Flood Mitigation System for the Brisbane Catchment

1.0 Proposal for Consideration

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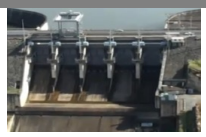
1.1 Preamble

The Wivenhoe Dam receives 50% of the Brisbane river catchment. However any overflow can only then be released into the Brisbane river. There is always a risk that releasing water during floods will exacerbate an already swollen Brisbane river system, as happened in February 2011. Reference



1.2 The Problem

1.2.1. Wivenhoe empties its storage into the Brisbane River, and in times of flood this mechanism can exacerbate flooding in Brisbane city and surrounding suburbs.

Reference:
http://www.theaustralian.com.au/national-affairs/fears-full-dam-will-cause-new-flooding-in-brisbane/story-fn59niix-1225997704047

1.2.2. When comparing the flooding rates of the Brisbane catchment, we can conclude that these events happen every 28.3 years. Since 1840, there have been 6 floods of the current level or more, (excluding the current event in 2011). If we included the current flood, the average would be every 24.4 years.

Reference:
http://www.bom.gov.au/hydro/flood/qld/fld_history/brisbane_history.shtml

1.2.3. The current flood event is about 25% to 50% below the highest recorded rain events for the Brisbane catchment, which happens on average, every 56 years.

Reference:
http://www.bom.gov.au/hydro/flood/qld/fld_history/brisbane_history.shtml
http://www.couriermail.com.au/news/rainfall-dwarfed-by-1974-figures/story-e6freon6-1225994511000

1.2.4. The estimated costs are enormous, about 30 billion dollars for the recent flood event. These costs would escalate over time, however currently may be costing 500 million dollars a year for the Brisbane region. (ie say 40% of 30 Billion divided by 24.4 years)

Reference:
http://en.wikipedia.org/wiki/2010%E2%80%932011_Queensland_floods
http://www.abc.net.au/news/stories/2011/01/18/3115815.htm
http://www.news.com.au/money/queenslad-deluge-puts-5bn-of-loans-at-risk/story-e6frfmci-1225990872446

1.2.5. All the gates at the Wivenhoe dam cannot be fully opened at the same time without the risk of flooding the Brisbane river area.

Reference:
http://www.news.com.au/national/parts-of-brisbane-set-to-flood-as-water-released-from-wivenhoe-dam-combines-with-high-tide/story-e6frfkvr-1225938466703
http://www.heraldsun.com.au/news/breaking-news/wivenhoe-dam-closes-floodgates-for-now/story-e6frf7jx-1225991109458

1.3 A Solution

1.3.1. The building of an aquaduct between Wivenhoe and North Pine dams sufficient for an emergency release of water, which would be big enough and fast enough to reduce dam levels in times of flood, is recommended for urgent consideration. This water duct would need to be built under the D'agular National Park, south of Mt Sim June, to the North Pine catchment. Reference

1.3.2. The image below shows the Pacific ocean as well as the Wivenhoe and North Pine dams to the left (west) of Redcliffe, Queensland. The white line shows the shortest route under the D'agular range for the 20km water duct between Wivenhoe and North Pine dams.

1.3.3. Close up of same area above, showing the water duct route, connecting Wivenhoe with the North Pine catchment.

1.3.4. Comparable tunnel developments in Brisbane city have been based on tunnel boring technology which is well proven.

1.4 Benefits

1.4.1. The distance between North Pine dam and the sea is only 12 kilometers. This dam is 40 meters above sea level, and appears to have ample room for dissipating water into the sea, compared with the winding narrow flat Brisbane river. (Refer 1.6.3.)

1.4.2. More of the water storage in Wivenhoe could be used for consumption rather than flood mitigation. The dam could be emptied safely on any occasion;

1.4.3. It may be possible to install a small hydro power station;

1.4.4. No pumps would be necessary;

1.4.5. North Pine dam would have a bigger effective catchment area. Some consideration could be given to increasing the height of North Pine as most of the surrounding hills are much higher than the existing dam wall;

1.4.6. This will prevent loss of infrastructure, property, business and homes along the Brisbane river, and will ease congestion where the Bremmer River enters the Brisbane River.

1.5 Costs

1.5.1. Costs would be minimized as there would need to be virtually no resumption of land, as almost all of the affected land is tunnelled under or set aside as parks or water ways.

1.5.2. Recent tunnelling project costs: The cost of this project would require a feasibility study however ought (on the face of it) not be more expensive, or difficult, than recent projects carried out in Brisbane. Reference

1.6 Calculations

1.6.1. The distance of the water tunnel to be built under the D'agular National Park and Mount Samson, would be 20 kilometers. The water would flow from a height of 65 meters above sea level to 50 meters at the North Pine dam end, (a gradient, falling 1 meter every 667meters).

1.6.2. The level of water at the Wivenhoe dam at 80% capacity, is about 65 meters above sea level and the North Pine dam is about 40 meters at full capacity.

1.6.3. Gradient Table - The following table shows the heights and distances of the rivers. The Brisbane river drops only 0.34 m/km compared with 1 m/km from the North Pine dam.

From	Distance to sea (as the River flows)	Height of the river at the bottom of the Dam Wall (m)	Gradient meters per kilometer
Wivenhoe	147 kilometers	50 meters	0.34
North Pine	20 kilometers	20 meters	1.00

1.6.4. Image of North Pine dam and river length calculation.

1.6.5. Image of the Brisbane river from Wivenhoe to the port of Brisbane, and calculation of distance.

1.7 Questions

1.7.1. Calculation for water flow rates and size of ducts. etc. ?

With a 12 meter diameter pipe (.4 meters less than the Tunnel boring machines used on the River City Motor way), at 10 meters per second, the flow rate would be 4,072 mega liters of water an hour.

1.7.2. Is the ground in the route suitable for tunnelling ?

1.8 Summary

The current solution is ineffective. The best we can do at this time is modify the timing of the release of water from Wivenhoe, and in that event, the excess water would still need to be released into the Brisbane river. Releasing water this way also has a detrimental effect on the Bremmer river and therefore on Ipswich. The effects of the potential volumes of water that can flow through the Brisbane river catchment have not been seen since 1893, and would be more catastrophic than the recent event.

As a result of the current floods, people have lost their houses and businesses, and have become insolvent. Loss of these businesses to the community cannot be costed: nor can the personal grief. It would be very difficult if nothing constructive was done to mitigate future floods in Brisbane.

In addition, the value of properties in the flood area are now a fraction of their recent value. The only way to return the value is to demonstrate that future floods can be avoided. Since this is the (failed) argument justifying the Wivenhoe dam after 1974, confidence in ANY solution will be difficult to engender.

This proposal is an elegant solution to a perceived intransigent problem. Please give it serious consideration.