

From: [NSW Government](#)
To: [Flood Inquiry](#)
Subject: Floods Inquiry
Date: Friday, 6 May 2022 9:40:02 AM
Attachments: [Flood Inquiry Submission.pdf](#)

Your details

Title Mr

First name Lindsay

Last name Hill

Email

Postcode 2480

Submission details

I am making this submission as A member of the general public

Submission type I am making a personal submission

Consent to make submission public I give my consent for this submission to be made public

Share your experience or tell your story

Your story My story is of little interest. I have lived in Lismore for 33 years and have been largely unaffected directly by flooding events. However, I have been regularly involved in the background helping to provide disaster welfare and both paid and volunteer assistance to flood victims.

Terms of Reference (optional)

The Inquiry welcomes submissions that address the particular matters identified in its [Terms of Reference](#)

1.1 Causes and contributing factors

See the attached submission.

1.2 Preparation and planning

As I see it there are three broad approaches to dealing with the flooding problem in the Richmond/Wilsons Catchment Area:

- 1/ provide more flood mitigation in an attempt to flood proof the area or, at least, to avoid major flooding events, or
- 2/ move everyone in flood prone land to higher ground to avoid issues associated with all types of flooding events from minor to major, or
- 3/ do nothing except to keep paying for rescue, recovery and repair every time it floods.

All three approaches would seem to have enormous costs associated with them. Whatever we do will be expensive even if we choose to do nothing.

Attached is my submission along with a number of maps and appendices where I argue that flood mitigation is the best way forward and where I provide suggestions on how it may be accomplished.

I hope you find the submission useful.

Supporting documents or images

Attach files

- [Flood Inquiry Submission.pdf](#)
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Submission to the NSW Flood Inquiry of 2022

It would seem to me that, in some degree, there is no need for any more flood inquiries in relation to the Richmond/Wilsons catchment area. We have had numerous inquiries which have come up with strategies that the NSW Government has agreed to implement. For instance:

Following the 1974 flood, the government of the day commissioned a number of studies to consider ways to overcome Lismore's flood problems. The then government assisted with the purchase of land at Goonellabah to create a new commercial area and new planning schemes to limit growth in floodplain zones. A voluntary purchase scheme aimed at assisting people to move out of the seriously affected flood zones was also introduced.

From the Lismore City Council website page titled Floods and Other Hazards See: <https://lismore.nsw.gov.au/a-short-history-of-flooding-in-lismore>

It would seem that one possible approach is for the NSW Government to extract the reports from previous inquiries and to implement them or to resurrect previously abandoned strategies and then complete what has already been agreed.

But failing that I suggest that some of the causes and contributing factors to the overwhelming scale of the record making floods in the Richmond/Wilson catchment are:

1. We had a huge amount of rain in a short period of time. It would be useful to have information from hydrologists to identify the exact quantities involved but, in the meantime, my rough estimates are that we had on average at least half a metre of rainfall over the whole catchment area of 17,000 square kilometres in the three days up to 28th February 2022. If this is correct then it equates to approximately 8,500 gigalitres (or 17 Sydney Harbours) which had to drain out to sea through the Richmond River at Ballina plus a much smaller component through the Tuckombil Canal to the Evans River that drains out to the sea at Evans Head.
2. The Richmond and Wilsons Rivers have become silted up to a great extent since they were last dredged and this has greatly reduced their capacity to drain away large volumes of water as quickly as they once did. A hundred or so years ago the river was dredged to a depth of 19 feet (approximately 5.8 metres). In the 1960s the Wilson River at Lismore had clear water and had abundant fish but today is silted up. At low tide at 1:30 pm on 5th May 2022 I measured the depth of the river at two places in Lismore. At the wharf beside the Ballina Street boat ramp the depth was 1.6 metres and at the wharf at the Rowing Club the depth was 1.95 metres. There are historical photos of the SS Wyrallah at a wharf in Lismore where it loaded and unloaded passengers and cargo. This ship had a draft of 4.5 metres or 13 feet. These figures give an idea of the level of silting that has occurred in the Wilsons River since ships stopped visiting the city in the 1960s. See: https://www.wikiwand.com/en/Lismore,_New_South_Wales for a photo of the SS Wyrallah at Lismore in the early 20th century.
3. In the 19th century the Big Scrub of 75,000 hectares was cleared and the Tuckean Swamp of 6,000 hectares was drained. These systems would have held back vast

quantities of flood water allowing flood waters to dissipate slowly into the rivers and streams and thus reduced the impacts of flooding downstream. While these systems cannot now be restored to their original pristine condition, all means should be taken to both provide adequate flood mitigation by reinstating longer retention periods for flood water where possible and improving water quality across these important environments by reducing the impacts of blackwater events.

See the Tuckean Swamp Hydrologic Options Study of January 2020 from the Water Research Laboratory of the UNSW School of Civil and Environmental Engineering by D. S. Rayner, A. J. Harrison and W. C. Glamore.

https://ozfish.org.au/wp-content/uploads/2020/03/WRL-TR2019-21-FINAL-DRAFT-JANUARY-2020_COMPRESSED.pdf

See also: Technical Note by Rous County Council and Ballina Shire Council titled "Blackwater: What is it, What causes it, What can be done about it?" By C. Clay, S. Acret and L.A. Sullivan (2020)

<https://ozfish.org.au/wp-content/uploads/2017/07/Technical-note-Blackwater-in-the-Richmond-River-2020.pdf>

Flood Mitigation Suggestions for Major Floods in the Richmond/Wilson Catchment Area.

Many ideas for flood mitigation have been developed over the years but it seems few have been implemented. I think the following ideas would each do only a little by themselves to mitigate the effects of major floods. And some of these ideas would possibly cause worse problems if implemented in isolation from the others. But taken as a whole and implemented simultaneously these ideas might have great benefits. Some of these ideas are up to 130 years old. I propose three canals be constructed amongst other strategies. All these ideas would need close examination by engineers and others who can calculate the cost benefit of the projects.

1. Reinvigorate and properly fund the the Wilsons Landcare Group to plant trees along all the Wilsons River and its tributaries and elsewhere. This has many benefits including the slowing of rainfall runoff that would make flood events less severe as the water gets into the rivers more slowly over a longer period and the slowness of the water stops it collecting precious soil from the farmlands and allows any soil that is picked up to settle before being washed downstream. The theory is that water needs to be slowed down before it can get into the river and then allowed to flow quickly once it has entered the river to get it to the sea quickly.
2. Build the 50 gegalitre Dunoon Dam. Many local land holders and people worried about the environment may be against the building of Dunoon Dam but it will be needed eventually and, though it will not solve the flooding problem in the Richmond and Wilsons catchments by itself, it will be a help and will contribute to the solution by potentially collecting the over-spill from Rocky Creek Dam and reducing the flows down Terrania Creek.
3. Build the Tuncester canal. Convert the existing drain that runs west of the airport into a proper canal running all the way from Leicester Creek to the river south of

the airport. It has been suggested that this canal would only shift the problem downstream. However, if built at the same time as these other suggestions are implemented it may successfully deal with Lismore's flooding problem without impacting others downstream. The location of this canal must have an impact upon a few local farmers but they too will gain a considerable benefit from this strategy. The canal would flow east of the South Lismore sewage treatment plant and west of Canaiba St then west of the airport to enter the Wilsons River via Loftville Creek which would need to be widened and straightened to accept the volume of water. See Appendix 2 for details of Mr. McMordie's proposal of 1894 – the main area of interest has been highlighted with bold text.

4. Dredge the Wilsons River between Boatharbour and Wyrallah. This will speed the flow of the floodwaters but it is important, once again, to note that this strategy would make the problems worse downstream if not implemented with other strategies such as the completion of all 3 canals should they prove viable and have a proven cost benefit. I don't propose the Wilsons and Richmond Rivers be dredged in their entirety as the expense involved would likely be prohibitive.
5. Cut a causeway through the narrow gap at Figtree Bend to give the river a shortcut during floods. See Appendix 2 for details of Mr. McMordie's proposal of 1894 – see area highlighted in bold text for the basic design concept.
6. Build the Tuckian Canal that was first proposed in 1894 by an engineer called McMordie and later promoted by Mr. Keele. This would be a wide canal starting at or in the vicinity of Ramsays canal just south of Wyrallah that would continue north of Tucki Tucki and in the vicinity of Mason Road to join up with the existing Tucki Canal which would be widened and shaped as proposed by the UNSW in their Tuckean Swamp Hydrologic Options Study of January 2020 which is mentioned above. This work would drain the Wilsons River at Wyrallah directly into the Tuckean Broadwater at Bagotville bypassing Coraki, Woodburn and many other towns and localities. This idea seems to have been around for 130 years with the idea of dealing with both the Lismore flood issue and to drain the Tucki swamp to provide valuable grazing land. It appears only enough of the canal was built to drain the land for grazing. This new canal would complete the flood mitigation idea. One huge issue to tackle is the cost of construction which was a fairly small amount when originally proposed 130 years ago but grew larger and larger with each new analysis over the subsequent years until it was finally abandoned in 1918. See Appendix 1 for some detail on the proposed canal design made in the year 1900- see the area highlighted in bold text for details of the plan.
7. Build a new canal or pipeline about 1.5 kilometres in length from opposite Goat Island to Broadwater Beach. This is needed in order to protect towns and communities along the lower part of the Richmond River such as Wardell and Ballina among many others. In order to do this flows coming from the new Tuckian canal would be funnelled via this new Broadwater canal or pipeline directly to the sea at Broadwater Beach. This new canal would be located in the vicinity of Boundary Creek and Andersons Creek which both currently empty into the Richmond River near Goat Island. It might be useful to have a pipeline laid to complete the connection to the sea as a pipeline would lay hidden under the beach and not be an obstruction to beach users. See Appendix 3 for some detail on Mr Keele's proposal first made in 1900 – see details highlighted in bold text for the main design concepts.

While I have not included any strategies for the Richmond River upstream from Coraki it

should be noted that the greatly reduced flows coming down the Wilsons River to Coraki would allow the upper Richmond flows to drain more quickly to the sea which must be of assistance to mitigate the flood problems at Casino and other localities such as Tatham. There would also be great benefit for towns and localities between Coraki and Broadwater from the new Tuckian Canal and there would be relief from the worst effects of flooding for the lower river from Cabbage Tree Island to Ballina from a new Broadwater Canal.

Also, someone suggested recently that there should be a series of dams located on the Upper Wilsons River for flood mitigation. Each dam could capture a couple of gigalitres of water reducing the impact downstream. Many years ago I believe the local construction engineer, Dayal Singh, proposed that a dam somewhere on the Upper Wilsons River, possibly at Nashua or Coorabell, could have excess flood water sent to the sea at Byron Bay via a pipeline under St Helena.

Much farmland would have to be resumed to complete these flood mitigation strategies. And, the benefit and cost of these strategies works would have to be investigated by engineers, surveyors and hydrologists but the cost would probably be in the billions of dollars. These costs and benefits needs to be weighed against two other broad strategies to deal with the impacts of flooding in the Richmond/Wilson catchment. These are:

- **To move houses and businesses to higher ground.** To move just Lismore's 3,000 businesses and 5,000 houses to higher ground would have a great benefit in ending the inundation of those properties but must come at great cost which would be in the billions. The area bounded by Richmond Hill to Wollongbar and Tregagle to Pearces Creek would need to be resumed, then a major development implemented to provide roads, services, playing fields, parkland etc. The cost of this strategy would be in the billions of dollars and must surely cost as much, if not more than the flood mitigation strategies and cause the loss of much land currently used for horticulture and grazing. One problem with this strategy is that it does nothing for numerous towns, villages and communities situated between Lismore and the sea where the option of moving does not appear to be very viable.
- **Do nothing except to assist property owners, residents and business people to cleanup, recover and rebuild after each successive flood.** The cost of doing little or nothing has also proven to be very expensive. It is not only costing billions of dollars but is regularly costing billions of dollars. An analysis is required to determine if doing nothing is more costly than the other broad strategies. It certainly appears to be an expensive waste of money when the costs of cleanup and recovery must be continuously repeated.

I believe at the end of the day that a proper investigation and analysis, if conducted, will show that the flood mitigation strategies are the best way of dealing with flooding in the Richmond/Wilson catchment as a whole while remembering the catchment needs to be dealt with as a whole. It will serve little to attempt to deal with flood issues separately in each LGA within the catchment. Also, implementation of these strategies needs to begin downstream and work back upstream. Nothing need hinder the immediate commencement of the flood mitigation strategies 1 and 2 mentioned above which are proposed in order to limit and slow down the waters flowing into the rivers and creeks. But strategies 3 to 7 ought to be implemented in reverse order starting with strategy 7

and finishing with strategy 3. This is to ensure that the implementation of one strategy upstream does not make conditions worse further downstream.

If we can aim to eliminate major flooding, move most people living in areas prone to minor and moderate flooding and minimise the need for recovery and repair we have will have probably achieved the best possible outcome.

Lindsay Hill
6th May 2022

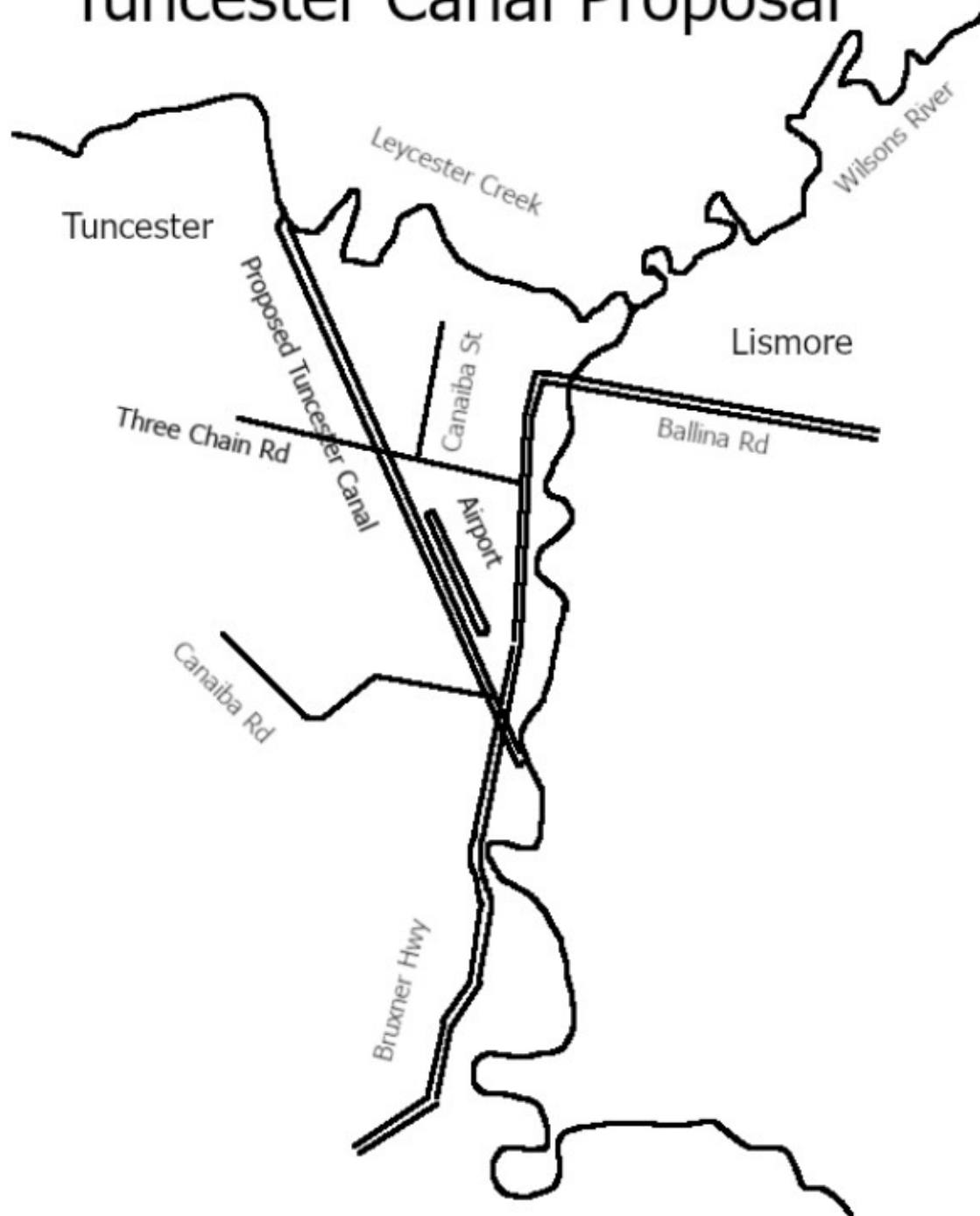
See attached maps:

- Tuncester Canal Proposal
- Tuckian Canal Proposal
- Proposed Broadwater Canal

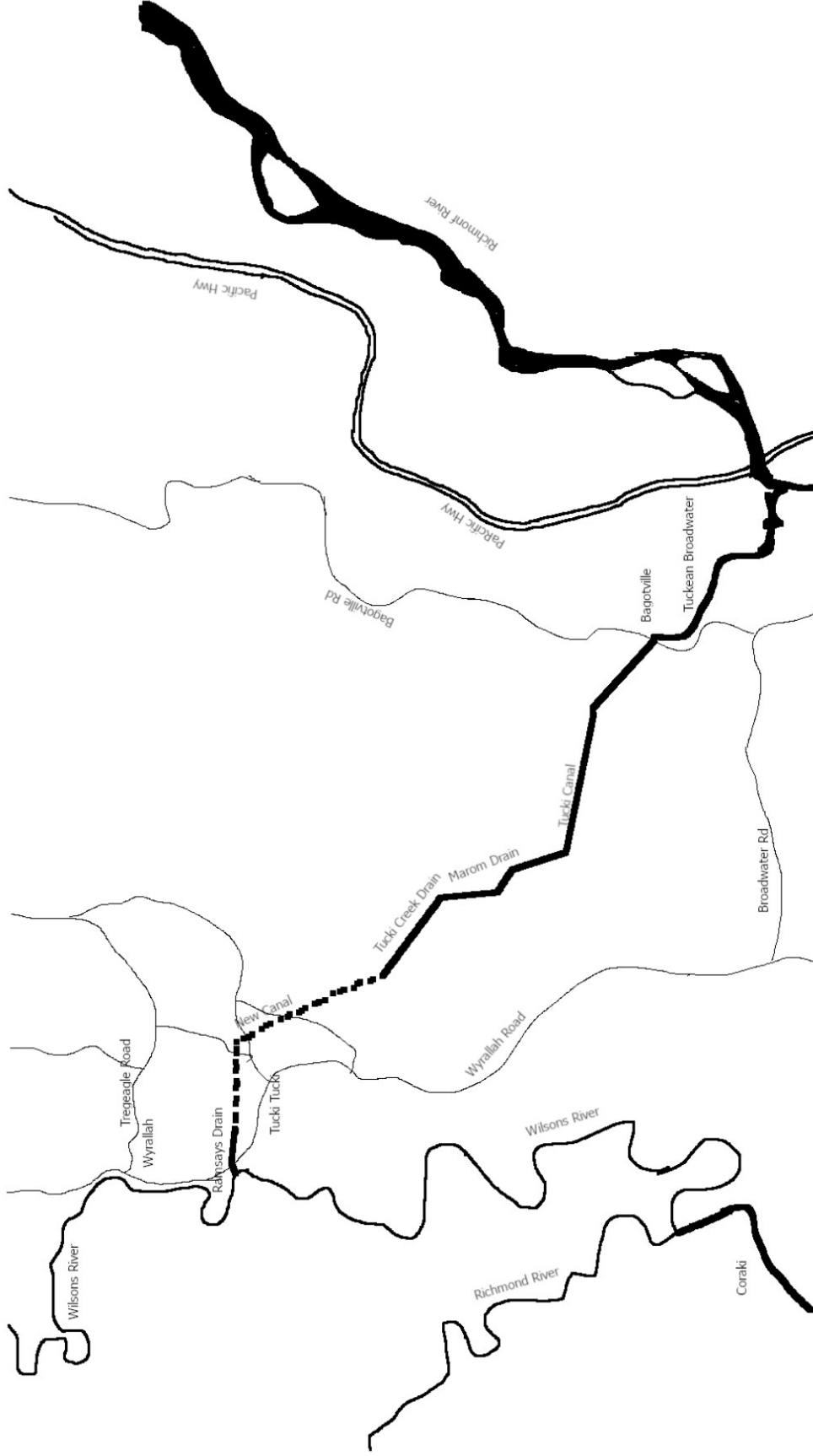
See attached appendices:

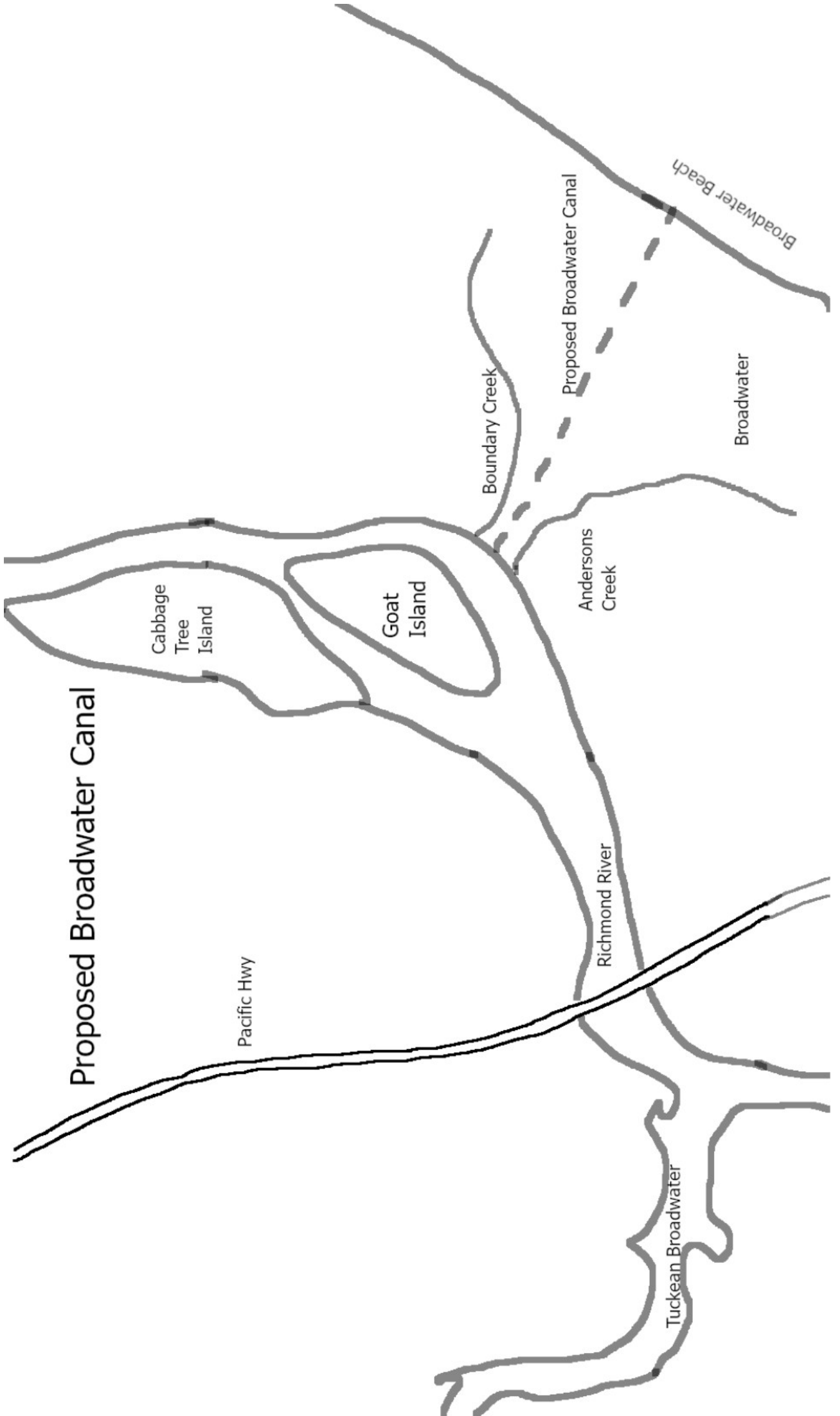
- Appendix 1 - "FLOOD PREVENTION ON THE RICHMOND. THE TUCKIAN SWAMP SCHEME. INQUIRY BY THE PUBLIC WORKS COMMITTEE". Daily Telegraph (Sydney, NSW), Thursday 22 February 1900, page 3
- Appendix 2 - "Escape for Flood Waters". THE NORTHERN STAR, SATURDAY MORNING, 21ST APRIL, 1894.
- Appendix 3 - "Tuckian Flood Escape". Richmond River Herald and Northern Districts Advertiser (NSW : 1886 - 1942), Friday 7 December 1900, page 2

Tuncester Canal Proposal



Tuckian Canal Proposal





Appendix 1

Daily Telegraph (Sydney, NSW), Thursday 22 February 1900, page 3

FLOOD PREVENTION ON THE RICHMOND.

THE TUCKIAN SWAMP SCHEME

INQUIRY BY THE PUBLIC WORKS COMMITTEE.

The Parliamentary Standing Committee on Public Works opened an important inquiry yesterday morning into the expediency of constructing works in order to prevent floods on the Richmond River, the general idea being to render it possible for the surplus waters to flow into the Tuckian Swamp. Mr. W. J. Trickett, M.L.C., the chairman of the committee, presided; and the other members present were Dr. Garran, M.L.C., Mr. P. L. C. Shepherd, M.L.C., and Messrs. J. M'Farlane, R. H. Levien, J. C. Watson, and W. T. Dick, Ms.P. The morning was occupied in taking the evidence of Mr. C. W. Darley, Engineer-in-Chief, Department of Public Works. Mr. Darley said that the question of the alleviation of the disastrous effects caused by floods in the Richmond River had been the subject of agitation for many years past amongst the residents of the district.

The Richmond River finds its way to the sea by a tortuous course, and, in addition, meets with many obstructions in the form of reefs, sharp bends, and contractions in the channel, all of which tend to choke the ready outflow of flood waters. As a consequence, a vast area of valuable land was periodically devastated by floods, as severe, perhaps, as any in the colony. Even if there were no floods in the Richmond River, the growing importance of the district, of which it is the main artery of trade, would entitle it to considerable improvements. Parliament had already recognised the importance of the Richmond district by sanctioning the outlay of some hundreds of thousands of pounds on improving the navigation of the river. The total expenditure on works of all kinds in connection with the river, from the year 1895 to 30th June, 1899, amounted to £402,000, of which the entrance improvement works had absorbed the sum of £250,000.

Parliament had now authorised the completion of these works, and it was estimated that a further outlay of about £100,000 would be required to bring them to a successful issue. When this had been accomplished, vessels drawing 17ft. of water would be able safely to enter the river, and it might then be taken for granted that the towns lying on its banks would at once insist upon the navigation of the river itself being so improved as to permit of the largest vessels that could enter the harbour coming alongside their own respective town wharves to load and discharge goods, instead of having to be transhipped at the entrance into lighter draught vessels. Such works, while making the river more navigable, would at the same time increase its discharging capacity, and thus, if not wholly preventing floods, greatly mitigate their severity. Any other project for flood prevention could only be regarded as a temporary and partial expedient.

The project now before the committee suggested itself to Mr. Keele, the resident engineer of the Richmond River district, early in 1893, when he was studying the question of a flood relief channel at Tuckombil Creek, and before the improvement works at the entrance of the river had advanced to that stage which now called for an early consideration of a scheme for the improvement of the river generally.

Mr. Keele's proposal to afford relief by diverting the flood waters directly into the Tuckian Swamp, on being submitted to the municipalities and other interested bodies, appeared to have been unreservedly adopted by all as one which would give the much-desired relief to the district.

The committee's inquiry, the witness thought, might take cognisance of the following questions: — To what extent and in what way the residents are prepared to contribute towards the cost of the works; if the proposed works are approved, what areas should be included in any betterment scheme that may be decided upon; and to what extent are the residents prepared to indemnify the Government against any possible claims for damage through the flood waters being temporarily raised to a higher level than heretofore.

Mr. Keele's scheme was a very simple one, although it would be rather costly. It was to cut down the left bank of the river at a point a little over four miles above the junction of the North and South Arms at Coraki, and to construct therein a weir 300ft. in length at the crest, 10ft. wide, and 12ft. over low water at Woodburn. Great care would have to be exercised in its construction to protect it from erosion; otherwise a deep hole might be cut by the flood water, which would have a tendency, to extend backwards, and so undermine and destroy the weir.

The proposed works provided for covering the whole surface and side slopes of the weir with concrete 12 inches thick on two feet of stone ballast, the inner and outer toe to be protected by sheet piling, carried up the slopes and extended 20ft. into the bank on each side. As a further protection to the toe, heavy stones are to be deposited outside the sheet piling on the lower side, in a trench to be cut, 18ft. by 4ft., the full length of the toe. The rest was merely a matter of excavation, and estimates had been prepared to show what would be the cost of the works under several conditions.

There were six schemes.

No. 1: Weir 300ft. long on crest, channel 500ft. wide at bottom side, slopes $1\frac{1}{2}$ to 1, and bottom level R.L. 105.00; total cost, £55,296 0s 9d.

No. 2: Channel same as No. 1, but weir to be 521ft. long on crest; total cost, £56,520 1s 1d.

No. 3: Same as No. 1, with the exception that the bottom level of 500ft. channel is R.L., 110.00, and a drain is cut along the centre, having a bottom width of 20ft., side slopes, $1\frac{1}{2}$ to 1, and bottom level, R.L., 105.00; total cost, £26,748 18s 11d.

No. 4: Same as No. 2 with the exception that the channel is the same as in No. 3; total cost, £29,972 19s 4d.

No. 5: Weir 300ft. long on crest at R.L. 112.00 and carried through on similar section to No. 1, but without any widening at the eastern end. The channel being also out 300ft. wide at R.L. 112.00, with R.L. of bottom, 105.00; total cost, £33,856 16s 4d.

No. 6: Same as No. 5, but channel to be excavated only to R.L., 110.00, and having a central drain as described in No. 3; total cost, £16,666 12s 6d.

Witness thought that the amount of excavation in schemes one, two, and five would be costly if carried down at once to a depth. Under the arrangement proposed in schemes three, four, and six, the lower part of the channel was left for the floods to cut away,

which, no doubt, they very soon would, with the lead given by the trench through the centre, and, if necessary, further assistance might be given by ploughing the surface of the bed after every flood. The silt carried away by the water would be spread over the swamp. If there were any reason to fear injury to the weir, by the concrete being disturbed by water getting under it, and, hydro-static pressure being engendered, stone pitching similar to that used on the Tuckombil weir could be substituted for the concrete, and the cost of the work thereby reduced; but the pitchers to cover so large an area would take a long time to procure.

There were two roads which cross the channel, one at 4000ft., viz., the Lismore to Coraki road, and the Lismore to Woodburn road, at 9200ft. The former would require a bridge, which was provided for in the estimates, but the latter crossing was so near the end of the channel that heavy ballast in the bed would not be likely to be disturbed, and would be sufficient to carry the traffic. The flood water conveyed through the channel would be discharged into the swamp, and would there spread and rise over it more quickly than it now does, but not to the same height, as the Broadwater River would carry a large portion of it direct to the Richmond River. The current might also be trained towards the Broadwater River by running out the spoil from the excavation, to form an embankment some distance through the swamp.

Under the present conditions the swamp was filled by the backwater, This was produced by the gorging of the river at a number of places, through sharp bends and contractions of the cross sectional area of the channel caused by reefs. A serious obstruction existed at Broadwater, where a reef extended half way across the river. Below the Broadwater there was another reef with shoal water, and above Wardell there was a long stretch over the Blackwall Flat, where there was only 8 3/4 ft. at low water on indurated sand. Each of those obstructions caused the water to head up to pass them, and the consequence was that it stood with very little variation, for some days after it had reached its highest level between Woodburn and Broadwater. Eventually, no doubt, it would become necessary in the interests of navigation, to deepen and otherwise improve the channel of the river, which would also lower the level of flood water below Woodburn, better than any flood escape that could be constructed.

In the meantime, however, it appeared to witness that if a large body of water coming down the north arm were diverted by means of the works proposed, and allowed to pass quickly, in a third of the distance, into the lower river, the congestion would be much relieved, and the north and south arms benefitted much, by lowering the flood level there.

A sectional committee, consisting of Messrs. Trickett, McFarlane, and Wilson, will leave by steamer for the north on Saturday night in order to make investigations on the spot. At the same time the expediency of constructing a line of railway from Grafton to Casino will be inquired into.

Citation:

FLOOD PREVENTION ON THE RICHMOND. (1900, February 22). *The Daily Telegraph* (Sydney, NSW : 1883 - 1930), p. 3. <http://nla.gov.au/nla.news-article237171368>

THE NORTHERN STAR

SATURDAY MORNING, 21ST APRIL, 1894.

Escape for Flood Waters.

AT the present time MR. McMORDIE, C.E., the officer who recommended the utility of a series of works to mitigate the damages sustained by floods, is again here, and brings with him the requisite documents, which if signed guaranteeing the payment of £200 annually for three years, or until the Betterment Bill is passed, will ensure the work being at once undertaken. The cost of the work is estimated at £10,000, and all that is required from property holders is the payment of 4 per cent, on the half of the above sum.

This contribution, it is estimated, would pay off the principal, with interest, in 60 years, and is such a trifle compared with the benefits which land-owners say the work would accomplish, that there should be no difficulty whatever in procuring the sum required. We have been told that some owners now refuse to contribute, but what the precise nature of their objection is we have not heard. There seems to be a good prospect of obtaining the required guarantee without the objectors' assistance, and the Betterment Bill will no doubt, provide for the recovery from these parties of their share with interest. We believe the Richmond offers the most favourable conditions of any of our coastal rivers for the success of works providing for the escape of flood waters, and for this reason it is desirable that the attempt should be made to demonstrate the utility of the proposed works.

Should the Tuckombil escape prove the success MR. McMORDIE so confidently anticipates, then the other works of making another drain via Tuckian, the cutting to do away with the Figtree Bend, and another out from Leycester's Creek to divert a good deal of its flood water so as not to touch Lismore at all, could follow in order.

Such a scheme, with several other works which have been suggested, would, it is believed, greatly minimise the flood damages along the whole course of the river, and thus avert the losses resulting from every high flood. Favoured as the district otherwise is by its natural gifts, it would then soon come to be considered by far the safest district for agricultural investment, and the results of this would be a rapid increase in the value of all farming land. We hope the result of MR. McMORDIE's visit will be that the first part of the work will soon be commenced and pushed on to completion, to the satisfaction of those who have worked so assiduously to get the scheme adopted by the Government—efforts which have been well seconded by the MEMBERS for the district.

Appendix 3

Richmond River Herald and Northern Districts Advertiser (NSW : 1886 - 1942), Friday 7 December 1900, page 2

Tuckian Flood Escape.

Sir, — Having received a copy of the evidence and report of the Works Committee, I hope you will allow me space to lay before your readers some of its contents, notably the evidence given by Messrs. Darley, Kemp and Keele, as I know it will be interesting to them. Mr. Darley being examined on page 3, question 7 says: —

"The flood waters passing down the North and South Arms, whilst still within the banks, pass on to about opposite Bungawalbin Creek, where there is a small drain or creek which allows a large quantity of water to pass into the back country into the swamp. It passes on down to near the Elbow, where there is another small drain letting water in to the back country. From there down a large quantity of water reaches the swamp by passing through Dungarubba Creek."

Now, Sir, the small drain referred to by Mr. Darley, near the Elbow, must be a very small one indeed if it is not larger than the one referred to opposite Bungawalbin Creek. The fact is there is no drain or creek between Coraki and the Elbow, except a small box drain and the small drain referred to near the Elbow, which, I presume, is Mr. James O'Connor's. There are three drains within O'Connor's frontage which let more water into the swamp than all the other drains and creeks put together from the proposed Tuckian weir to Broadwater on the left bank of the Richmond River. So much for the man with the big salary. He seems to know little of what he is talking about, yet the country pays him a large salary to know.

Mr. Darley, speaking of the Tuckombil Escape, says: "It was brought under my notice when I was in the district 28 years ago. When the scheme was mooted a few years ago, Mr. Keele, I think, took somewhat the same view as I did, and saw the danger of letting the water out of the river at all. He then suggested to some people the Tuckian swamp scheme as a possible alternative, thinking it would keep the water in the river. His proposal was looked into; I, however, came to the conclusion that no serious harm could be done by letting a portion of the water out there, at the same time, I held then, and I hold still, that no good will be done by it. I am quite sure that it will not lower the flood; it may satisfy the feelings of some of the settlers, but I am quite sure that it will not lower the floods in the neighbourhood to the extent of one inch."

Question 13, by the Committee: "That is the proposed weir, Mr. Darley, the work which has been carried out. It was taken up by the Mines Department, and they were rushing it through and the Minister said it should be referred to a Board of Engineers in the Works Department. It was referred to a board composed of Mr. Hickson, Mr. Firth, some other gentleman, and myself. We thoroughly investigated the proposal, and seeing that Tuckombil Creek was so small, and bound by rocks, and that it was not possible that the river would scour to any great extent, we decided that it might be done; at the same time we did not believe that it was going to do any good. We gave way to sentiment, and the work has been carried out at a cost of about £8,500.

Question 15. Chairman : "Has it had a test yet to see whether it is any good?" There has

been no big flood down since.

Question 16 : "So you are not able to say whether it will be a success."

No, but I am quite satisfied in my own mind that it will not lower the water at the Elbow by one inch."

Now, Sir, is it possible that Mr. Darley would be guilty of making a wilful and false statement on oath, or is it possible that Mr. Darley, through all these years of agitation, now made a calculation to ascertain what effect it would have over a given area, according to the capacity and velocity of the escape? The former would be a criminal offence against the law, and the latter against the State, and neither should be tolerated by the people of the State or the government of the State. Assuming the flooded area is 16 miles square, it is possible to make a calculation according to the velocity and capacity of the escape, showing within one inch at least what the effect would be, and if Mr. Darley cannot, or did not do that, he is not fit for his position. In the face of these facts Mr. Darley has stated, presumably on oath, that he is quite sure that it will not lower the floods by one inch, and that opinion is repeated in answer to a question as to the success of the Tuckombil.

Question 16: "Mr. Darley says there has been no big floods down since it was done." Mr. Kemp's evidence (Acting Resident Engineer) before the Sectional Committee, question 1572, page 59 : "Have you had any opportunity of observing the effect of the flood relief channel constructed at Tuckombil?"

I was there when the flood of July, 1899 occurred, and had observations taken of the flow of water over the Tuckombil, as regards the height over the weir, and dating the period that it was running over, 9th July, 1899, the water rose to the present level of the sills, that is the top of the stone work.

Question 1577 : "Would you give the Committee the result of your observations?"

On 9th July, 1899, at 8 p.m., the water rose to the present crest of the weir, 2ft. below the then existing sills; on the 11th, at 6 a.m., it rose to the height of the existing sills, that would be about 7ft. above low water mark; at 1 p.m. on the 12th it was 4ft. over the sills; at 5 p.m. the same day it was 5ft. 3in. over the sills; at 11 a.m. on the 13th it had fallen to the top of the sills, and at 6 a.m. on the 17th it was down to the crest of the weir.

Question 1578 : "Was the weir acting to its fullest capacity, considering the height at which the flood was?"

Yes, there was no obstruction whatever to the get-away of water.

Question 1579 : "We are informed by a witness at Woodburn that the land, some five chains below the weir, was 2ft. 5in. above the weir, or 5in. above the sills that were there during the flood, and further, that the escape drain at that point was only 60ft. wide, as against 300ft. on the weir."

There was not sufficient get-away for the water that passed over the weir.

"Did you see anything of any detention in that respect?"

No, the water had a free escape the whole time, in fact it was lower on the seaward side of the weir than it was above the weir. I might add here that if the sills had been off, as now, the case would have been different. There would have been 300ft. by 2ft. 5in. on the weir, and only 60ft. by 2ft. 5in. to receive the water at the point referred to, therefore the water will be almost still to that point until the first 3ft. of a rise in all floods, and we

should never rest till we get it widened to 300ft. below the level of the weir.

Question 1587: "Do you care to offer an opinion as to what measure of relief to the flooded area above the escape channel is afforded by its existence?"

I think there is no data whatever on which one could give an opinion on the subject.

Now, Sir, I think there is sufficient data in Mr. Kemp's own figures, seeing that the '99 flood fell 5ft. Sin. in 18 hours to the top of the then existing sills, and it took 91 hours to fall the next 2ft. to the crest of the weir. It is surprising how that did not strike Mr. Kemp as remarkable.

I think when Mr. Kemp compares those figures he will be honest enough to admit that there is sufficient data to show that the Tuckombil escape, when completed, will be a success, otherwise, he must be getting badly cobra eaten and wants removing from the harbour works. I think I am correct in saying that such a flood was never known in that locality before to fall 18in. in the first 18 hours, so that seems positive proof of the success.

Mr. Kemp, further examined, page 60, question 1597: "You are aware of the proposal to take a relief channel from above Coraki drain into the Tuckian swamp. Have you looked into the matter at all?"

No, I have not gone into the question of calculations. I have only a general idea of it.

Question 1599 : "What effect do you think that would have?"

I think it would have a very bad effect on the channel, because the weir would take off a large quantity of water from the North Arm that otherwise would come down the channel to Coraki, and on some occasions the water from the South Arm would be running in an opposite direction towards the weir, backing up through the North Arm to the weir, with the result that the flow of water in that part of the channel would be very slow, in fact at times it would be simply dead water, therefore the whole of the silt which came down into that part of the river would remain there.

Now, Sir, I will quote Mr. Keele's evidence on this point, page 17, question 258: "So you do not on the whole apprehend any danger of the stream silting?"

None whatever. It is the freshes (See definition at end note) that keep the low-water channel deep, and the high floods spoil the work done by them.

Question 259 : "'The evidence as to the river below Coraki was, that even with the proposed channel in full operation the remaining water passing down the North Arm, in conjunction with the water from the South Arm and Bungawalbin, would be sufficient to keep the scour in the main river."

Yes, I think the information we have about Bungawalbin has a great deal to do on the question of silting of channels, or otherwise by water running up them, showing how little damage is done by water running up that channel. It runs up there two or three days during flood time and, meeting the water from its catchment area, it is checked. Later on it stops, remains dead, and may remain so a day or two before it starts back again. It has an opportunity then to precipitate its sediment, but it does not silt up the channel. No doubt a deposit takes place, but as the water passes out it takes the silt away again.

Now, Sir, compare those two gentlemen's evidence as to the running up and silting of the North Arm.

Assuming that the North Arm does run up at times, and even runs over the weir,

Bungawalbin can be cited as a real case in point, as it always runs up and breaks over at Boggy Creek, thence to the Tuckombil escape, where it breaks over at a rise of about 4ft. 6in., and has not silted Bungawalbin, which is navigable for miles above Boggy Creek.

Mr. Keele, further examined, page 20, question 308: "On Tuckombil, from your experience of the cutting, you consider that it has already done some amount of good?" Yes, a very large amount of good. Previously, the river was almost completely blocked at the iron gates, only a very small quantity of water getting through; I should say less than one-tenth of what goes through now. Since the widening of the iron gates and the constructing of the weir at Tuckombil the flood waters did not remain so long on the land between Tuckombil and Bungawalbin.

Question 309 : "Has there been a high flood since the channel was made?"

No, it was flowing 5ft. in depth last year during the flood and that enabled us to form an idea of what it would do in time of high flood. High floods pass 4ft. over the banks at the above place and into Evans River.

Question 310: "Would a similar result follow the cutting of this proposed channel?"

Yes, to the extent of relieving the land on either side, of the banks of flood water.

Mr. Keele, being examined on the Tuckian, said: "We intend to deepen the river channel and remove the rocks at Broadwater, and also at Wardell. It is not worth while, therefore, arguing the point whether or not the water will heap up at Broadwater and below it. The fact of our removing the flats or deepening them at Wardell, and also removing the rocks at Broadwater, will certainly reduce the level of the flood water. **A channel cut 500ft. wide and 2½ft. deep through the undulating sand flats at Wardell for 1000ft., would carry off more water than would be likely to come down the proposed relief channel. It would carry off 10,000 cubic feet per second more than it does now, when the flood is passing there 5ft. over low-water mark, with a slope of 6in. per mile.**"

Question 207: "That is, assuming the proposed relief channel to be carrying water to its fullest capacity, the deepening of the channel as you suggest below Broadwater would be sufficient to carry off the extra water."

Now, Mr. Editor, I fear I have trespassed too much on your space already, so will conclude, but will have more to say later on.

Yours, &c., T. CASEY. Swan Bay, Nov. 28th, 1900.

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Tuckian Flood Escape. (1900, December 7). *The Richmond River Herald and Northern Districts Advertiser (NSW)*, p. 2. Retrieved from <http://nla.gov.au/nla.news-article127878641>

End note:

"freshes" refers to the action of an ebb tide, which, when increased by heavy rains or floodwaters, when flowing out into the sea, will scour the bottom of a stream and work to maintain the channel of a navigable river.