

**Submission to the
Queensland Floods Commission of Inquiry**

**Land Use and Planning considerations in response to
the SEQ floods of 10/11 January 2011**

By: Roy McLean Barrett

Dip TCP(Syd); CPP; MPIA; FDIA

Senior Planner / Urban Designer

Saunders Havill Group

[REDACTED]

[REDACTED]

March 2011

Executive Summary

This submission:

- Responds to Items 2 (c) and (g) of the Terms of Reference of the Queensland Floods Commission of Inquiry. It is focussed on land use planning issues arising out of the recent 2010/11 floods - with due consideration of historic flood events - as relevant to potential flood recovery and reconstruction policies and programmes. It does not deal with associated Planning Scheme provision matters.
- Focuses primarily on the South-East Queensland flood event due to knowledge of that region, but considers that the general intent of the proposals outlined have wider application to other flood impacted communities.
- Seeks to identify issues, proposals and practices that are likely to impact on the implementation and effectiveness of flood recovery and reconstruction strategies. In particular, it seeks to review and contrast the implications for potential adoption of either 'flood control' / 'flood-adaptation' policies for retained development within flood plains, and an alternative approach for 'flood-retreat' policies and programmes that return as much of the flood-plain as practically possible, to achieve its natural purpose with the least damaging impact to people, property, and local, regional and state economies.
- Outlines a suggested recovery / reconstruction strategy for potential implementation by the Queensland Reconstruction Authority, using the powers available to it, that offers a means of substantially recovering the costs of reconstruction activity through the use of 'Flood Reconstruction Bonds' in the creation of new 'flood-resilient' communities.
- Provides examples of the extent of recent flooding relative to contour information and post 1974 flood risk projection mapping for Brisbane.

Land Use and Planning considerations in response to the SEQ floods of 11/12 January 2011

1. Preamble

The submission's purpose is directed at land use planning and development issues relative to both the affected areas of South East Queensland, previously or recently flooded, or potentially liable to be affected by future flooding, and to approaches to better protect them from future flood events. The submission reviews approaches for reconstructing and strengthening those communities, their infrastructure and economic enterprise, and reducing the adverse economic impact of such events on local, regional, State, and Australian communities.

Although directed at land use planning and development matters, I am mindful of the comments by ex-Governor Peter Arnison, quoted in the Sunday Mail 27/2/11, that the urgency for action does not allow for detailed consideration of Planning Scheme and related administrative provisions that may or may not have contributed either positively or negatively to past or current flood impacts.

This submission is directed at presenting options for action. The submissions deals primarily with 'flooding rising from a river', rather than 'flash flooding' from intensive localised rain into constrained overland flow paths [eg the Toowoomba and Grantham 'tsunamis'].

2. What are the Imperatives?

This submission seeks to address land use planning and development actions in relation to what I consider to be the primary imperatives, being:

- 1) To ensure that the housing accommodation needs of families and individuals, most directly affected by the floods events, are urgently provided, and especially for those who have totally lost their houses or accommodation, or where such is unable to be readily repaired for even temporary habitable use, or where essential community services cannot appropriately be provided to the area;
- 2) To ensure that essential services and community facilities can be appropriately provided to service both interim and the long-term needs of affected communities;

- 3) To ensure the economic and social needs of affected communities are provided in a way that both appropriately assists in their urgent recovery phase and also in the transition to a more secure future;

To meet these imperatives in a way that returns as much as reasonably possible of the cost of community reconstruction, so that the overall community emerges safer, stronger, and better able to manage future disasters.

3. FLOOD HISTORY, HYDROLOGY & HYDRAULICS

I have no doubt that much will be presented to the Commission in relation to the adequacy or otherwise of the hydrological and hydraulic basis for past and current flood planning policies. While I deal with various aspects of these issues in my professional planning and urban design activities - and have personal views in relation to them - they are outside my area of expertise and are not generally dealt with in this submission.

Nevertheless, the report: *"Known Floods in the Brisbane & Bremer River Basin – including the Cities of Brisbane and Ipswich"*, on the Bureau of Meteorology web-site, and covering the period from 1840 to the present, should be required reading.

It needs to be said however - and many others have said the same - that common references in State and Local Government policies and codes to '1 in 100year floods' are so poorly understood by the community at large that it gives a false sense of security, even (or perhaps especially) for those who have previously experienced flooding of their area.

Nevertheless, there is a critical need for determining measures for establishing 'degrees of risk' areas within which certain classes of development should either not occur, or should only occur if undertaken in full provision for such risk, and in a manner that will not jeopardise the safety of adjacent people and property, nor unduly increase the risk to other upstream and downstream owners and properties as a result of such development.

The nature of such measures and the scientific basis by which they are derived, together with their limitations on use, needs to be agreed, fully transparent, and notified to all who are responsible for planning, approving, developing, and occupying any such development, within defined 'Risk Class' areas.

4. ISSUES FOR A RECONSTRUCTION STRATEGY

There appears to be two main schools of thought in respect of the most appropriate approach to be taken towards post-flood reconstruction:

- 1) Allow housing, businesses and infrastructures services in flood affected areas to be rebuilt essentially where they are, supported, where appropriate, by 'flood control', or 'flood adaptive' measures such as:
 - increased dam flood storage capacity;
 - levee bank systems;
 - flood 'back-flow' control gates on tributary streams and piped drainage networks;
 - proposals for housing adaptations such as: - constructing on multiple levels to provide upper level flood protection; permanently raising them on stilts/piers; or by temporary elevation via hydraulics, or by 'floatable' means, or
- 2) Use of 'flood retreat' programmes to move development out of the floodplains, or at least from the higher risk areas of such, and re-establishing such housing, businesses, services, and economic enterprise on flood-free or reduced flood-liability, higher land, and the use of the vacated land for flood-tolerant activities such as open space, recreation, food production, and environmental purposes [eg re-establishing lost vegetation and habitat].

'Flood Control & Flood Adaptive' Considerations:

From comments made by many affected householders and businesses, I suspect that there is quite likely a significant number of such people who favour the first approach. The reasons for this are readily understandable, especially for residents who have lived in an affected area for a number of years or own or have a mortgage over their home or business. They include:

- 1) The property being the occupier's main or only asset;
- 2) Mortgage commitments on such assets substantially 'tying' owner/occupiers, given the difficulty of selling up a 'flood-affected' asset, or using such asset as collateral for relocating elsewhere;
- 3) Strong community ties to, and social networks within, the area, or considered higher convenience to work, education, transport, hospitals, by comparison with potential alternative flood-free areas, particularly where financial disadvantage applies;
- 4) The physical attributes of the community, in preference to other areas, particularly once a flood has subsided and the area cleaned up;
- 5) A belief that the chances of it happening again are slight or 'worth the risk'.

- 6) Non- awareness of the nature or potential benefits of any realistically alternative reconstruction/re-housing/re-establishment programme; the cost and timeframe for implementation of such; or the impacts of such on resident lifestyles or business;
- 7) The lack of comprehensive 'flood retreat' programmes, or means to implement them, or even good examples of other successful such programmes.

The above factors can be seen in the many households and communities that have previously re-built in areas damaged by previous floods, fires, cyclones, and even earthquakes, and in the fact that 'rebuilding' is generally permitted to occur in such areas without necessarily any adequate planning or building code controls to ensure a higher level of flood protection is achieved.

Review of the excellent NearMap aerial photography taken along the Brisbane / Bremer River system on 13/14 January 2011, immediately after the flood peak, indicates that while policies such as not developing housing below the 'Q100 flood line' can be seen as having been partially successful in reducing the extent of further new housing encroachment into the flood-plain in some areas, closer examination of such areas, where contour information is also available (eg from Brisbane City Council's BIMAP), and comparison with BCC's Flood Projection mapping of 1974 - shows that recent flooding had often extended above Council's 'Flood Regulation Line' in many cases. [I have personally been involved in a project where development was recently undertaken on land above Council's Flood Regulation Line, but which nevertheless recived a degree of flooding].

Clearly the cumulative effect of new development in catchments change over time, so that any set 'Flood Regulation Line' [FRL] will eventually be exceeded, even for floods of equivalent intensity to that used for setting the original Flood Regulation Lines. Catchments generally also cover multiple local authorities and the development dynamics and policies used in any one local authority area for setting the FRL's, will likely be significantly different to those in other parts of the larger river system catchment, especially between highly developed Local Authorities and outer areas transitioning from semi-rural to significant new urban expansion.

'Flood Retreat' Considerations:

With respect to the 'flood retreat' approach, there has been some community recognition of the benefits of minimising the extent of future impact; allowing floods to take their natural course; and in using the vacated floodplain for other community benefit. Nevertheless, and notwithstanding some limited voluntary 'buy-back' schemes and the many post-disaster enquiries, there has been a little evidence of serious investigation or development of

comprehensive programmes or actions to actually implement moves towards this alternative approach, or even examples of where such approaches have been successfully implemented elsewhere.

The reasons for this lack of any comprehensive ‘flood retreat’ programmes, to date, are also readily understood, and include the following:

- 1) The lack of an organisation with the authority, funds, and expertise to prepare and oversee the implementation of a comprehensive ‘flood retreat’ programme;
- 2) The scale of the impacted areas in many locations;
- 3) The very substantial cost and associated legal implications and processes involved of ‘buying back’ [or resuming] flood affected properties, and also flood-free or low risk areas required for re-building and re-establishment of affected communities;
- 4) The very substantial cost of both the re-building of affected communities, including the associated physical and social infrastructure and community services, and appropriate redevelopment of the vacated floodplain;
- 5) The time involved in preparing and implementing such a programme;
- 6) The potential for community, political, or ‘organisational’ opposition to either the programme as a whole, or key parts of it.

From my readings in relation to the New Orleans ‘post-Katrina’ reconstruction efforts, some of the above issues have impeded the effectiveness of implementation of such programmes in that City [although it must be recognised that the socio-economic make-up of that City, and the causes of flooding from storm-surge and levee failures is very different to the SEQ situation, and to the northern and central Qld flooding, and Cyclone Yasi situation].

Nevertheless, in considering the costs associated with implementing a ‘flood retreat’ policy, it is also necessary to consider both the potential benefits from implementation of such and also the substantial personal, community, governmental, economic, and environmental costs – and lost opportunities – in not implementing a ‘flood retreat’ policy/programme.

So what are the potential benefits to be derived from implementation of an appropriate ‘flood retreat’ programme to flood affected areas?. They include:

- 1) A phased reduction of the number of people, properties, and infrastructural assets directly exposed to danger of, and damage from, floods, and the costs of flood recovery;

- 2) The consequential creation of new housing, business and community services in areas, either free from or with substantially lessened risk of flood impact;
- 3) The creation of new public 'open spaces' within the floodplain that allow flood events to occur with substantially reduced risk of damage to people, properties and infrastructure, as well as the opportunity to create facilities for flood-tolerant uses within the vacated floodplain, such as active and passive recreation; 'community gardens'; and stormwater quality management prior to discharge to river and streams; environmental rehabilitation, etc;
- 4) The ability to implement new, sustainable, community development with improved, integrated transport and employment and access to 'local food' production.
- 5) Major, sustained, job employment opportunities and new economic investment and enterprise, both during and after the active reconstruction phases;
- 6) The opportunity to 'showcase' world-wide, successful examples of major, sustainable, urban redevelopment. [In this respect it is acknowledged that there are many fine examples of urban redevelopment, and the development of integrated communities generally, and from which we can draw for inspiration, but none that I am aware of that are specifically associated with a policy and programme for progressive retreat from flood plains].
- 7) The potential, via an approach/funding proposal outlined in the following sections - for not only the affected communities but also the wider local, regional, State, and national communities - to participate in and benefit from the implementation of such a policy and programme.

Comparison of Approaches

As discussed above, there are two broad response options to repeatable major flooding affectation:

1. A 'flood control/flood adaptation' strategy, and
2. A 'flood retreat' strategy.

This submission generally proposes the latter approach, especially for the most heavily flood-impacted areas, but also recognises that there are benefits under the first strategy and that both have their place depending on circumstances.

The following is an attempt to compare the differences, advantages and disadvantages of each.

1. Flood Control / Flood Adaptation Strategies:

Advantages	Disadvantages
1. Installation of Flood Levees	
<ul style="list-style-type: none"> • Would allow areas behind the levees to remain essentially as before, behind a protective flood barrier; • Could be installed in stages between 'high land' to 'high land' areas along a frontage of a river or tributary stream; • Would avoid the need for substantial property acquisition and redevelopment; • Levees could form part of an extensive river & tributary open space system; • Could be used selectively around key, difficult to move, facilities; • Could be installed at different heights and locations within a flood plain to suit different 'risk/impact' area [at higher cost of acquisition, construction and maintenance], or in combination with a partial 'flood retreat' strategy. 	<ul style="list-style-type: none"> • Levees generally cause 'narrowing' of flood-plains and consequently result in increasing the rate of flood flows and flood heights; • 'Back-flow' gates on drainage lines required to prevent flooding behind levees via drains. These involve high costs installation and maintenance, and failure in only one, or a small number, could jeopardise the whole levee protection area; • Discharges of drainage from areas behind the levees are blocked unless pumps are installed; • Will often require acquisition of expensive, river-accessible private land to install [this was a factor for the costly 'floating walkway']; • Total length of levee system would be very high for extensive flood-labile frontages; • High cost of materials, construction, and maintenance, and high on-going operational costs if drainage pumps need to be used; • Levees are subject to potential failure or over-topping with resultant high cost, and potential liability, for people & property if such occurs;
2. Raising habitable or flood-sensitive parts of buildings above flood height	
<ul style="list-style-type: none"> • Allows residents to remain on their land, but with increased protection from flood damage • Typical 'timber & tin' SEQ houses can be readily raised on piers and in character with older Brisbane areas • Lower level(s) designed to allow flood flows through while main living and service areas are protected above; • Possible use of 'floating' or 'elevator' houses that rise and fall with a flood; 	<ul style="list-style-type: none"> • This strategy only considered an option if in conjunction with installation of a levee system • While possibly feasible at the household scale for 'T & T' houses, this approach is not suitable for brick & masonry construction, - or only at substantially higher cost; • The strategy relies on residents 'sitting-out' the flood, usually without power, water, or sewerage services, and reliant on boat access, especially for emergencies • Properties still at risk from floods substantially higher than '74 or 2011 • 'Queenslander' houses traditionally had low-use utility areas below them but, over time, these areas became 'filled-in' for additional useable floor area. The likelihood is that such would also occur with houses raised above current flood levels – creating future risks; • Houses that rise & fall with flood levels would be highly liable to failure due to flood debris • Allowing some households to remain in some areas imposes high costs on the rest of the

	<p>community, in having to maintain services and facilities, and could significantly impede 'flood-retreat' options;</p> <ul style="list-style-type: none"> • High cost of maintaining infrastructure services for development remaining in flood areas; • Retained sewer infrastructure in flood areas is a major cause of pollution and disease; • High cost of re-construction of houses for owners, and there are questions as to the willingness of financiers to fund reconstruction in medium to high risk flood areas, or for insurers to continue to insure such housing; • The broader community also continues to bear the costs of future flood recovery & economic impact to such areas if future flooding occurs.
3. Provide bigger, or multiple, upstream dams with increased flood storage detention capacity to reduce the impact of downstream flooding.	
<ul style="list-style-type: none"> • In theory this would assist in reducing flood impacts, and boosting water supply • The alternative to large storage dams may possibly be in a series of designed, 'leaky', 'flood-plain retardation' weirs that retard the flow sufficiently to reduce the rate of discharge, while also serving as wetlands and aquifer re-charge areas, and which gradually drain following the peak to serve subsequent retardation needs. 	<ul style="list-style-type: none"> • In practice it is not only difficult to find suitable sites that could meet the twin objectives of both water storage and flood detention, but such proposals are politically and environmentally divisive. • For the alternative, the difficulty is also in finding sufficient, suitable, potential flood retardation sites to be feasible and effective. [It is noted however, that the 500,000ML capacity of the 'Cubbie Station' lakes were flood-plains with the 'outlet' dammed].

It is considered that any 'flood control / flood-adaptation' policy requires detailed mapping and analysis of past, recent, and potential flood events, their causes, effects, and differences, and the determination of 'Risk Class' areas [from high to low], as an essential base for determining policies to permit re-building and development with existing flood-plains. In this respect, it instructive to review the series of maps prepared for the Brisbane local authority area, following the 1974 flood, and showing projected flood extents for various classes of flood risk.

I have prepared, at **Attachment A** to this submission, an example of one locality, at Oxley, showing the pre-2011 flood area; a NearMap aerial image of the immediate post-peak 2011 flood coverage; copies of the BCC BIMAP of the same area, with contours and with services; and the same area overlaid with the post-1974 [pre-Wivenhoe] flood projections. Such latter image indicates the 2011 flood extent to be at the upper level of the '1 in 11 year' to '1 in 28 yr' flood frequency band. The '1 in 28' – '1 in 60yr' band would add a further 2m of flood height, the '1 in 60' – '1 in 110 yr' band, an extra 4m, and to the '1 in 200yr' band an further 3.5m of flood height.

2. 'Flood Retreat' Strategies:

Advantages	Disadvantages
<p>1. Declaration of Areas for acquisition or resumption for community redevelopment on existing, or created, higher land via an overall Master Planning and development process</p> <ul style="list-style-type: none"> Establishes an action programme for the phased retreat from the highest risk flood-plain areas and planned, funded, development of new flood-resilient communities on higher land, partially won by compensatory cut & fill from the flood-plain. Redevelopment substantially funded via State-backed Reconstruction Bond issues returning long-term revolving funds from the increased value of building sales & leases in the new communities created An increased number of new dwelling units created, over the number acquired for redevelopment. More sustainable, integrated, transport-oriented, new communities created Creation of major new riverside open spaces and flood-resilient community facilities within the recovered flood-plain Ability to relocate pollution causing sewer infrastructure from flood areas, and to institute new, safer, less costly to install and operate, and environmentally beneficial infrastructure technologies as part of an overall redevelopment. The potential for the QRA to work with existing developers, with land and housing currently in the process of development, to secure stocks for use in faster relocation of households from affected areas. [The potential for State issued 'Housing Vouchers' for use by income-assisted families as a supplement to their financial ability to afford 'market-rate' housing accommodation – as used in the US - may be worth considering]. 	
	<ul style="list-style-type: none"> The forced relocation of residents from their homes and communities [notwithstanding that they will have been compensated for their property and may be able to have priority access to new housing in the redeveloped community – when constructed – or even financial gain from Reconstruction Bonds issued as part of an acquisition package] The possible need to Declare and acquire additional 'non-flood affected' land to properly plan and integrate the new areas into the adjacent, existing 'flood-free' areas. the often adverse community reaction and politics that arises in acquisition/resumption processes. Potential adverse community responses to higher density development in proximity to existing lower density housing, particularly in older established areas, and the potential for organised, community-initiated 'counter-proposals' to retain existing communities. The potential for creating high-cost new communities and not providing adequate affordable housing in place of existing areas. [It would be expected that provisions against such occurring would be a requirement of any redevelopment conditions and bid offers] The nature of some existing flood-impacted areas – such as Rocklea – being of such an extent and specific nature – and so 'locked-in' to existing transport systems and employee locations that it is difficult to identify how such can be removed from the extensive flood plain area that they occupy. Nevertheless the economic costs of such areas being 'out of action', during floods, are high. [It would likely require a phased combination of various measures to achieve relocation over time].

As can be seen, there are advantages and disadvantages in both strategies but, to my mind the highest benefits and least risks are achieved from a strong emphasis on 'flood retreat' options. Nevertheless a mixture of both approaches will likely be necessary.

5. OUTLINE OF A SUGGESTED 'FLOOD RETREAT' POLICY AND RECONSTRUCTION PROGRAMME

5.1. Policy Elements

Having regard to the issues raised in the previous section, the first element for developing and implementing a comprehensive 'flood retreat' strategy is already in place with the State Government's creation of the Queensland Reconstruction Authority to, inter alia: *coordinate and manage the rebuilding and recovery of affected communities, including the repair and rebuilding of community infrastructure and other property.*

Further, the Act provides for the following to facilitate flood mitigation for affected communities, or the protection, rebuilding and recovery of affected communities:

- *the declaration of declared projects and reconstruction areas; and*
- *the making of development schemes for declared projects and reconstruction areas.*

The Act also provides the Authority with the power of resumption of property, in Declared Areas, required to implement the provisions of the Act, and to prevent the sale of land by any owner in a Declared Area other than to the Authority. The Authority has power to sell, lease or otherwise dispose of property for the purposes of implementing a Scheme of Development for a Declared Area, or for other associated purpose. Two other essential elements for effective implementation are: necessary funds, and appropriate expertise, and it is expected that both will be readily available.

It is considered that this Authority, and the powers with which it has been invested, is essential to the implementation of any flood mitigation or reconstruction programme, and especially so for one directed at implementing a 'flood retreat' strategy. This submission outlines a suggested approach by which the costs of such a reconstruction programme could be substantially, if not wholly, recovered [over time] through the way in which the programme is funded – to the long-term benefit of the wider community.

The other reality, irrespective of funding and expertise, is that the Reconstruction Authority is charged with a mammoth task, extending over a huge area of Queensland, and covering a wide range of different types of impacts on city, regional and rural landscapes, covering urban, agricultural, business and industry, mining, tourism, and local, regional and state-wide infrastructure, as well as the related social, economic and environmental impacts.

The QRA will have to be, and be seen to be, progressing recovery strategies on each of these fronts at all times. This is going to require difficult judgements as to needs and priorities, will require partnerships with various 'industry groups' and organisations, and will require clear and constant communication with the community at all times, to maintain support.

5.2. A Suggested Approach for Reconstruction of 'Flood-Resistant' Communities

It is stressed that it is not suggested that the following programme outline will fit all situations for a flood recovery/reconstruction strategy. Rather, it is primarily aimed at heavily flood-impacted urban communities. Elements of the strategy may, however, be appropriately adapted to other situations.

Firstly, the strategy calls for the Queensland Reconstruction Authority [QRA] to identify those heavily flood-impacted areas where:

- 1) major community re-construction is warranted to remove the majority of development from future flood damage, and
- 2) where doing so would provide the highest overall benefits to the wider community, and
- 3) recovering a substantial area of the flood-plain is able to be achieved to return to its natural flood-flow function, with substantially lessened impact on people, properties, and future economic and environmental recovery costs; and
- 4) Use of such recovered flood-plain area is gained for community-beneficial purposes that are also flood-resilient in their nature, but allow greater community connection with the river.

Secondly, having identified such reconstruction areas and quarantining property sales within Declared Areas to other than the QRA, to prepare and publicise its preliminary 'Principles for Community Reconstruction' for each such Area. These would be subject to further community consultation but could include such matters as the following:

- A general intent to relocate most flood affected development, roads and infrastructure services from the relevant flood-plain area;
- All land within the Declared Area to be acquired as State Land, with property owners and mortgagors to be compensated by a combined package of cash payment (based on pre-flood values adjusted for insurance recovery and mortgage liability), and/or the offer of alternative housing or business premises in the new community, or accepted other location – with interim accommodation pending availability; and/or the conversion of all or part of

the agreed value of the premises to an equivalent value of State-Guaranteed 'Reconstruction Bonds', that will derive their value from the new community development.

- To recover available fill material from the flood-plain, by way of 'compensatory cut & fill', to provide for an extension of flood-free, or substantially flood-free higher land around the perimeter of [or in some cases within] the flood-plain, for community reconstruction;
- The recovered flood-plain to be rehabilitated for flood-resilient, primarily community purposes, such as active and passive recreation; community gardens; appropriate cultural facilities and activities; and flood-resistant river transport facilities;
- Experienced private sector community development firms or consortia being invited to bid, on a 'fee for service basis', for the provision of:
 - a. 'Master Planning' design of the new community and associated infrastructure services and facilities and related flood-plain rehabilitation, to be undertaken via a consultative process and in accordance with the established principles for sustainable, balanced community development, with housing development at a higher development density than that of the replaced development area, and with required provision for affordable housing; together with related Community Development Codes, and
 - b. The design and construction of the future development parcels, roads, services and essential infrastructure for the new community area.
- The second part of the bid offer to be for a set quantity of 'Reconstruction Bonds' for the right to construct development on selected development parcels. It is not intended that the underlying land itself be sold but only the built development. The land is intended to remain in State ownership, but such could be subdivided and leased for extended terms for private house, or other purpose, construction – as applies in the ACT;
- The bonds acquired by the successful developer/bidder can either be used as collateral for the building construction, or on-sold to financial institutions, or held for subsequent gain in value as the development is sold or leased, or a combination of each. [This effectively provides for a lower 'up-front' cost of development];
- The accepted bid offer for the bonds sets a 'commercial' value for such. Part of the bonds retained by the State, as well as bonds comprising part of the compensation package for acquired properties in the Declaration Area, could also be offered by such holders to the wider investment market and, at a discounted rate, to Local authority and government agencies for use in infrastructure reconstruction;
- As the value of the redeveloped land rises over time, the bonds create a revolving source of funding for the State Government for further reconstruction and recovery purposes.

- In addition, by using a 'Tax Increment Funding' rating approach for the Declaration Areas [a relatively common rating technique for redevelopment areas used in the USA], such increase in land values is substantially quarantined for use in such Declared Areas for nominated works and services.

5.3 Other Considerations

As noted at the end of Table 1, of Section 4 of this submission, an extensive 'flood retreat' policy could involve catering from flood events over up to about 10m higher than the recent 2001 floods and even then such could not be guaranteed to provide absolute protection from flooding.

At the same time the potential for such higher flood events to occur also strongly suggested that a flood protection system based on levee banks and raised buildings would be totally inadequate to cater for the possibility of such future events – with the virtually certainty of major consequential failures of any such system, with major flooding and high loss of life of failed 'levee-protected' areas [as occurred with 'Katrina' in New Orleans, even though the cause of the flood even t was different].

It is recognised that the post-74 flood projection maps were based on 'pre-Wivenhoe' circumstances and subsequent assessment of Flood Regulation Lines took into account the protection provided by such dam. Nevertheless, the reality was that the downstream flood-plain of the Brisbane River came very close to a disastrous catastrophe in January 2011, had the storage volume increased by another 850mm in height or more and triggered to automatic charges for the rapid degradation of the emergency spillway. That this did not occur was as much a matter of fortuitous circumstance in lack of even heavier, sustained rainfall in the key catchments areas, or follow-up cyclonic conditions as occurred in 1893, as it was in the belated emergency releases of flood waters when they did occur.

Figure 1: 2009 BIMAP Image – Oxley Station to Oxley STP



Figure 2: 2009 BIMAP Image – Oxley Station to Oxley STP with 5m contours added





Figure 4: Previous image with semi-transparent overlay image of January 11, 2001 flood



Figure 5: NearMap Image 13 January 2011 – showing Oxley Station area and approximate flood limit of 11/1/2011



Figure 6: BIMAP image of Oxley Station area showing approximate flood limit & 1m contours



Figure 7: Previous image with overlay extract from BCC 1974 Flood Map 7, showing pre-Wivenhoe flood frequency projections. [Note: January 2011 limit coincides approximately with RL 9m contour & '1:28year' limit]

