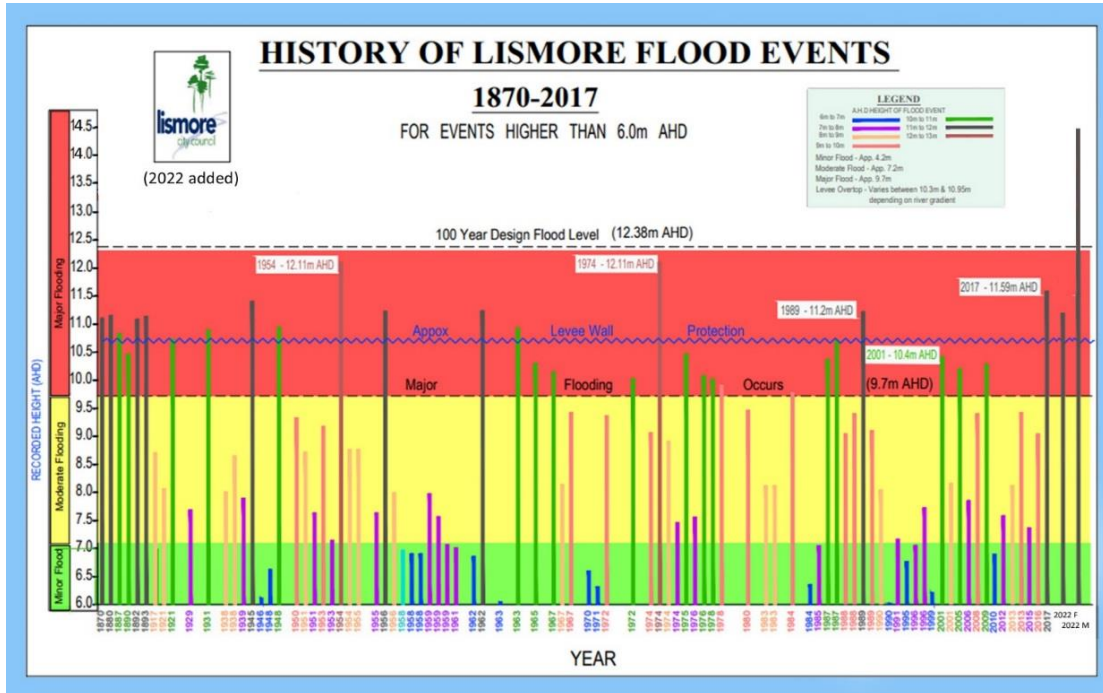


Minimising the Impact of Floods in Lismore



A short history of Lismore and its Floods:

“Lismore was first settled by red cedar cutters and farmers looking for high quality fertile land. All transport was by boat, using the river system as a major trade route to the sea.

Ships could not travel upstream much further than the junction of Leicester Creek and the Wilsons River. This junction was also suitable for the ships to turn around.

Lismore grew rapidly around the river trade, timber and agricultural industries, becoming one of the major North Coast towns. In the 1890s the railway linked the river and rail systems, further confirming Lismore’s status as a regional centre. The importance of the river diminished as road transport improved after WWII. By this time Lismore was a major city, established adjacent to the Wilsons River.

While the location of Lismore is ideal as a service and trading centre for produce and freight, *floods come very quickly and consequently have a major impact.*

During heavy rain, rainfall from the high surrounding hills comes down the steep creeks and rivers meeting at Lismore, then slowing down and spreading across the floodplain before moving out to sea.

In 1954 and 1974 Lismore experienced very severe flooding, creating major problems for the community.

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. The study concluded by stating that it would be very difficult to construct a levee system for Lismore.

Following the 1989 flood the concept of a levee to protect the CBD was again investigated. After examining the hydraulic effects of more than 20 possible levee schemes, it became clear that it was both practical and financially feasible to construct a limited levee system around South and Central Lismore.”

In 1999 a government-funded scheme to protect the CBD and South Lismore from a 1-in-10-year flood event was approved. This proposal would mean that most of the smaller floods would not enter the central area of Lismore and substantially improve the time available for the evacuation of residents and the business community during larger floods.

Minimizing the Lismore Floods.

In 2005 levees were constructed, which would protect limited parts of the city, particularly the city centre, but not all the time. *Of the 30 major floods, 17 would have, or were above the new levee, including 3 in the last 5 years. In other words, even the city centre would be subject to some of the major floods.*

In 2014 the Lismore City Council produced a very comprehensive document “The Lismore Floodplain Risk Management Plan 2014” on how to respond to a flood when it occurs. It was based on the assumption that floods were going to continue and how to handle them.

In March 2017, the Lismore flood levee was overtopped for the first time, causing one of the most damaging floods in living memory in terms of material and community destruction. *(There have since been 2 more floods as bad or worse, in 21 and 22.)*

Following the flood, Lismore City Council launched its Flood Ready project, to develop a comprehensive, community-wide action plan for natural disasters. Working with emergency services, local agencies and community groups, the Lismore Flood Ready plan provides a clear framework on how to be prepared and resilient before, during and after a natural disaster.”

Why a 2014 Plan followed by a 2017 one? The later, although based on the 2014 report, brought the process into the real time internet world.

The Geographical Aspects:

Terrain:

A caldera is a large bowl like depression formed when a volcano erupts and collapses. They usually have rivulets, which flow into creeks, which in turn flow into an exit river.

Lismore is located at the exit of a 40km+/- diameter caldera. And being estuarine it was port for ocean going vessels. The ultimate place to build a city. Disadvantages are that being at the bottom of a bowl it is hot in the summer, cold in the winter and is subject to flooding.

Flooding:

Lismore’s catchment includes the catchment of the Wilsons River upstream of Lismore (550sq kms), and the water from the tidal pool, including Leycester Creek (850sq kms), giving a total of 1,400sqkms. This is small compared to the Clarence’s 22,000sq kms. As a result. rain can fall over the whole catchment at the same time, and it all rushes down to Lismore in a short time. And during a deluge that is a lot of water.

A minor flood is 4.2m, a moderate is 7.2m and a major is 9.7m and above. But unlike the Clarence, where flood levels at Grafton can be predicted days ahead, in Lismore it can go from minor to major “overnight”.

People keep talking about a major flood being a 1/100 or even 1/1,000-year event. Unfortunately, saying this is quite misleading as it creates the impression that the next one won’t occur for many years. In reality a major flood can occur on successive years or even multiple times in one year.

There are two main items that need to be addressed:

1: “Lismore needs to prepare for a major flood, because any flood, anytime could be major.”

On the lighter side: If you want to bet on when the next major flood will be: “Roll a ten-sided (pentagonal trapezohedron) dice with the sides numbered 0 to 9, four times. Add up the four numbers and divide them by 4 rounded.” Your answer will be 0 to 9 and it will have a realistic chance of being correct.

2: “That with many floods the volume of water entering Lismore, no matter what is done, exceeds the ability of regular mitigation procedures to handle it.”

Unlike Adaminaby or Tallangatta, moving the town is not a realistic option.

So, is there a feasible, practical and affordable option? There is.

If the town can’t be moved then move the river, (actually the creek).

Minimizing the Lismore Floods.

Overcoming Lismore's Floods:

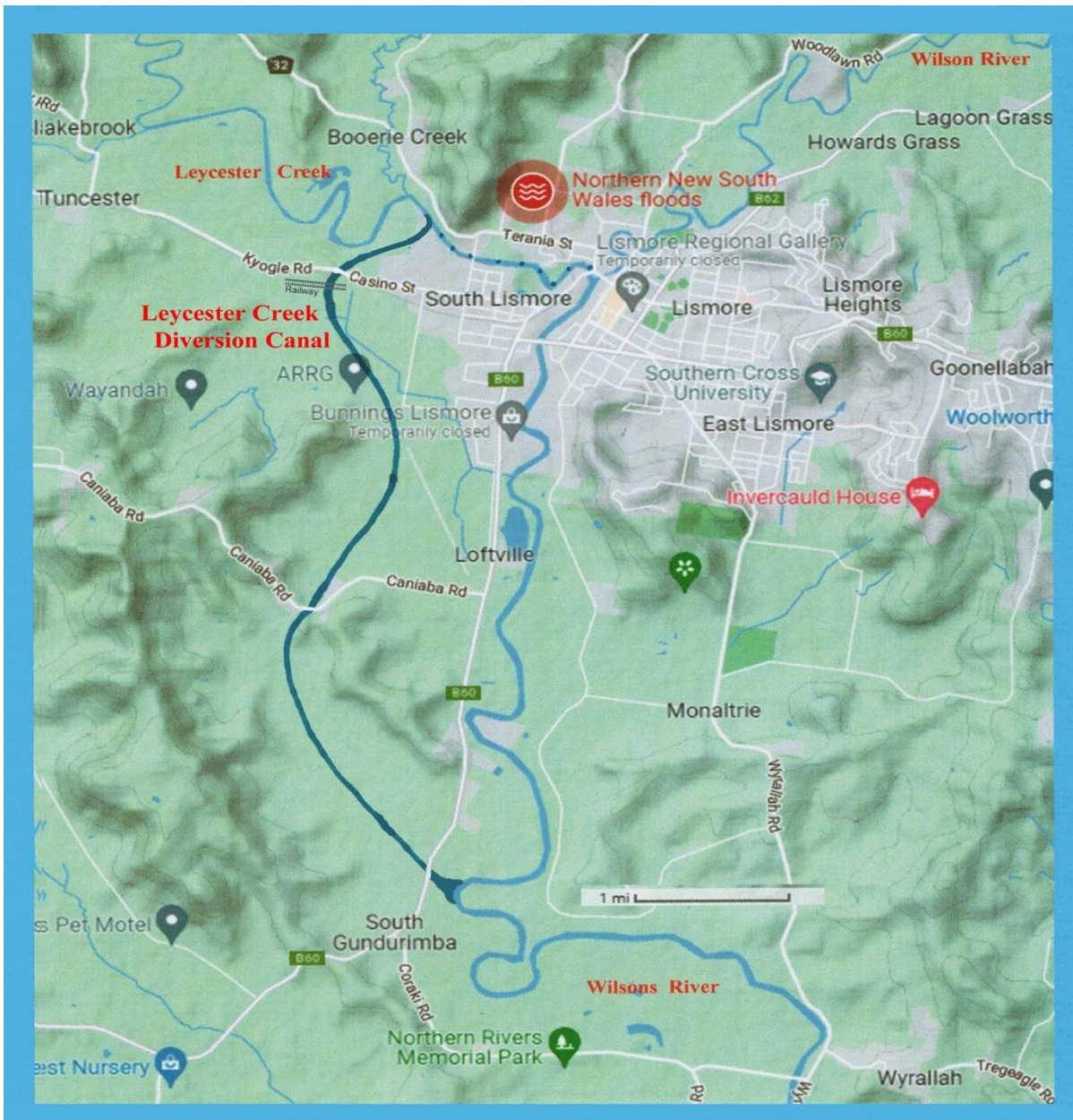
Based on the last 150 years (as shown in the earlier chart), there have been 30 major floods (1 every 5 years), as well as 36 moderate floods. If all floods are counted it is at least a flood every other year. And under the current flood mitigation plans flooding will continue to occur on a regular, but random basis.

The Diversion:

The only viable way to flood proof Lismore is to remove some of the water from entering the city. This would involve diverting Leycester Creek from merging with the Wilson River in the middle of town.

About 2.5km upstream from its junction with the Wilson and after the junction with Boerie Creek make a new south bound 8km water course diverting Leycester Creek which:

- Goes under the Kyogle road,
- Goes under the Railway tracks
- Collects the water from Hollingworth/Yeurabar Creeks,
- Runs along the east side of the ARRg parallel to the runway,
- Goes under the Caniaba, Northcott, Johnson Roads and the Bruxner Highway,
- Flows into the Wilson River at South Gundurimba just north of Coraki Road.



The Leycester Creek Diversion Canal

Minimizing the Lismore Floods.

Some Other Considerations:

The 2.5km unused portion of the Leicester Creek could become a peoples' lake.

At the old junction provide the ability to divert Wilson River water into the lake.

It would also be possible to provide the capability at flood times, for water to be channelled from the Wilson River back along the now unused end of Leicester Creek, and into the diversion canal.

Where the diversion enters the Wilson River, fan it out so the water merges in at an acute angle (not 90°), to minimise the turbulence.

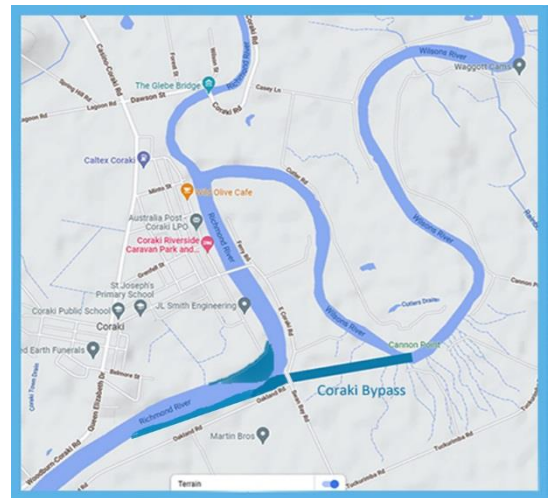
Cost:

The main cost would be purchasing the diversion right-of-way.

The cost of constructing the canal would be reasonable, except for the new or modified bridges required.

Koraki:

Currently the Wilson River enters the Richmond in the centre of Coraki. It would also be quite feasible to divert the Wilson near Canon Point to the junction of Oakland, Swan Bay and East Coraki Roads particularly if a number of choke points in the Richmond were widened as far as Bungawalbin Creek, to reduce the backup in the Richmond.



Wilson River - Koraki Bypass

Appendix I

An article of interest:

Long Lost forgotten rain bombs –

The BOM yells “unprecedented, while ignoring 120 years of history

If Climate Change was a real threat, the Bureau of Meteorology might even look at their own historic records. When Jennifer Marohasy and Chris Gillham did just that, they found that as bad as the current situation is, it's happened before:

- The wettest *day* in Lismore was in February **1954**.
- The wettest *year* for Lismore was **1893**.
- There was no increase in intensity or frequency of extreme wet days at Lismore, or the towns around it.

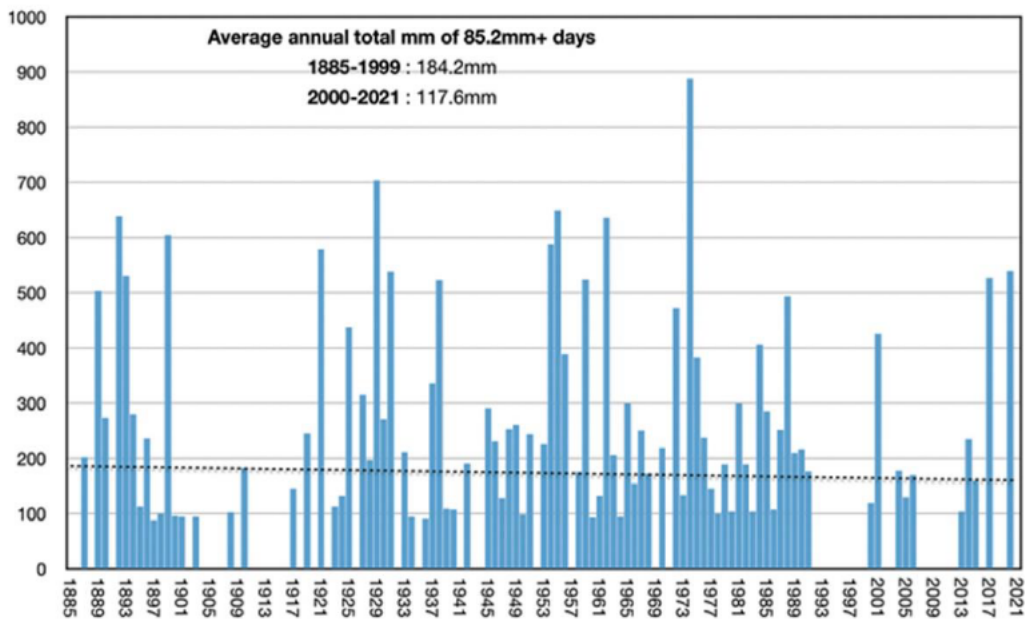
Now if the BOM looks at this with a supercomputer, they might find an effect from CO2. But if the BOM just used a calendar, like I did, they might find the latest floods started the week after rolled across Australia. Maybe that matters?

No one needed a supercomputer to read a rain gauge in 1885, and we have excellent long data. Imagine how handy that might be if the BoM wanted to understand, say, Australian flood cycles? There are 137 years of rainfall records in Lismore from 1885 to now, *but the BOM said we set a new record for Lismore based on Lismore airport where records started as long ago as... 2002.*

Minimizing the Lismore Floods.

Here's what big rain looks like in Lismore:

Annual total millimetre volume of rainfall days above 99th percentile (85.2mm) at Lismore 58037 and 58214, 1885-2021



Graph by

Article Courtesy of Jo Nova 04-04-22

Appendix II

“2.2 Flood Behaviour in Lismore A number of factors are responsible for flooding in Lismore. Its latitude and proximity to the coast make it liable to the effects of extreme weather mechanisms, via tropical cyclones from January to April, and east coast lows from April to July. The catchment above Lismore is fan-shaped and the valleys and streams are steep providing a relatively quick transfer of rainfall to runoff. The whole of the runoff from the 1,400km² catchment squeezes through a narrow section of floodplain at Lismore, which is located at the confluence of Wilsons River and Leicester Creek. The floodplain lies at approximately 9.5m AHD with significantly lower levels near Lismore Park in Central Lismore. At the confluence, the Leicester Creek floodplain is approximately 2 to 2.5m higher than the Wilsons River floodplain. This causes the upper section of the Wilsons River to act as a natural detention basin. During the very early rising stages of a flood it is not uncommon for floodwaters from Leicester Creek to back up into the Wilsons River, and once the storage is filled the flow reverses and discharges into the lower, southerly section of the Wilsons River. The prospects for mitigating the effects of flooding are complicated by the city being centred around the confluence of Leicester Creek and Wilsons River, either of which may dominate in a flood event. The April 1989 flood was an example of a 1 in 100 year ARI flood occurring in Leicester Creek with only a minor flood occurring in the Wilsons River. This flood highlights the importance of understanding the variability of rainfall across the Leicester Creek and Wilsons River sub-catchments and the impacts this has across different areas in Lismore, especially from a flood warning and evacuation planning perspective. In particular, flood warning should not just focus on the rowing club gauge height alone as the evacuation trigger. In 1989 South Lismore was flooded sooner and more severely than the gauge had indicated. Flood behaviour is further influenced by more localised features such as Hollingworth Creek and the railway lines. Hollingworth Creek was a major floodway before European settlement. Due to the construction of the railway embankment in the 1880s and the South Lismore levee in the 1970s, it now functions more as a drain until the levee overtops when it once again becomes a major floodway. Local flooding problems in past floods, for example, in 1954, led to the construction of viaducts through the railway land to allow water to flow southwards. BROWNS CREEK PUMP STATION AT LEVEE SPILLWAY Lismore Floodplain Risk Management Plan 2014 11 Reference should be made to Appendices 2 and 3 for details on flood history and flood behaviour.

Lismore Animated tool explains 2017 flood disaster, future options

Lismore November 8, 2020 - 12:00AM

COUNCIL will publish digital animations to explain the recent disaster and how different draft options may impact the city.

THERE is no single magic solution to make Lismore floodproof, and the options offered to the community will have different consequences, according to the digital modelling done by experts, which will be available to the community as animations next week.

Lismore City Council will publish animations showing how the 2017 floods happened and what the impact of some options raised could be on the city, once the Lismore Flood Risk Management Project draft goes on exhibition.

Six flood-mitigating ideas have been included in a new Lismore Flood Risk Management Project draft report. The options are:

- Option 1 - CBD levee raise to provide one-in-20-year flood protection.
- Option 2 - South Lismore levee raise to provide one-in-20-year flood protection.
- Option 3 - Excavate to increase Wilsons River conveyance at 387 Keen St.
- Option 4 - Removal of Kyogle Rd railway embankment and viaduct.
- Option 5 - Increase conveyance at key hydraulic controls at Bruxner Highway, Caniaba Rd and Krauss Ave.
- Option 6 - Combined option, reflective of implementing Options 1 to 5.

Comment:

No 1 and 2 to raise levees just sends the water elsewhere.

Nos 3 and 5 would have a doubtful impact.

For No 4 would allow water to go elsewhere but what happens to the railroad tracks?

Lismore City Council's Strategic Planning , , said the options offered will not make Lismore completely floodproof.

"The option to raise the levee for a one-in-20-year flood would keep the Lismore CBD dry, however, you can't say that for the whole of Lismore," she said.

"The model said the levee has a negative impact on North Lismore, and I think South Lismore as well.

"When you develop flood plans, one of the important things is that you need a package of measures, especially for a place like Lismore

"Also, the option to excavate the Wilsons River bends to increase its conveyance, provide an additional time for evacuation (...) it does not provide any extra physical protection per se."

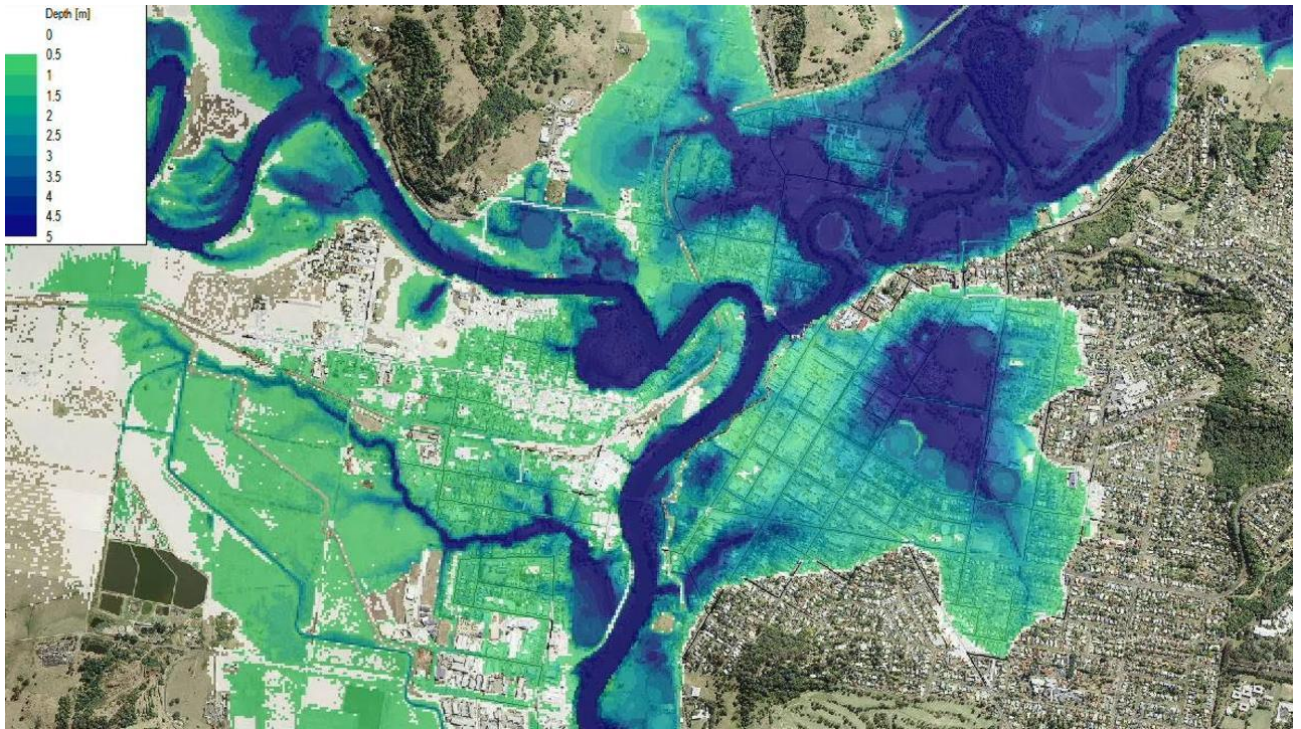
Comment: comments are very appropriate.

The study examined a number of scenarios and offered preferred options to protect the city for the "least expenditure of public monies".

Comment: The acceptable cost should be based on the cost of not doing it.

"We can also model what would happen today in Lismore if we had a (*one-in-100 year*) major flood, and how fast the water would move in an event of that scale."

Minimizing the Lismore Floods.



Comment: This graphic appears to emphasize how the Leycester Creek entering the Wilson River, causes the Wilson River to back up. Part of this could be that, at the point of entry, the creek is about 1.5m(?) higher than the river.

