

From: [NSW Government](#)
To: [Flood Inquiry](#)
Subject: Floods Inquiry
Date: Monday, 9 May 2022 10:51:46 AM
Attachments: [TUCKOMBIL CANAL FINAL 27.5.19.pdf](#)

Your details

Title	Ms
First name	Florence
Last name	Dagan
Email	
Postcode	2477

Submission details

I am making this submission as	A primary producer
Submission type	I am submitting on behalf of my organisation
Organisation making the submission (if applicable)	Richmond River Cane Growers Association
Your position in the organisation (if applicable)	Manager
Consent to make submission public	I give my consent for this submission to be made public

Share your experience or tell your story

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

Structures such as the Tuckombil Canal have been put in place to alleviate the potential of flood devastation in areas from Coraki to the mouth of the River.

Tuckombil Canal is a man-made canal that runs between Rocky Mouth Creek (Woodburn) through to the Evans River and out to the ocean. The distance to the ocean is 11km. The alternative is for the water to go 42km to the river mouth at Ballina.

A fabridam was installed to manage the flow of water and prevent too much salt water going into the river and vice versa. The fabridam worked exactly as it should have for years, however it was easily vandalised. The council reviewed the best option to manage the water flow and it turned out to be the fabridam option. The Council thought this was too expensive and instead of going with the Fabridam, Council put concrete blocks in to act as a "temporary" weir.

These blocks were to be removed in sections during flood events to allow the water to get out via Evans River rather travelling 42km to the mouth of the river in Ballina.

Council later reneged on their commitment to move the blocks during flooding and over time have concreted the blocks in and capped it so there is now the fixed weir.

This association has been lobbying on behalf of the community and our growers, to have the fixed weir decommissioned and returned as a fabridam or flood gates similar to those on the Belmore River.

Rous County Council who are responsible for this a) have no funds to do it; and b) don't seek specific funding to do it; and c) no desire to do it. I understand another study was completed last year; however, the results have not been

provided. I have attached a document that clearly displays the issues and solutions to the current fixed weir that lead to more intense flooding in the area.

If government is serious about reducing the impact of flooding in the future the fixed weir structure must be removed and replaced with flood gates.

In addition, there was an outlet at Boundary Creek that flowed directly to the ocean, there are old maps that prove this, unfortunately I am unable to attached copies in time to send this submission, however, I should have them soon. The older farmers have a lot more information about this particular outlet, I only raise it as another option to be investigated.

Supporting documents or images

Attach files

- [TUCKOMBIL CANAL FINAL 27.5.19.pdf](#)
-

EXECUTIVE SUMMARY:

- ★ In the 1890's a 1.5 km Canal was dug from the Richmond River to the Evans River at Woodburn to give mid Richmond flood water a 30 km shorter route to the sea at Evans Head.
- ★ A flagstone weir, made of sandstone blocks, prevented salt water from the Evans mixing with fresh water from the Richmond, which settlers used for watering crops and livestock.
- ★ The weir was contentious from the first flood, holding back water and reducing the efficiency of the new Canal. Calls for it to be lowered and removed continued until the 1960's.
- ★ In 1965, the canal was enlarged to 61 metres wide and 1.5 metres deep with levee banks on both sides at 4.14m AHD.
- ★ An inflatable rubber fabric dam attached to a concrete base was installed at this time replacing the flagstone weir at the head of the Canal.
- ★ The fabric dam worked well preventing salt water intrusion when inflated, and when deflated laid flat on the bottom of the canal presenting no obstacle to flood flows.
- ★ After a series of failures, the fabric dam was replaced with a fixed weir at 0.74m ADH on conflicted advice, and against strong community wishes.
- ★ The weir remains in place blocking water up to 0.74m AHD; obstructing flood flow; and negating any opportunity to implement accepted measures to counter sporadic fluctuations in water quality used in other sections of the river.
- ★ A more flexible solution to flood relief on the mid Richmond, damage to the local and state economies and preventing adverse water quality events, needs to be found.
- ★ A replacement for the now outdated fixed weir system is required.
- ★ The Richmond River Canegrowers' Association Limited is proposing the installation of a vertical lift Bulk Head Gate system to replace the current outdated fixed weir.
- ★ A vertical lift Bulk Head Gate system gives full control over the Canal from fully open to fully closed; it removes blockage of water up to 0.74m AHD; it removes all obstruction to flood flow; it counters possible damming effects of the new highway; and it gives the capability to immediately treat fluctuations in water quality before they become a problem.

Contact: **Tracey Doherty,**
Manager

Richmond River Cane Growers Association Ltd



Telephone: 02 6683 4205

Facsimile: 02 6683 4503

Email: richmondcane@gmail.com

Facebook: www.facebook.com/richmondcane

This submission seeks to replace the concrete block fixed weir across the Tuckombil Canal with a vertical lift 'bulkhead' gate system

"The Committee supports a structure for the Tuckombil Canal that can be fully openable and fully closeable"

Tuckombil Canal Community Consultative Committee 2006

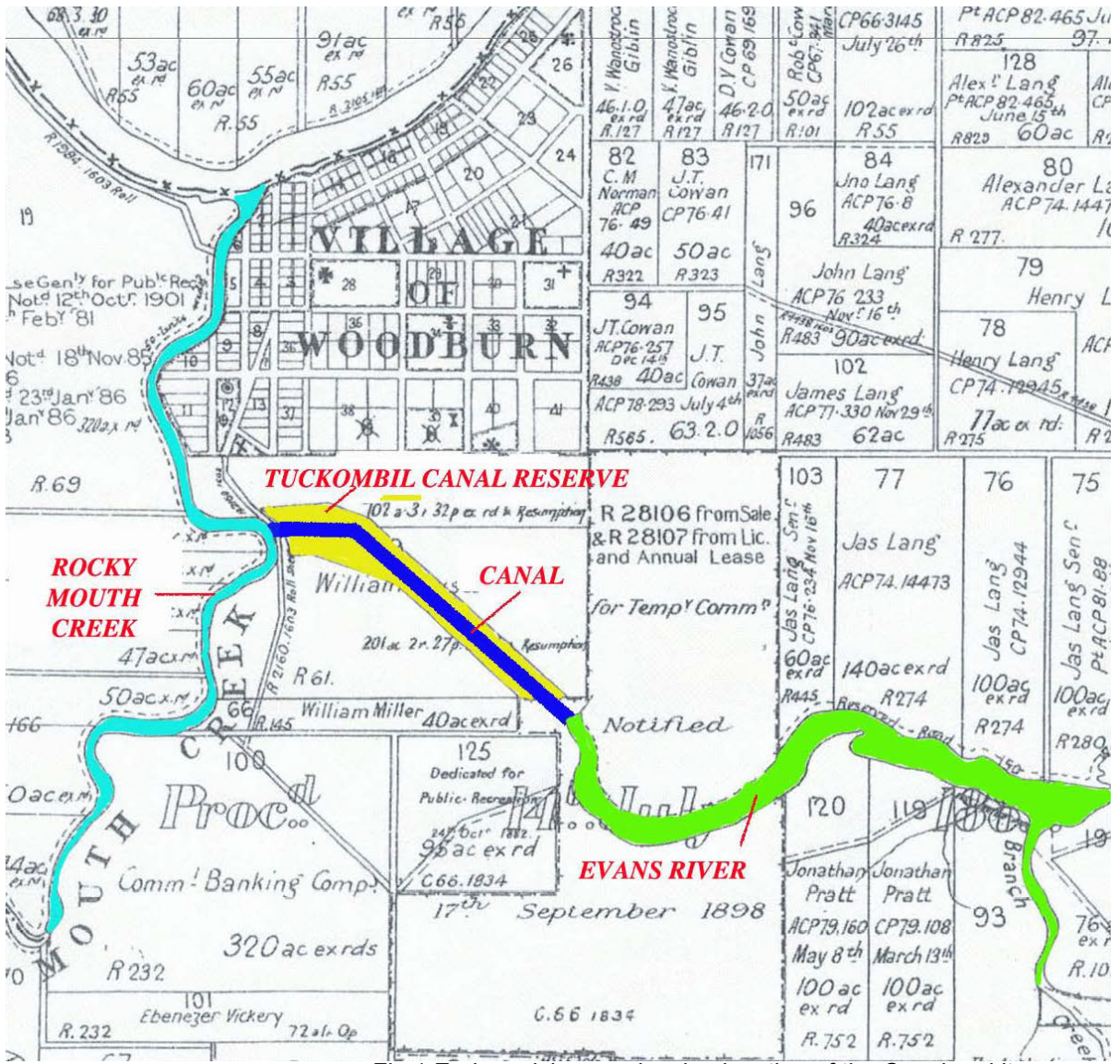


Fig 1 Early parish map showing location of the Canal and its reserve

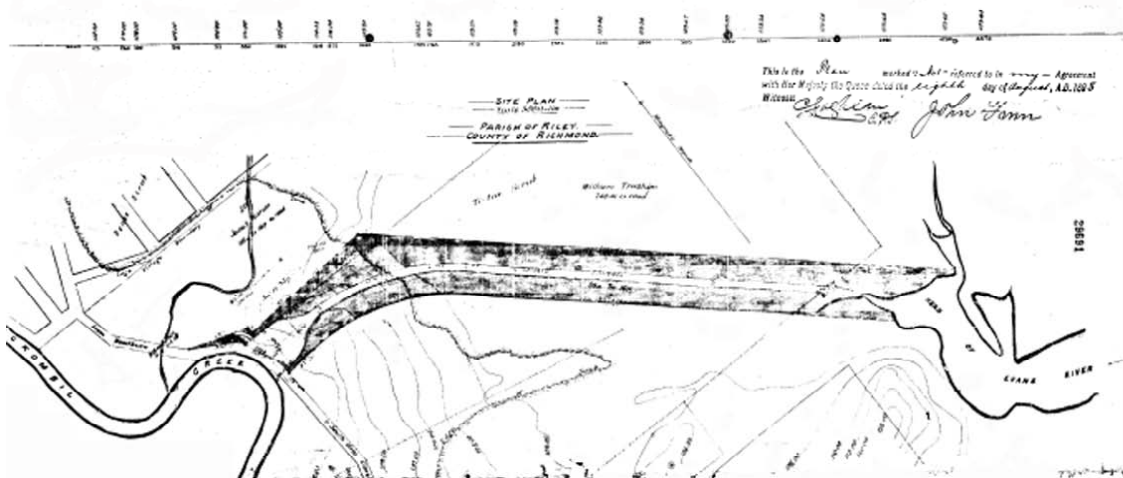


Fig 2 Canal location from the original plan. (Note that Rocky Mouth Creek was then known as Tuckombil Creek)

1. Background

The Tuckombil Canal is a man made canal linking the Richmond River to the headwaters of the Evans River south east of Woodburn township. The canal was dug in the 1890's by the NSW Department of Public Works as part of extensive private and public works on the Richmond to improve navigation and protect against flooding. It was opened in 1895

The canal taps into an oxbow bend in Rocky Mouth Creek (then known as Tuckombil Creek) and extends east for 1500 metres discharging into the headwaters of the Evans River. The original canal was shallower and narrower than the existing canal and featured a flagstone causeway at its junction with Rocky Mouth Creek. This causeway, made of sandstone blocks, prevented salt water from the Evans mixing with fresh water from the Richmond, which settlers used for watering crops and livestock. Its height was set at just above the high tide mark.

Early records show a needle dam was planned, possibly instead of the flagstone weir, but it is uncertain if it was used. Vertical wooden needles are not designed to be watertight and the desire not to contaminate the fresh creek water may have favored the watertight flagstone structure

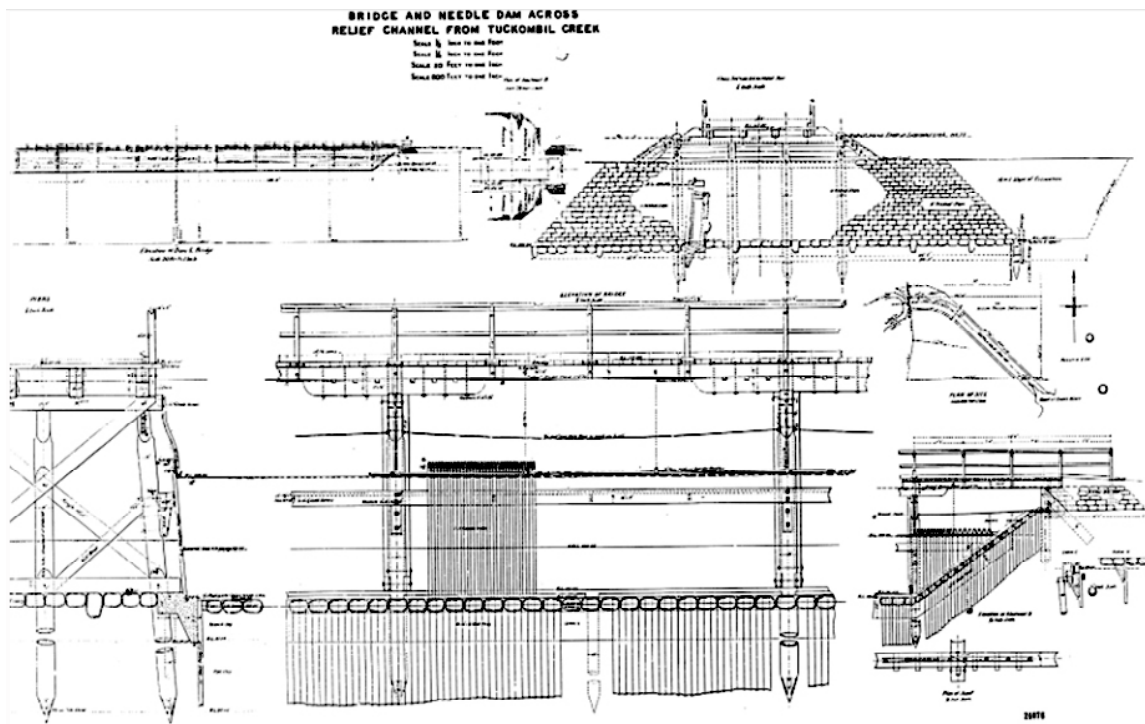


Fig 3 Original Needle Dam Plans

The logic behind the canal construction was straightforward:

- The Evans River is part of the Richmond River Flood Plain draining its south eastern region
- Geological features of the area suggests that the Richmond River once flowed through Evans Head to the sea
- It is inferred that over time with the Irongates restricting flood flow, the river migrated through coastal swamps and lowlands to its present outlet adjacent to the east Ballina lava flow
- Flood waters from the Richmond continue to spill onto the upper reaches of the Evans River taking the shorter route to the sea
- A canal was seen as a cost effective means of speeding up the natural flood overflow at Woodburn into the swampy headwaters of the Evans (Geological Features 1985)



Fig 4 Original Fabridam inflated – 1965 (Michael Woods Photo)



First Fabridam Fails 1985 and
Sheet pile barrier installed

Fig 5 Steel Sheet Pile Barrier – 1985 (Michael Woods Photo)



Fig 7 Present Fixed Height Weir 2019

A number of ambitious flood mitigation schemes were proposed in the 1800's to provide flood relief for the mid Richmond by reducing inundation times in the Swan Bay and Bungawalbyn catchments. Construction of a direct and deeper route for floodwaters from the Richmond to the Evans River was part of these plans, as was the simultaneous clearing a path through the meeluca swamps at the headwaters of the Evans River and widening and deepening a section of the Irongates obstruction. This path would take floodwaters seven miles (eleven kilometers) to sea at Evans Head instead of the twenty six miles (forty two kilometers) to the sea at Ballina, cutting inundation times on the mid Richmond and reducing flood damage on the lower river.

The height of the flagstone weir was always contentious with residents and local councils complaining that it was too high and restricted flow in flood time. In a deputation to the Director of Public Works in 1929 fifty delegates complained *'when the water pushed over the sill there was already seven or eight feet of water in the river at Swan Bay, which meant destruction of crops. The suggestion was that the Sill be lowered or taken out'* (NS 12/6/29)

There is no doubt that the Canal alleviated flooding on the mid Richmond, however many considered it could be improved, and by the 1940's calls were made for the enlargement of the canal. *'Cr. Robinson pointed out that the original opening of the canal had reduced the flood level by seven feet. If work of widening and deepening of the canal could be carried out as was planned, it would certainly relieve the flooded areas'*. (NS22/1/44)

Following a series of destructive floods in 1945, 1948 and 1954, the Richmond River County Council was formed as the public Flood Mitigation Authority for the Richmond River, and immediately faced renewed calls for the canal to be made more efficient. In 1965, the canal was enlarged to 61 metres wide, 1.5 metres deep (excluding levees) and 1600 metres long with levee banks on both sides at 4.14m AHD, as part of extensive flood mitigation works. An inflatable fabridam attached to a concrete base replaced the flagstone weir at the head of the canal.

The fabridam was designed to eliminate the restriction of flood flow caused by a fixed weir. In normal weather the fabridam was inflated (80% water and 20% air) to prevent tidal exchange between the Canal and Rocky Mouth Creek. During floods the fabridam was deflated, allowing it to sink to the bottom of the Canal, eliminating any restriction to floodwater flow into the Canal.

The fabridam was a 'good' solution, however the nature of its reinforced rubber construction made it prone to vandalism and natural degeneration. By 1983 it had worn out and needed replacing. The fabridam was removed and a barrier made of interlocking steel sheet piles was installed to prevent salt water entering Rocky Mouth Creek while studies were conducted to determine the best replacement option. Nature intervened in 1988 and following heavy rain, the sheet pile barrier seriously impeded flood water flow, increasing flooding in the Rocky Mouth Creek catchment and surrounding areas. As a result, approximately one third of the piling was removed allowing free tidal interchange through the opening.

In 1993 the remaining sheet piling was removed and a new fabridam installed. This dam failed in 1999 and was repaired.

In July 2001 two of the seams on the fabridam parted, the dam collapsed and salt water again entered Rocky Mouth Creek. Richmond River County Council immediately began monitoring salinity levels at Rocky Mouth Creek, Woodburn, Swan Bay and Coraki, publishing the results each week in the Northern Star's Rural Section, along with Maximum Tolerance Levels for six species of livestock (Dairy cattle, beef cattle, poultry, pigs, horses and sheep) NS10/10/2001.

A temporary fixed concrete weir, constructed of precast Jersey type Barriers with steel pegged and cement sealed joints was installed by Richmond Valley Shire Council at 0.74m AHD the same height as the inflated fabridam. For the next seven years RRCC conducted a consultative and study process to determine the 'best' long term management option for the Canal.

Despite community objections RRCC opted to leave the fixed weir in position as the replacement for the fabridam citing scores on a decision making matrix to justify the decision.

In 2014 this barrier was vandalized. A jack hammer was used to unseal two vertical joints either end of a central block with the intention of using flood flow and accompanying debris to dislodge the block setting up a chain reaction to destroy the weir. (Richmond Flood Plain Newsletter 16/5/14)

The damage was repaired and a welded, folded stainless steel ridge capping was bolted into the top of the blocks, effectively preventing sections from being removed during, and replaced after flood flow.



Fig 8 Damage to the fixed weir 2014

A reward was posted by RCC for information leading to a conviction (Richmond Flood Plain Newsletter 16/5/14)

2. Current position

- i. A concrete precast Jersey Barrier weir at 0.74m AHD, located on the foundation of the original fabridam, completely transects the Canal at its junction with Rocky Mouth Creek. The depth of the weir is approximately 1550mm.
- ii. At the time of its installation the public believed that this barrier was 'removable' with sections being able to be lifted out of the canal by crane, as required in flood time. The 10mm folded stainless steel capping bolted to the sections makes them difficult to remove and return quickly as floodwaters may dictate. (Capping would have to be cut and unbolted, then rewelded)
- iii. The weir has a base level at -0.86m AHD and a crest height of 0.74m AHD
- iv. The fixed weir prevents saline water entering the Richmond but restricts water flow into the Canal in flood time
- v. An extensive elevated embankment carriageway bypassing Woodburn Township to its east, across the natural flood flow path to the Evans River, has been constructed as part of the Pacific Highway upgrade. The four-lane highway crosses the Canal (C04) Woodburn Town Drain (C05 Woodburn Floodway) and has a further floodway (C50) in between these two waterways just north of the Canal.

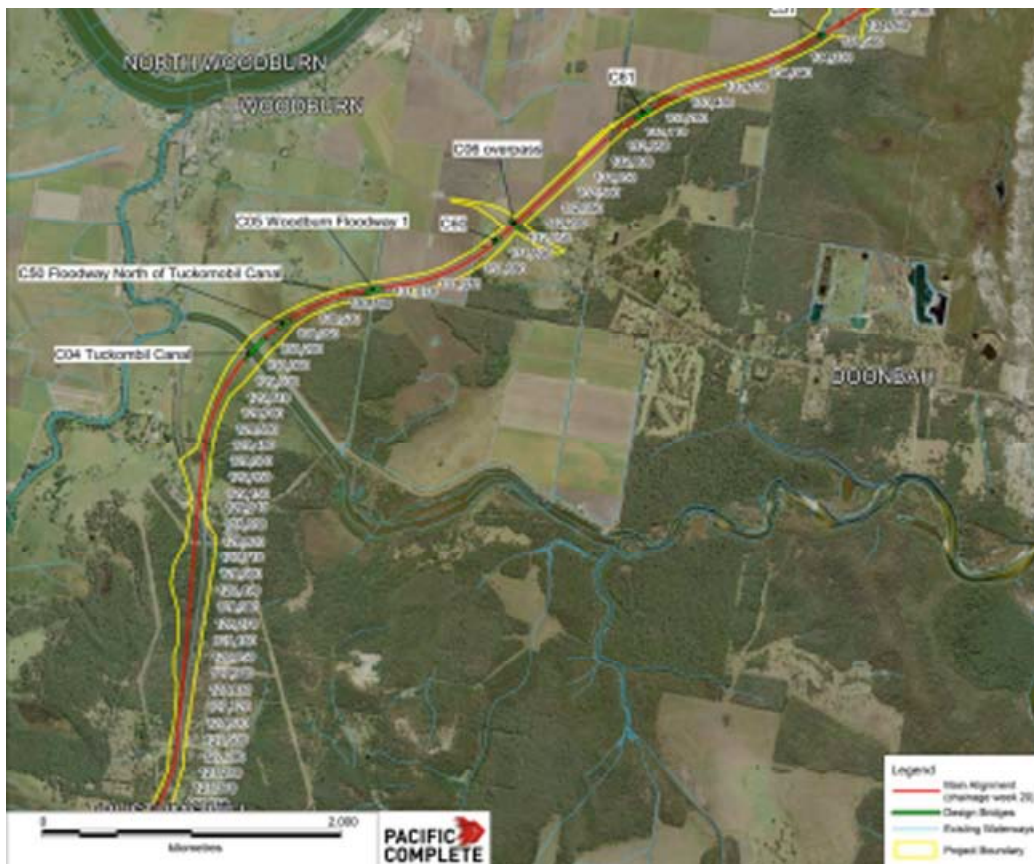


Fig 12 Highway path over the canal and flood route

vi. Association members and local residents remain skeptical of flood modeling for the Pacific Highway upgrade in this area. Their concerns, focused on the damming effect of the elevated carriageway, the low number, and small size of flow paths for water to stream under the roadway in flood time, and the new obstructions in the Canal posed by the highway bridge pylons, were aired in 2005, and were supported by The Tuckombil Canal Community Consultative Committee. (Tuckombil Canal Structure Report 2008).

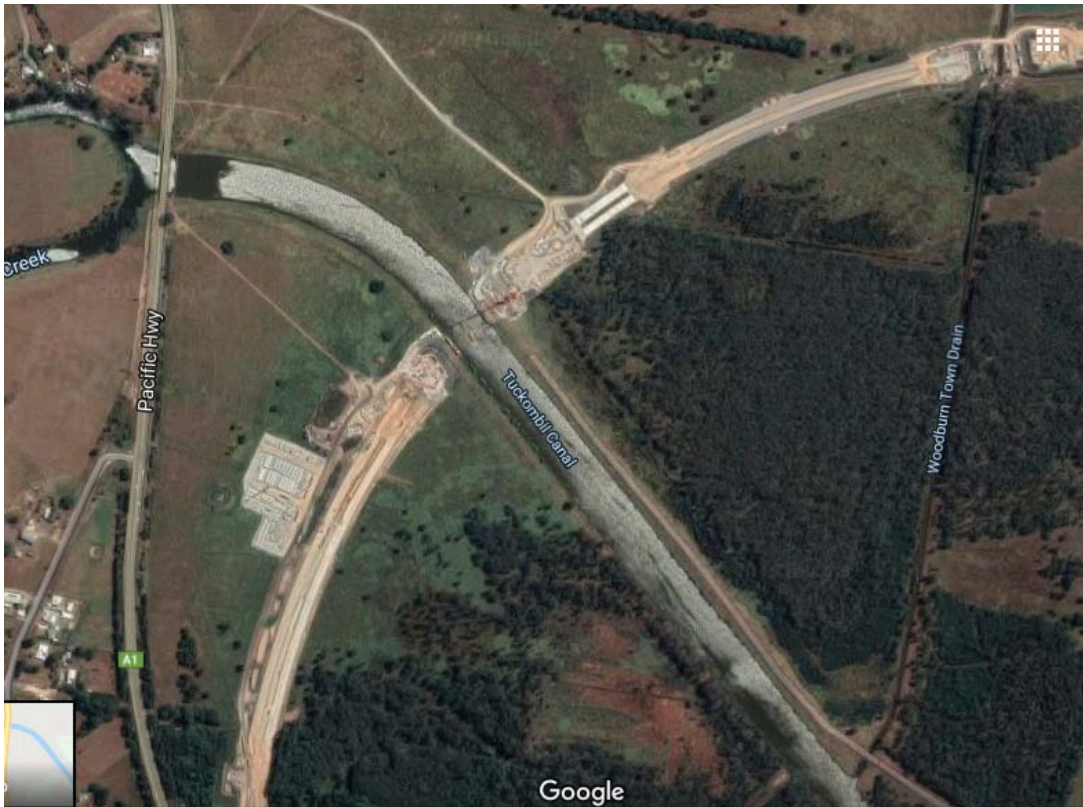


Fig 7. Highway over the Canal showing three escapes, the canal bridge, a small escape to its north and the bridge over the Woodburn Town Drain



Fig 8. Water banked on the western side of the carriage way embankment, north and south of the Canal, after heavy rain in 2017

The Flood Management Objectives set out in the RMS 'Hydrological Mitigation Report 2017', allows for a flood level increase of up to 50mm on cane land; no more than a 5% increase in duration; flood velocities below one metre per second on cane land where flows are currently below this figure and increase of not more than 20% where existing velocities are above 1 metre per second; and, 'no changes in direction of water courses or the direction of flood flows except for constriction in and expansion out of discrete openings (bridges and culverts) and construction diversions'

Members believe these objectives will not be met while the current fixed weir is in place. The cumulative restrictive effects of the weir, the embankment, and new bridge pylons in the Canal will retain water longer, at a greater depth on upstream cane land, and seems certain to change the direction of water flow in the vicinity of the carriageway.

vii. The Marine Estate Management Strategy (MEMS) launched by the NSW Government in Ballina last year, highlights the findings that the Richmond River *'is in worse ecological health than most estuaries in NSW'* and has designated 'Restoring the Richmond River' as the Case Study to be used for the Strategy's implementation. (MEMS p30). Stage two of MEMS will require the development of Drainage Management Plans (DMP) for drains on the floodplain, and while it is suggested that DMPs will include Current Floodgate Management Plans (Russel 2019), it is not clear what other legislative requirements will have to be met. It is reasonable to suggest that any structure in the Tuckombil Canal will have to be flexible enough to adjust to flood flows and water quality changes. There is now widespread community pressure to 'fix' water quality on this River. The current fixed weir fails to address community concerns, and may well be contributing to poor water quality.

viii. The fixed weir limits access to high quality sea water that would allow the implementation of standard practices now used in other parts of the river to improve water quality and avoid fish kills eg sea water buffering, dilution and tidal flushing. The 'Historical Construct of Activities in the Richmond River Catchment' (Bruschett & Otto 2017) (Appendix 1) shows no fish kills in the river during the operation of the fabridam between 1965 and 2000. Major fish were experienced in 2001 and 2008 after the current fixed weir was installed.

ix. Flood Mitigation has become a low priority for governments charged with funding the management and maintenance of its vital infrastructure. Rous County Council (previously Richmond River County Council), the government body responsible for the Tuckombil Canal is grossly underfunded. It relies on annual funding from the Office of Environment and Heritage (OEH) and contributions from those local government councils with jurisdiction over the floodplain. RCC has not had a funding increase from OEH since 1985, and local councils seem to have other more pressing funding priorities. RCC has inadequate funds, a staff of five (three of which are field staff) and is hamstrung by cross jurisdictional legislation and red tape which prevent it obtaining permits essential for flood mitigation works. Preventative maintenance of large infrastructure including pipes and headwalls, has ceased.

xi. Economic impact of water inundation on the sugar industry is substantial. Sugar Research Australia (SRA) has developed an accurate calculator of sugar cane degradation for industry managers and farmers that shows substantial losses after five days of water covering cane land and progression to total loss after fifteen days inundation.

xii The 'cheap' 2001 fixed weir option is outdated in 2019. Community attitudes to river water quality have changed dramatically since the installation of the fixed weir, and the GHD report regarding a replacement structure in the Canal in 2008. Fixing water quality and preventing fish kills would now override cost considerations, which featured so heavily in the decision making process in 2008.



Fig 9 Concrete weir obstructing flow



Fig 10 Concrete weir obstructing flow



Fig 11 Weir height at 1550 mm

xiii. Members of this Association and local residents considered the 2008 RRCC decision to install a fixed weir, and sections of the GHD 'Tuckombil Canal – A Report Regarding a Replacement Structure in the Canal' (GHD 2008) to be flawed. A choice seems to have been made from four possible alternatives based on cost, not necessarily on what was best. This Association questioned the validity and reliability of the process at the time and again in 2013 (Poel 2013), specifically seeking clarification on the weightings given to components of the decision making matrix (p26), the modeling on high weir levels that were never going to be implemented, and the final recommendation that 'fixed crest weir with a crest height of 0.74m AHD was identified as the preferred option'.

This recommendation remains conflicted. GHD authors noted that there were four options that returned much the same score - the fixed weir at 0.74 AHD (Score 2.37), Fabridam (Score 2.16), Watergate (Score 2.06) and fixed weir at 0.6 AHD (Score 2.01). The authors draw attention to the fact that *'the difference in scores between these options is minimal (10%). Given that it was difficult to establish tangible and qualified or quantifiable answers to several criteria based on the information available, these differences are not considered to be significant and therefore any of these options are likely to be acceptable'* (p32)

A campaign to sell the weir to the public as the 'best' option continues at a time when local residents and the SES Deputy Controller questions its effectiveness in flood time (McCormack undated) and the wider community question its ability to deal with intermittent changes in water quality.

3. Limitations of Current Position

Current system;

- restricts water flow into the canal in flood time
- retains flood water at increased depths for longer periods on properties in the Rocky Mouth Creek catchments and upstream from its junction with the Richmond eg Yeager's Canal
- reduces the effectiveness of a range of measures available to improve water quality in Rocky Mouth Creek eg sea water buffering, tidal mixing, dilution or flushing. (Practices that are now standard procedures on the lower river eg in the Empire Vale system)
- raises acute concerns about the damming effects of the elevated highway upgrade through the natural 'overland' route floodwater takes to the Evans River
- does not adequately address increased inundation times and crop damage
- significantly impacts the sugar industry (and other industries) and hence the local and regional economies
- puts 42 kilometres of the Richmond River from Woodburn to Ballina at risk

From its beginnings the objectives and functioning of the Canal were conflicted. The primary objective of flood mitigation was at odds with the need to preserve the fresh water status of the Richmond ie preventing salinity.

This disparity remains today with a fixed weir being effective in preventing tidal exchange between the two rivers and hence fluctuations in salinity, but in so doing restricts water flow into the Canal in times of flood. (It is the same argument that was used by residents against the flagstone weir at the turn of the last century.)

This Association now has grave concerns that the cumulative effects of the new highway and the permanent weir restricting water flow into the canal, will lead to increased inundation times and depths, west of Rocky Mouth Creek. There is little doubt in the minds of long term residents that the new highway will restrict overflow from the Richmond via the 'overland' route to the east of Woodburn into the Evans in flood time. It is logical to suggest that this restriction will push water to the north and **will dramatically increase the importance of the Tuckombil Canal** as the channel and main route for escaping water. Most members

consider the 'highway escape' north of the new canal bridge (C50) and the bridge over the Woodburn Town Drain (C05) to be inadequate floodways in large flood events.

The 'Rocky Mouth Creek Active Floodgate Management Plan 2018-2012' minimises the effects of low oxygen and acid water discharge into the Richmond River. The floodgates are a large six cell system across Rocky Mouth Creek south west of the Canal opening. Implicit in this plan is a supply of water containing high concentrations of oxygen and whose buffering capacity has not been reduced ie that is still capable of diluting and reducing the effects of acid water in the creek. In times of both acid and oxygen stress, the plan relies on a source of 'good' water. It is reasonable to suggest that sea water that has traveled 42 km from Ballina will have had its acid buffering capacity reduced compared to that which has traveled 11 km from Evans Head. At pH's in the ranges 7-9 the bicarbonate ion (HCO_3^-) is favored in the buffer equilibrium with the ability to absorb protons (H^+ or acid) as the equilibrium shifts to the H_2CO_3 side. It is reasonable to suggest that water that has negotiated 42 kilometers from Ballina to Woodburn through acidic run off will have a high concentration of H_2CO_3 relative to HCO_3^- ie a lower acid buffering capacity to that traveled 11 kilometers through similar conditions.

The Empire Vale Floodgate system also using sea water to dilute, oxygenate and buffer water, is 8 km from Ballina and is very effective because of its close access to the sea.

Research into the relationship between inundation times and sugar cane crop damage undertaken in the Mulgrave and Babinda areas of Queensland was used to develop and validate a regressive crop damage calculating equation, that is now used industry wide, based on inundation times and sugar cane stalk length. The 'regression calculator' is most accurate for periods of flooding greater than five days. This research indicates that sugar cane may suffer between fifteen and twenty percent yield loss after five days of submergence, between thirty and sixty percent yield loss after ten days and between thirty seven and one hundred percent loss after fifteen days, when stalk lengths range between one half of a metre and two and a half metres. (Ridge & Reghenzani 2016). When the decision was made to install a fixed weir at 0.74 AHD this research was available, however the lack of accurate predictions of water inundation times on cane land west of the Rocky Mouth Creek and Woodburn areas caused by the weir, (and the failure to use the calculator) did not provide an accurate picture of the expected financial losses that would result. Farmers in the area now report water retention times in excess of the critical fifteen day period and strongly argue that removal of the fixed weir system would significantly reduce these times, and the subsequent crop regression.

This Association considers the flow on effects of the fixed weir on the local and state economies were under estimated in the original decision making process. In 2013 the NSW Sugar Milling Co-operative's Agricultural Services Division was requested to accurately assess the impact of the Australia Day floods and the subsequent flooding caused by a low pressure system towards the end of February, on the NSW Sugar Industry. The impact was assessed at a loss \$69 million to the state, of which \$29 million was suffered by growers and \$40 million was lost by the milling and refining sectors. Broadwater sugar producers had 369 hectares of cane destroyed, 210 hectares severely damaged and lost 607 hectares of soybeans, with a total loss value at \$4.2 million. In addition the cost of replanting destroyed areas was put at \$0.9 million and the repair bill for damage to headlands, tracks, loading pads and culverts was placed at \$0.35 million. The 'up river' shires were most harshly affected with the mid Richmond suffering severely, particularly in the Woodburn, Swan Bay Dungarubba and Coraki areas. Ballina Shire fared better with inundation times reduced by good mitigation and proximity to the river mouth. In the Ballina Shire 11 hectares of cane were destroyed, 16 severely damaged and 80 hectares of soybeans were lost, compared with 148 hectares of cane destroyed, 85 severely damaged and 412 hectares of soybeans lost in Lismore Shire, and 210 hectares of cane destroyed, 109 severely damaged and 115 hectares of soybeans lost in the Richmond Valley Shire area. (Beattie 2013)

This was not a major flood but the impact of a \$15 million loss to the local economy from one primary industry on the flood plain is substantial. Producer members of this Association strongly argue that the removal of the current fixed obstacle to flood flow in the Canal, the fixed weir, would reduce retention times and cut losses.

It is understandable that the Insurance Council of Australia is now advocating for flood mitigation to be placed on an infrastructure par with road, rail, and bridge construction (Sullivan 2019). The concept of allocating funds for preventative infrastructure has proven to be a cheaper option for the insurance industry and governments than the costly rebuilding processes after flood damage has occurred.

The cost of this proposal, which will lower water retention and inundation time, would be repaid rapidly into the local and state economies as average losses in excess of \$10 million per flood (to the sugar industry alone) are reduced.

The Productivity Commission has recommended that \$200 million be allocated each year to disaster relief including flood mitigation. This recommendation has not been implemented.

Rainfall, water quality and water flows since 2008 have discredited the Decision Matrix scores used to justify the low cost option of the fixed weir. Landholders, particularly those in the Rocky Mouth creek catchment now have first hand experience of the performance of all options - a fabric dam, a sheet pile barrier, a fixed weir at 0.74 and a clear canal with no structure at all, but feel their experience and knowledge is neither valued nor used.

4. Proposal

The recommendation of the Tuckombil Canal Community Consultative Committee (2006) be revisited and adopted ie that a fully 'openable' and 'closable' structure be constructed as a long term replacement for the fixed weir on the Tuckombil Canal, to alleviate flooding and improve water quality.

The proposal concentrates on the long term twin requirements of improving water quality of the Richmond and the rapid unimpeded removal of floodwater into the Evans River. It recommends a suitable structure and a suggested method of funding it.

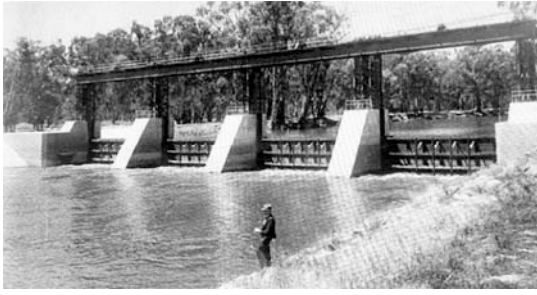


Fig 13. Four gate system on the Edwards River at Deniliquin

Fig 14 Three gate system (location unknown)



Fig 15 Stevens Vertical Lift Bulkhead Weir



Fig 16 Tuckombil Canal Fixed Concrete Block Weir

5. Proposal in Detail

All available reports were considered in formulating this proposal, including all recommendations by the Tuckombil Canal Community Consultative Committee. At its meeting No11 (22/8/2006), the Committee 'agreed to advise the Richmond River County Council that:

*I The Committee members' discussions with the wider community reveals that the community **favors a fabridam option and will not support a fixed weir option***
*li The Committee supports a structure for the Tuckombil Canal that can be **fully openable and fully closeable** with a crest height of 0.74 AHD and a base of 0.00 AHD which could be a fabridam or tidal activated gates solution'*

At its final meeting August 2006 the Committee instructed GHD Consulting to come up with recommendations that could satisfy the criteria listed in (ii) above. GHD recommended a **TOPS Spillway gate** and a **Lay flat gate** as structures that would meet the criteria set by the Committee; (GHD p10) either alternative would remove any restrictions to flow during flood time. Vertical Lift Bulk Head gates were not evaluated.

The proposal also takes into account the financial constraints and limited funding resources available to RCC at the time, and considers lack of money to be the primary reason for choosing the cheap, no maintenance, fixed weir option. This lack of funding persists to the present day with widespread detrimental effects on flood relief and river water quality. In 1996 RRCC cleaned drain outlets from floodgates to the river for the last time, and has not performed any maintenance on these outlets for twenty five years. The clogged outlets now hold water back on the floodplain for unnecessarily long periods allowing microbial breakdown of submerged vegetation to deoxygenate and acidify the water before it is eventually discharged into the river. The fixed weir in the Tuckombil has the same effect.

The General Manager of RCC has stated to the RRCCG Association, local members of parliament and representatives of the contributing Shires Councils, that RCC does not have the funds nor the staff to maintain these outlets and no longer considers their upkeep to be the responsibility of the Rous County Council (Rudd 2018). The Association acknowledges that RRCC staff who advised the Board, and the Board who rejected community recommendations for the Tuckombil Canal in 2008 are no longer with Rous County Council.

This proposal takes into account the obstructive nature of the fixed weir, its inability to address community and government pressure to 'fix' water quality on the Richmond, and the need to cope with long term effects of upgrading the Pacific Highway through the lowlands east of Woodburn township. It draws on local experience of water movements in the area over the past one hundred and twenty four years and seeks to provide a long-term solution to current and future challenges.

5.1 Recommended Structure

The Richmond River Canegrowers' Association recommends that Vertical Lift Bulkhead gates be installed across the Canal to replace the current fixed concrete weir.

Whilst the locally favored replacement in 2008 was another fabridam, the limited lifespan, high initial cost and expensive repair and maintenance bill made it unattractive. The vertical lift gate system has a high initial cost, offset by the fact that it is a long-term investment that addresses both water quality and flow restriction problems posed by the fixed weir.

The structure would be modeled on Stevens Weir on the Edwards River at Deniliquin in the NSW Riverina but on a much smaller scale in terms of the width of the waterway covered

and the strength of the gates required. Spanning 60 metre Canal width to a depth of 1.55 metres with only a small pressure differential on either side of the gate due to tidal fluctuations, the gate specifications would bear no comparison to the river height controlling system of the Stevens Weir.



The ability to lift the gates incrementally from fully closed at values below 0.00 AHD to totally open at heights well clear flood waters satisfies all community requests, including the desire to improve water quality. The ease of adjustment provides rapid response to rain and water quality events. The system provides operators with immediate reaction capabilities to counter poor water quality as it begins to form, allowing a suite of counter measures to be used, including dilution, sea water buffering, tidal mixing and in conjunction with the Richmond system, tidal flushing of Rocky Mouth Creek through the Canal. It gives very fine control over

water movement and allows a much more measured approach to adjusting water quality than does the opening or shutting of floodgates.

5.2 Project Management, Funding and Construction

Association members are disappointed that agencies did not capitalize on the opportunity to develop a long-term plan to combat pressures on water quality and flood mitigation on the mid Richmond as part of the Pacific Highway upgrade in this area.

This project will be the responsibility of the Canal owner – Rous County Council. The option to subcontract or increase staff and complete the project ‘in house’ would be a matter for RCC. Given the current staff and funding levels at the Council, it is acknowledged that at this stage RCC has neither the staff nor the financial capability to construct the Bulk Head Gate system proposed, but does have the technical expertise and experience to manage the project.

This long-term option has not been costed but will be expensive compared to the fixed weir and fabridam options.

Funding would be required from both the Federal and State governments, with considerable support and representation from local stakeholders to secure adequate financial support for the project, including an allowance for ongoing maintenance. The Richmond River Canegrowers’ Association Limited and the NSW Canegrowers’ Association would play a key role in this support.

This Association suggests a ‘stepped’ strategy to recover outstanding monies and secure new funds:

- i. As an initial step, proceedings, including legal, be initiated to recover all indexed funds withheld by OEH since 1985.
- ii. One off matched grants be sought from the State and Federal Governments by a combined group of stakeholders including peak mid Richmond industry bodies, local councils and RCC. (The Productivity Commission has recommended that \$200 million be allocated each year to disaster relief including flood mitigation.)
- iii. Contributions be sought from local councils particularly those that have levied ratepayers to establish ‘fix the river’ funds
- iv As part of the political process all local State and Federal representatives be engaged to support the proposal with the view to prosecuting the case for funding with relevant ministers. This Association will meet with Kevin Hogan, Justine Elliott, Chris Gulaptis, Janelle Saffin Tamara Smith and Ben Franklin to discuss funding this project.

With the benefit of hindsight this system would have been a much cheaper option than the fabridams, the steel sheet piling, the current weir and their maintenance, combined.

5.3 Overall Assessment of the Proposal

This proposal gives the best long term capability to address ongoing water inundation, flood flow and water quality issues on the mid Richmond River, exacerbated by obstructed flow in the Tuckombil Canal.

The economic, environmental and social costs of **not** replacing the fixed weir with a more flexible structure, are substantial.

In economic terms, the release of flood waters in 2013 could have saved a large proportion of the \$5.5 million losses to Richmond River Canegrowers. The flow on losses in production to the milling and refining sectors of another \$10 million bring the total losses from that one

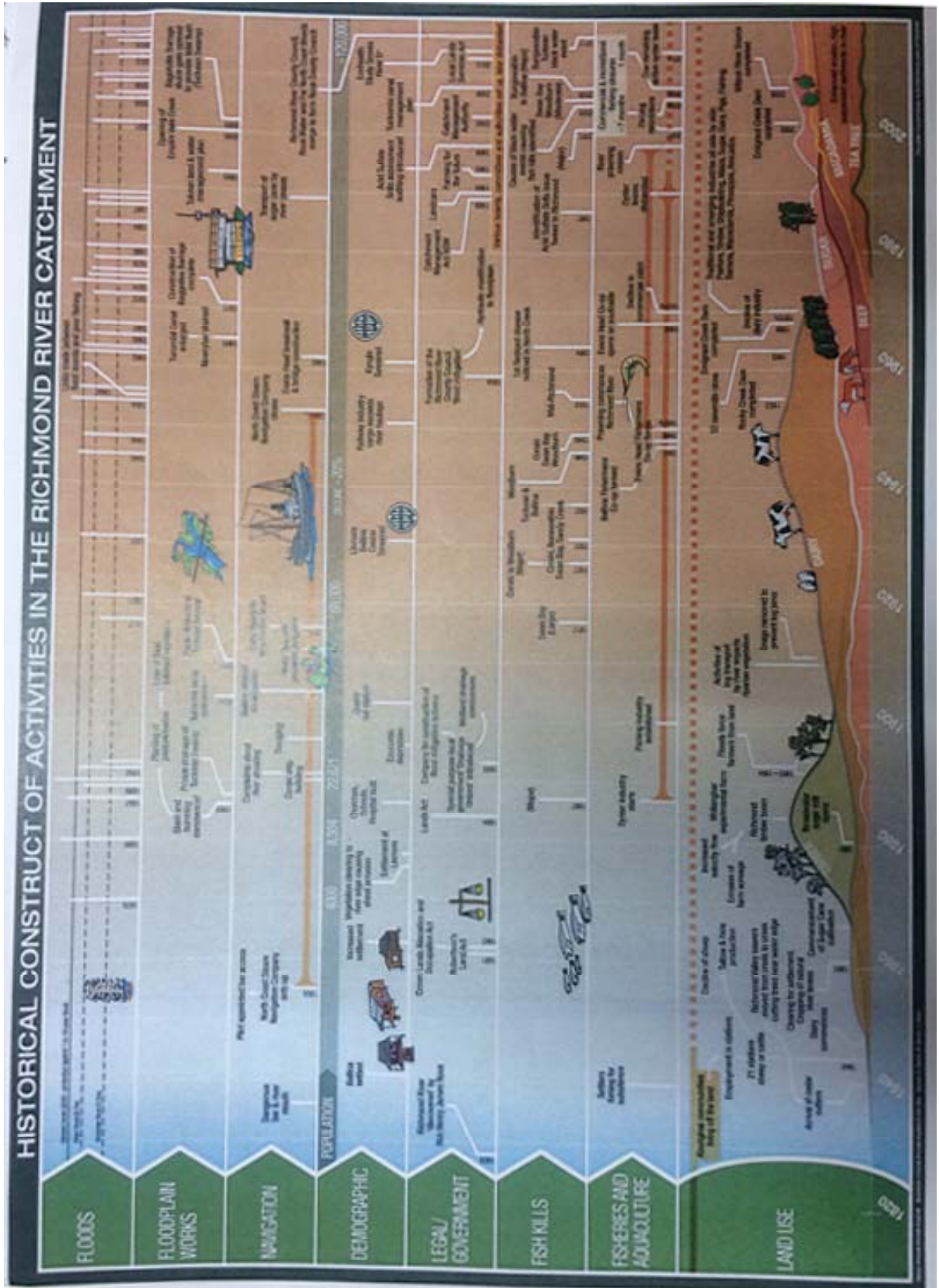
flood to \$15 million to the Richmond sugar industry alone (Beattie 2013). With ongoing flooding being a feature of this river, assessment of the cost of this proposal must be considered in light of these losses to the local and state economies.

The proposal also addresses the environmental cost of blocking water at 0.74m AHD and gives those charged with managing this system a flexible tool to use in treating any decline in water quality before it becomes a problem.

Reference List

- Richmond River County Council "*Richmond Floodplain News*" Issue 16 may 2014 North Coast Media
- Bert Plenkovich "*Woodburn – Tuckombil Canal*" 14.2.18 Self published. Private publication
- NSW Canegrowers Council "*Concerns over Management of Tuckombil Canal*" August 2013 Internal publication
- Jamie Brown "*Weir's Future Set In Concrete ...for Now*" Northern Star Article 9.5.13 Northern Star Publishers
- Hamish Broome "*Weir 'best design' to control floods in Tuckombil Canal*" Northern Star Article 26.9.13 Northern Star Publishers
- Rick Beatie "*Impact of Recent Flooding on the NSW Sugar Industry*" May 2013 NSW Sugar Milling Co-operative – Agricultural Services Division
- Rous County Council "*Rocky Mouth Creek Active Floodgate Management Plan 2018-2021*" Rous County Council
- Rudd V.A. and Chardon "*The Effects of Drainage on Cane Yields as measured by water table heights in the Macknade Mill area*" Bureau of Sugar Experiment Stations Ingham 1977
- Ridge R and Reghenzani "*Manual of Cane Growing*" Chapter 11 Drainage Bureau of Sugar Experiment Stations Brisbane 2000
- Poel M "*Management of the Tuckombil Canal*" 29.7.13 Richmond River Canegrowers Association. Submission to NSW Parliament
- Richmond Valley Naturalists Club/Lismore Gem and Mineral Society "*Geological Features of the Richmond Valley*" 1985
- Rob Van Iersel "*Tuckombil Canal – A report regarding a replacement structure for the canal*" Geolink Environmental management and design, August 2008
- RMS "*Woolgoolga to Ballina Pacific Highway Upgrade – Hydrological Mitigation Report Devils Pulpit to Ballina*" April 2017
- Karl Sullivan "*Which 20 federal electorates are Australia's most flood prone?*" Insurance Council of Australia March 20 2019
- Bruce McCormack 'Information about the Tuckombil Canal' SES Deputy Controller Woodburn Self publication
- J Murphy "*A Survey of Recreational Fishers in the Evans River NSW*" September 1988 Southern Cross University
- NSW Marine Estate Management Authority "*Marine Estate Management Strategy 2018-2028*" NSW Government 2018
- NSW Public Works access to all original plans and diagrams 1875 – archived on Microfiche
- Tove archived newspaper articles

Appendix 1 Historical Construct of Activities in the Richmond River Catchment



EVANS RIVER FLOOD CHANNEL
 AND CUTTING, WEIR, BRIDGE, ETC.

