Control of Future Floods - Add 1.

Alex Stoney. 28 January 2012..
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This submission is intended as an addition to my submission of 24 February 2011, to the Queensland Floods Commission of Inquiry.

Index.

1. Introduction

From my previous submission, I quote:- "If it is alright to spend several billion dollars on recovering from the devastation (and death roll) of the recent flood, why is there a problem with spending a fraction of that sum on avoiding having to spend it all over again?"

This second submission is based on a further study of available data relevant to the 2011 Floods in Queensland, and the collection of further relevant data. This data includes the Navigation Maps of the Brisbane River, being maps 237 and 238, of the Australian Hydrographic Service, which show the depths of the River to be more variable than had been supposed at the time of preparation of my first submission.

The document "Understanding floods - Questions and Answers" has been copied from the Commission's website, and read in detail, and the following is quoted from it:- ***"Waterway or floodplain modifications*** such as widening, deepening, realigning or cleaning rivers and flowpaths can improve the transport of floodwaters downstream and reduce the likelihood of blockage, but can increase velocities and erosion and cause negative environmental impacts. The benefits of cleaning and clearing are only temporary unless these continue to be maintained."

In addition, I have read in full the 2011 book "A World of Rivers" by Ellen Wohl, Professor of Geosciences, at Colorado State University, which gives an excellent description of 10 of the world's largest rivers, and in each case the geology which created the river, the natural environment, the wildlife in and around the river, the effects of factors such as flooding, and the engineering which may have disturbed the natural environment, always with good intentions, but not always with completely satisfactory results.

As in my earlier submission I recommend that the Commission should recommend that the Government should commence a program of increasing the available flow cross section of all relevant rivers, so that the water in the next flood will be able to escape to the sea, without needing to inundate the valuable land areas surrounding the rivers. Also as before, I shall make special reference to the Brisbane River, although the same recommendations should be applied to all rivers of Queensland which have inundated valuable developments in recorded times.

(The same recommendations should be applied also to the NSW rivers, such as the Manning River, which in mid-2011 inundated Taree, and the Macleay River, which at the same time inundated Kempsey, and others in January 2012, but that is probably not within the terms of reference of the Queensland Inquiry.)

2. Environmental Considerations.

Although the above-mentioned book "A World of Rivers" makes a good case for the protection of rivers, and in particular, of flood plains, against the damage of altering the natural layout of the river, it should be noted that the Brisbane River (within the Greater Brisbane Area) is not now a natural flood-plain. It is almost all "suburban development" and "industrial development". The benefit of inundation by flood waters has now been lost by alterations made by mankind. The silt is regarded as desirable in a natural flood-plain, but when deposited on the Brisbane area by a present-day flood, is quickly attacked by residents armed with brooms, hoses and shovels, and washed back into the river.

Little of the Brisbane area was ever flood-plain of the natural type. Much of it was of volcanic origin, and has been eroded from a sedimentary plain. The meanders which appear so obvious on a map of Brisbane, are deep erosion valleys, quite unlike a normal flood-plain. The suburbs of Highgate Hill (where I was born and grew up), and St Lucia (where I attended University) are mountain ranges, (small mountains I must admit, but certainly not a plain).

There are small pockets of flood-plain, such as the Oxley Creek area, Breakfast Creek area, Norman Creek area, and Bulimba Creek area, all in their lower reaches only.

The recommendations which I give below, mainly cover the deepening of the Brisbane River by cutting a trench, similar to the Navigation Shipping Channel in the lower reaches of the river, in the middle of the river, up as far as the junction with the Bremer River.. In this location, the trench will not be seen by the public, and will not affect the appearance of the river. It will have negligible influence on the tidal area, extending it upstream by an immeasurable amount. In addition, the central location of the trench will leave a wide area of the river bed unaltered, where any bottom-living creatures will be unaffected.

3. Lower Brisbane River. (Downstream from Central Business District)

The recent flood flow, which occurred in January 2011, has been calculated as 12,900 cumecs (cubic metres per second) at the Moggill area (the upstream edge of the Greater Brisbane Area). Since the cross section area of the river is clearly insufficient to carry this water flow, the cross-section of the river should be increased. This area includes a shipping channel, from the mouth of the river to the Brisbane Cruise Terminal, at Hamilton, with a width of 90 metres, and a "managed depth" of 9.1 meters, below the datum (which is approximately "lowest astronomical tide" level). The lower reaches of the Brisbane River passes under the Bridge on the Gateway Motorway, which is shown in my Figure 1, looking upstream.

Figure 1.
At this point the river is approximately 436 metres wide between the banks.

The cross section of the river at this point is shown in my Figure 2.

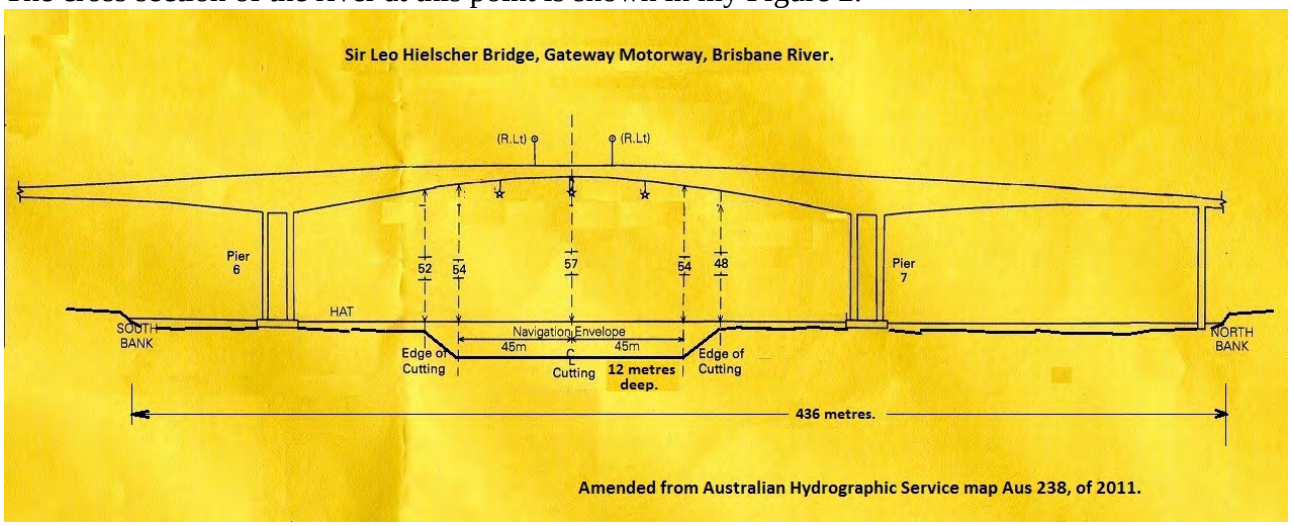


Figure 2.

It will be seen that the majority of the cross-section flow area is in the shipping channel, since the remainder of the river is much less deep.

The Brisbane River consists of many sharp bends, with short more-or-less straight sections between the bends. The water is substantially deeper at the outside of the bends due to the turbulence of the water (particularly during flood flow), and much less in the straight sections. Under the Story Bridge the depth at the outside of the river (i.e. the north side) is 18 metres, while the straight sections are usually about 5.6 metres deep.

The Town Reach of the river, between the Central Business District, on the north side, and Kangaroo Point, on the south side, is approximately 326 metres wide, and only about 5.6 metres deep, as shown in Figure 3. As a result I recommend that the depth here should be increased by dredging a channel, equivalent to the shipping channel, (although shipping may not use it), as shown in Figure 4.

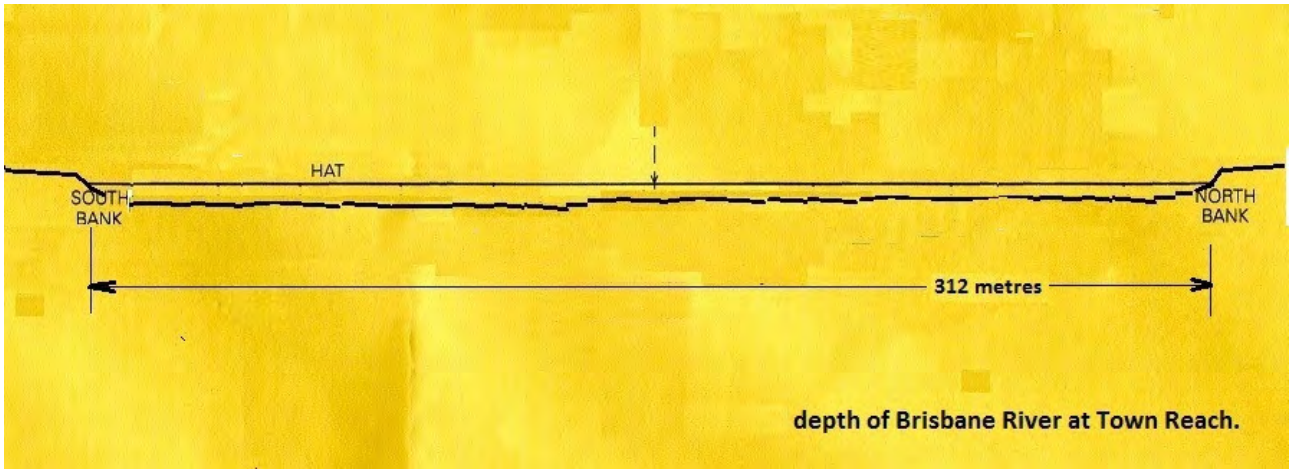


Figure 3.

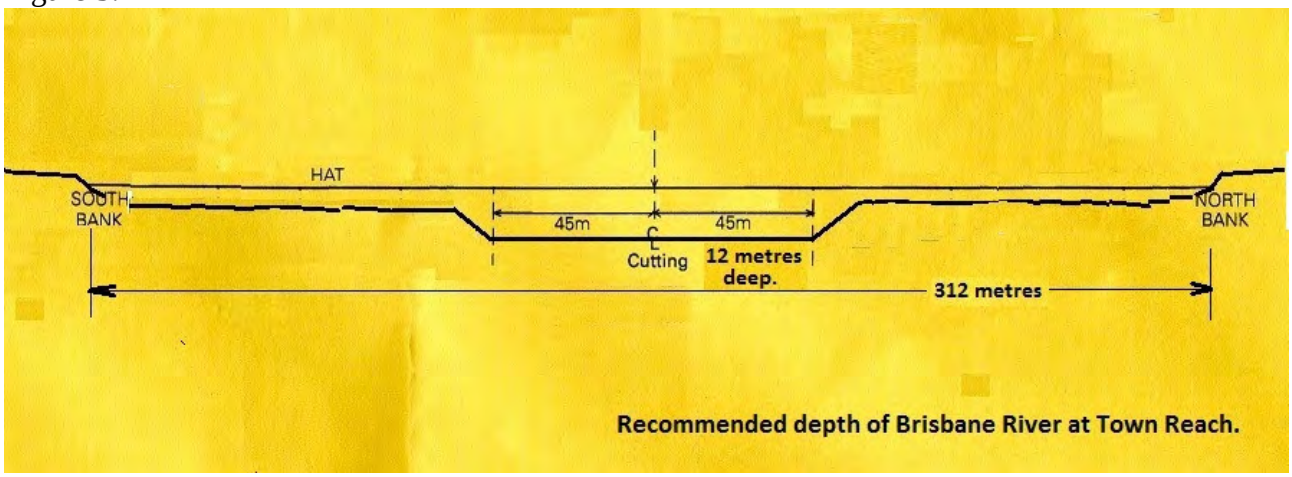


Figure 4.

I recommend that 12 million cubic metres of silt should be removed from this area of the river. To visualise the scale of this job, the website of the Port of Brisbane includes the removal of 15 million cubic metres of sand from the "Spitfire" channel across Moreton Bay, in order to improve the access of ships. (Section 2.4.5 of Port of Brisbane - Strategic Plan "Channel Access").

In order to ensure that silt is not placed in locations where contaminants make it unacceptable, early in this program several samples should be taken from the river bed for analysis to determine its composition, in regard to:- particle size distribution; salt content; radioactivity; heavy metals; pesticides; fertilizers; hydrocarbons; unacceptable chemicals such as PCBs, etc. This preliminary analysis need not be of high precision, unless the findings suggest that more detail is needed. There is the possibility that some valuable resource may be found, such as building sand and gravel (which, in the last century, was dredged from the Brisbane River in large quantities). Any commercial values should be explored to contribute to the cost of this program.

The silt could be removed by the dredge "Brisbane", part of the Port of Brisbane fleet, which is currently busy in the Gladstone Harbour development, and is described in their website (www.portbris.com.au/PortDevelopment) as:

Brisbane

> The *Brisbane* is a trailing suction hopper dredger and the main unit of our dredging fleet. Equipped with the latest state-of-the-art automation control and navigation systems, it is capable of performing capital and maintenance dredging in accordance with latest environmental standards. The *Brisbane* is used for maintenance and development dredging, and reclamation works in Brisbane, as well as an annual maintenance dredging campaign in north Queensland ports. The dredger is certified as an ocean-going dredger, and is available for contract work anywhere in Australia.

Details:
Dredging depth: 25m
Hopper capacity: 2,900 cubic metres
Discharge: pump ashore by bow coupling or bottom dump
Crew: 13 per two-week swings

As given in my previous submission, the silt from the lower Brisbane River could be placed in the Hemmant area, around Bulimba Creek, which could be straightened by two cut-offs as shown in Figure 5, to shorten the creek by about 6 kilometres and give flood protection to the upstream suburbs.

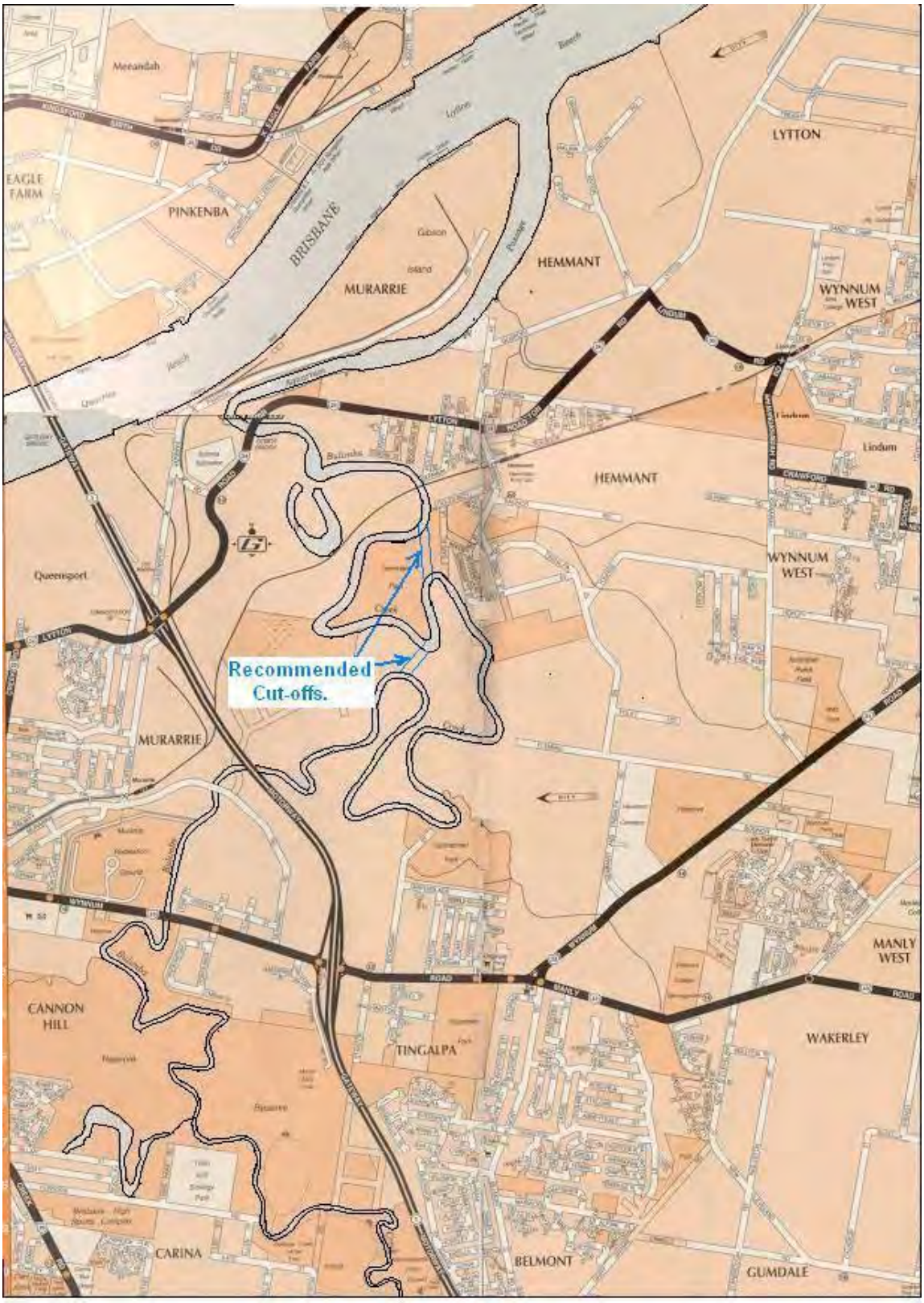


Figure 5.

The details of the Hemmant Recreation Reserve is expanded by the Figure 6, taken from Google maps, showing this flood-prone area surrounded by suburban and industrial development.

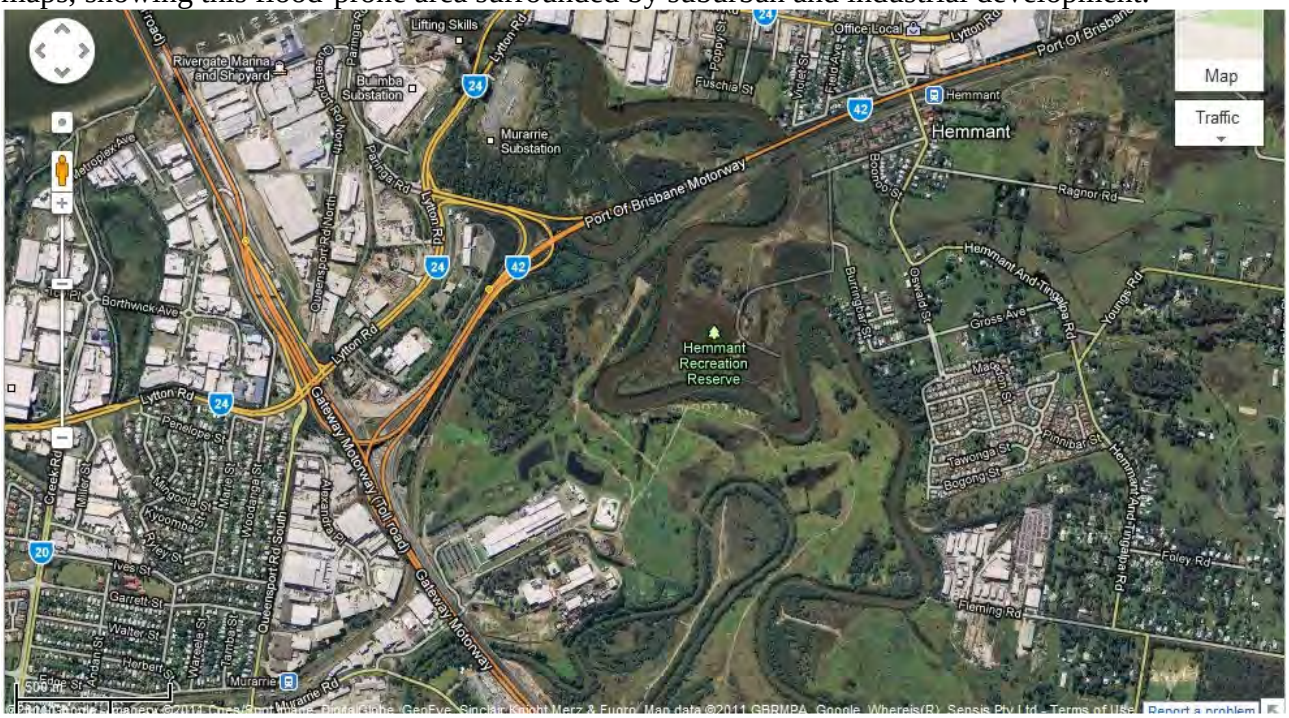


Figure 6.

Recommendation.
That the Queensland Government, in conjunction with the Brisbane City Council, set up a program to increase the flow capacity of the Brisbane River, downstream from the CBD, by excavation, (i.e. dredging) a path, 90 metres wide and 12 metres deep, along the approximate centreline of the river, from the mouth of the river to the William Jolly Bridge (i.e. Grey Street Bridge), and placing the dredged material in a suitable location, such as the Hemmant Recreation Reserve.

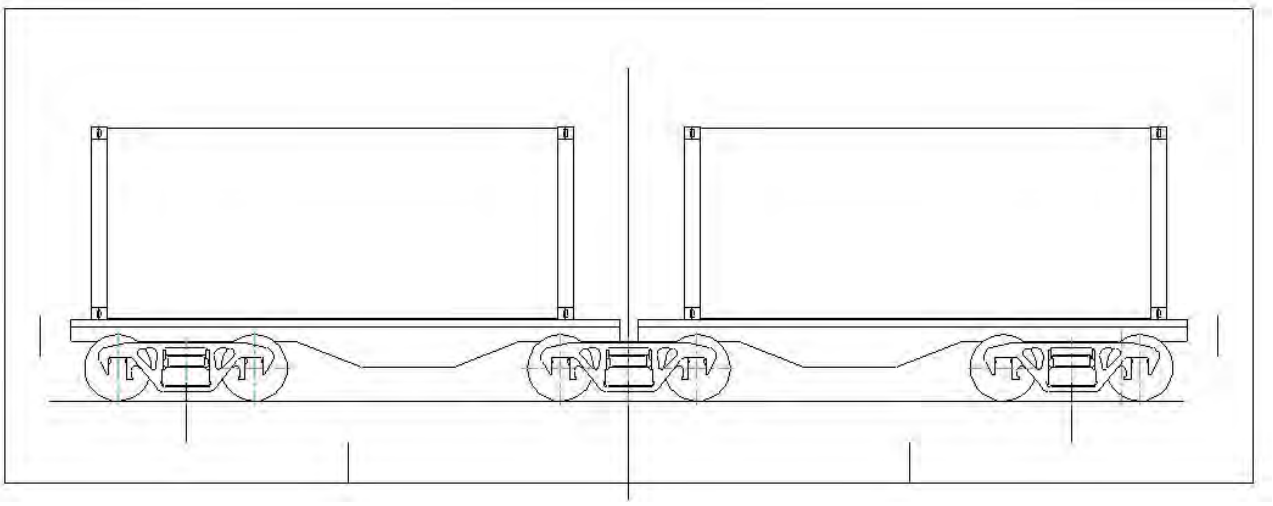
4. Brisbane River (upstream from the CBD.

In the area between the William Jolly Bridge and the junction of the Bremer and Brisbane Rivers, the flow capacity of the river needs to be increased if the devastation seen in the January 2011 floods is not to be repeated. Since the dredge "Brisbane", being an ocean-going vessel, probably cannot pass under the bridges connecting the CBD to South Brisbane, another dredge needs to be located. Moreover, if the program recommended above to excavate 12 million cubic metres of silt from the downstream part, (together with the approved removal of 15 million cubic metres of sand from Moreton Bay, as indicated in the Port of Brisbane website) is to be carried out within a reasonable time, then the "Brisbane" will probably not have enough capacity for these upstream and downstream tasks, and possibly not for either.

A barge, with a mobile crane, equipped with a "grab" bucket, and accompanied by another barge (or two) carrying the excavated silt, might serve this need. However the amount to be excavated may need to exceed the 12 million cubic metres, if adequate protection is to be given to this upstream suburban area. A continuation of the channel 90 metres wide and 12 metres deep is recommended.

As given in my earlier submission, I suggest a container system be used to handle the silt from the dredge to distant destinations, such as the farmers' fields, from which the silt came in the first place. The analysis, recommended above, may reveal sufficient fertilizer value in the silt to make this a desirable soil additive for farmers to use to improve future crops. Transport of silt to places such as the Lockyer Valley should be considered, and for this distance the suggested container system may prove ideal.

The silt handling barges could be equipped with compartments to locate the recommended 20 foot (6 metres) containers, which would be filled in place. The barge would then move to a suitable wharf facility, equipped with a container lifting crane, for removal of the filled container to the wharf area, and later for loading onto a train, for transport to upstream areas.



Figire 7.

A recommended type of vehicle, needed for efficient transport of containers of silt, is shown in Figure y, and is an articulated (i.e. three-bogie) platform for two 30 tonne containers, and will remain within the 15.5 tonnes axleload, giving access to all Queensland Railway lines.

Figure 8.

Here a suitable container lifter would place the loaded container on a special semi-trailer truck of transport to the farm field.

In close proximity to the Redbank Railway Workshops are two reaches of the Brisbane River, as shown in the Figure 9.

Figure 9.

These areas appear to be suitable for a wharf to handle containers of silt from barges to shore, and then to load them on trains for movement to the upstream farm areas.

The recommended semi-trailer (see Figure x) includes provision to unload the silt in the container onto the ground, by tipping under the control of the driver in his cab.

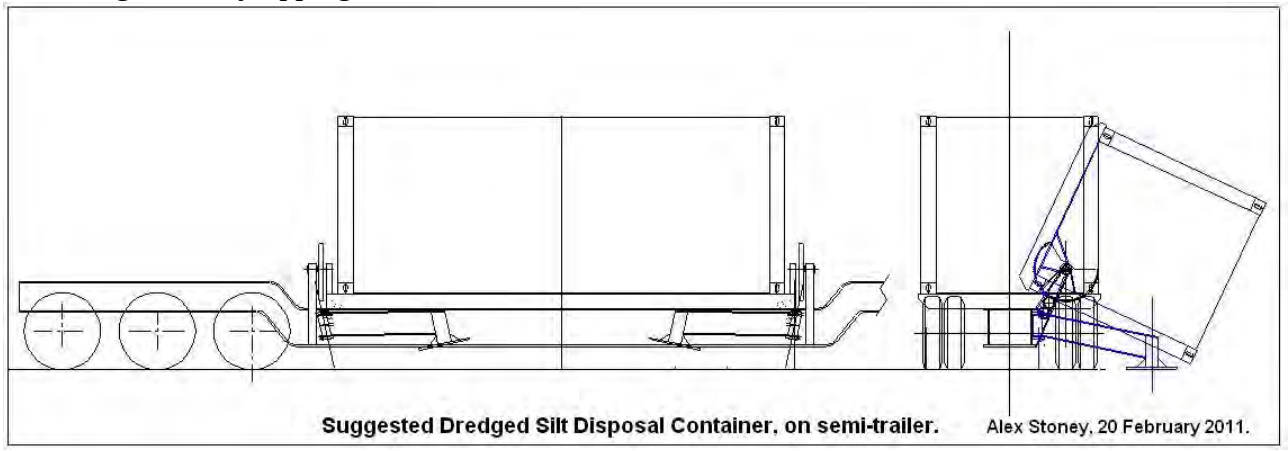


Figure 10.

Recommendation.

That the Queensland Government, in conjunction with the Brisbane City Council, arrange to excavate a channel up the Brisbane River, from the William Jolly Bridge to the junction of the Bremer and Brisbane Rivers, to increase the flow capacity of the river under flood conditions, with a width of 90 metres and a depth of 12 metres, and arrange disposal of the silt to upstream farming areas, by a container system and rail transport.

5. Upper Brisbane River.

Recommendation.

To provide some flood protection for the areas surrounding the Lockyer Creek, continued dredging of the Brisbane River, above the Mount Crosby weir, to the junction with the Lockyer Creek, should be done with the removal of silt being limited by the available dimensions of the river in that location.

6. Ipswich.

As given in my previous submission, I suggest that Ipswich would be much better protected from the coming floods if the above-recommended dredging of the Brisbane River, both down-stream and up-stream from the CBD, is carried out and is extended up the Bremer River past Ipswich.

7. Fitzroy River.

Figure 12.

Recommendation.
That the Fitzroy River be straightened at the loop approximately half-way from the river mouth to the city of Rockhampton, and that the loop be filled with silt dredged from the river bed over its complete length from the mouth to the city.

8. Mary River.

Recommendation.
That a large amount of silt be dredged from the bed of the Mary River, in order to protect both Maryborough and Gympie from the floods which have damaged these cities.

9. Inland Rivers.

Recommendation.
That the Queensland Government should require that each Local Government Authority, in whose area towns have been inundated by floods, build in each town a flood refuge consisting of a raised area high enough to exceed the height of any recorded flood, and of sufficient area to accommodate the population of the town under flood refuge conditions. This raised area could be located in any suitable park(s), and should be built of silt dredged from the adjacent rivers course in and downstream from the town.

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[redacted]