Glenbrook Lagoon, the Duck Hole and Steam Trains. (Draft 8.0)

By Michael Keats, OAM and John Fox.

Abstract

*Building the railway line over the Blue Mountains (The Main Western Line) in 1867 created a demand for a local, guaranteed water supply to replenish the boilers of steam locomotives once they had climbed the Lapstone Monocline from Emu Plains to Glenbrook. The most accessible, cheapest and reliable water source was Glenbrook Lagoon, a body of water first noted by Blaxland, Wednesday 12th May 1813. In 1814 Cox the road builder established a depot at the lagoon. By 1867 a gravity feedline was delivering water from the lagoon to storage tanks on level ground at Water Tank (later Wascoe’s and later again Glenbrook) siding where locomotives could refill. The long drought, 1877- 1884, reduced the lagoon water level to a critical level. Water trains from Penrith kept the trains operating until an additional reliable supply was developed. This was achieved by installing a steam pump near the Duck Hole in Glenbrook Creek. The water was lifted about 100m then it travelled by a gravity feed line to the rail side tanks. Changes to the railway alignment in 1913 rendered the whole water re supply operation at Glenbrook obsolete.*

General

Glenbrook Lagoon is an isolated perched lake at an elevation of approximately 200m on the lower Blue Mountains plateau, about one kilometre north-west of the then operational rail siding at Water Tank (Glenbrook). The Duck Hole is a deep pool on Glenbrook Creek[[1]](#footnote-1), some 100m lower and approximately two kilometres west south west of the former rail siding. The two water sources share some common history. Both were used as water sources for replenishing the boilers of steam trains after they had laboured up the Lapstone Zig Zag, (the Lapstone Monocline) from Emu Plains.

This paper examines the historical context and some aspects of the harnessing of these resources to serve steam locomotives from 1867 to 1913.

Glenbrook Lagoon

In 2017 Glenbrook Lagoon Reserve is enclosed by suburbia, bounded by Lagoon Drive to the west, Haymet Street to the north, Glenbrook Road to the east and Skarratt Avenue to the south. It is spring fed and is the source of Lapstone Creek, which exits on the east side of the lagoon and flows into the Nepean River near McCann’s Island. The large expanse of reed-edged lagoon is a haven for birds. Stands of large mature eucalypts and *Angophora costata* at the edge of the reserve make a significant contribution to the aesthetic appeal of the lagoon area. There is a large area of Sydney Peppermint-Smooth-bark Apple open forest (*Eucalyptus piperita - A. costata*) at the northern end of the reserve and a small area of Red Bloodwood-Narrow-leaved Stringybark woodland (*Corymbia gummifera - E. sparsifolia*) in the southwest corner[[2]](#footnote-2).

Glenbrook Lagoon is approximately 200 metres above sea level, and is one of several small lakes that have developed between the monocline and associated faults, within the Blue Mountains. It varies in depth from 2 to 8 metres. Water has ponded behind the fault at Lapstone and formed the Lagoon. Triassic Hawkesbury Sandstone underlies the water body, Mt Sion and Mitchell’s Pass. In the area the Triassic rocks comprise medium to coarse grained quartz sandstone with minor shale and laminate lenses. The surrounding vegetation of Glenbrook Lagoon reflects a more dominant shale component than the adjoining areas[[3]](#footnote-3).

The earliest description of the lagoon was written by Gregory Blaxland in his journal of the famous expedition across the mountains by Blaxland, Wentworth and Lawson, with four servants.[[4]](#footnote-4) On Wednesday 12th May 1813 the party ‘ascended the first Ridge of the Mountains [and] fell in with a large lagoon of good water full of very Coarse rushes’.

Following the success of the Blaxland expedition, Surveyor, George William Evans was selected by Governor Macquarie to survey a route across the Blue Mountains. He set out in November 1813 and successfully accomplished this task, reaching the Macquarie River some forty-two miles (68 km) beyond Bathurst, and was thus the first European to cross the Great Dividing Range, the more famous expedition led by [Gregory Blaxland](http://adb.anu.edu.au/biography/blaxland-gregory-1795) not having actually crossed the main range[[5]](#footnote-5).

In the following year, 1814, William Cox and a team of convicts built the first road over the Blue Mountains following the survey by Evans. Cox established a depot in July 1814 at Glenbrook Lagoon. In 1815 (25th April) the arrangements at Glenbrook Lagoon were described in his private journal by Major Henry Colden Antill, who travelled over Cox’s new road with Governor and Mrs Macquarie. Antill wrote:   
  
*‘About 5 ½ miles [8 km from Emu Plains], came to the first depot established by Mr Cox [in July 1814], when making the road, as a place of safety for his provisions for his working party. A small guard of soldiers are stationed here in a good log hut with two rooms, one of which answers as a store. It is placed about 100 yards [100 metres] on the right [east] of the road, near a small lagoon of fresh water. The soldiers had enclosed a small piece of ground for a garden, and one of them had displayed some taste in laying it out in little arbours and seats formed from the surrounding shrubbery, which gave the place an appearance of comfort and simplicity.’ [[6]](#footnote-6)*  
  
Although the constant fresh water was clearly Cox’s motive for placing the depot where he did, neither Cox nor Governor Macquarie mentions the lagoon in his account. The military guard at the lagoon remained to police the passage over the Mountains. On Macquarie’s own instructions, “an intermediate Post had been established to keep the communications with Bathurst open, and to prevent Run away Convicts and other Idle Persons from going to the New Country”.[[7]](#footnote-7)

Since a second depot, at Springwood, soon replaced Glenbrook depot as the first port of call for travellers going westwards and Springwood in turn was overtaken by the Weatherboard Inn (Wentworth Falls), little was heard of the lagoon, although it presumably remained a welcome source of water after climbing Lapstone Hill via Coxs Road. When Coxs Road was bypassed between Emu Plains and Blaxland first by Dumaresq’s Old Bathurst Road in 1826 and then by Mitchells Pass in the early 1830s, Glenbrook Lagoon ceased to be a convenient watering place for travellers.[[8]](#footnote-8)   
  
The lagoon became an economic item again with advent of the steam railway in 1867 (*the* *date of completion of the gravity feed water line*).

The New South Wales Government Gazette (Sydney, NSW), *Tuesday 19 November 1867* (No.205), page 3073, sets out the details of the contract to be let for the construction of the pipeline and ancillary works from Glenbrook Lagoon to ‘Water Tank’, a.k.a. Wascoes, a.k.a. Glenbrook. The relevant section of the tender is reproduced here.

“Department of Public Works, Railway Branch,

Sydney, 11th. November, 1867.

TO CONTRACTORS AND OTHERS

TENDERS will be received at this Office, until Tuesday, the 26th instant, at noon, from persons willing to Contract for excavating, sinking shafts, constructing a valve pit, in masonry, &c., for the Water-works near Wascoe's, on the Great Western Railway.

Plan, specification, and form of Tender may be seen, and further particulars obtained, at the Office of the Engineer-in-Chief for Railways, Tenders are to be endorsed, "Tender for Waterworks, near Wascoe's

JAMES BYRNES,

Commissioner for Railways.”

Also in 1867, as part of the works “a small tank and pump was installed at Water Tank on the original line. Water from the lagoon gravitated to a well on the down side at the Lithgow end of the station. The water was then pumped by a Tangye, 6” x 3” steam engine[[9]](#footnote-9) to a tank on the up side, which was fitted with a jib, and served the main line west of the station. During the drought years 1877 to 1884, the water supply from the lagoon gave out and it was necessary to carry water by train from Penrith to water troughs situated near the well. In 1881 an additional Tangye 6’ x 3” pump was erected this time at the lagoon end of the line to supplement the gravitational supply from the lagoon.” [[10]](#footnote-10) It is not clear from whether a separate pipeline was built this purpose.

West-bound steam locomotives were thirsty after climbing the Lapstone Zig Zag, so Glenbrook Lagoon became an essential source of water. A *gravity* (author’s emphasis) pipe-line brought water from the lagoon to an iron water-tank beside the original railway track from which the engines could be refilled. This tank stood on the northern side of the old railway line at the foot of Hare Street. All traces of it have since disappeared. The brick pillars preserved in Garlic Parade (*now a location only* *on the north side of the present Great Western Highway –authors emphasis)* supported a later tank [[11]](#footnote-11).

For 1866 technology the water pipe line from Glenbrook Lagoon was quite a sophisticated piece of engineering. Due to the local topography, a small ridge flanking the southern edge of the lagoon, it was necessary to drop part of the line into a trench. Between the present day Skarratt Avenue and the lagoon two vertical shafts were sunk and the trench between them deepened until it was possible for water to flow by gravity through the pipe from the lagoon all the way to the tank at the railway siding.[[12]](#footnote-12)

The Map of the Village of Glenbrook, Parish of Strathdon, County of Cook, Land District of Penrith, 1890,shows the alignment of the covered fabricated timber water pipeline from Levy Street[[13]](#footnote-13) to the water tank at the station siding as well as the original railway line, now the route of the Great Western Highway.[[14]](#footnote-14) The current Department of Lands 1:25000 topographic map Penrith 3rd edition still shows a section of the easement for the original buried pipeline between Levy and Moore Streets, GR 794 618 to GR 795 616.

A sketch map by Charles Robert Scrivener dated 20th May 1897[[15]](#footnote-15) prepared for the trial of ‘Butler’ for the murder of Captain Lee Weller, shows the position of the two circular shafts as well as the plotted alignment of the covered pipeline. Regrettably the map is not to scale. It is however annotated with words to the effect that the shaft located close to the lagoon “as 21 ft. (7m) deep”. The second shaft is also shown, on the south, downstream side of the ridge. According to information from Doug Knowles, Glenbrook and District Historical Society[[16]](#footnote-16), at least one of the original shafts, now on a private land, was filled in ‘only recently’ (statement made January 2017) as the owner was concerned for his children’s safety.

The gravity pipeline pipes were made of timber. Cut timber staves were bound with heavy duty steel wire and then coated in bitumen. The timber staves were shaped so they formed a watertight cylinder similar to the principle used in making wine barrels. Because the wood expanded when wet there were very few leaks. A similar situation applied to joints. An image of a section of the pipeline unearthed during the construction of the Glenbrook bowling green in the 1960s is now in the Glenbrook Museum[[17]](#footnote-17).

Water pipes made by this technology were manufactured in Australia from 1875 to 1919.[[18]](#footnote-18) Given that the Glenbrook installation was built in 1866-67, it is possible that there was an unrecorded Australian manufacturer or alternatively that the pipes were imported from either England or the USA. To ensure the pipeline did not leak, it was buried to prevent drying out[[19]](#footnote-19). The burial requirement is the reason why a section of the line was recovered in excellent condition when excavations were made for extensions to the Glenbrook Bowling Club greens, 1960[[20]](#footnote-20).

In 1867 the first dam wall was built on Glenbrook Lagoon by constructing a retaining wall along the eastern edge where it empties into Lapstone Creek. To ensure a plentiful water supply the wall was raise again around 1880[[21]](#footnote-21). While this increased the amount of stored water it did not increase the continuing supply. The lagoon is principally spring fed; the actual surface catchment area is tiny so except in cases of prolonged very heavy rain, no additional water is available. The stored water supply is almost totally spring dependent.

In the 1860s there was no name for the lagoon and the supply of water for the steam trains was utilitarian. By usage alone the railway stop was called “Water Tank”[[22]](#footnote-22). The new and increased retaining (dam) wall became part of a thoroughfare to The Western Road and for 59 years it was called Railway Street. (Later it was renamed as Glenbrook Road)[[23]](#footnote-23).

According to Aston, Nell, Rails, Roads and Ridges, 1988, the long drought from 1877 until 1884 reduced the lagoon water level dangerously and supply was augmented by water pumped up from the Duck Hole down in Glenbrook Creek 1500 metres away to the south-west on the other side of the ridge to the Lagoon and then gravitated to the Tank[[24]](#footnote-24). Aston continues, “This system was used again in a much later drought and we have a photograph of the pump houses at the Duck Hole.[[25]](#footnote-25)”

In part Aston is correct. The photograph of the pump house at the Duck Hole is authentic. That is where the truth ends. From this point Aston has not undertaken original research. Her assertions are based on regurgitating erroneous work by William A Bayley as he had published a map in his book Lapstone Zig Zag Railway, 1972.

Bayley firstly chose the wrong bend in Glenbrook Creek to position the Duck Hole. He was out by more than 800m, and worse, located it in a precipitous, rocky cliff area where there is no space for constructing a pumping station, coal chute or even a track down. The only merit in his hypothetical case was that the distance from his ‘Duck Hole’ to the Glenbrook Lagoon was about a kilometre. Bayley failed to recognise the basic engineering principles his assumptions violated; viz. why pump water up 100m, then over a ridge, then by a tunnel under the railway line only to disgorge this now costly water into a vast evaporation basin so that what remained in turn could flow by gravity all the way to the tank at the railway station.

Bayley’s pipeline never existed. Copies of scaled plans and cross section drawings obtained from the Australian Railways Historical Society (NSW) branch and attributed to ‘GWR –Water Supply at Glenbrook’ show that considerable engineering was involved in ensuring water supply from the Duck Hole.

With the realignment of the railway line through Glenbrook Creek Gorge, a tunnel under The Bluff in 1913, water from Glenbrook Creek was more convenient for railway needs and the lagoon gradually lost its significance[[26]](#footnote-26). The need for rewatering steam trains at Glenbrook also disappeared making the installation at the Duck Hole also redundant.

The Duck Hole

The Duck Hole, is a natural water hole on Glenbrook Creek located at GR 781 612, height above sea level, 75m. It was named after the native Wood Ducks which used to frequent the location. The water hole was reportedly also used to provide water for railway steam engines from the late 1860s[[27]](#footnote-27).

Pumphouse Gully is a small gully which feeds into Glenbrook Creek. It is located on the eastern side of the Duck Hole, Glenbrook. The pump site was in part serviced by a winding narrow road for coal deliveries to a chute down to the pump engine. A short distance downstream from the site of the former Duck Hole installation is a cave with a quantity of coal. Bruce Cameron, personal correspondence dated 25th May 2017 opines it could be related to the Duck Hole installation and may have been used by Duck Hole operations staff.

Pictures of the pump house next to the Duck Hole show that it housed a steam driven pump that lifted the water nearly 100m to a high point storage. From this point water flowed by a gravity pipeline to the tank at the railway siding.

In correspondence dated 9th May 2017, Mark Langdon has proffered the comment, “The standard pump used by the railways for a pumping plant was a Tangye steam pump 'powered' by a vertical boiler. However, these pumps were generally used for minor lifts, for example at Tarana from the creek to the station, and given the height of lift from Duck Hole to the railway (400ft) it would have required a larger pump than the standard installation, but it may have still been a Tangye pump. If the boiler only weighed 2½ tons it would suggest that it was a vertical boiler, not a much larger Lancashire or Cornish boiler. Also steam could be raised faster in a vertical boiler. To understand the size of a vertical boiler, there is a vertical boiler at the rear of the Imperial Hotel at Mount Victoria. It is in the carpark accessed from the highway and it is not fenced in. For comparison there is a Lancashire boiler at the State Mine Museum in Lithgow.”

The Nepean Times, June 3, 1903, ran the following article “GLENBROOKS WATER SUPPLY- Owing to the alteration of arrangements for watering trains at Glenbrook, and pending further improvements there, Mr. Charles Towle, who has been employed there for the last 18months in attending to the watering of trains, has come back to Penrith, and Mr. J. Ensor, of Lawson, is now in charge. During the severe drought, and while the duplication was going on, Mr. Towle's duties were of the hardest, but, by his obliging manner, he had endeared himself to, not only the employees, but the townspeople as well, all of whom regret his leaving”. I am curious about the section, “the alteration of arrangements for watering trains at Glenbrook, and pending further improvements there …Mr. Towle's duties were of the hardest...” Was Towle down at the Duck Hole or was he at the station? He could not have done both duties. What were the changes?

Here in the historical record there is an apparent conflict of information about when the first pumping of water from the Duck Hole commenced. The Nepean Times, Saturday 3rd October 1903, page 6, record, “The Commissioners are now having a pumping plant put down in Glenbrook Creek over a mile from the station and over 400feet below the rail level, which, when completed, will give them a never failing supply of beautiful water. This work will be completed in about a fortnight’s time.”

… and also of Saturday 14th November 1903, page 6, “The new pumping plant to supply the Railway Department with water from Glenbrook Creek, a mile and a quarter from the station, and something over 400 feet below the rail level, was put into operation over a week ago, and has done away with the necessity of running a water train from Penrith which has been going on for nearly two years at great expense to the Commissioners. The pump, a very powerful duplex Worthington is working well and keeping up the supply satisfactory.”

The Nepean Times, Saturday 7th May 1904, page 6, records, “The Railway Department are also calling for tenders for the carting of coal from the station out to the new pumping station for the year ended 30th June 1905.” [We didn’t get that advt- Ed, N.T.]

The fickleness of nature is recorded again in the Sydney Morning Herald, (NSW) Saturday 14th January 1905, page 12, “Water has again given out at Glenbrook Lagoon, necessitating the Railway Department using the pumping plant at Glenbrook Creek for railway purposes.” The Nepean Times, 20th May 1905, ran a similar story but with a twist. “Notwithstanding the great amount of rain we have had during the last few months, the water in the lagoon is too low to gravitate and pumping from the creek has to still be continued.”

The media is noticeably quiet on the issue until January 1911, when the Nepean Times, Saturday 21st January 1911, page 3, in a roundup of news reported, “The copious rainfall which has fallen over the Mountains this summer has filled Glenbrook Lagoon to overflowing. This splendid sheet of water covers 40 acres and is used by the Railway Department for watering the Mountains trains. The demand in this direction is heavy and as a result the lagoon was entirely drained a few years ago… a pumping station was fixed in the Duck Hole in Glenbrook Creek. For the past three years the water for the Glenbrook train tanks has been pumped from the Duck Hole where there is an inexhaustible supply. However to the surprise and regret of local residents, the railway pumping man has within the past week, shifted his location and is now engaged in attempting to lower the lagoon waters… Glenbrook Creek was up to record height, being 6 inches over the pump house floor, clearing away a great heap of ashes the accumulation for the past 7 years…”

The demand for water and the size of the steam pump in Glenbrook Creek can be gauged from the following extract from the Nepean Times, Saturday 3rd June 1911, page 4, “There is still plenty of water in the lagoon which supplies the locomotives with water by gravitation, and the different camps,[[28]](#footnote-28) are being supplied from Glenbrook Creek, pumped up into a 20,000 gallon tank in the station yard, and then re-pumped up to the various camps for domestic purposes etc.”

As the completion of the railway deviation progressed, the local citizens began to think ahead about repurposing the railway infrastructure. The Nepean Times, Saturday 21st December 1912, page 6 reports, “The want of a good water supply is felt by the residents and it is expected the Shire Council will come to some arrangement with the Railway Commissioners to take over their plant when the deviation is completed, as the Department will then take water at Valley Heights for loco purposes. They will not require to pump water here as the water is now available at Valley Heights having been run down from Wentworth Falls by gravitation.”

Dry conditions coupled with growing demand led to an article in the Lithgow Mercury, Monday 3rd March 1913, page 2. It was captioned, “Not Enough Water… The lagoon at Glenbrook that has supplied the railway for many months has again become dry: Glenbrook Creek, which was supposed to be a never failing supply, has stopped running, and the big water hole known as the Duck Hole out at the pumping station is already some inches below the overflow level. Should this supply entirely fail, it will mean big expense to the Railway Commissioners, as well as to many business places and private residences, which are now depending on this supply”

On 23rd February 2017, John Fox, acting on advice from Doug Knowles, Glenbrook Historical Society, visited a site about 20 metres from the track head to the Duck Hole where he located a shaped depression that is probably the trench that was used for a “holding tank”.  It is positioned on the highest part of that section of the ridge GR 278651E 6261271 N. elevation 217 m.

John documented, “The depression is about 2m long in a north-south orientation.  It is about 0.5m wide and about 1.5m deep. There was no other infrastructure found – not even iron. In further searching I located a pile of rocks that looked as though they had been placed in position many years ago, GR 278738E 6261256 N, elevation 203 m.”

Copies of two separate sets of plans to construct this installation have been obtained from the archives of the Australian Railways Historical Society (NSW) branch. Although neither plan is dated, one plan is more refined and is annotated with two proposed air valves and a site for a service reservoir. The pipeline line was divided into two parts, a pump line and a gravitation line. The service reservoir is located at the highest point which is also the junction of the two lines and is confirmed by John Fox’s record of 23rd February 2017.

Retired engineer, John Cooper has studied these plans and offered the following comment by correspondence 22nd March 2017.

*“I have had a preliminary look at the drawings of the pumped supply.  They are two distinctly different schemes, and perhaps one superseded the other when the pump and boiler were renewed.  The scheme shown on drawings 1 and 2 (Scheme 1) appears to predate drawing 3 (Scheme 2).  Scheme 1 shows a lift of about 390ft to a rail level of about 500ft, while Scheme 2 shows a lift of about 360ft to a rail level of 700ft.  Given that the general elevation of Glenbrook is at least 200m, the levels on the Scheme 2 map are more accurate and appear to be the more recent.  The levels on Scheme 1 appear to relate to an earlier datum.  Nevertheless, the map and greater lift under Scheme 1 suggests it supplied a tank further along the line up the hill to the tank for Scheme 2 (with potential for gravity flow to Glenbrook Lagoon).*

*As a coal fired boiler installation, it would have operated continuously and required a permanent boiler attendant.  It would be expected that operational records and log books would have been kept.”*

Records have not been found to confirm whether either or both plans were built. It is possible that both were built, the second plan being for a much improved installation. Significantly this more sophisticated plan references a flood level point above the normal level of Glenbrook Creek. This would imply knowledge of an experience of flooding and the importance of locating the steam pump above this point.

From a newspaper story in the Nepean Times (Penrith, NSW), Saturday 14 November 1903, page 6, we know that the pump unit was a Duplex Worthington[[29]](#footnote-29). The Worthington Corporation founded by Henry Rossiter Worthington, was a diversified American manufacturer that had its roots in Worthington and Baker, a steam pump manufacturer founded in 1845. The Worthington Pump Works operated from 1845 – 1899. The company made a huge range of steam pumps. A perusal of the early catalogues while interesting does not help identify the possible specifications of the unit installed at the Duck Hole.

Some indirect information about the unit installed at the Duck Hole on Glenbrook Creek was provided by Dennis Bainbridge, a member of the Glenbrook Historical Society, via Doug Knowles. It is in the form of a tender advertisement by the Government Railways and dated 8th June 1910[[30]](#footnote-30). The tender in part reads:-

“GOVERNMENT RAILWAYS: New South Wales Government Railways. Office of the Chief Commissioner, Sydney, June 8, 1910.

Tenders will be received at this Office not later than 12 o'clock noon on the dates specified for the undermentioned Works, Supplies, etc., MONDAY, JUNE 13, 1910.

THE CARTAGE OF PUMPING BOILER AND GEAR FROM GLENBROOK RAILWAY STATION to pump at Duck Hole, Glenbrook: and Cartage of Old Boiler from Duck Hole to Glenbrook Station.  Approximate weight of boiler and gear in each case: 2½ tons. Particulars, Chief Mechanical Engineer's Office, Redfern and Steam Shed Inspector, Penrith.”

From this tender it is deduced that the installation was significant and critical to ensuing that water was available at Water Tank when it was needed.

During the times of inadequate supply which lasted nearly two years, water was brought by rail from Penrith[[31]](#footnote-31) to replenish the water tank. The nameless refilling stop became known as ‘Water Tank’.[[32]](#footnote-32)

A series of drought periods between 1877 and 1884, combined with the increasing rail traffic brought a rising need for more water. It was in this period that a coal fired steam pump was installed.[[33]](#footnote-33)

The need for the steam pump installation in the Duck Hole disappeared with the construction of the railway deviation with designed better gradients obviating the need for the steam trains to stop for re watering. This story is chronicled in the Lithgow Mercury (NSW), Monday 19 June 1911, page 1. Once the railway deviation was completed, the construction camps dismantled, the need for the steam pump installation at the Duck Hole was made redundant. The article reads,

“THE GLENBROOK DEVIATION PROGRESS OF THE WORK, On January last (1911) the railway deviation works were started at Glenbrook, and hundreds of navvies and camp followers swarmed into the village. A camp was located on a plateau about a mile and a half from the railway station, and soon was the scene of a thriving township, which now boasts a population of 1200 navvies, with their wives and families.

A doctor and a hospital have been provided by the Railway Department. The place also boasts of a couple of policemen and a resident Church of England clergyman. A large hall has been built, wherein are held picture shows, dances, and other amusements. Football clubs have been formed and a proper oval constructed. Regarding sanitary matters, an officer has been especially appointed by the department to supervise matters in the interests of public health. The attendance at the local school numbers two hundred, and an increase of the teaching staff has been found necessary.

The deviation is intended to do away with the steep grade which at present exists between Emu Plains and Glenbrook, and Glenbrook Creek is being blasted out of recognition in the process. The journey over the mountains will, when the alteration is finished, be three or four miles longer than at present, but the train passenger will have ample compensation in the grandeur of the scenery in the Glen-brook Gully. The train will skirt along cliffs 700 feet deep, while the line will pass through timbered country on a course which is parallel with the Nepean River, affording a beautiful view of the prettiest portion of the Nepean.

The progress of the work up to the present is wonderful. Big gullies are being filled up, and hills are being pulled down. Immediately after passing Emu Plains the new line takes a wide semi-circle and returns to the pre-sent line near the road crossing, then skirts along eastwards some three hundred yards. A big tunnel is to be excavated, and it will end right at the back of the Glenbrook station. The first pinch is met with at Penrith, 84 miles from Sydney. Here the line gradually rises 155ft. before it crosses the Knapsack Gully by the via-duct, which is 388ft. long, with a maximum height of 126ft. The crossing is 245ft. above Emu Plains, and the line reaches the lowest point of the first Zig-zag at an elevation of 414ft. above sea level. From there an elevation of 470ft. is attained in 30 chains, and the line continues to go higher until the tunnel, 539 yards in length, conveys the train through Mount Clarence. The rails at the entrance to this tunnel are 3658 feet above sea level.

The construction camp is supplied with water pumped from the Duck Hole, a deep pool in the Glenbrook Creek, and to connect this with the camp miles of pipes had to be laid down. The work of making the deviation will last for two years.”

In 1913 the pump was removed[[34]](#footnote-34).

Visits by the authors.

On 10th February 2006 in company with bushwalking legend, the late Wilf Hilder a visit was made to Glenbrook to visit the Duck Hole. An extract of the authors notes of that walk based on statements by Hilder are set out below.

*“Heading west again along Station Street we picked up a fire trail for 50m before heading north and west along the remnants of a long forgotten trail that joined with an historic ‘coal road’.*

*Although this ‘coal road’ is long forgotten it is well graded with some significant but crude dry stonewalls up to 3m in height. It is a road redolent with history – railway history. It was constructed as a result of the prolonged drought in the late 19th Century that dried up the natural lake (Glenbrook Lagoon) water source for replenishing water for the steam trains at Glenbrook[[35]](#footnote-35).*

*The road and associate timber chute enabled the delivery of coal to service a steam pump on Glenbrook Creek at the Duck Hole. This installation lifted water from the Glenbrook Creek through some 90m to the plateau top. On the day evidence was found of one of the rock cuttings made to allow the inlet suction pipe to fit snug into the cliff line. Hilder reported that he had collected a piece of coal from the track on a previous visit.”*

Ten years on, 24th October 2016, in the company of co- author John Fox, we retraced some of this journey,

*“The built track down Pumphouse Gully to Glenbrook Creek is 2m+ wide and apart from several washaways and trail bike rider’s random shortcuts it is still in reasonable condition. Checking for artefacts, a square headed forged bolt was located fixed into the rock about 5m back from the river bank. Here also there is a concrete slab with four embedded bolts and nearby a hand forged loop bolt secured into the rock by molten lead. A deeply cut trench in the sandstone could have been used to secure the inlet water pipe line.”*

On 1st May 2017 another visit was made to the area, principally to search for evidence of structures associated with the operation of the steam pump at the Duck Hole. Immediately off the coal road to the south near the crest of the hill, there are several groups of stones, manufactured bricks and dug pits that could have been related to dwellings and or the operation of the steam pump. It is possible that a person was permanently stationed to monitor coal deliveries, prevent theft of coal or interference with the works.

A steam pump almost by definition requires an attendant, and given the demand for water it was most likely a 24 hour, 7 day a week operation. Supplies of lubricants and other maintenance items would need to be on hand and also protected. Even if the attendants walked in from Glenbrook each shift there would still need to be a caretaker/security person controlling the pump site.

Concluding Statement

Understanding the connection between water supplies at the Glenbrook Lagoon on the plateau, the Duck Hole in Glenbrook Creek and the watering of steam trains at Glenbrook appears to be a case of necessity driving development. The rising demand for water by steam engines after they had climbed the Lapstone Hill neared a crisis when supply at Glenbrook Lagoon was affected by drought. This situation was temporarily solved by special water trains from Penrith while a supplementary reliable source was arranged locally.

The alternative source developed was the Duck Hole on Glenbrook Creek where a steam pump was installed and separate pipeline to the water tank at Glenbrook siding built.

The reason for the lack of residual infrastructure of either installation can be attributed to a total change of land use and the propensity at the time to recycle items when their economic application changed. In the case of the Glenbrook Lagoon gravity feed line we do know that part of this buried wooden gravity feed line was dug up when the Glenbrook Bowling Club was undertaking extension works. Maps also show the easement provided for the buried pipeline.

In the case of the line from the Duck Hole to the water tank, the steel pipe component of this line would have been readily sold and recycled along with the coal driven steam pump unit. The remaining evidence at this site is in the form of low value or not removable items such as embedded attachment points that were of little advantage to remove, the access road, foundation blocks and rock cuttings.

Glenbrook Lagoon and the Duck Hole (draft 8.0- 01617) /MK

1. Glenbrook Creek was named by Sir John Jamison, 15th November 1818 and was shown on Plan of Emu Plains and Lines of Road up Lapstone by Surveyor Rusden, 29th July 1831. [↑](#footnote-ref-1)
2. G006 Glenbrook Lagoon, Physical description, NSW Environment and Heritage, 29th September 2004. [↑](#footnote-ref-2)
3. Glenbrook Lagoon, Mt Sion and Mitchell’s Pass- Plan of Management Prepared by Blue Mountains City Council February 2003. p 4 Topography, geology and soils. [↑](#footnote-ref-3)
4. Mackaness, George, Fourteen Journeys Over The Blue Mountains of NSW 1813-1841, 1965. Journey Number one by Gregory Blaxland p.3. [↑](#footnote-ref-4)
5. Weatherburn, Alan Keith 'Evans, George William (1780-1852), surveyor', in Douglas Pike (ed.), *Australian Dictionary of Biography*, vol. 1, Melbourne University Press, Melbourne, 1966, pp. 359-360. para 3 -4. [↑](#footnote-ref-5)
6. Mackaness, George, Fourteen Journeys Over The Blue Mountains of NSW 1813-1841, 1965. Journey Number five by Major Henry Colden Antill p 76. [↑](#footnote-ref-6)
7. Mackaness, George, Fourteen Journeys Over The Blue Mountains of NSW 1813-1841, 1965. Journey Number four by Governor Lachlan Macquarie. p 73 note 4. [↑](#footnote-ref-7)
8. Glenbrook Lagoon, Mt Sion and Mitchell’s Pass- Plan of Management Prepared by Blue Mountains City Council February 2003. Historical notes para 6. [↑](#footnote-ref-8)
9. This information was cast into the side of the unit. It signified the pump had a six inch bore and an output of three horsepower. In March 1857, Richard Tangye, with brothers James and Joseph, started a manufacturing business in Birmingham under the title of *James Tangye and Bros.* Principally manufacturing [hydraulic](https://en.wikipedia.org/wiki/Hydraulic) appliances and particularly [lifting jacks](https://en.wikipedia.org/wiki/Jack_(device)).  [↑](#footnote-ref-9)
10. The Australian Railway Historical Society Bulletin No. 263- September 1959, pp 144 -145 [↑](#footnote-ref-10)
11. Aston, Nell, Rails Roads and Ridges, 1988, p 14. [↑](#footnote-ref-11)
12. A sketch map of Glenbrook Lagoon and the gravity pipeline to the water tank by Charles Robert Scrivener dated 20th May 1897. Image thanks to Glenbrook and District Historical Society, 16th January 2017. [↑](#footnote-ref-12)
13. Levy Street is a contraction of Levey, derived from the original landholder’s name, Barnett Levey, who prior to resumption by the railways owned 640 acres including the lagoon. [↑](#footnote-ref-13)
14. Copy of the Parish Map 1880 courtesy Brian Fox [↑](#footnote-ref-14)
15. Copy provided by Doug Knowles Glenbrook and District Historical Society, 16th January 2017 [↑](#footnote-ref-15)
16. Personal communication, 16th January 2017. [↑](#footnote-ref-16)
17. From examining a picture of this pipe section in relation to a man’s hand it is about 5” in diameter. [↑](#footnote-ref-17)
18. Powerhouse Museum website. Search 2.53, 88/73 Water pipe, wood /wire/tar, maker unknown, Australia 1875-1910 [↑](#footnote-ref-18)
19. Wooden Stave Pipe, Built by Redwood Manufactures Co. and quoting Transactions of American Society of Civil Engineers, Vol, XLI, Stave Pipe Its Economic Design and Economy of Its Use. p.12 [↑](#footnote-ref-19)
20. Correspondence with Doug Knowles and Phil McColl, “the initial earth works that unearthed the pipe section was mid-1960. Documented in the Glenbrook Bowling & Recreation Club Silver anniversary booklet 1959-1984, page 8”. [↑](#footnote-ref-20)
21. Correspondence from Denis Bainbridge 10th May 2017. [↑](#footnote-ref-21)
22. Aston, Nell, Rails Roads and Ridges, 1988, p 14. [↑](#footnote-ref-22)
23. Woods, Christopher J, Street Whys: the origins of Blue Mountains City street names, page 45 [↑](#footnote-ref-23)
24. Aston, Nell, Rails Roads and Ridges, 1988, pp 14-15 [↑](#footnote-ref-24)
25. Aston, Nell, Rails Roads and Ridges, 1988, p 15 [↑](#footnote-ref-25)
26. G006 Glenbrook Lagoon, Historical Notes, NSW Environment and Heritage, 29th September 2004. [↑](#footnote-ref-26)
27. Fox, Brian Kenneth, Blue Mountains Geographical Dictionary, 2nd ed. 2001.p 98. [↑](#footnote-ref-27)
28. This is a reference to the railway deviation construction camps, several of which were established in the greater Glenbrook area 1911 to 1913. [↑](#footnote-ref-28)
29. “The new pumping plant to supply the Railway Department with water from Glenbrook Creek, a mile and a quarter from the station, and something over 400 feet below the rail level, was put into operation over a week ago, and has done away with the necessity of running a water train from Penrith, which has been going on for nearly two years at great expense to the Commissioners. The pump, a very powerful duplex Worthindgton,(sic) is working well and keeping up the supply satisfactory”. Retired engineer, John A Cooper has proffered the following comment Worthington steam pumps are well known and have been around for some time, albeit with continual improvements. In my early engineering days, I recall working on one in a boiler house.  They are not engine driven pumps, but rather consist of a rigid reciprocating connecting rod with a piston in a cylinder at either end.  Steam pressure drives one piston which moves the other to pump the fluid (water).  In a duplex pump there are two reciprocating parallel piston sets, usually with interconnected steam valve gear.  I've attached the earliest brochure I've been able to find so far which gives a general idea of the general configuration.  It would not have changed much over the years.  You can see they were manufactured in a range of sizes and capacities, from relatively small units primarily I expect for boiler feedwater pumps, to large units where there would be a considerable discharge head, such as in this application at Glenbrook.  Considering that locomotive tenders of the time could have held at least 1000 gallons of water, and probably two to three times that, and there well could have been multiple engines to replenish each hour, then it could be expected the capacity required of this pump would place the unit among one of the larger sizes listed.  This is supported by the description in note 25 which describes the pump as a "very powerful Duplex Worthington".  To identify the actual unit would be a challenge unless some record can be found of its actual size. [↑](#footnote-ref-29)
30. This tender was also published in the Blue Mountain Echo, Saturday 18th June 1910, page 7, The Sydney Morning Herald, Saturday 11th June 1910, page 2. [↑](#footnote-ref-30)
31. Nepean Times (Penrith, NSW), Saturday 14 November 1903, page 6, The new pumping plant to supply the Railway Department with water from Glenbrook Creek, a mile and a quarter from the station, and something over 400 feet below the rail level, was put into operation over a week ago, and has done away with the necessity of running a water train from Penrith, which has been going on for nearly two years at great expense to the Commissioners. The pump, a very powerful duplex Worthidgton,(sic) is working well and keeping up the supply satisfactory. [↑](#footnote-ref-31)
32. Aston, Nell, *Glenbrook and District History,* Glenbrook Historical Society Inc. 2009 [↑](#footnote-ref-32)
33. ibid. [↑](#footnote-ref-33)
34. G006 Glenbrook Lagoon, Historical Notes, NSW Environment and Heritage, 29th September 2004. [↑](#footnote-ref-34)
35. The first time the Duck Hole was used as a water resource for the railways was in 1877. Ref Aston, Nell, Rails Roads and Ridges, 1988, pp 14-15 [↑](#footnote-ref-35)