Australian Institute of Architects

Submission to the

COMMISSIONS OF INQUIRY ORDER (No.1) 2011

Response to the 2010 / 2011 Queensland Floods

SUBMISSION BY

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PURPOSE

• This submission is made by the Australian Institute of Architects (the Institute) to the Commissions of Enquiry Order (No 1) 2011

• The author of this submission is the President of the Queensland Chapter of the Australian Institute of Architects , Associate Professor Peter Skinner FRAIA.

[redacted]

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INTRODUCTION

The Australian Institute of Architects is a not-for profit, independent, national, member-based organisation with approximately 11,000 members nationally and more than 1,700 members in Queensland. The Institute exists to:

• advance the interests of its members, their professional standards and contemporary practice, and

• expand and advocate the value of architects and architecture to the sustainable growth of our community, economy and culture.

The Institute actively works to maintain and improve the quality of our built environment by promoting better, responsible and sustainable design. In responding to the Commission of Enquiry the Australian Institute of Architects has drawn on the experience of members affected by the floods, and members involved in post-disaster aid through our subsidiary *Archicentre* and the not-for-profit organisation *Emergency Architects Australia.*

Due to the focus of Institute activity in South- East Queensland - this submission primarily addresses the events in the Bremer and Brisbane catchments. In this submission of the Queensland Chapter of the Australian Institute of Architects addresses the matters associated with the Queensland floods of 2010/2011 identified as:

> *g) all aspects of land use planning through local and regional planning systems to minimise infrastructure and property impacts from floods.*

EXECUTIVE SUMMARY

We wish to recommend consideration of the following issues in future land use planning:

1. Investigate the feasibility of floodgates at the mouths of Brisbane suburban creeks.

2. Monitor and severely limit construction in the flood-prone river course.

3. Reconsideration of the design of City Cat Terminals.

4. Utilise 2011 flood heights as the new Design Flood Level.

5. Locate electrical and mechanical plant and egress above Design Flood Level.

6. Allow relaxation of 8.5m residential height limits.

7. Permit some habitable rooms to be built below Design Flood Level.

8. Consider higher density usages to stimulate rebuilding perimeters of flood plains.

9. Make Flood Levels Visible to Future Residents

10. Disclosure of flood risk and insurance implications

11. Investigate the use of green infrastructure for flood and drought resilience

DETAILED SUBMISSION :

1. Investigate the feasibility of floodgates at the mouths of Brisbane suburban creeks.

Immediate post-peak aerial photography from 13 January reveals that some vast areas of suburban flooding were the result of riverine flooding rising back through relatively small creek-mouth openings. This phenomenon was particularly apparent at the mouths of Oxley Creek, Western Creek, Norman Creek and Breakfast Creek.

In the January Brisbane floods, very little local rainfall was recorded in the catchment of Brisbane's suburban creeks in the two days prior to the impact of the riverine flood peak, suggesting that relatively small floodgates at the mouth of these creeks may have provided sufficient flood control to have saved thousands of properties from inundation.

On Oxley Creek, approximately 1500 hectares of land was inundated through the mouth of the creek at Pamphlett Bridge. (Fig 1) From aerial photography it appears that a low levee bank predominantly in parkland, combined with operable floodgates beneath elevated bridgework could have prevented the influx of riverine floodwaters. A low landscape berm around 500 metres long would have been sufficient to link the high land west of the creek on Graceville Avenue to the high land at King Arthur Terrace east of the creek. (Fig. 2, 3)

Western Creek is an even more obvious candidate for the installation of floodgates. The much-televised floodwaters that inundated the southern part of Milton, Rosalie and Auchenflower all came through a very small culvert section under the John Oxley Centre on Coronation Drive, less than 100m2 in area. (Fig 4. Fig 5.) Norman Creek and Breakfast Creek likewise have a narrow mouth to the Brisbane River that would make them appropriate for riverine flood-gates.

It is acknowledged that the floodgate approach will only succeed in occurrences where the rate of water flowing up from the river exceeds the flow-rate down the local creek catchment, as occurred this year. In occurrences where heavy local rainfall continues during the period of the approach of the riverine flood peak, the use of floodgates would be generally less successful though it would still allow a limited defence against peak tides.

To support this strategy, stormwater systems that discharge directly into the River rather than the Creek would need non-return valves or manual control to close alternate entry routes for river water. Where levee banks are utilised to strengthen a barrier to the river, careful design would be needed to ensure these barriers did not impede downstream flash-flood flow from the creek. A further consideration is the possibility of increased downstream flooding if the water volumes of the Creek floodplains were not retained. A subjective comparison of stream speed at the mouths of the side creeks compared to the stream flow in the river course suggests that reduction of the diversion of floodwaters into creek catchments would have only a minor impact on downstream flooding.

An additional and very significant benefit of the introduction of measures to mitigate against riverine flooding would be the clarity that it could give to householders and insurers with regard to the identification of the source of inundation in many cases.

2. Monitor and severely limit construction in the flood-prone river course.

Between 2006 and 2008, both Brisbane City Council and the Queensland Government supported the North Bank project by Brookfield Multiplex that proposed seven towers on 4.5 Hectares of

platforms extending up to 90 metres in to the city reach of the Brisbane River. Had the Government not withdrawn support for this project in October 2008, a very large contingent of construction barges, pile drivers cranes and associated building structures would have been at work in the zone immediately upstream of the Goodwill Bridge at the time of the 2011 flood. The proposed deck itself would have been below the flood level, and the risk to upstream flooding and downstream debris impact could have been great.

In the Enquiry by Design established by the Department of Infrastructure and Planning in 2008, it became clear that since the 1974 floods there had been significant incursions into the river course by extension of the South Bank waterfront, floating and permanent river-walk structures, the permanently fixed 'Drift' , formerly 'Oxley's' restaurant, the City Cat terminals and innumerable private pontoons, in addition to the addition of major pedestrian, rail, bus and vehicular bridges. While the Q100 flood level had been recalibrated following the extensions to Wivenhoe dam, it appeared that the flood impacts of subsequent incursions into the river course had not led to a discipline of subsequentregular re-evaluation of flood risks.

In rebuilding after the floods, any incursion into the river-course needs rigorous scrutiny, and non-essential and potentially dangerous structures such as 'Drift' or 'The Island' need to function as genuine floating structures that can be towed to anchorage in the bay at times of flood warning.

3. Reconsideration of the design of City Cat Terminals.

The survival of the Riverside City Cat terminal demonstrates the benefits of arranging floating walkways to the ferry pontoons, parallel to rather than perpendicular to the current. When rebuilding terminals, wherever there is sufficient depth of water for the draught of the boats, floating walkways should be designed parallel to the bank running downstream from the terminal so that walkway connections remain in structural tension rather than shear during a flood event.

4. Utilise 2011 flood heights as the new Design Flood Level.

The Australian Institute of Architects endorses the Interim Design Flood Level proposed by the Brisbane City Council and Ipswich City Council Joint Task Force of the recorded 2011 flood levels plus 500mm freeboard.

Every flood is unique in its rainfall distribution in the catchment and the bathymetric profile of our river systems and the run-off characteristics of our cities continue to vary due to man-made and natural causes. The complex tasks of modeling the probable 1 in 100 or 1 in 50 year events and undertaking the actuarial calculation of the potential impacts of such floods are bedeviled with unknowns and uncertainties.

During this year's flood event the peak heights of the 1974 flood were still very well known by long term residents and precisely identified on local buildings and landmarks. As a deeply imbedded memory the height of this past event carried much greater psychological importance than the expertly recalibrated Q100 level adjusted after the Wivenhoe Dam alterations, and more personal significance than the numerically described flood height prediction relative to the Brisbane City Gauge.

Residents have experienced the 2011 flood, and it would now be inappropriate to set any future design height below that level, regardless of the outcome of more sophisticated probability studies as to its predicted return period.

5. Locate electrical and mechanical plant and egress above Design Flood Level.

Significant damage to electrical and mechanical gear occurred when the equipment was located in ground floor and basement levels that flooded. In many cases, enforced evacuation of buildings and extended loss of productivity arose because of the inability to restore power to upper floors while basements were flooded, or because equipment was water-damaged.

In multi-storey structures electrical substations and switch gear should be located above flood level. Electrical services to the floors above flood level should be isolated from those below this level, and designed to allow rapid reconnection to available power supply following floods.

Where possible, consideration should be given to the design of at least one elevator to continue to function above flood levels in the event of flooding. In residential buildings where egress occurs at or below the Design Flood Level an additional emergency egress point should be provided at the floor level above.

6. Allow relaxation of 8.5m residential height limits.

Maximum residential building height restrictions should be relaxed where they would otherwise prevent the raising of existing buildings above the new Design Flood Level. Allowance for houses with two storeys of habitable space above car parking should be permitted on residential sites that were inundated by a depth equivalent to one storey or less.

7. Permit some habitable rooms to be built below Design Flood Level.

Some more nuanced considerations as to the impacts of flood inundation on the habitable sections of housing should be considered. Where residential sites and houses were inundated, the severity of the property damage impacts varied greatly according to the house form.

In single storey houses that had floodwater inundation, residents needed to ferry precious possessions away from the house prior to the flood and many lost furniture, appliances and valuables. Following the flood damaged linings and cabinetwork were stripped out and affected residents needed to find short-term accommodation while repairs were undertaken, often severely disrupting schooling and family routines.

In those houses where the floor level was elevated above the waters, the flood had a significantly lesser effect on residents, with generally only minor impacts on carport, workshop or similar utility spaces and the garden

In two-storied houses where only the lower floor was inundated, in the warning period prior to the flood, residents had greater opportunity to save valuable possessions by moving them to the upper level. Following the flood, half of the house or more remained undamaged, allowing residents to return to live on site while repairs were undertaken, minimizing the cost and disruption of relocation.

For people rebuilding or renovating in flood-prone areas, elevated or 'high-set' houses provide the best protection for property in the event of flooding. However, entry by staircase to high-set houses makes it very difficult to achieve the equitable access requirements of 'universal housing' that enables residents to 'age in place'. Principles that encourage enable barrier-free access for residents and guests with temporary or permanent mobility impairment support an argument that would allow at least some of the habitable spaces within a house to be built at or near ground level.

For this reason we would encourage some flexibility in the application of the Design Flood Level as the lowest height of habitable rooms. Allowing a proportion (say one-third) of a house to be built below the DFL could significantly improve the quality of life of residents through all phases of life while significantly reducing the impacts of floods.

A second possible possible relaxation could be given for use of flood resilient materials in lower levels below the flood line. This may involve the use of materials that can cope with inundation, such as concrete, or the use of methods of construction that allow effective post flood cleaning, through disassembly and reassembly. Separating electrical switching for different levels may also need to allow for early reoccupation after floods.

8. Consider higher density usages to stimulate rebuilding perimeters of flood plains.

On sites at the edge of the suburban creek plain that are at risk of repeated flood events, consideration should be given to rezoning of residential uses to allow three-storied townhouse construction or three to four storied multi-residential units.

Currently, there are small houses on many of these sites that have been flooded on several occasions, with serious loss of resale value, a lack of insurance cover and often difficulties in obtaining finance to rebuild or repair. 'Up-zoning' of these sites may stimulate economically feasible redevelopment at a higher density.

In multi-residential building types it will be easier to ensure the lower floor of building is maintained for car-parking, and it may be possible to use earth berms between garage structures to contribute to a local levee system at the edge of suburban creek zones.

In non-flood times, the suburban creek system provides high residential amenity with open landscape space, walking and cycle paths and often easy access to rail or ferry routes. For these blocks that look onto open space, there will often be neighbours only on one side to be affected by the increased building height. The rates base that could come from up-valuing of the creek-front neighbours could help to fund needed parkland improvements that could benefit all.

These strategies for economic uplift and increased residential densities on these relatively low-cost sites should be considered in the light of South-East Queensland Regional Plan requirements for provision of substantial infill housing in our cities, and demand for affordable housing options.

9. Make Flood Levels Visible to Future Residents

For all buildings that suffered inundation, or for any buildings rebuilt within the existing flood plains, a small permanent marker should be mandated beside the front door to indicate the depth of inundation. Such a marker would be visible to all future residents and tenants. This

could be an important physical reminder of flood events that would communicate in a way that reference levels on a title plan cannot.

10. Disclosure of flood risk and insurance implications

There needs to be a recognition by the community that the ownership or development of property with close proximity to historic flood levels and potentially more severe flood risk presents a greater loss risk to the public purse. It seems inequitable that, in the most recent event, public funds were used to assist of uninsured property-owners, while those with insured properties received substantially reduced assistance.

11. Investigate the use of green infrastructure for flood and drought resilience

Green infrastructure (the return to ecological health of our water catchments) has the potential to influence the future planning of neighbourhoods in terms of flood and drought resilience, reduced cost of infrastructure upgrades necessary for increased densities and inherent ecological benefits. More permeable ground surfaces in our cities can help to recharge groundwater, restore life to revegetated and running watercourses and moderate and cleanse rapid storm runoff.

CONCLUSION

The Queensland Chapter of the Australian Institute of Architects submits the above comments for consideration by the Enquiry and offers its further assistance, including willingness to appear before the Enquiry if required.

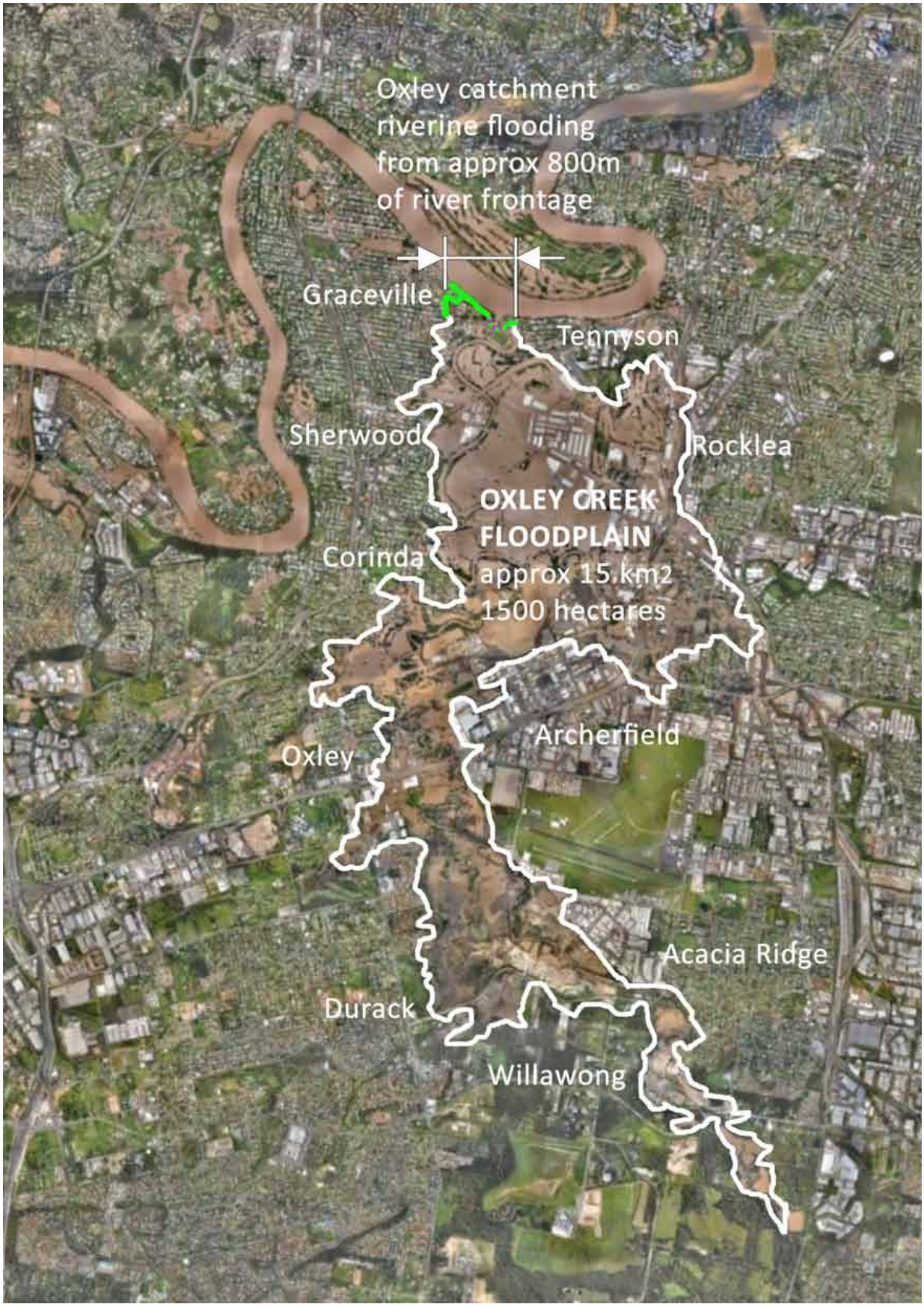

FIGURE 1: Extent of Oxley Creek Flood Plain *(P. Skinner after Nearmap Aerial Image, Jan 14, 2011)*

FIGURE 2: Mouth of Oxley Creek Flood Plain *(P. Skinner after Nearmap Aerial Image, Jan 14, 2011)*

FIGURE 3: Possible Levees & Floodgates Oxley Creek *(P. Skinner after Nearmap Aerial Image, Jan 14, 2011)*

FIGURE 4: Flooding in Western Creek catchment *(P. Skinner after Nearmap Aerial Image, Jan 14, 2011)*

FIGURE 5: Possible Floodgate location at mouth of Western Creek *(P.Skinner)*