

From: [NSW Government](#)
To: [Flood Inquiry](#)
Subject: Floods Inquiry
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Attachments: [Flood Mitigation.pdf](#)



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I am making this submission as	Other
Submission type	I am making a personal submission
Consent to make submission public	I give my consent for this submission to be made public
Your story	<p>I am a retired Civil Engineer as indicated in the attached letter I sent on the 21st March to the premier of NSW and the then Prime Minister, Scott Morrison. The letter details actions that can be taken to mitigate flooding on the Richmond and Clarence Rivers.</p>

Additional Points not made in the letter:-

Before the Clarence was trained early reports indicate the mouth of the river was 2Km wide and at low tide consisted of multiple rivulets and was unnavigable. It is probable the Richmond was similar before training works were installed.

I could have been overly pessimistic in relation to Lismore. Controlling the ingress of sea water

under flood conditions would have a big benefit to Lismore since the Wilsons river is tidal beyond Lismore.

The radial gates referred to in my letter are all undershot radial gates. If the ultimate plan involved shutting off all incoming tidal waters the main channel would have to incorporate a very wide overshot gate. Limiting the ingress of sea water by narrowing the channel would be a much cheaper option.

Much has been made of the new section of Pacific Highway East of Woodburn blocking flood waters. I find it hard to believe that Transport for NSW would undersize drainage systems. It is much more likely that the drains were not protected by trash racks. These are a necessary part of the design given the debris carried by flood waters. These require regular maintenance to be effective, with debris promptly removed.

My reference on funding to deferred mortgages recognises that effective flood mitigation will increase property values. Therefore, on sale of the property, it is reasonable that a portion of the increased value would go to the government to defray the cost of the works. This would be reserved by deferred mortgage placed on properties.

A modelling studies of the Clarence and Richmond have been funded. Only when that modelling has been completed and the civil works proposed by me tested, will you be able to make a definitive finding as to their effectiveness and the best design parameters. ie. Main channel width and secondary gate capacity.

Of course there are a number of other estuaries on the east coast of Australia which could benefit from similar works.

Attach files

- [Flood Mitigation.pdf](#)
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The Hon Scott Morrison MP, Prime Minister
The Hon Dominic Perrottet MP, Premier NSW

Dear Prime Minister/Premier

Flood Mitigation on the North Coast of NSW

No doubt you are both feeling the political heat that the recent flooding has generated.

The perception is that successive governments, State and Federal, have all previously found the problem of flood prone communities too difficult and too costly to deal with. So is now the time to do something about it, or move on to the next issue as soon as possible?

As a civil engineer, I have always had an interest in public works that improve the lives of the general population. Now that I am retired, I still take a keen interest, especially when so many peoples lives are badly affected.

In the recent floods the following areas on the north coast were badly affected:-

Ballina
Woodburn
Coraki
Lismore
McLean
Ulmarra
Grafton
The Pacific Hwy between Ballina and Glenugie.

So what can be done to reduce the risk of flooding in the these areas?

Here are a few suggestions:-

Richmond and Clarence Rivers

Maintaining navigation at river mouths is important for rivers supporting strong commercial and recreational activities. "Crossing the bar" at any river mouth can be fraught with danger under different tidal, flood and storm conditions. To improve safety and navigability, important river mouths are usually trained by narrowing the mouth and building sea walls out into deep water. This keeps the water velocity high enough so that its sediment load, which creates the bar, is deposited in deep water beyond the sea walls. This sediment load can then be transported away from the river mouth by prevailing ocean currents, or failing that by dredging.

Unfortunately, the training of the river means that under flood conditions, the flow of water out of the mouth of the river is artificially constricted, and as a consequence the flood level raised.

A more dynamic way of managing these competing interests is possible.

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At the mouths of the rivers it is possible to build a secondary river outlet managed by hydraulically operated **radial gates**. A typical secondary outlet would consist of multiple radial gates each 6-7 metres wide. These outlets could be designed and operated in a number of different ways:-

1. **Open the gates only under flood conditions** when the tide is favourable to help drain the river.
2. **Preemptively open the gates to lower the level of the river** in anticipation of a flood event.
This would create a buffer against flooding. This could result in a temporary loss of navigability.
3. **Narrow the existing river mouths**, to make it possible to limit the ingress of sea water at high tides. The gates on the secondary outlet, in normal conditions, would be used to manage the river height and velocity through the main narrowed channel.

Under flood conditions, at high tides, the secondary outlet would normally be closed to limit the ingress of sea water. This would result in higher than desirable velocities at high tides in the main channel. This might also create a standing wave in the channel.

A secondary benefit of this system though, is that it would be possible to temporarily increase the velocity (over that currently achieved) through the narrowed main channel at low tide. This would allow any build up of sediment to be cleared.

4. **Combine 2 and 3.** (preferred ultimate plan and operating system)

Under systems 2, 3 and 4 the competing interests of temporary loss of navigability vs flood mitigation would have to be managed. The maximum design capacity of the gates will determine the success of all these systems.

Implementation of the above systems could be staged and adjusted with operational experience.

Gate operators would have to be trained and be guided by a suitable operations manual. Input from the Bureau of Meteorology and from real time river height stations throughout the catchment, as well as accurate tide predictions, would be key to the successful operation of the system.

In truth, I believe only a computer aided system would be capable of handling the many variables. This would be developed through many computer simulations. In fact such simulations would help in proving and designing the system – total gate capacity and main channel width in particular.

Richmond River

With the Richmond river there is a unique opportunity, in that it flows parallel and close to the ocean for some 20km.

Approximately 17km south of the river mouth at Ballina the river is only about 1.7km from the ocean. This lies within the vicinity of Goat island. It is possible to excavate a flood relief channel

cont. /3

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controlled by hydraulically operated radial gates at each end. This channel would only operate under flood conditions. If it was constructed sufficiently deep, it could also be used to preemptively lower the level of the Richmond river, in anticipation of a flooding event.

Other works needed on the Richmond river, would be the removal/relocation/modification of the Burns Point Ferry crossing in Ballina, to eliminate a pinch point in the river.

Wilsons River

Removing flooding on the Richmond river will improve the gradient on the Wilsons river during flood events, but what more can be done?

Wilsons river enters the Richmond river towards the north end of Coraki. Eliminating the meander at that point in the Wilsons river so that it enters the Richmond river south of Coraki would alleviate flooding in Coraki. This would also improve the gradient on the Wilsons river.

South East of Gundurimba an oxbow has almost formed. Cutting across the narrow neck that still remains would improve the gradient on the Wilsons river.

Lismore

All of the above work would mostly prevent flooding in all of the above mentioned problem areas with the exception of Lismore. There it would probably only reduce the flooding level. The Town itself sits in a low area that forms a natural retention basin during flood events. Given the frequency and severity of flood events is increasing, this leaves difficult choices. The probable need to relocate the Town Centre should be acknowledged.

If that option is off the table, the investigation of using large siphon spillways should be considered. These would be **air tight** (along their length) drains with submerged intakes, which only come into operation with rising water levels. In effect these would act as large pumps, operating on the head difference between the inlet and the outlet. The greater the head difference the more effective is the pumping action. This would be aided by reducing flood levels on the Richmond river and alignment changes on the Wilsons river. Since both of these will improve the flood profile of the Wilsons river.

Implementation

All of the suggested works come with hefty price tags, but who is going to pay for it? Well, there are 6 main stakeholders who have an interest in the work being completed. If the cost can be shared amongst these stakeholders, the work is more likely to proceed quickly.

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So who are the stakeholders who would benefit from flood mitigation?

1. The Federal Government
2. The State Government
3. Local Government
4. Residents
5. Business owners
6. Insurance Companies.

Clearly, residents and business owners are for the most part not in a position to contribute financially at this time. But what about deferred mortgages or deferred rate levies? Insurance companies would benefit from improved insurability and reduced claims, a contribution from them seems equitable. If insurance companies are willing to contribute, residents and businesses are more likely to contribute.

Naturally, most people will want governments to pay for everything, so this will be a hard sell. At the same time, giving people some hope that their current nightmare will come to an end, and not be repeated is a worthy goal!

So it's over to you!

Yours faithfully

A handwritten signature in dark ink, appearing to read 'W A Dale', written over a light blue rectangular background.

Wilson Dale