnants of the route continuing to the eastern shoreline of the Traeth, finally petering out at a point below Minffordd.

The success of the Creassy undoubtedly inspired Madocks, and drove his visionary ambition to build that everlasting monument to

his memory - "The Cob", or 'The Great Embankment' as it was then known. When completed the earlier embankments simply became inland features, though the Creassy would remain subject to occasional substantial flooding of the Afon Glaslyn behind The Cob.

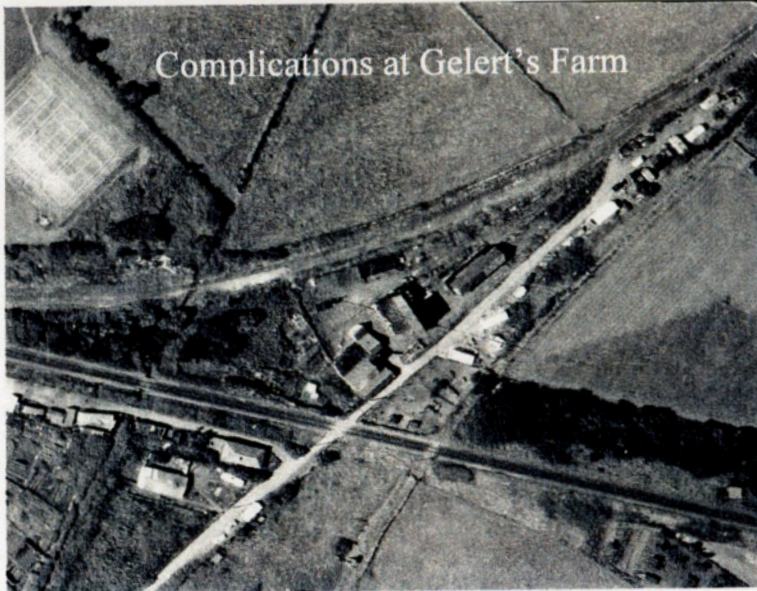
In order to identify the termination of the Creassy where it became 'lost' in Porthmadog it was necessary to superimpose the plan in Elisabeth Beazley's book over a part of the Ordnance Survey Landplan (see Fig. 2). Both plans have had much of the obscuring detail deleted to assist clarity. The alignments were found to be mostly good and in parts, excellent.

The Lost Creassy

From a point on the Creassy about 200 metres north of the Cambrian/Croesor/WHR rail/rail crossing, and looking South West along the track bed, the Croesor/WHR route veers to the left to go over that crossing, past the former flour mill and along the familiar route to the quays and the harbour.

However, from that same point, the Beazley plan shows the southern portion of the Creassy continuing south-westwards virtually in a straight line from Pen-y-mount, over the

Complications at Gelert's Farm



This 1975 aerial photo shows the diagonal 'white' line, which was the Creassy; below it, curving gently away, is the old WHR trackbed (note the shadow of the water tower). Above is the standard gauge siding shortly to become the track of the '64 Co (now WHR Ltd), whilst the Cambrian is obvious as the other diagonal.

advantage of islets and rock promontories along the route, using all as terminals for sections of embankment and, in some cases, as quarries providing rock for construction.

Thus, from the foot of a promontory on the north-western shore line, which became the site of Tremadog, an attractive route for the road would be first to the small islet (c.2 metres high) upon which is built St Mary's Church, to the larger successive islets of Ynys Fadog, Ynys Hir and Ynys Galch (now a War Memorial), onwards to meet the "Porthmadog promontory", discussed above, near the roundabout at the junction of A487 and A497. Then, to continue over this outcrop of Moel-y-Gest and along the line which is now High Street, which probably became a "High Street quarry", most of which was excavated away to achieve a suitable level for a new, better road route. The route continued to the islet of Ynys-y-Towyn, some of which was quarried away, and also making a deep rock trench to create the river water outflow past The Cob where the Britannia Bridge now stands. From



The line of the Creassy clearly defined by the right angled bend in the footpath at Portreuyddyn Farm.. It then gradually converges with the line of the railway, which is located near the bottom edge of the picture 2000 - WHR Ltd

present main thoroughfare through the centre of the town. The eventual outcome of this was to leave the elevation of the main crossroads on High Street about 3 to 4 metres higher than areas to its immediate north east. This can be seen mostly easily by looking from the A487-A497 roundabout towards the main crossroads of High Street, Snowdon Street and Bank Place (by Woolworths). Hereabouts, perhaps, is the remnant of the original outcrop which attracted a role for it as the termination of the southern end of the earlier Creassy.

Chapel Street, together with its two back alleys, seen in detail, is out of alignment with its more "grid-pattern" neighbouring streets by about 9 degrees, seen most clearly at the NW corner of New Street (see Fig. 3). Furthermore, when seen on the ground, its entrance from High Street is narrow and appears to pass through earlier established buildings by approximately the depth of one

house and garden, which suggests that demolition of an earlier building occurred to create the access to the wider and later street of terrace housing in Chapel Street itself. This is unusually wide compared to some others nearby and there are also small level changes visible between the street and the rear alleys by up to a good fraction of a metre.

Indeed, Chapel Street follows the "Beazley" line of the Creassy Embankment almost perfectly (Figs. 2 and 3), which suggests that it may represent later infill building on land previously unused as being

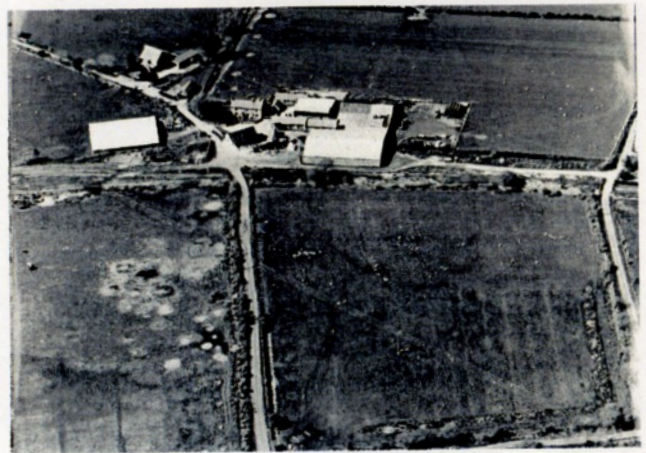
there it was straight across the narrow part of Traeth Mawr towards the promontory and quarryable site of Boston Lodge.

With the building of The Cob, and as a convenient source of rocks, leveling the "High Street quarry" down to a reasonable height would form part of the route of the

the open space of a redundant, degraded embankment and retaining its alignment. Furthermore, close observation (without measurements) shows that Madoc Street has a hump in it as it crosses the end of Chapel Street of up to half a metre or so in height. It might be concluded that here also is evidence of the former street passing over a severely degraded embankment ?

Following the projected line north-eastwards over Madoc Street, Chapel Street crosses the former Canal (Y Cyt) and through modern industrial areas until the former Cambrian Railway line is met. No visible remains of the embankment have been seen here.

However, the bridge over the Y Cyt bears further inspection. Clearly, it is built on earlier foundations and, under the bridge, there are vertical channels in the stonework and other signs consistent with it being a substantial guillotine-style lock or sluice gate. This seems to confirm it as the site of Madocks' original "Great Sluice" in the Creassy (see Figs. 2 and 3), the modern, much larger sluice



Pen y Mount farm - the WHR runs in front of the farm buildings 'The old route across the sands' comes in from top left, crosses the line, and then exits at the bottom of the picture. 2000 - WHR Ltd

in The Cob for the whole of the Afon Glaslyn being some distance downstream.

Northern portion of the Creassy and the Railway Route

The relationship between the Creassy embankment and a railway route began in the mid-1860s with the building of the Croesor Tramway. By this time, the Creassy was some 60 years old and had been sheltered from the sea by The Cob for some 50 years. Notwithstanding that, the Afon Glaslyn is subject to flooding at intervals and a water-free track bed would be valued. It would be sensible to assume that the engineering of the Croesor, from quarry to port, would seek a good economic route both in terms of construction and operation. An important consideration for this horse-drawn tramway would be that of the ruling and maximum gradients.

In qualitative terms, these considerations might well lead to the following design elements of the Croesor Tramway route of 1864 from the quarries to Porthmadog :-

From Creassy (1800) to WHR (1923) - A Synopsis

The building of the Pre-1800 Embankment (see Fig. 1) along the boundary hereabouts of the estate purchased by Madocks and using (from East to West) the shore line near Portreuddyn, the former rock islets at the-now Farmyard Farm and Ynys Hir. Then, turning North West via Ynys Fadog and St Mary's Church (built upon a small outcrop) to the present-day site of Tremadog.

Upon the success of that, presumably, the building of the somewhat longer 1800 "Creassy" Embankment, from the "Portreuddyn Corner" on the shore line to its southern-most terminal on the promontory of Moel-y-Gest (to which Porthmadog High Street is now adjacent),

When that had removed the sea from a large area bounded by the sites of Porthmadog, Tremadog and below Penmorfa, improvement of the road connection from Tremadog to Porthmadog could be considered. The route of that road was facilitated by the rock outcrops successively of St Mary's Church, Ynys Fadog, Ynys Hir, Ynys Galch, the High Street promontory and Ynys-y-Towyn,

Under Madocks' vaulting ambitions to connect London and Dublin via Porthdinllaen, Ynys-y-Towyn would be attractive as a western terminal of The Cob on its way to Boston Lodge across one of the narrower parts of the estuary,

The building of The Cob and constrained outlet for the Glaslyn created the site for a port and route for the Ffestiniog Railway ("FR"),

The success of the gravity and horse-operated FR from 1836, allowed the burgeoning of the slate trade in area of the Festiniog valley,

This must have influenced powerfully the establishment of the slate quarries in the Croesor Valley and facilitated their essential outlet to the port, the Croesor Tramway, c.1864, using the Creassy in part,

The later success of steam on the FR from 1863 led directly to the ambitious proposals for the NWNGR(1872), the PB&SSR (1901), leading to the WHR (1922), the latter using a portion of the Croesor route incorporating the Creassy.

Where justified, the raising of a modest embankment on the approach from the north-east, passing Garreg Hyllidrem towards Pont Croesor to give an economic, drained route above the flood plain thereabouts. The surviving flood-relief vents just north of that bridge are an interesting indicator of this approach, and similar considerations would apply south-west of Pont Croesor until the Creassy was met at the Portreuyddyn Farm track after which point the tramway could take advantage by executing a gentle climb of its easterly shoulder, consistent with gradients for horse traction, to reach its crest somewhere about Cynfal and follow that until it was necessary to veer easterly towards the Porthmadog quays.

This arrangement would retain attraction when steam haulage arrived in 1922/3 with the construction of the WHR, taking advantage in turn of the route of the Croesor Tramway between Croesor Junction and the quays.

The passage of 200-plus years has not been kind to the Creassy north of Cynfal. Where

the crest and eastern shoulder have been occupied since 1864 by the Croesor, it has survived to a degree. In this region, there is some survival up to a height above nearby field level of a little over 3 metres for around 400 metres in length. Hereabouts, the height of the rails above field level is a little over 2 metres.

Conclusions

The alignments of embankments, road and rail routes in the area bounded by Tremadog, Porthmadog and Boston Lodge were clearly based on the fortuitous configurations of the shore line of Traeth Mawr and then, in detail, upon the advantageous positions of the five rock islets and three promontories (see Fig 2). Initially they were used as "anchors" for the two early embankments and then, as ambition and confidence grew, as "stepping stones" between Tremadog, Porthmadog and Boston Lodge, giving rise, of course, to 'The Cob'.

Thus, it seems reasonable to conclude that after 1800 the alignments of local main roads together with the lower FR and part of the southern section of the WHR, were determined by the location and exploitation of these existing topographical features. Without them, and without the vision of Madocks, the WHR (and the FR), may never have existed.

Locally, the relationship between the Creassy and the WHR is straightforward between a point in the vicinity of Gelert's Farm buildings and thence North-East towards Pont Croesor, but reaching the Portreuyddyn Farm track only. However, South-West of Gelert's Farm, there appears to be surprising evidence from Beazley that about 500 metres of the southern end of the original Creassy Embankment was removed at some stage and the cleared site built upon to create Chapel Street. Surviving local alignments and relative elevations of streets in the vicinity appear to support this conclusion.

In preparation of this note, it was tempting to stray further outside matters of strict relevance to the history of the WHR and there seems to remain scope for further enquiry and report upon the subject elsewhere.

Finally, the Writer wishes to acknowledge helpful observations by Ian Fraser, which added new perspectives to views of these matters and contributed directly to this account. Also, to thank my Wife, Margaret, and Dick Lystor for reviewing the text and making helpful criticisms, and Mrs Pat Schofield for her assistance in local observations and measuring a portion of the Creassy.

Any errors, omissions or misconceptions are attributable to the Writer only.



Pont Croesor extension from Gelert's Farm,, north of Cynfal. Showing how the railway was 'cut into' the Creassy embankment, The field to the left is the foot of the embankment and the top of it is to the right. D. Allan October 2006

This is an edited and shortened version of John Hopkins' original paper, which is published separately and available from John Keylock for £3.50

THE NANT MILL COLLISION AND THE NWNGR TIMETABLE

SNOWDON and BEDDGELEERT DISTRICT (1st and 3rd class).—North Wales Narrow Gauge.
Sec. and Mast. G. C. Aitchison.

Miles from Dinas.	Down.		Week Days.							Miles from Dinas.	Up.		Week Days.						
	dep.	arr.	Mon	Tue	Wed	Thu	Fri	Sat	Sun		dep.	arr.	Mon	Tue	Wed	Thu	Fri	Sat	Sun
44 8	BANGOR	dep.	7 49	8 52	10 0	11 0	12 0	1 0	2 0	3 0	4 0	5 0	6 0	7 0	8 0	9 0	10 0	11 0	12 0
44 8	CARNARVON	dep.	7 57	9 0	10 0	11 0	12 0	1 0	2 0	3 0	4 0	5 0	6 0	7 0	8 0	9 0	10 0	11 0	12 0
	DINAS	dep.	8 07	9 10	10 10	11 10	12 10	1 10	2 10	3 10	4 10	5 10	6 10	7 10	8 10	9 10	10 10	11 10	12 10
	Tryfan Junction	arr.	8 07	9 10	10 10	11 10	12 10	1 10	2 10	3 10	4 10	5 10	6 10	7 10	8 10	9 10	10 10	11 10	12 10
	Tryfan Junction	dep.	8 09	9 12	10 12	11 12	12 12	1 12	2 12	3 12	4 12	5 12	6 12	7 12	8 12	9 12	10 12	11 12	12 12
	Rhostryfan	arr.	8 09	9 12	10 12	11 12	12 12	1 12	2 12	3 12	4 12	5 12	6 12	7 12	8 12	9 12	10 12	11 12	12 12
	Bryngwyn	arr.	8 15	9 18	10 18	11 18	12 18	1 18	2 18	3 18	4 18	5 18	6 18	7 18	8 18	9 18	10 18	11 18	12 18
	Tryfan Junction	dep.	8 10	9 13	10 13	11 13	12 13	1 13	2 13	3 13	4 13	5 13	6 13	7 13	8 13	9 13	10 13	11 13	12 13
	Waenfawr	arr.	8 18	9 21	10 21	11 21	12 21	1 21	2 21	3 21	4 21	5 21	6 21	7 21	8 21	9 21	10 21	11 21	12 21
	Bettws Garmon	arr.	8 23	9 26	10 26	11 26	12 26	1 26	2 26	3 26	4 26	5 26	6 26	7 26	8 26	9 26	10 26	11 26	12 26
	Quellyn Lake	arr.	8 26	9 29	10 29	11 29	12 29	1 29	2 29	3 29	4 29	5 29	6 29	7 29	8 29	9 29	10 29	11 29	12 29
	Snowdon*	arr.	8 50	9 53	10 53	11 53	12 53	1 53	2 53	3 53	4 53	5 53	6 53	7 53	8 53	9 53	10 53	11 53	12 53
	Beddgelert† (Coach)	arr.	11 40	12 43	1 43	2 43	3 43	4 43	5 43	6 43	7 43	8 43	9 43	10 43	11 43	12 43	1 43	2 43	3 43

* 1st class and gov. † Passengers for Dinas must inform the Guard. ‡ Saturdays only.

* 3/4 miles from the summit of Snowdon. † 1 1/2 miles from Pont Aberglaslyn: for Vale of Gwynant and Pass of Llunberis; Bettws-y-Coed; Portmadoc, &c.

July 31st 1906 was a busy day on the North Wales Narrow Gauge Railway. Their new engine 'Russell' was recently delivered from Hunslets in Leeds, and passenger traffic was reaching the peak of the tourist season with August Bank Holiday less than a week away. On that Tuesday there would be no less than six departures from Dinas for Snowdon (Rhyd Ddu), two of which had a connection for Bryngwyn. Examination of 'Bradshaw' over a number of years shows a requirement for three locomotives in steam daily, and as the impoverished company never had more than this number available until the arrival of 'Gowrie' in 1909, one can only wonder how the timetable was maintained. The single line was operated on the Block System using Wise's Patent Train Staff, the sections being Dinas - Tryfan Junction; Tryfan Junction - Waenfawr; and Waenfawr - Snowdon. In the event of two trains proceeding in the same direction, the driver of the first train was shown the staff and given a ticket, the following train bringing the staff.

I have studied the summer time table for some years prior to 1906 and find it was the practice to operate two trains mid morning from Dinas to Snowdon. The first departure connected with a train from Bangor, whilst the second connected out of a train from Afon Wen, so providing for tourists on both the north coast and Cambrian Bay resorts. In 1905 these trains departed Dinas at 9.35am and 10.45am, the first returning from Snowdon immediately and crossing the second at Waenfawr at 11.02am

In 1906 the time of the second train was changed to 10.00am, possibly to accommodate a change in the service from Afon Wen, but this change was to

result in the company coming under severe criticism from the Railway Department at the Board of Trade. Why Gowrie Aitchison sanctioned, or even compiled this time table is a mystery now unlikely to be solved. Perhaps he was too busy running his other railway up Snowdon!

Our story starts at 9.35am with the departure of the first train from Dinas. This must have really been two trains, as it split at Tryfan Junction at 9.45am, the first part leaving at 9.46am for Bryngwyn, and the second part at 9.47am for

Eye witness statements add a dramatic flavour to Michael Davies' account

Snowdon. How this was done we shall probably never know, but from the writings of E. Pennant Jones relating to his grandfather John Jones of Rhostryfan, (WHH Journal No 13) it is said that the Bryngwyn engine sometimes PROPELLED its train from Dinas. Perhaps the 9.35am ran as two trains coupled together, hence the remarkably short time of one minute at the Junction for the Bryngwyn train, and two minutes for the Snowdon train.

We don't know which engine was working the Bryngwyn train, but it was in all probability the new 'Russell', unless the old 'Beddgelert' was retained as 'spare engine'. The 9.47am from Tryfan Junction consisted of 0-6-4T loco, bogie carriage and Pickering bogie van, with a coal wagon attached to the rear. From the evidence of the Waenfawr Station Master, Mr J. Hughes, the train was offered by Tryfan at 9.57am, accepted, and was received 'Train entering section' at the same

time. It was offered to Snowdon at 10.03am, and the Station Master there, Mr Idwal Owen accepted it and it he received the 'train entering section' signal from Hughes at 10.03am. It must have stopped but briefly at Waenfawr to cover the start to start in six minutes.

We must now consider the evidence of Driver T Beaumont of the 10.00am train. He states that he is in the service of the Company for 15 years, all the time a driver, and came on duty at 7.45am. He must have left Dinas a few minutes late as his train was not offered to Waenfawr by

Tryfan Junction until 10.19am, at which time Waenfawr also received 'train entering section'. His train reached Waenfawr about 10.24am to drop passengers, and give up the train staff to Hughes. Beaumont was then given the Waenfawr - Snowdon staff and departed at 10.25am. Hughes in

evidence stated 'that on July 30th and 31st I did not wait to get 'Out of Section' for the Mixed train before letting the Excursion train go forward, but worked to the timetable'. Idwal Owen at Snowdon stated that he was offered the 'Excursion' train at 10.25am which he immediately accepted, although of course the first train had not yet arrived. Bradshaw shows the first train as arriving Snowdon at 10.27am, and the 10.00am 'Excursion' train at 10.36am just nine minutes apart. At about 10.37am Hughes received a message from Owen saying 'not one of the trains arrived here yet'.

But for the vagaries of loose coupled wagons on a road that would be far from perfect, all might have been well, and indeed the time table had operated to these schedules for over four weeks without incident, and Idwal Owen had never questioned having two trains in the same section. In evidence he stated that 'we never give "Train Arrived" signal as un-



Pont Cerig y Rhyd bridge - this is roughly where the coal wagon would have been when sighted by driver Beaumont when he was 15 yards the far side of the bridge.

David Allan - January 1988

der our regulations this need not be sent unless special instructions are given for so doing'. Owen stated that he had served the NWN GR at Snowdon for 17 years, whilst Hughes at Waenfawr had served there as station master for 29 years, or in fact since the railway opened in 1877. He was aged 68.

To return now to Driver Beaumont, he also had a 0-6-4T but with two bogies and Pickering bogie van and had slackened speed for the reverse curves around Nant Mill (NWN GR Rule No 111 states 6 MPH on sharp curves. Rule 104 imposes overall speed limit of 17 MPH). Fifteen yards from the Pont Cerig y Rhyd overbridge he saw a runaway wagon and shut off steam and applied the Westinghouse brake but was unable to avoid a collision. The wagon apparently came loose around Glanyrafon Sidings where the grade is from 1 in 74 to 1 in 100, but fortunately for a length of 47 chains just ahead of the point of collision it has eased to 1 in 551. Nevertheless considerable damage was done to the engine including bent and broken buffer and coupling, cracked cylinder covers, both head stock plates bent, steam chest covers cracked and trailing end buffer broken. The trailing bogie left the rails. The leading carriage was No 9 (a 'corridor') which had its headstock smashed and end plates broken, also two panes of glass broken and seat dislodged. Both driver and fire-

man were injured, but not seriously.

The 'Herald' newspaper gives us a flavour of the accident in its issue the following Friday. 'From Llandudno, the party from the Craig y Don boarding house was smaller than usual, numbering about fifteen. They all travelled together and were mostly in one carriage on the narrow gauge train. Mr Thomas Gront of Enfield was good enough to describe his experiences. "As we went along", he said "a storm of rain came on, and we could not see much. We were quite a merry party however, and some of the passengers were singing. Suddenly there was a fearful crash and the train came to a standstill. I was thrown forward, but fortunately I was opposite the gangway of the carriage, which was of the open kind like a saloon and so we escaped injury. All the other passengers were also flung forward, and there was a moment of dire confusion. We heard missiles falling upon the train. They were lumps of coal pitched out of the wagon with which we had collided, and we were enveloped in a cloud of dust. The fore end of our carriage was burst in. We escaped onto the railway side, and learned that a loaded coal truck had become detached from the train in front, run down the gradient which we were ascending, and collided with our engine, which was partly derailed. Happily, it had not got up very great speed, and we were not moving rapidly up the ascending line, or the effects of the collision might have been appalling. As it was a gentleman of our party

sustained injury to the leg, and a lady was much bruised in the face owing to being thrown against the face of another lady passenger. My own companion had his leg cut, and the stoker's arm was dislocated, and the guard and the engine driver were both injured. It was two and a half miles to Snowdon Station, so several of the party went on foot, but I returned with my injured friend". Our correspondent learned that the gentleman of the boarding house party who was most hurt was Mr Ball of Stoke Newington, who was given first aid treatment and sent back to Llandudno, where he was attended by Dr Lockhart Mure. The tendon of one leg was torn'

Col. Druitt in his report calls for stricter control in regard to the regulations for block working, and recommends side chains in addition to the centre buffer hook couplings on the coal wagons. Nor was he impressed with the evidence of the guard of the mixed train who in his report of the accident states that when he found the coal wagon was missing, he stopped the train and made the passengers alight. He then had the driver set back in search of the errant wagon, despite the fact that another train was following in the single line section!

In conclusion it is interesting to make comparison with today's tourist motoring from Llandudno in less than an hour, and those of a century ago. In 1906, departure from Llandudno to make connection into the 10.00 train at Dinas was at 7.50am, so we can imagine the party at the Craig y Don boarding house sitting down to breakfast around 6.30am. Presumably most tourists then went by horse coach to Beddgelert, and later in the day to Capel Curig and Betws y Coed station, for a return train to Llandudno Junction. Others will have climbed Snowdon from Rhyd Ddu, to return by train via Llanberis and Caernarfon. Llanberis based tourists certainly used the NWNG trains from Rhyd Ddu to Dinas as part of a circular tour as we know that printed single tickets existed at Rhyd Ddu for the journey to Llanberis via Dinas and Caernarfon. The Victorian and Edwardian tourist certainly didn't flinch from long and arduous days of travel.

For the full official report into this accident see WHH No.24

We have a new membership secretary! Chris Hazlehurst has offered to take on this vital role, which has been accepted with alacrity. This will enable the multi-functional, multi-tasking, John Keylock to devote even more time to his un-ending research into the fascinating history of the Welsh Highland Railway as well as continuing in his role as Group Secretary and controller of Sales. We are very grateful to John for the splendid effort that he has put into the Membership Secretary's role since the inception of the Group in 1997

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For the Technically Minded.....

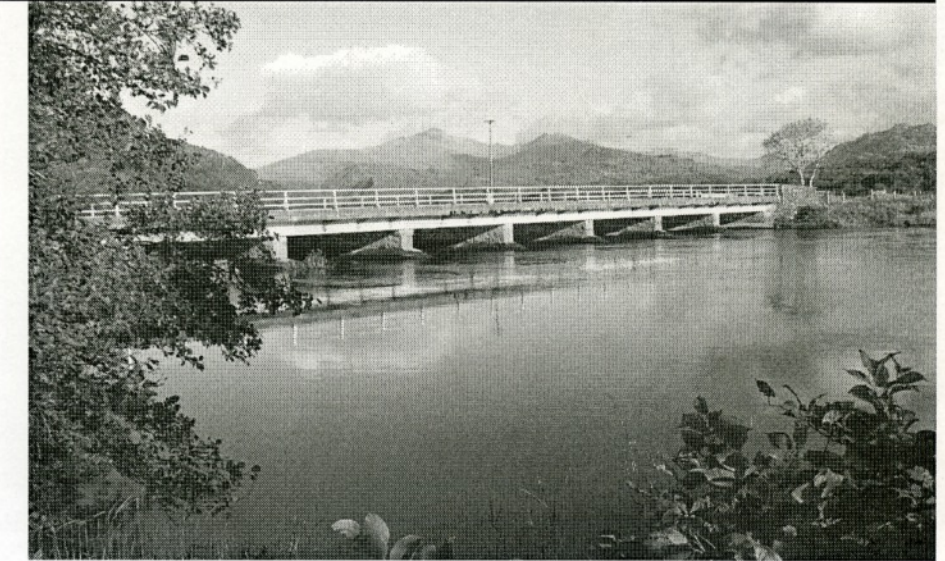
Some previously unknown bridge calculations have been obtained by Peter Johnson from Ministry of Transport archives. The 1922 Sir Douglas Fox and Partners figures show the loads used to determine the beam sizes for bridges of spans 4', 11', 14', 24' and 75'; the last mentioned being the truss girder bridges. The status of the document is unclear, but its brevity would suggest that these are 'check' calculations produced at the request of the Ministry. There are only two pages; one lists the dimensions and weights for rolling stock while the other has the derivation of the bending stresses and hence beam sizes required. Only the vertical loading is considered; there is no mention of transverse, longitudinal, wind, nosing or lurching forces, nor any calculations for the truss connections.

The loading diagram used consisted of two 2-8-0 tender locomotives based on 'Cooper's Standard Loadings'. This loading configuration was developed by Theodore E Cooper in 1894 and represented American locomotives in use at that time. The four driving axles were spaced 5' apart and weighed 80,000lbs each (35.714 imperial tonnes). The leading bogie and tender axles were respectively 40,000lbs (17.857 tons) and 52 000lbs (23.214 tons). This seems exceptionally heavy for the time so presumably impact was included.

For the design of the Welsh Highland Bridges, the Douglas Fox design engineers factored down the Cooper loading diagram to give driving axle loads of 8 tons; the leading bogie and tender axles became pro rata 4 tons and 5.2 tons. The distances between axles were

kept the same hence the resulting load diagram bore no relation to any physical 2' gauge locomotive that has ever been built as far as I am aware. For comparison the NG15 has driving axles weighing 6t 9¼ cwt or 6t 15¼ cwt, at a maximum pitch of 3' 4". The additional impact allowance used by Douglas Fox was $(300 / (300+L))$ regardless of speed, where L was the span in feet.

For the 75' span, the modified Cooper loading diagram gave me a maximum bending moment



(BM) and end shear force (SF) of 2338kNm and 469kN respectively when worked out by spreadsheet. The comparable Douglas Fox figures were 2187kNm (720 ft ton) and 448kN (45 tons); errors of -6.5% and -4.5% which can be excused, given the complexity of the task when conducted manually!

I wanted to find out whether the old truss bridges at Bryn-y-Felin, Nanmor and Dylif would have been adequate to carry our modern-day Garratt and NG15 locomotives. In my calcula-

would be 29.5mph for a Garratt and is likely to be quite fast enough. Even when taking Douglas Fox's greater impact factor into account, the truss bridges would still have been 11% deficient in their ability to carry double headed Garratts or NG15s.

In 1922 the allowable stresses assumed in the steel were 8 and 5 tons per square inch in tension and shear respectively. This is equivalent to 124N/mm² and 77N/mm², low by today's standards, but no doubt representative of the steel in production at that time.

By comparison our new bridges all specify the use of steel with a yield stress of 355N/mm² which has equivalent allowable stresses of 209N/mm² and 131N/mm² for tension and shear.

For compression members, Douglas Fox's reduction in allowable stress to

avoid buckling was simplistic at L/40r in imperial units (r = radius of gyration), compared with today's more complicated design formulae. This dangerously overestimated the capacity of any section with an L/r value greater than 50. The truss upper chord and end rakers had L/r values of 72 and 83 respectively.

Elsewhere on the calculation sheet, the 24' span beams at Pont Croesor are shown as having a stress of 8.28 tons per sq. in. Given that this exceeds the value of 8 tons per sq. inch already stated above the table, it begs the question as to how the theoretical overstress came to be accepted.

The conclusion is that Pont Croesor and the three truss bridges would have been inadequate to carry our locomotives, even if they had been regularly painted to prevent corrosion loss, and the analysis used in the design was also rather dubious.

Will the bridges take the strain? Top - Pont Croesor on 1st November 2006. Right Girder bridge over Afon Nanmor at Hafod y Llyn on 26th January 1988. Photos - David Allan

John Screeves, WHR bridge engineer, examines the 1922 bridge calculations to see if they would take the strain of today's locos

tions I found that the worst permutation of NGG16 and NG15 double heading in any direction gave 2917kNm (BM) and 562kN (SF), which exceeded the Cooper load diagram used by Douglas Fox by 24.7% and 19.8% respectively. The test load of Merddin Emrys and James Spooner, the two Fairlies being the heaviest locomotives available in 1922, imposed upon the structure 1595kNm (BM) and 308kN (SF) which amounted to no more than 70% of the design load.

When considering the effect of impact on the 75' truss bridges, Douglas Fox's formula allowed for an increase of 80% i.e. a factor of 1.8, independent of speed. In my design I have used a lower value of 1.5 which is valid for a driving wheel rotational speed of 5 revolutions per second. This is based in part upon work done by David Barnes in the 1970s using a BR programme. Five RPS



More History of the PB&SSR (Part II)

We left Part I of this history quoting the optimistic views of the Caernarfon & Denbigh Herald, but a lot remained to be done.....

In March 1905 the Directors of Bruce Peebles & Co. Ltd were reporting on their accounts to 31st December 1904: *"The Debentures and Shares in Power and Traction companies acquired by the Company in part payment of certain contracts have been valued at considerably under par . . ."* The Company was issuing a prospectus for more funds. Harper Bros. & Co. reported: *"Having already a Power Station generating 3-phase electricity, the idea of adopting 3-phase distribution for the railway suggested itself, and taking into consideration the distances of the line - amounting to about 25 miles between Portmadoc and Carnarvon, the proposed system allows considerable saving against any other system."* The alternative at that time was direct current which would have involved *"complicated sub-stations and rotary converters or motor dynamos"* which apart from the expense would require continual attendance with at least two attendants per sub-station and the cost of oil, brushes, repairs etc. With 3-phase the transformers would be static with periodical inspection by an inspecting gang of the line. There would be ten sub-stations: Portmadoc Slate Wharves, Junction of Croesor extension, Beddgelert, Hafod Ruffydd Ganol, Snowdon Station, Bettws Garmon, Trfyan Junction, Bryngwyn, Dinas and Carnarvon, each with a transformer placed in towers of steel construction.

Readers may recall the extract from a June 1905 newspaper (Journal No 13, p4) describing the near completion of the famous arched road-bridge just south of Beddgelert.

The NWNCR LRO was granted on 6th June 1905 allowing the PB&SSR to lease their line 'and other things'. The PB&SSR Act of 1904 authorised the extension from the Dinas terminus of the NWNCR to Carnarvon. Also it had been agreed by the PB&SSR with the NWNCR and the Light Railway Commissioners that the Junction Railway could be constructed and equipped under the terms of the LRO shortly to be made. It was now decided the construction agreement with Peebles should be updated.

On 31st July 1905 a formal Agreement with Bruce Peebles was signed. This was referred to as a "works contract", and had attached to it a specification and general conditions.

There was also a revised agreement between the Power Co. and its wholly owned Subsidiary, the PB&SSR Co, replacing that of 2 years earlier *"owing to the modifications of the arrangements between the two companies resulting from the Acts and Orders hereinafter mentioned."* The contract was for £143,000, £2,000 less than the previous one, but this specifically excluded the headings "Dam and Intake Works and Strainer, &c" and "Steel Pipe Line from Lake" then included at provisional figures

Michael Bishop completes his account of this pivotal railway

of £5,000 and £10,000 respectively. Part of the reason for the higher figure seems to have been because the 1903 accepted tender only included the 12 7/8 miles from Portmadoc to Gwynant and this contract replaced the section back to Aberglaslyn with one to Rhyd ddu, including a bridge over the Glaslyn, another over the road near the Goat just referred to, and a tunnel just north of it at Beddgelert. It also included the section from Dinas to the Quay at Carnarvon, other than the permanent way, which the Engineers advised, on the basis of tenders, was likely to cost £15,523. The Specification included a couple of interesting reflections on attitudes of the time:

"Wages and Housing of men - Wages shall be paid in the current coin of the realm, upon the works, and not in a public-house or other place where liquors are sold. The Contractor shall make, at his own cost, suitable provision for the housing of his men, within a reasonable distance of their work."

"Sunday Work. - The Contractor shall not cause any work to be carried out on Sundays."



Part-built, never used accommodation bridge in the field near Gelert's Grave. Photo David Allan - 1988

The provisional items, along with the supplemental specification (the extra provisional contract of £35,000 in the earlier agreement), and which had been priced at cost + 10% profit, now had a 5% administration charge added. This time no figures were mentioned for these items. The clause about actual land costs being reimbursed remained and there was a similar one relating to the quantity of masonry and brickwork undertaken at 30s per cubic yard beyond or below 5000 cu. yards. The price included end facings of the tunnel at Aberglaslyn. This end facing and any lining or additional tunnels, if required to be of brickwork or masonry, were to be extras. 450 yards of tunnel were allowed for (including the fourth one near the Goat Hotel) and was to be adjusted to actual from £14 per yard. If the rock excavation exceeded 40,000 cu. yards the extra was to be paid for at 1s 3d a yard. Rock from cuttings used for ballast was not to be deducted and not paid for twice! And there were some more minor clauses about possible extra works. There was a clause stating: *"This contract is to supercede the Contractors' Tender of 31st July 1903 accepted by the Power Company on the 31st July 1903 which with the General Conditions and Specifications referred to are hereby cancelled."* This wording confirms the lack of a contract before 1905, although the acceptance by the Power Co of the tender in 1903 with attached general conditions (which also survives in the archives) effectively amounted to one.

What is interesting is that whereas the old General Conditions included the provision of four locomotives to draw 50 tons at 10 mph and seven motor cars, the new ones specify six locomotives to draw 30 tons at 18 mph on a gradient of 1 in 40. The Specification is a "marked up" one - i.e. printed with inserts referring to additional hand-written pages which have been inter-

leaved. This includes a three-page "Brief Schedule Specification for Electrification of Railways." Item 4, headed "Rolling Stock", reads as follows:

Six Locomotives to be supplied, each equipped with one 3-phase motor of 90lbs nominal and 180HP maximum capacity. Four of these locomotives to run at a speed of 18 miles an hour & capable of hauling a train of 20 tons weight up gradients of 1.43 at the above speed. The same locos. must be able to haul the same weight at the same speed up gradients of 1.20, provided that these do not exceed 500 to 600 yards. The above locos. will be used for passenger trains.

Two locomotives to be built for the goods traffic & to be equipped with one 3-phase motor of the same capacity as the passenger locos.

The speed of the goods locos. to be only 10 miles an hour these locos. to be able to haul a train of 42 tons at this speed up gradients of 1.48.

Should the conditions of traffic require 2 locomotives should be coupled electrically and to be operated from one driver's stand.

Drawings of the locos. As well as for the trailers (ten in number) must be submitted to and approved by the Engineers.

Under an agreement of 9th August 1905 the Power Co was to pay the PB&SSR Co £1,200 a year from that date until the works were completed, but there is no more sign of this being paid in the Portmadoc Co accounts than the rent under the 1904 agreement. And whereas the Power Co contributed £13,535 in share capital to cover the PB&SSR Co's capital expenditure up to June 1904, and this was made up to £50,000 in the second half of 1905 under the agreement, which paid for further capital spending, the rest of the capital spending was paid for by the Power Co. No further capital came to the PB&SSR and the spend remained in the Power Co books, and the further issues of shares and debentures provided for in the agreement (including £120,000 payable in 28 days of it) were not implemented. Unfortunately the Power Co accounts cannot be traced before 30th June 1908, but by this time the Power Co Balance Sheet was showing capital spending on the Portmadoc Undertaking of £112,590 (including the £50,000 PB&SSR shares) and £155,670 on the Electric Power Undertaking.

On 2nd November 1905 a working agreement was drafted between the three Companies. Under it the NWNNGR's Moel Tryfan undertaking was to be worked by the PB&SSR in perpetuity and that com-



Cwm Bychan bridge built by the PB&SSR circa 1906 (Photo P Thomas) & right the same bridge 100 years later (Photo D. Allan)

pany was to pay a rent of £1,000 pa to the NWNNGR from 1st January 1905, but reduced to £520 pa until it had issued the £12,000 in debentures under the previous agreement. The NWNNGR share on a mileage basis was guaranteed at £1,000 or £520. Russell was to be appointed a Director of the PB&SSR Co although it seems doubtful he would have taken it up.

There seem to have been at least two or three periods when construction work ground to a halt, one indicated by a piece in the Herald of 1st December 1905 about unemployment in Carnarvonshire, with a statement by Bruce Peebles - "as soon as we have arranged for work to proceed, which we trust and think will be in the very near future, we will advertise in local papers and will give as far as possible the native labour preference." A report of work resuming near Aberglaslyn appeared in mid-February 1906.

However, things seem to have fallen apart on the railway front a short time later, with the Power Co desperate to get their power station up and running and earning money, which it did in August 1906, supplying Oakley, Dinorwic and Pen-yr-orsedd slate quarries amongst others. But in the mean time Russell, the NWNNGR Chairman, wrote to the Power Co. It is not clear what he said in this letter of 29th January, but it led to Power Co Chairman meeting him to make "the best possible terms" for postponing electrification of his line. The NWNNGR considered themselves compelled to ask the contractors to discontinue work on the transmission lines where they crossed the line (which it was due to do on its way to Nantlle at the south end of Quellyn Lake.)

Russell seems to have taken full advantage of the situation, quoting terms which the Power Co felt obliged to accept. The construction of the railways would be postponed for two years, the PB&SSR Co

undertaking to recommence construction on or before March 1908 and complete the railways within a reasonable time of that date. The PB&SSR Co. was also "to restore the NWNNGR for present steam working" (does this imply work had been done on electrification, or merely that arrears of maintenance were to be made up?) and "provide one steam locomotive at a cost not exceeding £2,500". If the Carnarvon to Dinas line was not commenced by that date all the agreements were to be cancelled and the NWNNGR was to receive £5,000 in cash or Power Co debentures which would realise this sum (which sounds like saying that debentures were in danger of being worth less than par value). The NWNNGR was to receive £250 pa from 1st January 1906 until the opening of Carnarvon and Portmadoc Railways or until the determination and cancellation of the agreements. Aitchison was to remain Manager for 10 years from his appointment as general Manager of the Power Co (i.e. May 1914). After the meeting with Rawlins (chairman of both the Power Co & the PB&SSR), Russell put these demands in a letter of 2nd February, finishing his letter in a way that suggests something near to cynicism: "But it must be clearly understood that no arrangement will be entered into with the Portmadoc Company. The Power Company is the Company with which the Narrow Gauge deals and to which it looks for the carrying out of all arrangements &c. The Portmadoc Company is mere paper and no contract or undertaking entered into by it would be of slightest value."

As has already been noted in the Journal this led to the purchase of RUSSELL by the Portmadoc Co. but delivered to the NWNNGR. NWNNGR miscellaneous receipts, were usually (but not always) around £12 - £17 each half-year, but were £134 and £137 in the two half years of 1906, suggesting the £250 was being paid. Receipts were £238 in the first half of



1907 (which conceivably could have included the proceeds from scrapping the locomotive BEDDGELERT). Then only £19 in the second half of 1907, and £158 in the first half of 1908, beyond which they went back to the small figures.

In March 1906 the NWNCR Directors Report said *"In consequence of difficulties which have arisen in the carrying into execution in their entirety of the plans of the NWPT and the PBSSR Company your Directors have thought it fit to accede to a postponement of the operation of the agreement between those Companies and this Company."*

In a letter written by Rawlins to Aitchison of 17th June 1906, he explained *"frankly the position - viz. that the Power part of the scheme having cost so much more than the estimate there are not sufficient funds to complete the Railway, that the Company has no intention of abandoning this portion of the work however and that I am at present conducting negotiations with a view to the completion of the whole undertaking."* This may, of course, have been a letter designed to reassure Aitchison and keep him as General Manager, but in the event the increasing amount of loans produced no railway, and in 1907 they had to sell the land including Llyn Eigaiu (originally bought by the Power Co. as reserve water power) for £40,000 to the Aluminium Corporation to keep the Law Debenture Corporation (who had loaned money) happy.

In 1907 the NWNCR spent £780 of the *"Money in Court"*, lodged in support of Light Railway Orders, on two replacement Bogie Brake Vans Nos 4 and 5 from Pickering's, followed by about £1,300 the following year on the new locomotive GOWRIE. In March 1908 shareholders were told that they regretted that the NWPT and PB&SSR Co. *"have been unable to carry out the proposed Agreements between them and this Company, and that consequently the matters contemplated thereby are at an end."*

Meanwhile by an Indenture of 31st July 1907 between the Power Co and Peebles (detailed in Journal 29) their contract was cancelled, with a settlement of £60,000

debenture. This was an enormous sum, approaching £3m in today's money. Peebles had completed the power station, but only part of the railway (and none of the Dinas - Carnarvon section), and little, it would seem, of the electrification of the NWNCR. If they had done work worth upwards of £180,000 by that stage, (including £112,000 on the railway), the 10% retention would have been £18,000 suggesting that the rest of the £60,000 - viz. £42,000 was owing on the contract. As certificates (and therefore payments) were due monthly, the realistic conclusion has to be that Peebles had not been paid for a considerable time. In which case it would not be surprising if this had a knock-on effect on their payments to August Krauss, the main sub-contractor - and this might explain why Krauss advertised the Bagnall locomotive he was using in May 1906. (See Journal 31 p6) Maybe he pulled off the job. Unfortunately a look through the 1906 Carnarvon & Denbigh Herald has produced no enlightenment about the work at this time.

What remains unresolved is that when Bruce Peebles exhibited a locomotive in mid 1905 it was reported another nine were in hand. But only six were contracted for. JIC Boyd in his book *Narrow Gauge Railways in South Carnarvonshire* (pages 294 and 295) provides confirmation that ten were intended, and two recollections of 1949 and 1955 that ten were lined up at the works until scrapped about 1916. This is what led the writer to suggest Peebles had been getting ahead of their contractual obligations, maybe as a result of a verbal suggestion from the Power Co not confirmed in writing, maybe anticipating the need with the planned Betws-y-Coed extension. Readers will come to their own conclusions on this one. On a related subject, it seems unlikely the trailer cars (i.e. carriages) were ever built; Board of Trade correspondence of May 1905 says that the order for passenger carriages had *"not yet been decided upon and no drawings are yet prepared"*. Under the contract two months later (as we have just seen) Peebles were to submit drawings for

approval. No mention is made of trailers in the 1907 cancellation indenture.

LROs of 1908 revived the Dinas-Carnarvon powers and inherited those for the line to Betws-y-Coed, and gave powers to run as a light railway, but it was a forlorn hope - by the end of 1908 the Power Company was burdened with £377,000 of capital and loans (including £100,000 of mortgage debentures at the unusually high rate of 7%), even after selling the *"Conway Undertaking"* - i.e. Dolgarrog, and had accumulated trading losses of £14,000, and these continued to get larger, reaching £86,000 in 1918, when the figure was written off in a revaluation of assets along with an expenditure suspense account of £73,000, mostly the £60,000 settlement to Peebles and discounts and interest on debentures.

In 1909 a figure appears in the PB&SSR Co's Balance Sheet *"Cash paid into Court in action Aitchison v PBSS Rly Co £37.10.0"*. This falling out is suggested by JIC Boyd on page 281 of his book. In the light of the May 1904 employment agreement which has just emerged it seems plausible that the Power Co may have eventually welched on paying his full salary. By 1913 the figure *"paid to Aitchison"* had reached £767.17.0.

Another letter in the Archives dated 1914 is from Ernest Lake, successor as Chairman of the NWNCR (Russell having died in 1912), writing to Humphries (of the NWPT), and talks about a proposal for the purchase of the NWNCR and PB&SSR by an un-named company for £40,000 - £10,000 in cash and £30,000 in shares. Humphries had suggested a split of two thirds/one third. But this is embarking on another era of WHR pre-history.

*PB&SSR abortive bridge abutments over the Glaslyn, constructed 1906.
Photo - David Allan*



Cwm Cloch Lane Bridge?

*Francis Jones
Enquires.....*

Dear Mr Allan

The picture of the two bridges in the current issue of 'Welsh Highland Heritage' has brought to light yet another PB&SSR/WHR mystery.

I am reluctantly persuaded that they are both photographs of the Cwm Cloch road bridge, since the only other underbridge - over the track to Cwm Bychan Mine - has a different road layout and bridge parapets.

However it is the right one that we are familiar with, and shows Welsh Highland concrete-topped abutments that would have supported an RSJ or concrete deck, but not an arched bridge. So, why did McAlpines rebuild the fairly new bridge? Subsidence or the desire to provide for a wider road is all that I can think of. Of course, none of the books mention this.



Was the other underbridge nearer Beddgelert over a field access rebuilt in a similar manner? It too has concrete abutments, but we do not know whether it was completed by the PB&SSR. Thank you for an always interesting magazine.

Yours sincerely

Francis S. Jones

See the pictures on page 9, 10 & 11 of the Cwm Bychan bridge & the abortive 'field' crossing to which Francis refers in his letter

*.....and Jim Hewett
Investigates.*

The publication of the photo of an arched bridge at Cwm Cloch lane was quite a surprise and provoked some discussion on the WHR email group as to whether the line had been lowered in 1922/3. I thought the only way to be sure was to examine the plans of the 1904/6 PB&SSR and the WHR of 1922/3 and work out the respective heights above sea level. To examine the plans meant a visit to the Na-

tional Archives at Kew which I was already planning anyway. The relevant plans are MT54/455 for the PB&SSR & MT54/616 for the WHR. However, it was not possible to resolve the plans accurately enough to give a definitive answer but that did not matter as the WHR plan clearly showed *Private Rd. overbridge*.

Formation to be lowered 3' 0", so there we are. It also showed that the embankment continued rising above the proposed WHR level up to the point where the two routes diverged, about another 100yds. It has been pointed out to me by Ben Fisher that the land level on the left has risen since

PB&SSR days and this might be where the extra material was dumped.

It looks as though no alteration was needed to the river bridge as the re-

duction in height was only about a foot and could probably be accommodated by just removing a little fill.

Interestingly the PB&SSR did plan a short level section in the station otherwise the main part of the station was at much the same height it is today.

The plans show all the alterations to be made in building the WHR between Rhyddu and Croesor Junction. Unfortunately it did not occur to me at the time that the changes would make an interesting article so I did not record all of them. When I get time I will go back and do that publishing the results here (Editor permitting!)

What I can say is that the roof of the Goat tunnel needed raising by about 2 feet, the most northerly short tunnel needed the roof trimmed and the other short tunnel roof had to be raised 2 ft (strange considering it had been originally planned for overhead electrics). The long tunnel was only bored half way (from the south) and some fill was still needed on the Cwm Bychan embankment. Beyond there and through Nantmor it looks as though virtually nothing had been done. Hopefully I will be able to report on the rest of the line later.

Pictures - Cwm Cloch lane bridge on 6th July 1988 - David Allan

