

# TOWN PLANNING REPORT

## Planning Aspects of Alternative Approaches to Mapping the Effect of Flood

10 November 2011

DEVELOPMENT PROCESSES  
STRATEGIC PLANNING  
SPECIALIST PLANNING

**QFCI**

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## **1.0 INTRODUCTION**

**1.0.1** The Queensland Floods Commission of Inquiry (the Commission) has engaged the author of this report, Greg Vann, to give advice and opinion on different ways of mapping flood risk. This report is the outcome of this work.

**1.0.2** My curriculum vitae is attached as Appendix A.

### **1.1 Scope of Work**

**1.1.1** The scope of work provided by the Commission is set out below:

1. A description of the different ways of mapping the effect of flood, including, for example:
  - a. Q100;
  - b. Other design floods of different AEP;
  - c. Zones of risk in terms of likelihood or hazard;
  - d. Whole of floodplain maps;
  - e. Historical flood events;
  - f. Queensland Reconstruction Authority interim floodplain maps.
2. The advantages and disadvantages of using each mapping option (as discussed in response to topic 1) as a planning tool in a planning system. This may go to, but not be restricted by, the following examples: public understanding, ability to make proper assessment of flood risk in development assessment decisions, ability to make proper assessment of flood risk in planning scheme preparations, flexibility in how the map is used in the planning scheme, cost, time required etc.
3. Opinion as to the most appropriate option or options (as discussed in response to topic 1) for Queensland local government areas, including comment as to whether, and why, particular options are more appropriate for particular areas (for example on the basis of topography, population density, population pressures etc).
4. Opinion as to the most appropriate way to trigger development controls in a planning system for areas mapped as flood affected. This may go to, but not be restricted by, the options discussed in response to topic 1, the most appropriate way to incorporate such triggers into existing Queensland planning schemes and planning schemes prepared pursuant to the Queensland Planning Provisions (version 3) under the Sustainable Planning Act 2009 (Qld) ('SPA'), or the referral of a development application to a referral agency as defined under the SPA.

- 1.1.2** From the work undertaken to compile this report, it is considered that the range of options identified in the above scope of works reasonably reflects the range of approaches typically used in planning in Queensland to identify flood risk. For completeness, the report also examines the conceptual approach set out in the report on Floodplain Management in Australia: Best Practice Principles and Guidelines by the Standing Committee on Agriculture and Resource Management<sup>1</sup> (the SCARM report).
- 1.1.3** This report sets out firstly the planning context for consideration of this issue, both in terms of first principles and the evolution of the Queensland planning system to date in dealing with this issue. It then describes each of the identified ways of mapping the effect of flood; considers briefly the advantages and disadvantages of each; and finally sets out the thoughts and opinions of the author in respect of the matters identified in paragraph 4 of the scope of work.

## **1.2 Assumptions and Limitations**

- 1.2.1** My expertise is as a town planner, and I acknowledge that identifying and analysing the information required to map the effects of flooding requires other expertise, particularly hydrology and hydraulics. I am not an expert in the technical analysis underpinning the process of preparing these different ways of mapping the effects of flood, but have dealt with information of this nature over my career in preparing planning schemes and in the assessment of development proposals. Consequently, this report is directed to the implications of incorporating the different ways of mapping of the effects of flood into our planning system.
- 1.2.2** For the purpose of preparing this report, I have been asked to assume that the information is available to allow the preparation of the various ways of mapping the effect of flood so that the mapping of each option is assumed to be available.
- 1.2.3** It is also assumed that any such flood mapping will have factored in the implications of factors such as climate change, on the flood levels so mapped; and that the mapping would account for different types of flood events (for example, river and local flooding).
- 1.2.4** The report also assumes that reference to likelihood of flooding relates to measures such as Annual Exceedance Probability; while reference to hazard of flooding takes into account issues arising from the depth and velocity of flood waters in particular events.
- 1.2.5** While not expert in the analysis involved in establishing this information and mapping, I understand it can be complex and substantial, so that the preparation of at least some of these mapping options can be very costly. This aspect is considered in general terms in the assessment of options and opinions expressed in this report but could be informed further by those with expertise in that work.

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<sup>1</sup> Floodplain Management in Australia: best practice principles and guidelines" Report 73 of the Standing Committee on Agriculture and Resource Management 2000.

- 1.2.6** Finally, I acknowledge that flood management and the role of the statutory planning system in that context raise a wide range of issues and complexities which require both a range of professional expertise and appropriate community involvement to properly consider.
- 1.2.7** The report is therefore offered as input from an experienced town planner as a contribution to assist the Commission in its work.

### **1.3 Overview of Approach**

- 1.3.1** From a town planning perspective, dealing with flooding is in essence an exercise of risk management, as each flood event is unique and the adopted standards that underpin different ways of mapping its effect generally reflect differing approaches to striking an appropriate balance between the risk of flood and the implications for the communities it affects. The SCARM report describes this in the following terms:

*“Flood management is inevitably a compromise – trading off the social, economic and ecological costs and benefits of conducting certain activities on the floodplain against the risk, hazard and adverse consequences to these activities caused by flooding. The management of risk and hazard, however, is essential to responsible floodplain management. All best practice principles outlined in this document are aimed at better managing flood risk to optimise society’s safe and sustainable use of Australia’s floodplains in a cost-effective and ecologically responsible manner.”<sup>2</sup>*

- 1.3.2** The Joint Expert Statements provided to the Commission on Brisbane and Bremer River flood frequency both acknowledge that *“characterising flood behaviour over the full probability domain is an essential requirement for sound risk-based planning and management”* and that this involves balancing the costs of flooding against the costs of protection, where costs is defined in a broad sense, so as to include social, economic and environmental costs.<sup>3</sup>
- 1.3.3** Most cities and towns in Queensland, as elsewhere, are located on floodplains for historical reasons including matters such as transport, access to productive soils and amenity considerations. They will be subject to flooding from time to time, so that it is a matter of managing that risk in a way that best reflects the community’s values in relation to the economic, social and environmental effects of flooding.
- 1.3.4** It is also understood that mapping and managing the effects of flood is complex because of the widely varying range of circumstances that apply in each place.
- 1.3.5** This report focuses on the practical implications from a planning perspective of mapping effects of flood. It is founded on a “first principles” approach to the rationale for town planning, the role of planning in our society and its context in the evolving planning system in Queensland. It examines the town planning context of different ways of mapping the effect of flood and their implications for the planning system in the State.

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<sup>2</sup> SCARM report Executive Summary p xii.

<sup>3</sup> Queensland Flood Commission of Inquiry: Joint Expert Statement Brisbane River Frequency and Joint Expert Statement Bremer River Frequency, both dated 25 October 2011.

## **1.4 Terms Used**

**1.4.1** The report uses a number of acronyms common in considering the effects of flood, including the following:

- DFE – Defined Flood Event
- AEP – Annual Exceedance Probability;
- PMF – Probable Maximum Flood;
- Q... – eg. Q100 – an alternative expression of AEP, with Q100 being 1% AEP;
- ARI – Average Recurrence Interval; and
- AHD – Australian Height Datum.

**1.4.2** They are used here in their general meaning in this field, for example, as reflected in reports by the SCARM and State Planning Policy 1/03 “Mitigating the Adverse Impacts of Flood, Bushfire and Landslide” (referred to elsewhere in this report).



## 2.0 THE ROLE OF TOWN PLANNING

### 2.1 Objectives of Town Planning

**2.1.1** The objectives of town planning have evolved over time and place in response to changing community values, social concerns, technological change and advances, and other socio-political and economic agendas of the day. At various times in history, planning has focussed on health and sanitation, aesthetics and amenity, military defence, traffic movements, disaster recovery and various other social, economic and environmental imperatives.

**2.1.2** There will be many opinions about the basic objectives of town planning and many ways of explaining similar concepts. From my perspective, its modern practice involves the physical / spatial organisation of our communities to meet the following broad objectives:

- ***Sustainability - the optimum balance of environmental, social and economic outcomes:*** This can be thought of as facilitating economic activities and development; creating a sense of community and opportunities for social interaction and social cohesion; and respecting environmental values and ecological processes, balanced in a way that meets the needs of the current population without compromising the needs of future generations;
- ***Use of resources:*** The wise use of resources to achieve the greatest degree of community benefit within available means. This includes particularly the appropriate use of land in recognition of its capability, including its environmental and natural resource values;
- ***Relationship between land uses:*** The separation of incompatible land uses and the association of mutually beneficial uses;
- ***Accessibility:*** The promotion of accessibility from homes to work places, shops, facilities and services; and from industry to labour, power, raw materials etc;
- ***Provision of services:*** The provision of services (utilities, transport, communication, social and environmental services) to communities consistent with appropriate levels of service;
- ***Creation of desirable places:*** The creation of places, including the design of buildings and the public realm, where people want to live, work and be (including the carrying out of development in an aesthetically pleasing manner);
- ***Health and safety:*** The location and design of development in a way which promotes community health and minimises potential harm to people, property and infrastructure;
- ***Transparency and community confidence:*** Providing publicly available planning documents that bring together these objectives in a set of provisions which promote understanding and confidence about the outcomes sought.

**2.1.3** These objectives do not always work towards the same direction, so that the planning process often requires balancing competing objectives. For example, dealing with the effect of flood might require a balance between the wise use of resources and striking an appropriate level of safety. Good planning will address all these considerations consistent with community values and the public (rather than individual) interest.



- 2.1.4** Several of these objectives are directly relevant to considering how to deal with mapping the effect of flood, particularly those about health and safety, resource use, transparency and community confidence, and the overarching objective of sustainability.

## **2.2 The Planning System**

- 2.2.1** In Australia, and in many other developed countries, the primary statutory instrument by which local areas are planned is a document prepared primarily by the relevant local government, usually known as the planning scheme. There are often higher level planning instruments, prepared at a regional or state level, which are required to be reflected in the planning scheme.
- 2.2.2** These planning instruments are normally prepared in accordance with the relevant legislation promulgated by a higher level of government, which currently in Queensland is the Sustainable Planning Act 2009. That Act sets out a range of planning instruments, including state planning policies, regional plans and planning schemes. While all have a statutory role, it is the planning scheme that is required to bring together requirements into a locally specific instrument to guide and regulate development in that area.

## **2.3 The Evolution of the Queensland Planning System in relation to Flood**

### **(a) Context**

- 2.3.1** The Queensland planning system has been the subject of changing legislation, initially commencing in a substantive way through provisions in the 1936 Local Government Act (LG Act), which were superseded by the Local Government (Planning and Environment) Act 1991 (LGP&E Act), then the Integrated Planning Act 1997 (IPA) and the current legislation the Sustainable Planning Act 2009 (SPA).
- 2.3.2** It is considered that the change from the LG Act to the LGP&E Act was a useful refinement and expansion of the original planning system, including for the first time statutory recognition of a state role through state planning policies. The change to the IPA represented a major reform involving fundamental changes to the planning system. This reform was carried further through the SPA. In particular, the IPA and the SPA provide for statutory instruments such as state planning policies and regional plans (initially through voluntary arrangements and later through statutory means), and a new system of development assessment known as the Integrated Development Assessment System (IDAS), which enables statutory triggers for referral of applications to agencies for their requirements or advice on particular matters. Those triggers often flow from other related legislation and/or state planning policies.
- 2.3.3** For many years, up to 2003, the matter of dealing with flood and its effects from a town planning perspective was left to the individual local governments who had primary responsibility for preparing planning schemes for their area. This resulted in each individual local government choosing to address the issues in its own way, according to its overall priorities (recognising that planning schemes need to deal with a wide range of matters), availability of resources and its understanding of flood risk. Although these planning

schemes were subject to oversight and final endorsement by the State Government, there was little consistency of approach in dealing with flood and the State had no policy position enunciated in this respect.

- 2.3.4** To support the reforms introduced by the IPA, the State Government produced templates for planning schemes, which introduced the concept of overlays as a means of dealing with particular values or constraints which do not follow property (cadastral) boundaries and which can affect the zone-based development provisions that apply to individual allotments of land. This concept has been carried through into the current planning system, as discussed further below.

**(b) State Planning Policy No. 1/03 “Mitigating the Adverse Impacts of Flood, Bushfire and Landslide” (“SPP 1/03”)**

- 2.3.5** In 2003, the introduction of the SPP1/03 represented the first statutory planning instrument setting out the State’s interest in ensuring that natural hazards, including flood, are adequately considered when making decisions about development and in the preparation of planning schemes.

- 2.3.6** SPP 01/03 and its accompanying guidelines dated June 2003, were underpinned by a number of key concepts, including the following:

1. A position statement that “the Queensland Government considers that development should minimise the potential adverse impacts of flood, bushfire and landslide on people, property, economic activity and the environment”.
2. The need to identify “natural hazard management areas” (NHMA), within which minimising risk to the community from the natural hazard concerned would be a key consideration in development assessment and preparing planning schemes.
3. A position that, generally, the appropriate DFE for determining a natural hazard management area for flooding is the 1% AEP, while recognising it may be appropriate to adopt a different DFE depending on circumstances of individual localities.
4. Adopting a probable maximum flood as the DFE is generally impractical and probably overly cautious for the purpose of managing floodplain, land use and development.
5. Specific outcomes that development maintains the safety of people from floods up to the DFE, does not result in adverse impacts on people’s safety or the capacity to use the floodplain, minimises potential property damage from flooding, protecting against the risk of safety and environmental impacts of floodwater on hazardous materials, and the ensuring essential services infrastructure maintains its function during a DFE.
6. Setting out a recommended process for undertaking the natural hazard assessment for flooding, based largely on the process outlined in the “Floodplain Management in Australia: Best Practice Principles and Guidelines” by SCARM.
7. It may not be cost effective or practical to undertake flood studies for each locality or catchment area for areas that are not subject to significant development pressures, especially in small and/or low growth local governments, but that as a minimum the flood NHMA should address areas identified in the planning scheme as existing or proposed urban development, including rural residential development.

**2.3.7** Local governments in Queensland progressively prepared new planning schemes under the IPA since its introduction. While a small number of these were completed before the introduction of SPP 1/03, most were completed after its introduction.

**2.3.8** Research undertaken by others<sup>4</sup> indicates that currently:

- less than one quarter of the planning schemes in Qld (31 of 127) are considered to have appropriately reflected the flooding aspect of SPP 1/03;
- of those 31 schemes, 27 include a Natural Hazard Management Area including land identified by a DFE;
- 47 schemes include a mapped DFE – 24 over the whole planning scheme areas, and 23 over part of the planning scheme area;
- the Q100 event is the most commonly nominated flood hazard management area, being adopted exclusively in 34 Planning Schemes and partially in additional 30 planning schemes;
- the highest recorded flood was adopted exclusively as the applicable DFE in 35 (28%) of the reviewed planning schemes, and partially in an additional 15 schemes;
- planning schemes which reference the highest recorded flood as the DFE, generally include further guidance in relation to its spatial extent;
- a nominated flood hazard management area consistent with a Q50 flood event was identified exclusively in 4 planning schemes and partially in an additional 15 planning schemes;
- a further 3 planning schemes identified a specific height for the DFE which did not relate to a specific frequency of event;
- 34 planning schemes adopted a combination of flood events depending on the location of the site, the information available to determine a DFE and the proposed land use; and
- 21 of the planning schemes did not nominate a DFE.

**2.3.9** Where SPP 1/03 is not appropriately reflected in a planning scheme, then it remains a requirement in the assessment of development through the IDAS to take the SPP into account in that assessment.

**2.3.10** The accompanying guideline to SPP 1/03 also contains, at Appendix 5, guidance on devising detailed measures in planning schemes to support achievement of its intended outcomes, including for the NHRM, a table which sets out types of development that should be made assessable or self-assessable, the specific outcomes and particular solutions that could apply.

### **(c) Queensland Planning Provisions**

**2.3.11** A major innovation of the SPA was the introduction of the ability to adopt standard planning scheme provisions. These have been prepared by the State Government and are known as Queensland Planning Provisions (QPP). Several versions have been prepared with the current draft, Version 3, released for comment recently.

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<sup>4</sup> Draft Review and Analysis of Existing Queensland Planning Schemes – Flood Provisions, forming Annexure 13 to the Statement of Brendan John Nelson to the Queensland Floods Commission of Inquiry (exhibit 538).

**2.3.12** This version provides the opportunity to include an overlay dealing with flood hazard. It recognises that the purpose of an overlay is to address both State and local government interests by identifying areas that (amongst other things) are sensitive to the effects of development, or constrain land or development.

**2.3.13** QPP Version 3 contains a standard suite of overlays which are not mandatory, but if adopted, must be used in the form set out therein. The overlay for flood hazard indicates its application with the following statement:

*“Flood hazard*

*The flood hazard overlay deals with areas of land identified pursuant to the requirements of State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide. It may include the following areas of land identified within the local government area as:*

- *areas of land with flooding and inundation potential;*
- *overland flow paths identified locally.*

*It applies, at a minimum, to development that:*

- *increases the number of people living and working in the natural hazard management area, except where the premises are occupied on a short term or intermittent basis; or*
- *involves institutional uses where evacuating people may be difficult; or*
- *involves the manufacture or storage of hazardous materials in bulk.”*

**2.3.14** This version of the QPP also provides a suite of zones, from which planning schemes must select those that apply to each area. This include zones that could also have a role in dealing with flood, by limiting the range of development that can occur, such as the Rural and Limited development (constrained land) zones. The mandatory purpose statement for the latter zone indicates flooding as one of the constraints that could apply to land in the zone.

**(d) Temporary State Planning Policy**

**2.3.15** As part of the response to extreme rainfall events and flooding experienced in Queensland in the second half of 2010 and early 2011, the State Government has introduced a temporary State Planning Policy entitled “Planning for Stronger, more Resilient Floodplains” (“TSSP”). The effect of the TSSP is to suspend those components of SPP 1/03 requiring an NHMA for flood to be land inundated by a defined flood event and identified in a planning scheme, and in particular that the generally appropriate flood event for the DFE is the 1% AEP.

**2.3.16** The TSSP is intended to deal with and give effect to the matters which it suspends in SPP 1/03 by providing local governments with information necessary to determine the NHMA (flood) and adopt associated flood overlay map/s and code by way of amendment to their existing planning schemes. Those maps are discussed in section 3.6 below as the “Queensland Reconstruction Authority Interim Floodplain Maps”.

- 2.3.17** The TSSP is supported by a planning guideline, “Part 1 – Interim Measures to Support Floodplain Management in existing Planning Schemes”, which includes the rationale for the overall approach, the basis on which the interim floodplain assessment overlay maps are being produced, and includes an interim floodplain assessment overlay model code suitable for integration into existing IPA compliant planning schemes.
- 2.3.18** The documentation also indicates an intention that part 2 of this work would involve the preparation of standard planning scheme provisions and a flood study template to provide more detailed floodplain assessment guidance to Councils looking to prepare new planning schemes under the SPA.
- 2.3.19** In essence, the TSSP and supporting material are intended to provide a more standardised approach to flood risk mapping across the State, and respond to the need for such mapping in the many locations where none currently exists. The approach recognises that issues of cost and resource involved in producing such mapping makes it difficult to achieve if left to local government alone.
- 2.3.20** The TSSP and guideline also provide the opportunity for the local government to refine that mapping and to support its introduction into their planning schemes together with the codes based on the model provisions. If the proposed scheme amendments are generally consistent with the intention of the TSSP and guideline, these planning scheme amendments can be made as a minor amendment which allows for a simple and short process for their introduction.

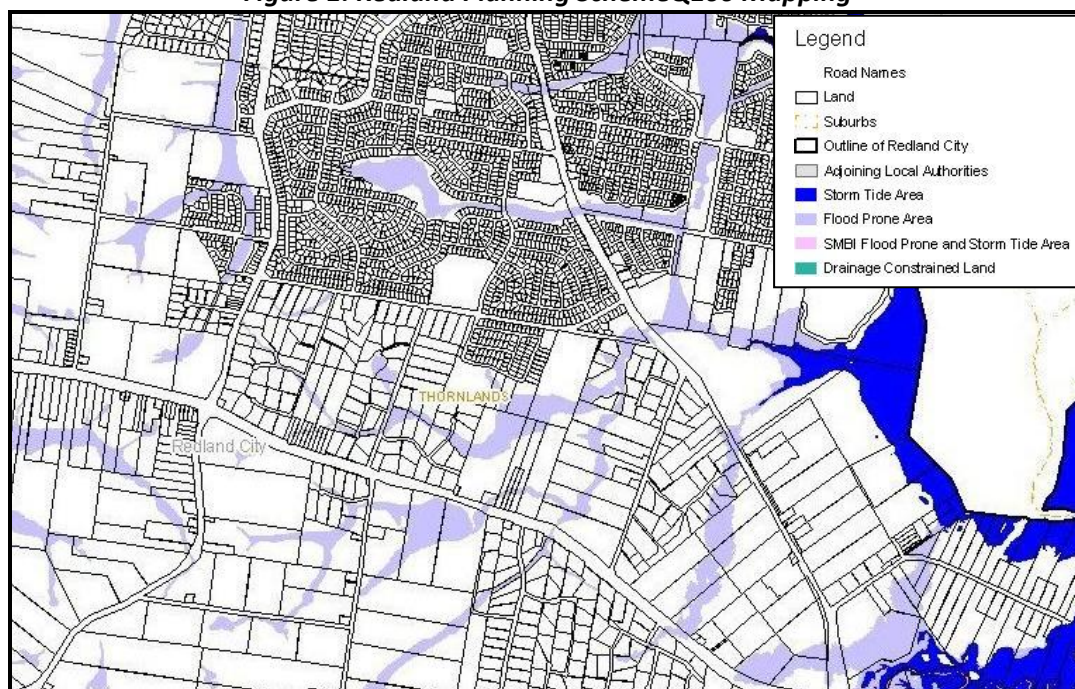
## 3.0 OPTIONS EXAMINED

- 3.0.1** The scope of work provided by the Commission identifies six different ways of mapping the effect of flood. A brief description of each of these is set out below, in terms of what each approach intends to map and how it would be mapped for the purposes of incorporation into planning instruments. This report also addresses the conceptual approach set out in the SCARM report on Floodplain Management in Australia: Best Practice Principles and Guidelines.
- 3.0.2** In each case, the mapping would need to be supported by planning provisions that set out the approach to dealing with land so mapped. Matters related to these provisions are considered in subsequent sections of this report.

### 3.1 Q100

- 3.1.1** This approach involves mapping, the defined flood event of 1% AEP, also known as the Q100, as a line on a cadastral information base. This is also referred to by an Average Recurrence Interval(ARI) of 1 in 100, giving rise to it being commonly called the 1 in 100 year flood, and this wording is often used in planning schemes. This terminology has implications about community understanding discussed in the next section of this report.
- 3.1.2** The mapping normally uses a cadastral base so that the extent of the Q100 flood event can be seen on individual properties. An example from the Redland Planning Scheme is set out below.
- 3.1.3** The Q100 is the most widely used standard and form of mapping in planning schemes to address the DFE and was the approach adopted by SPP 1/03 as generally the appropriate DFE until the introduction of the recent TSSP.

**Figure 1: Redland Planning Scheme Q100 Mapping**



**Notes:**

- (1) The light blue coloured area is the indicative and approximate area flooded in a nominal 1% AEP (100 year average recurrence interval) ) flood.
- (2) The dark coloured area is the indicative and approximate area under water in the 1% AEP storm tide.
- (3) Other overlays may be seen using a similar procedure.

Again, this information is indicative only and for official advice in writing (for legal, valuation, loan purposes etc) contact the Council's Stormwater Management Engineer.

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November 2011

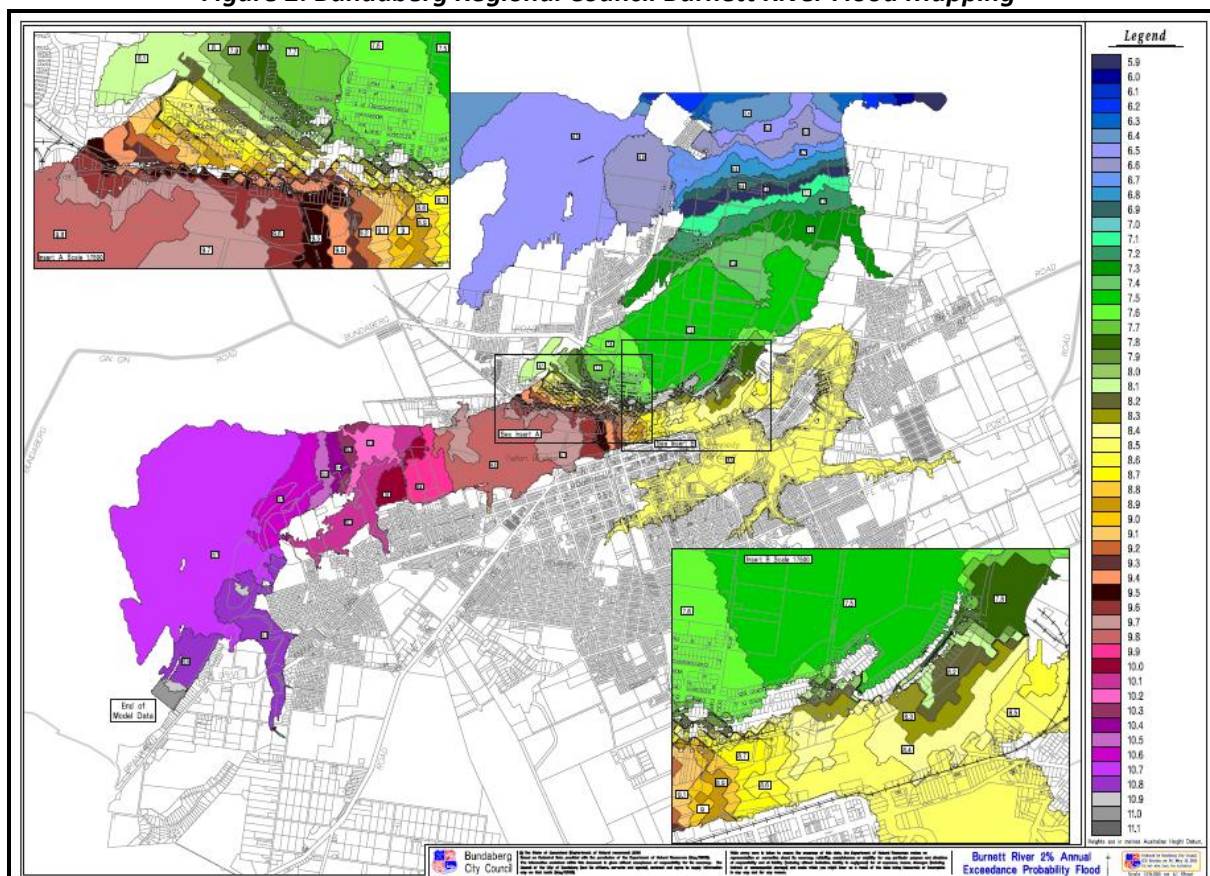
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### 3.2 Other Design Floods of Different AEP

- 3.2.1** This would involve adopting a different AEP to the 1% (Q100). In some planning schemes, 2% (Q50) and 5% (Q20) have been used either as the DFE or for other purposes eg. to denote land uses considered appropriate within each category of flood risk.
- 3.2.2** This mapping would take the form of depicting the chosen AEP on a cadastral base, so that understanding can be gained about the level of flood risk on individual allotments. It would also need to be supported by scheme provisions setting out a policy approach and development and building controls.
- 3.2.3** The figure below is an example from Bundaberg Regional Council. (Note: The colours on the map refer to Australian Height Datum, which would not be necessary for this mapping)

**Figure 2: Bundaberg Regional Council Burnett River Flood Mapping**

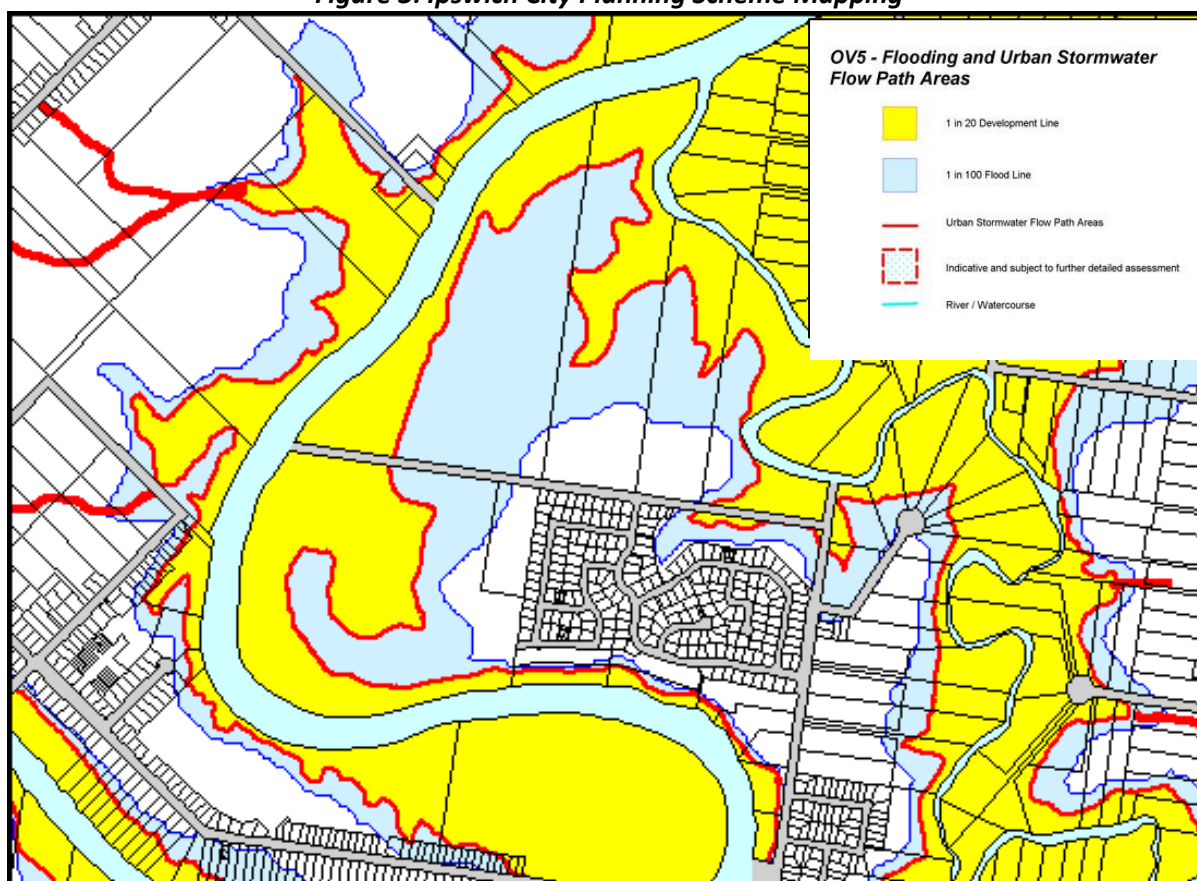




### 3.3 Zones of Risk in Terms of Likelihood or Hazard

- 3.3.1** The report assumes that reference to likelihood of flooding relates to measures such as Annual Exceedance Probability; while reference to hazard of flooding takes into account issues arising from the depth and velocity of flood waters in particular events.
- 3.3.2** This mapping would involve a more finegrained portrayal of the risk associated with different flood events, both in terms of their likelihood (which would be expressed as AEP) or the extent of hazard, for example whether flood waters are likely to be fast moving or stationary. This option could also be considered to include both approaches, so that the mapping would depict both the likelihood and hazard involved with different DFEs.
- 3.3.3** This mapping would need to be expressed through a series of categories which involve either different levels of likelihood (AEP), different levels of hazard or both. It might be portrayed through coloured mapping for different categories, or through two separate maps - one denoting likelihood and one denoting hazard (although the practicality of producing this type of mapping is a matter for relevant flood experts).
- 3.3.4** Ipswich City Council's planning scheme contains mapping of both the 1 in 20 and 1 in 100 flood lines as shown in the figure below. It is one example of this type of mapping with two "zones" of flood likelihood. The mapping does not document the velocity of flood waters.

**Figure 3: Ipswich City Planning Scheme Mapping**



### **3.4 Whole of Floodplain Maps**

- 3.4.1** It is understood that this would involve mapping the whole floodplain, which in effect is the Probable Maximum Flood (PMF). It would be extensive over any floodplain area.
- 3.4.2** Again, it would be expressed as a line delineating the probable maximum flood on a cadastral base. As discussed elsewhere, the QRA mapping discussed below might be indicative of such mapping.

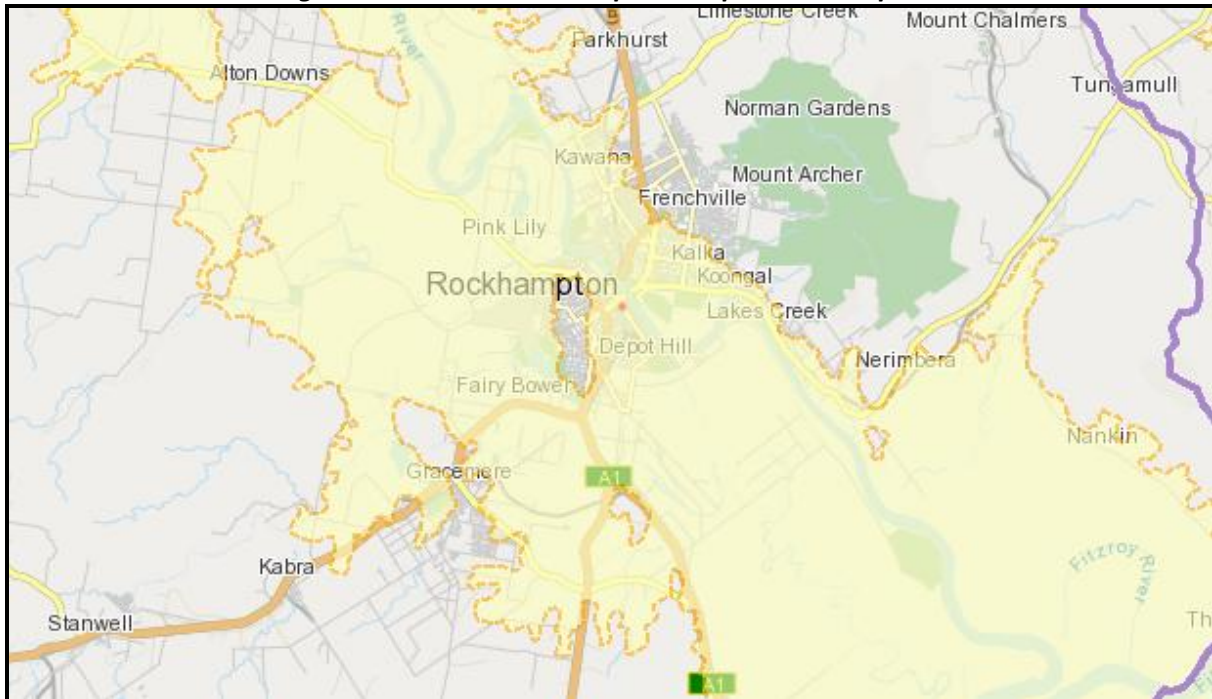
### **3.5 Historical Flood Events**

- 3.5.1** This mapping would document the levels of various floods recorded in a local government area over time. For example, for Brisbane, it could involve flood events in 2011, 1974, 1893 etc
- 3.5.2** It would be expressed as a map with lines delineating each flood event.

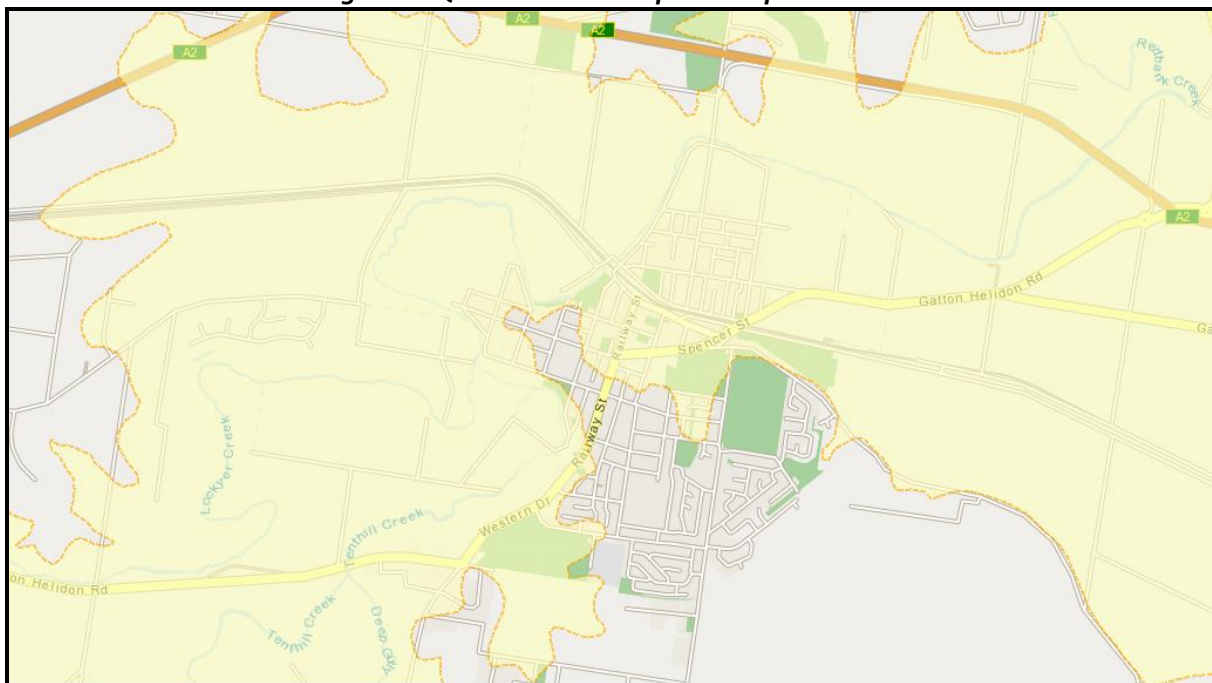
### **3.6 Queensland Reconstruction Authority (QRA) Interim Floodplain Maps**

- 3.6.1** These maps have been produced by the QRA as part of its work on “Planning for Stronger, more Resilient Floodplains” and are explained in a publication by that name incorporating “Part 1 – Interim Measures to Support Floodplain Management in Existing Planning Schemes” released in September this year as a supporting guideline to the TSSP, as discussed in section 2.3(d) of this report.
- 3.6.2** The interim flood mapping is based on a range of datasets (contours, land set inventory, gauging stations, 2011 aerial photography of flood extent) and is mapped through a digital database available on [www.qld.gov.au/floodcheck](http://www.qld.gov.au/floodcheck) and also produced in map books in both electronic and hardcopy format. It is understood that this mapping does not represent a particular AEP or DFE, but is broad scale mapping of areas subject to flood risk. The Guideline makes some reference at a table on page 9 about, after review by the local government, “potential to adopt as equivalent to the Probably Maximum Flood defined at Sub-Basin level”, but it understood the mapping does not generally reflect PMF.
- 3.6.3** The information is mapped as a line, within which the flood affected area is coloured, and operates on a cadastral base and/or aerial photography. The web site involves an interactive lot on plan search which allows a search to be undertaken on individual lots to depict the floodplain map area affecting an individual property.
- 3.6.4** The mapping is intended to provide a basis for adoption of a NHMA (flood) under SPP 1/03, as an overlay in the planning scheme, which would trigger the associated code provisions based on those set out in the guideline accompanying the TSSP discussed above.
- 3.6.5** Two examples of this mapping are set out in the figures below.

**Figure 4: QRA Interim Floodplain Map – Rockhampton**



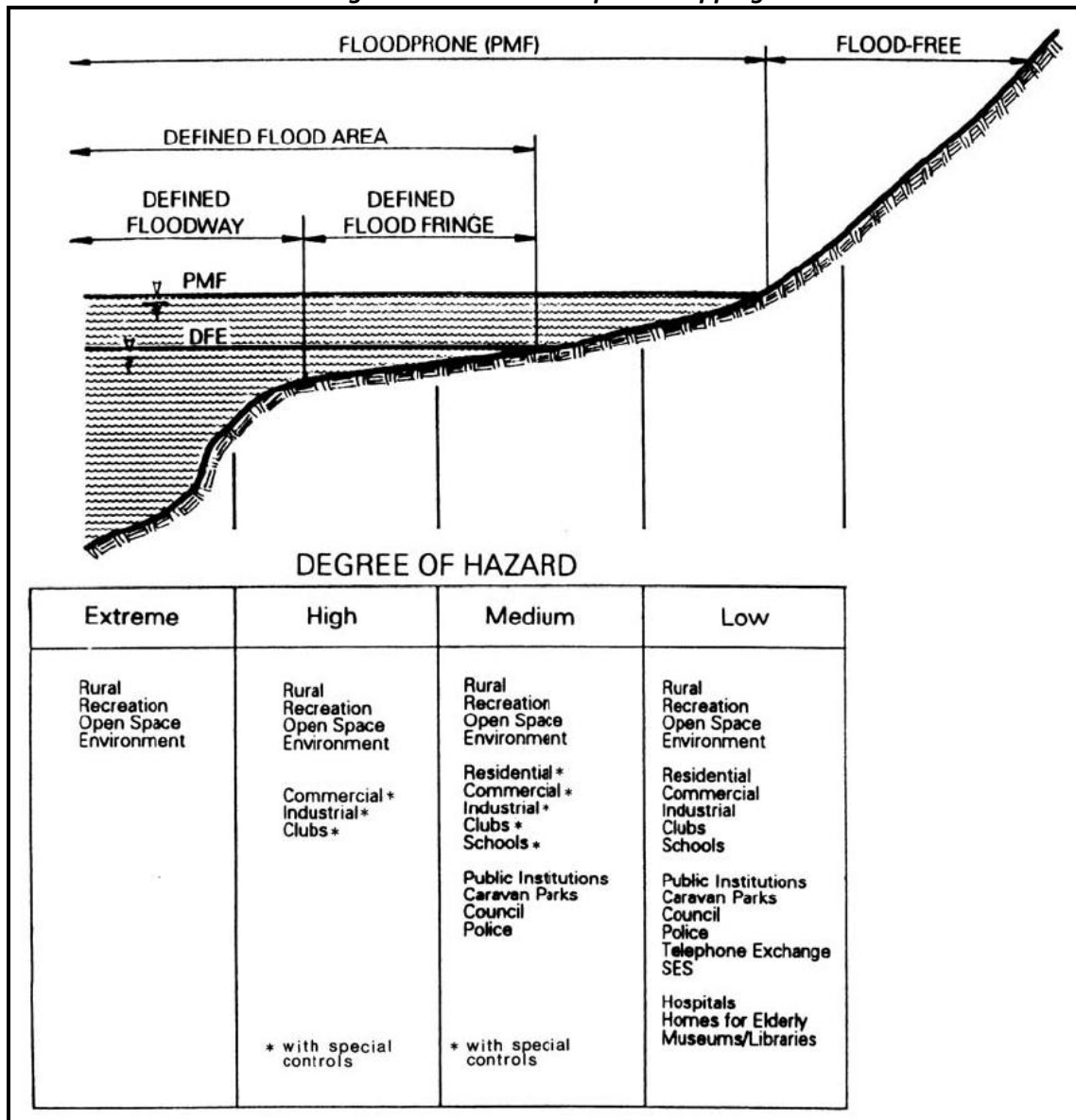
**Figure 5: QRA Interim Floodplain Map – Gatton**



### 3.7 SCARM Report Conceptual Mapping

3.7.1 This report contains some discussion about the approach to flood mapping as it might relate to appropriate land uses across the floodplain. This is depicted in figure 1 of that report, which is repeated as Figure 6 below.

**Figure 6: SCARM Conceptual Mapping**



- 3.7.2** The figure sets out a cross section of a floodplain showing a range of flood “lines”, including the PMF, DFE, and within the DFE a defined floodway and defined flood fringe. The table indicates the range of land uses that might be appropriate having regard to the degree of hazard within these zones. Aspects of this approach are also referenced in Appendix 2 of the guideline supporting SPP 1/03, at sections A2.27 to A2.31. Paragraph A2.27 identifies that the degree of hazard varies across a floodplain in response to factors of flow depth, flow velocity, rate of flood level rise (including warning times) and duration of inundation.
- 3.7.3** Assuming the information is available, each of those categories could be mapped and included in the planning scheme with appropriate supporting provisions.
- 3.7.4** The SCARM report also sets out the range of measures that need to be integrated in the management for each specific floodplain area, to include four principal categories:
- structural flood mitigation works (e.g. levees, channel improvements) aimed at modifying flood behaviour;
  - land use planning controls such as zoning, aimed at ensuring land use is compatible with flood risk;
  - development and building controls (e.g. minimum floor levels, flood proofing) aimed at reducing the risk of inundation and damage that it causes; and
  - flood emergency measures (e.g. flood warning, evacuation and recovery plans) aimed at reducing flood hazard by modifying the behaviour of people at risk.

## **4.0 ADVANTAGES AND DISADVANTAGES**

- 4.0.1** This section of the report sets out a town planning assessment of the advantages and disadvantages of incorporating each of the mapping options discussed above as a planning tool in a planning system. As required in the scope of work this includes public understanding, ability to make proper assessment of flood risk in development assessment decisions, ability to make proper assessment of flood risk in planning scheme preparations, flexibility in how the map is used in the planning scheme, cost, time required etc.
- 4.0.2** Due to the scope of work for this report, this section focuses on the implications of the use of the different forms of mapping. However, it is also considered that it is necessary to have regard to the planning scheme provisions that might support each option to understand the policy approach that each would provide in a planning scheme.
- 4.0.3** It is common in planning schemes to require specific development applications to be subject to specific flood investigations against the scheme mapping and provisions. The costs involved in that are also considered to be a relevant consideration.

### **4.1 Q100**

#### **(a) Public Understanding**

- 4.1.1** Because it involves depicting only one line on a map combined with the terminology commonly used of the Q100 being the “1 in 100 year” flood, the approach has raised problems of public understanding and perceptions and created misconceptions in the community which are not helpful in effectively managing the risk of flood.
- 4.1.2** In my experience, there is often a commonly held belief that the Q100 is the flood line, in that it is interpreted by many as a line beyond which flooding will not occur. Of course by its very nature it is not that, it simply expresses the flood level for which there is a 1% probability in any given year. It is only the probable maximum flood line that could reasonably be considered to show such a flood line. Further, the “1 in 100 year” terminology gives rise to a misunderstanding that one such a flood event has occurred, it will not reoccur for 100 years, whereas in reality it could occur in the next year.

#### **(b) Proper Assessment of Flood Risk**

- 4.1.3** The adoption of this approach provides the opportunity to establish mapping which can readily be introduced into a planning scheme by virtue of an overlay and through appropriate zonings, supported by appropriate provisions to manage land use and development within the defined flood event to minimise the impacts of this flooding.
- 4.1.4** While this has the advantage of providing a standard approach to mapping the effect of flood across the State, it does not provide for any local circumstances that might make it appropriate to adopt or at least have regard to other AEP; nor does it help understand the nature of the hazard associated with this defined flood event, through such matters as velocity of the water.



- 4.1.5** Because this approach involves the use of one DFE, without regard to the level of hazard as opposed to frequency, it has some shortcomings in making a proper assessment of flood risk in development assessment decisions or to set a framework in planning scheme making to guide those development assessment decisions and in its flexibility for use in planning schemes.
- 4.1.6** These concerns could be addressed by planning scheme provisions which provide for appropriate assessment of flood risk for a particular development proposal within the Q100 area, for example, through detailed guidance of requirements for different land uses or direction as to which land uses may be considered within the Q100 area or the need to undertake further studies which specifically address these other aspects of a development proposal. As discussed in section 2.3(b) of this report, the guideline accompanying SPP 1/03 sets out guidance on provisions of this nature.
- 4.1.7** One further practical consideration with this approach is whether any further requirements are to be provided in the planning scheme for development outside the Q100 line to manage the risk of a less frequent but greater flood that would affect areas outside the mapped area, or whether that is to be left to matters outside the land use planning system, for example, flood emergency measures.

**(c) Other Considerations**

- 4.1.8** The work necessary to create a Q100 flood line over the local government area requires substantial resources for the necessary hydrological and hydraulic assessments, and those resources may well be beyond the means of councils, particularly smaller and low growth ones, and may also be difficult to justify in locations where the level of flood risk is low due to the nature of existing and planned development.
- 4.1.9** There is also the issue of the level of confidence in the adopted Q100, which is addressed by other experts (e.g. the Joint Expert Statements on Brisbane and Bremer River Flood Frequency already prepared for the Commission).

**4.2 Other Design Floods of Different AEP**

**(a) Public Understanding**

- 4.2.1** If other AEP are expressed using the terminology discussed in relation to the Q100 option (for example, 1 in 50 year or 1 in twenty year floods), this would cause the same public understanding issues discussed in the preceding section.
- 4.2.2** The use of the AEP terminology (rather than Q or ARI or the “1 in 100” type approach) is considered an important aspect of public understanding, as it properly conveys each of these levels as one which relates to the probability of a flood of that scale, rather than the frequency of its occurrence, in terms of number of years before it would reoccur.



- 4.2.3** Ultimately, if another AEP is used rather than 1%, this would represent a different balance of risk tolerance that would need to be understood.

**(b) Proper Assessment of Flood Risk**

- 4.2.4** Other design floods of different AEP would lend themselves to mapping in the planning scheme through an overlay and by appropriate zoning, in the same way as the Q100.
- 4.2.5** This would depend on the AEP adopted, but it would suffer the same limitations as set out in Q100, in terms of understanding of hazard as well as frequency of flood. It could similarly be addressed by appropriate provisions about requiring a proper flood assessment report undertaken having regard to these factors.

**(c) Other Considerations**

- 4.2.6** It is considered likely that production of mapping information under this approach would involve significant resources similar to the Q100 option and may not be justified in some locations for the same reasons set out above.
- 4.2.7** Presumably, similar to the Q100 option, issues of levels of confidence about the adopted AEP would apply to this option also.

**4.3 Zones of Risk in Terms of Likelihood or Hazard**

**(a) Public Understanding**

- 4.3.1** This approach is considered to represent a more sophisticated and thorough approach to mapping the effect of flood, so that the likelihood of flood and the hazard involved in each flood of that nature would be more readily understood at least by technical experts.
- 4.3.2** However, with this sophistication would come more complexity in mapping and supporting information and more implications to be considered. Therefore, it has the potential to be more confusing in the public mind as to the implications of the different zones of risk.

**(b) Proper Assessment of Flood Risk**

- 4.3.3** Because this approach provides for a more sophisticated level of information about the nature and extent of flood risk, it is likely to require more extensive planning provisions to support its operation. On that basis, it would lend itself to establishing a clearer understanding of the implications of flood risk for particular development in particular locations, and improve the opportunity for a proper assessment of that flood risk to be established by the planning system and undertaken in the development assessment processes.

**(c) Other Considerations**

**4.3.4** Because of this approach involves the production of more detailed information including both the likelihood and hazard of flooding, it is likely that preparation of this information would have substantial time and cost implications, which again might not be justified in some locations and might be outside the capacity of local government to fund.

**4.3.5** I understand from the Joint Expert Statements on Brisbane and Bremer River Flood Frequency already prepared for the Commission that establishing the Q100 level would require much more extensive work that is likely to cover other AEP level, so that this option may not be significantly more expensive on that basis. This is a matter for those experts to confirm. Presumably, issues of level of confidence about the information underpinning the mapping of this option would also apply.

**4.4 Whole of Floodplain Maps**

**(a) Public Understanding**

**4.4.1** Because this option is likely to involve mapping of probable maximum flood, it would incorporate within the mapped area of flood risk very substantial areas of existing development and areas which might otherwise be considered appropriate for further development to occur.

**4.4.2** While this would identify virtually all areas subject to any flood risk, this is considered likely to cause difficulties of public understanding due to a perception firstly that flood levels have “changed” (whereas in reality it would be just the adoption of a different level of risk), and secondly because of the impacts if the only mapping of flood risk shows that extensive areas of existing urban areas is subject to that risk.

**(b) Proper Assessment of Flood Risk**

**4.4.3** This approach would represent the lowest risk approach as the whole floodplain over which a flood might be expected at some time in the future would be mapped and could be dealt with by supporting planning provisions.

**4.4.4** While there is a benefit of clarity about the full extent of flood risk, it would result in a situation where such wide areas are subject to identification of flood risk that it would become difficult to establish appropriate standards to apply over the whole area.

**4.4.5** SPP 1/03 indicates that adopting the probable maximum flood as the DFE is generally impractical and probably overly cautious for the purpose of managing floodplain, land use and development. It is considered that this approach would, if adopted on its own and without mapping of other AEP or flood characteristics, provide a relatively unworkable approach to mapping flood risk in planning schemes or development assessment in development assessment decisions. That is not to say that it doesn’t have a role or usefulness as part of a broader approach.

**(c) Other Considerations**

- 4.4.6** While it is more a matter for persons with the appropriate expertise, it is expected that this mapping might be easier to generate because it uses more readily available information such as topography rather than detailed flood modelling, which might provide some cost and time benefits.

**4.5 Historical Flood Events**

**(a) Public Understanding**

- 4.5.1** It is likely that the public would readily understand that this mapping reflects actual events.
- 4.5.2** However, this approach would result in a wide variety of flood mapping from area to area, depending on the particular range of flood events that have happened in particular catchments and parts thereof and the adequacy of the records of those events. For example, land of different levels of AHD, in similar circumstances in a catchment but in a different catchment, may be treated differently in terms of flood related requirements simply because historical events rather than assessed flood risk.
- 4.5.3** This lack of consistency has potential to cause some public confusion.

**(b) Proper Assessment of Flood Risk**

- 4.5.4** While mapping of such events would still allow the use of planning provisions which could support the assessment of flood risk having regard to those events, the lack of context about the likelihood of future events being different to those which have been historically recorded could be problematic in setting out any criteria for proper assessment of flood risk in the planning scheme and therefore in development assessment decisions.
- 4.5.5** The fundamental issue here is the level of understanding as to the likelihood of the historical events reoccurring and the implications of that for risk management of flood, and the consistency of approach to this from place to place.
- 4.5.6** However, the approach does have potential to be of use in locations where the level of risk arising from flood is low due to the nature of the floodplain and existing or proposed development anticipated in the planning scheme.

**(c) Other Considerations**

- 4.5.7** On the assumption that the detail of historical flood events is readily available, this mapping would be more cost effective to prepare than those that involve identification of AEP levels and other flood characteristics.

## **4.6 Queensland Reconstruction Authority Interim Floodplain Maps**

### **(a) Public Understanding**

- 4.6.1** It is evident from the material supporting this approach that the mapping is intended as “interim” and a starting point for flood mapping which can be refined by a local government. It also provides a consistent methodology for mapping flood risk.
- 4.6.2** In my understanding, this approach involves flood mapping being generated based on a range of criteria, and the resultant mapping does not relate to any particular AEP or hazard rating. It is therefore unclear to me whether this mapping represents probable maximum flood or some other AEP criteria, and although the supporting guideline does indicate potential, after review by local government, for adoption as equivalent to PMF at a sub-basin level,<sup>5</sup> it also does not represent this standard.
- 4.6.3** It is therefore considered likely that it has at least some potential to create some public confusion as to the level of risk in a particular location, as the basis for it is not immediately apparent and it cannot be explained against any particular level of risk, such as AEP. If it is comparable to the PMF, the comments made in relation to the whole of floodplain mapping above would also be relevant.

### **(b) Proper Assessment of Flood Risk**

- 4.6.4** This mapping forms part of a package that offers accompanying model code provisions, and so does provide a relatively simple approach that would facilitate ready introduction of flood mapping and associated provision into planning schemes. It also promotes consistency of approach and understanding about the implications for development in areas affected by the mapping.
- 4.6.5** It appears to involve a consistent methodology for assessment of flood risk and appropriate planning and development responses, although because it is new, this has not been tested in practice.
- 4.6.6** However, from a preliminary appraisal, it appears to establish flood levels that affect large parts of existing urban areas, and so raises a range of complications similar to the comments made above in relation to the whole of floodplain mapping.

### **(c) Other Considerations**

- 4.6.7** This is a relatively low cost option, as the mapping is being produced by the QRA progressively across the State; and it is anticipated it will be available throughout the State by mid 2012.

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<sup>5</sup> See table entitled Flood Mapping Maturity Levels page 9 Planning for stronger, more resilient floodplains Part 1 – Interim Measures to support floodplain management in existing planning schemes – Queensland Reconstruction Authority 2011.

- 4.6.8** It is also an approach which can be readily facilitated into planning schemes by the means discussed in sections 2.3(d) and 3.6 of this report, in a similar way that the equivalent guiding material in SPP 1/03 supports the approach it takes of mapping an AEP level, usually the Q100.

#### **4.7 SCARM Report Conceptual Mapping**

- 4.7.1** While this approach has many similarities to the option discussed in section 4.3 about zones of risk in terms of likelihood and hazard, it is included here as it provides a particular model of such an approach.

##### **(a) Public Understanding**

- 4.7.2** While more complex than identifying one line of flood mapping as do many of the options above, it is considered that the diagram used to explain the approach is readily understandable in terms of documenting different levels of risk and the planning and associated response to these levels.

- 4.7.3** It would therefore require more explanation than simpler approaches above, but appears to do a useful job of making a relatively complex matter understandable.

##### **(b) Proper Assessment of Flood Risk**

- 4.7.4** Because this approach provides for a more sophisticated level of information about the nature and extent of flood risk, it is likely to require more extensive planning provisions to support its operation. On that basis, it would lend itself to establishing a clearer understanding of the implications of flood risk for particular development in particular locations, and improve the opportunity for a proper assessment of that flood risk to be established by the planning system and undertaken in the development assessment processes.

- 4.7.5** This approach involves the production of more detailed information about the likelihood and of flooding. The extent to which it deals with matters of hazard is not clear, although it does distinguish between a floodway (where flood waters would be deeper and presumably faster flowing) and the flood fringe, where they would be shallower.

- 4.7.6** Finally, the approach provides for a context within which planning scheme controls would operate, dealing with other actions outside the planning and building controls that are part of the overall integrated response to managing flood risk.

##### **(c) Other Considerations**

- 4.7.7** It is likely that preparation of this information would have substantial time and cost implications, which again might not be justified in some locations and might be outside the capacity of local governments to fund.

- 4.7.8** I understand from the Joint Expert Statements on Brisbane and Bremer River Flood Frequency already prepared for the Commission that establishing the Q100 level would require much more extensive work that is likely to cover other AEP level, so that this option may not be significantly more expensive on that basis. This is a matter for those experts to confirm. Presumably, issues of level of confidence about the information underpinning the mapping of this option would also apply.

## **5.0 DISCUSSION AND OPINION**

### **5.1 Role of Land Use Planning**

**5.1.1** Land use planning is considered to have an important role in managing the effect of flood, and reflecting the flood risk approach determined by communities as appropriate to their circumstances. This is especially so in its capacity for dealing with the development of areas within nominated flood risk locations. It has the capacity to restrict the development and impose requirements on development to respond to that risk.

**5.1.2** In so doing, the planning system can address flood in a manner which responds to the relevant objectives of planning set out in section 2.1 of this report.

**5.1.3** However, it is considered that its role should be understood as part of an integrated approach to dealing with the risk and effect of flood. The SCARM report approach discussed above provides a useful context for this role, in setting out the range of measures that need to be integrated in the management for each specific floodplain area, to include four principal categories:

- structural flood mitigation works (e.g. levees, channel improvements) aimed at modifying flood behaviour;
- land use planning controls such as zoning, aimed at ensuring land use is compatible with flood risk;
- development and building controls (e.g. minimum floor levels, flood proofing) aimed at reducing the risk of inundation and damage that it causes; and
- flood emergency measures (e.g. flood warning, evacuation and recovery plans) aimed at reducing flood hazard by modifying the behaviour of people at risk.

**5.1.4** The role of the planning system is in the second and third categories. For it to be most effective, clarity about how the other components are dealt with and the relationship of the planning system to those components is desirable. For example, it may be appropriate for the land use planning system to involve the imposition of requirements for land uses in some circumstances to have evacuation plans to respond to flood events.

### **5.2 Queensland Planning System**

**5.2.1** This system is summarised in section 2.3 of this report.

**5.2.2** It is considered that this system is well placed to provide planning instruments which can be drafted to incorporate appropriate provisions to respond to any of the range of mapping approaches considered in this report. The evolution of the planning system has created several planning instruments that can be used for this purpose, including state planning policies, the QPP and, of course, planning schemes.

**5.2.3** There are options within these instruments about which guidance would be desirable, but as a general approach, the following could apply:



- a state planning policy is best placed to set out the overall planning approach to the matter and to drive consistency across the State;
- the QPP provides the opportunity to create standard provisions to support consistency and clarity of approach;
- the concept of an overlay dealing with flood effect, reflecting the chosen mapping approach, provides a logical means of dealing with the matter in planning schemes; and
- other scheme components can also support, or in some cases perhaps deliver, the planning approach e.g. through the use of the Rural or Limited development (constrained land) zones for areas where the flood risk is of a nature that development opportunities should be curtailed.

**5.2.4** The IDAS arrangements for referral agencies could also potentially play a role in dealing with this issue, for example, by providing for referral to the relevant State agency for expert input about flood aspects for development applications. Generally, the preferred approach is for planning schemes to provide sufficient guidance and requirements so that is not necessary, but this could be a requirement where schemes are not so drafted.

### **5.3 Mapping and Associated Provisions**

**5.3.1** It is clear from the work undertaken in preparing this report that whatever mapping approach is adopted to identifying the risk of flood, there is a need for supporting provisions that identify the policy position and requirements applicable to the areas so mapped. Without those provisions, the mapping is of little utility. There is already considerable material on which to base any such provisions contained in the guideline to SPP 1/03 (at Appendix 5), the guideline supporting the TSSP (at Schedule 1), QPP version 3 (particularly in the flood overlay and relevant zones), and in the approach outlined in the SCARM report (particularly in Chapter 3).

**5.3.2** It is largely a matter of the risk tolerance which the community overall adopts as to the appropriate mapping approach that would apply. For example, if the community wished to adopt an approach focussed on the minimisation of risk, the probable maximum flood line would be the appropriate basis for its planning requirements in relation to restrictions on development or requirements for development. However, this would have significant impacts of the future growth and development of our communities and is generally considered to be inappropriate in most circumstances as the appropriate balance of risk which communities will tolerate. It also doesn't differentiate between levels of risk or hazard within the PMF area.

**5.3.3** It is considered important there is consistency across catchments so that local governments are consistent from place to place in the management of the effects and risks associated with flooding. Until recently, best practice has been to, as a minimum, adopt a particular flood event which would usually be the AEP 1%, but is a matter for the community through its elected governments to consider and adopt.

- 5.3.4** A more sophisticated approach which is considered worthy of investigation is mapping zones of risk, both in terms of frequency and hazard. This would provide an additional level of information which would allow a more refined and appropriate response to assessment of development in those locations. This could, for example, identify areas subject to the PMF, more than one AEP, and areas of particular hazard, which in each in turn could inform planning scheme requirements for the assessment of development in each of those circumstances and the standards that would apply to that development.
- 5.3.5** The SCARM conceptual mapping discussed in this report is considered to provide one logical framework for such an approach.

#### **5.4 Cost/Resources**

- 5.4.1** There are two considerations in this respect - the cost of flood mapping; and the costs imposed on the development process of planning scheme requirements for development in areas affected by flood.

##### **(a) Cost of Flood Mapping**

- 5.4.2** One of the real problems in establishing any consistency of approach to mapping the effect of flood and dealing with the risks in the planning system has been the cost and time involved in establishing flooding information which can allow for a consistency of approach. Even after the introduction of SPP 1/03 some 8 years ago, there remain large areas of the State which do not have natural hazard mapping for flooding contained in their planning schemes, nor is there consistency of approach across local government in the State for those that do.
- 5.4.3** In my experience, the cost of undertaking the modelling and other investigations necessary to generate flood mapping of sufficient quality to be used in a planning scheme is very substantial, sometimes comparable to the cost for a Council to prepare a whole planning scheme. It is therefore often outside the capacity for local government to fund, particularly for smaller and low growth councils, and it is considered likely that this is a main reason why so many existing planning schemes do not contain mapping of this nature.
- 5.4.4** Because this mapping involves significant expertise and resources in its preparation, it may also be considered a low priority in large areas of the State where land is predominantly sparsely populated and the risk to safety of people and/or of significant damage to property is low. There may be some warrant for creating different requirements for land within existing urban areas, compared with “greenfield” land planned for urban expansion.
- 5.4.5** It is considered that, as a minimum, there is a clear need to understand the risks and effects of flood in urban areas, particular those experiencing substantial growth, and to ensure these are dealt with by the planning scheme as part of the overall integrated response discussed above.

**5.4.6** In other circumstances, the cost of developing this mapping may not be justified by the risk to life and property, particularly in rural or sparsely populated areas. In those circumstances an alternative approach to establishing the defined flood event maybe appropriate through the use of historical flood event information and/or the QRA mapping.

**5.4.7** Ultimately, the generation of flood mapping across the state is likely to require resources and/or funding from outside local government. The QRA interim mapping provides an example of this.

**(b) Costs Imposed on Development**

**5.4.8** Part of the process of striking the preferred balance between flood risk and the implications of managing that risk for communities is the cost that any such provisions or requirements would impose on development, both during its assessment, and for its ultimate construction.

**5.4.9** For example, requirements for additional flood investigations for a particular proposal can be very costly and represent an additional imposition on the viability of the proposal. Equally, requirements for standards of construction in areas subject to some flood risk can add substantially to the cost to the ultimate consumer of the building developed.

**5.4.10** This is not to say that such requirements are unwarranted, but it is appropriate to have regard to this consideration when framing requirements and establishing the appropriate balance in the approach to managing the effect of flood. For example, such requirements may not be appropriate if the risk of flood is very low and these costs are high.

**5.5 Public Understanding**

**5.5.1** Public understanding of flood mapping in the planning system is an important consideration. Any mapping of flood risk needs to be explained carefully in terms of what it is portraying, so that if it is 1% AEP the community has a clear understanding that this represents a flood level which there is a 1% chance of occurring in any given year, and rather than that it would only occur once every 100 year flood.

**5.5.2** It is equally important that communities understand that if a DFE is adopted (such as 1% AEP), that there will always be a risk of a higher flood which might impact on areas outside the defined flood area, so that areas outside that mapping are not “flood free”, and that there is a likelihood of larger, less frequent, flood which affects the area outside those identified as affected by the DFE. It needs to be clear as to whether there are land use planning responses intended for those circumstances, or whether it is a matter for other mechanisms outside the land use planning system, for example, counter disaster planning etc, as part of the integrated approach discussed above.

**5.5.3** Finally, it is considered desirable that there is clarity about the role of the planning scheme in supporting public understanding. These schemes are technical documents which deal with a wide range of issues, values, development and circumstances. It is likely that any mapping included in a planning scheme will be based on other mapping produced specifically to map flood risk, and these may not be identical. This commonly happens now, where there is flood mapping in the planning scheme, but it is cross referenced to other sources for more detail, for example, the Redland Planning Scheme Mapping at Figure 1 of this report contains a note saying *“this information is indicative only and for official advice in writing (for legal, valuation, loan purposes etc) contact the Council’s Stormwater Management Engineer”*.

**5.5.4** For this reason, planning schemes and planning instruments are often accompanied by non-technical explanatory notes or material designed to promote public understanding of their purpose and approach.

## **5.6 A Possible Approach?**

**5.6.1** It is considered desirable that any approach to the use of the planning system be guided by determining the objectives sought and assessing which approach best matches those objectives. Some such objectives informed by the overall objectives set out in section 2.1 of this report and the other content of this report could be, for example:

1. **Clarity of role:** the overall integrated strategy to managing the effects of flood is clear, and the role of the planning system within that context is clear.
2. **Safety:** providing desirable levels of protection through the planning system from the effects of flood as part of that integrated strategy.
3. **Consistency and public confidence:** a similar approach is employed across the State with the capacity to respond to local circumstances, in a way which can be readily understood by the community.
4. **Practicality:** an approach which can be readily applied through the planning system.
5. **Balanced:** the complexity of the nature of flooding is fairly addressed in a way that facilitates the intended outcomes efficiently in terms of the resources needed to implement the approach and to operate it (from both the public sector and private sector viewpoints).

**5.6.2** Responding to these objectives and the foregoing discussion, an appropriate approach to dealing with the effect of flood in the planning system to these objectives could involve:

- establishing a consistent system of mapping zones of flood risk (both likelihood and hazard) for existing and planned urban areas (including rural residential development);
- using the SCARM conceptual approach either through mapping defined floodways and flood fringe areas or alternatively, specific AEP levels e.g. 1% and 2 or 5%, the PMF and areas of particular hazard due to likely velocity of flood waters. The detail of such an approach could be a matter for specialist advice from those with the relevant expertise and experience in such mapping working with planning experts to frame up;
- supporting local governments financially to develop this information;

- using other more readily available flood risk information in other locations, as an interim arrangement until more detailed mapping is available. The QRA interim floodplain mapping would provide a consistent approach across these areas, however, the full implications of this approach need to be properly understood in terms of the practicality of the model code provisions. If utilised, it would also be appropriate to allow local governments to refine this mapping in those locations as intended by the TSSP and supporting guidelines;
- delivering these outcomes into the planning system by appropriate amendments to SPP 1/03 and supporting guideline, and the QPP in relation to appropriate zoning, together with overlay mapping and code provisions, as the primary planning mechanisms to deliver these outcomes. This could be informed by the material contained in the guideline to SPP 1/03 (at Appendix 5), the guideline supporting the TSSP (at Schedule 1), QPP version 3 (particularly in the flood overlay and relevant zones), and in the approach outlined in the SCARM report (particularly in Chapter 3);
- establishing clarity about when flood effects will be dealt with through the planning system and when it would apply through other means as part of an integrated approach. For example, if the SCARM approach applied, it may be that areas outside the declared flood fringe are best dealt with by other means; and
- supporting this approach with non-technical explanatory notes or material designed to promote public understanding of its purpose, principles and operation.

**5.6.3** As observed earlier in this report, flood management and the role of the statutory planning system in that context raise a wide range of issues and complexities which require both a range of professional expertise and appropriate community involvement to properly consider. This approach is therefore offered as a conceptual framework on which to progress consideration of these matters as a contribution to assist the Commission in its work.

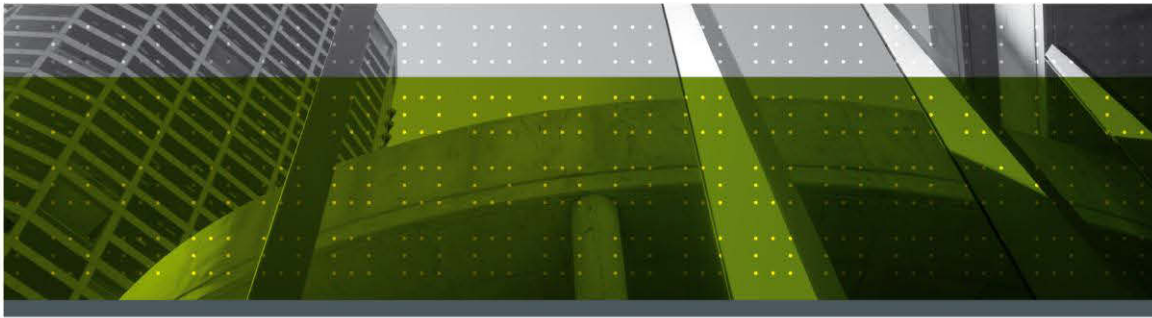


Greg Vann, BRTP(Hons), BEcon, LFPIA, CPP  
10 November 2011

# APPENDIX A

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## Curriculum Vitae



**Greg Vann** DIRECTOR & CEO

■ DEVELOPMENT PROCESSES  
■ STRATEGIC PLANNING  
■ SPECIALIST PLANNING

## Summary

Greg Vann has degrees in planning and economics and over 30 years experience in planning in Queensland, both as a consultant and in positions for local and State government.

He has been the project director for wide ranging projects throughout the state and has extensive experience in providing planning advice to the private sector, local and state governments and in development assessment and planning appeals. As a senior professional committed to the planning profession, he is often called on to undertake leadership, facilitator and mentoring roles.

He also has extensive experience in the business planning and operation of Buckley Vann in his role as CEO.

## Qualifications and Professional Affiliations

- Bachelor of Regional and Town Planning (Hons) UQ, 1977
- Bachelor of Economics UQ, 1983
- Life Fellow, Royal Australian Planning Institute (member since Jan 1982)
- Certified Practising Planner PIA - completed courses 2011
- Past President, Qld Division of Royal Australian Planning Institute
- Past National Councillor, Royal Australian Planning Institute
- Member, Queensland Environmental Law Association

## Career

- Buckley Vann Town Planning Consultants (Aug 1992 – Present)  
Director & CEO
- Beaudesert Shire Council (1985 - 1992)  
Shire Planner
- Beaudesert Shire Council (1980 – 1985)  
Planning Officer & Assistant Planning Officer
- Queensland Department of Education (1978 – 1980)  
Research Officer, Planning Branch

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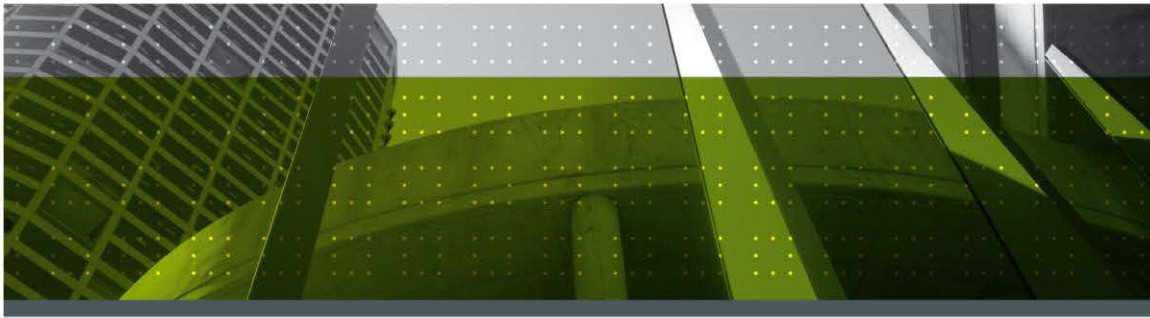
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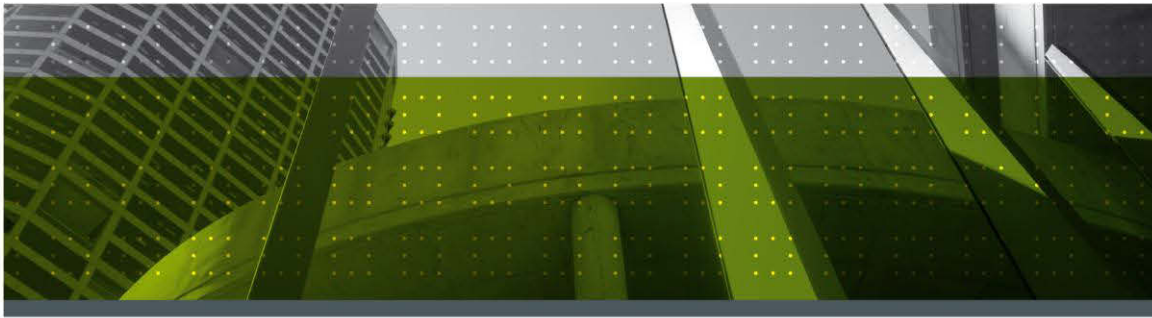
## Appointments

- Chair of Office of Urban Management Transit Oriented Development Taskforce (2006-2009);
- Member of the Brisbane City Plan Review Reference Group, Logan City Planning Scheme Reference Group and Gold Coast New Planning Scheme Peer Reference Group (2007-present);
- Member of various groups associated with regional planning in SEQ including the Regional Planning Advisory Group, which over saw preparation of the SEQ2001 project (1990-2002);
- Member of the Innovators and Early Adopters Group advising the Department of Infrastructure about the current IPA review and proposed standard planning scheme provisions;
- Planning System Review Group for review of the Local Government (Planning and Environment) Act (1993);
- Member of the Steering Committee for Development Approvals System Review (1990-1992);
- Past member of various university planning related bodies;
- Participated in a wide range of reference groups for State and local governments.

## Experience

### Planning Schemes

- Various roles - Planning Scheme Review for Gold Coast City Council (2008-present);
- Beaudesert Shire Council Planning Scheme (2005-2007);
- Whitsunday Shire Council Planning Scheme (2005-2006);
- Esk Shire Planning Scheme (2000-2005);
- Boonah Shire Planning Scheme (2000-2006);
- Gatton Shire Planning Scheme (1999-2003);
- Sarina Shire Planning Scheme (1999-2004);
- Clifton and Cambooya Shire Planning Schemes (1999-04);
- Code for Reconfiguration of a Lot, Gold Coast City Council (2000);
- Brisbane City Council Plan (1997-1999);
- Brisbane City Plan Subdivision Provisions, Brisbane City Council (1998);
- Open Space Strategy & DCP for Redcliffe City Council (1995-1997);



- Beechmont Plateau DCP for Beaudesert Shire Council (1996-1997);
- Redland Shire Council Strategic Plan Review (1995-1997);
- Brisbane City Council Town Plan Review & Strategic Plan (1994-1996);
- Open Space Development Control Plan;
- Gladstone City Council (1994-1995);
- BCC Newstead & Teneriffe Waterfront DCP (1994);
- Redcliffe City Council Town Plan Review (1993);
- Bohle Plains/Burdell/Mt Low DCP, Thuringowa City Council (1992-1993);
- Kirwan/Upper Ross Development Control Plan;
- Thuringowa City Council (1992-1993);
- Beaudesert Shire Council Draft Strategic Plan (1991-1992);
- Draft Tamborine Mountain DCP, Beaudesert Shire Council (1991-1992);
- Canungra Area Development Plan, Beaudesert Shire Council (1989-1990);
- Northern Rural Residential Areas CDP, Beaudesert Shire Council (1987-1988);
- Town Planning Scheme for the Whole of the Shire of Beaudesert, Beaudesert Shire Council (1983-1985).

### Planning Studies And Investigations

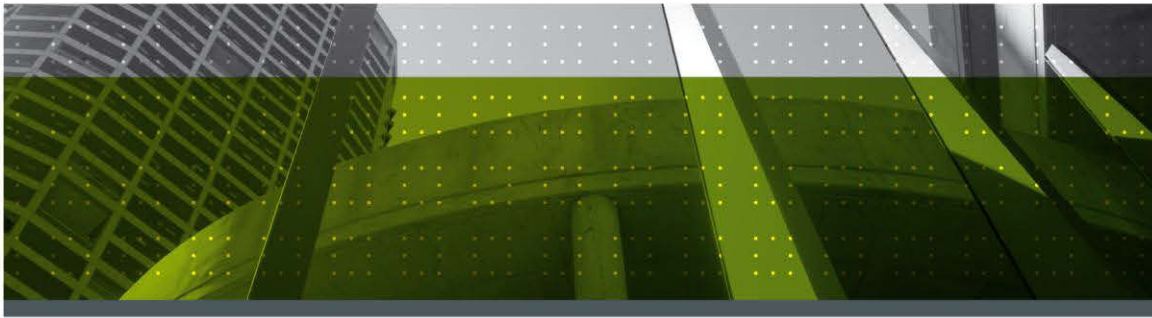
- Next Generation Planning (2010), SEQ Council of Mayors and DIP;
- Fraser Coast Sustainable Growth Strategy (2009-2011) for Fraser Coast Regional Council;
- Beaudesert Shire Council - Whole of Shire Planning Process (2005-2007);
- Preparation of various Port Land Use Plans and assistance with IPA arrangements for Port of Brisbane Corporation, Port Corporation of Queensland Port of Gladstone (1997-2004);;
- Noosa Riparian Lands Project, Noosa Shire Council and DLGP (1998);
- Maroochy Open Space Strategy, Maroochy Shire Council (1998-2000);
- Brisbane Western Gateway Study, Brisbane City Council (1997);
- Beenleigh Centre Development Strategy, Gold Coast City Council (1996-1997);
- North Ipswich Railway Yards Study, Queensland Rail and Ipswich City Council (1993);
- Input into IPA preparation, various guidelines and assistance with Act introduction and operation – SEQROC, BCC & DCILGP;
- SEQ 2001 Institutional Arrangements, SEQ 2001 Regional Resource Unit (1995);

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- Extractive Industry Study, DPETD (1993-1994);
- Compensation Issues Paper, Brisbane City Council (1993);
- Planning Circular on Alternatives to Rezoning, DHLGP (1993);
- Working Paper on Planning Instruments, DHLGP (1992).
- Beaudesert Economic Development Program, Beaudesert Shire Council (1989-1992);
- Bromelton Prefeasibility Study, Beaudesert Shire Council (1990-1991);
- Beaudesert Opportunities Kit, Beaudesert Shire Council and Beaudesert Development Board (1988-1989);
- Logan River and Western Tributaries Sand and Gravel Study – Beaudesert Shire Council and Water Resources Commission (1988-1989);
- Planning for Educational Facilities, Department of Education (1978-1980).

### Development Projects (Various Clients)

Provision of strategic advice, preparation of reports, coordination of expert reports, submission of applications and negotiations of planning approvals for a range of private sector clients. These include commercial, industrial, extractive industry, tourist, residential and rural residential projects throughout Queensland. Working as a strategic advisor to major development interests in a number of locations throughout SEQ.

### Expert Witness

- Planning and Environment Court  
for over 30 years, provided advice to, and/or gave evidence in a number of planning appeals for a wide range of both public sector and private sector clients, relating to a comprehensive range of land use planning and statutory matters in a wide range of local government areas throughout Queensland.
- Other Jurisdictions  
Provided evidence in numerous Land Court matters and in the Supreme and Magistrates Courts.

### Facilitator/Mentor/Training/Planning Coach

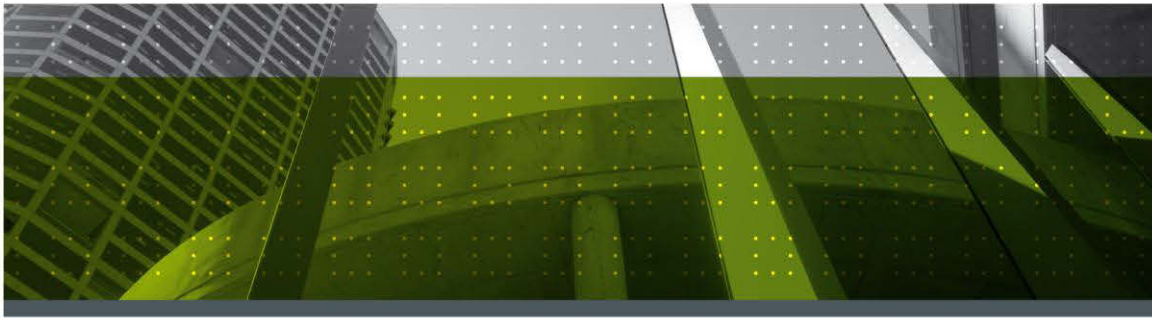
Facilitated many forums and workshops for a range of public sector clients for specific projects or studies, running training courses (e.g. on SPA, Natural Resource Management) and provided mentoring or peer to peer coaching support for planning professionals at all stages of their career.

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## Conference/Workshops Presentations

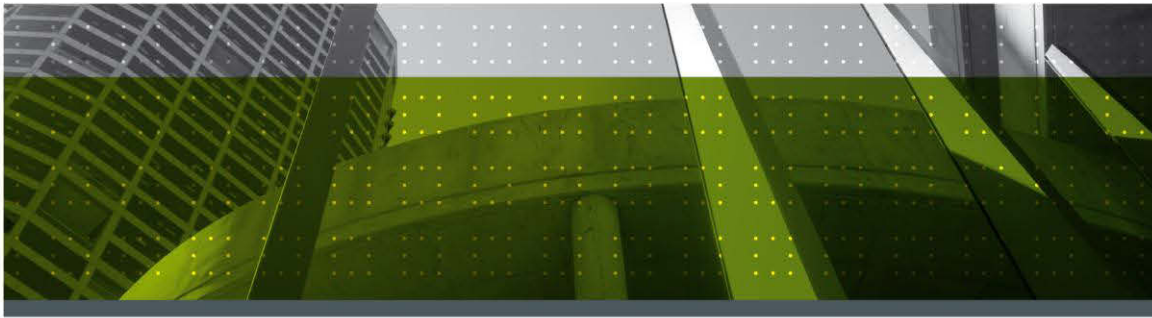
Presentations to numerous conferences and workshops over the last 25 years in Queensland, nationally and overseas on a wide range of planning topics including:

- A joint seminar of the American Planning Association and related bodies in New York;
- Many PIA events;
- Queensland Environmental Law Association conferences;
- Various in house presentations on transit oriented development and waterfront development, at the Department of Infrastructure, Urban Land Development Authority and Brisbane City Council.
- Facilitated working sessions at, and chaired, a wide range of seminars and conferences.

## Other - Development Assessment Reviews, Infrastructure & Transport Planning

- Gold Coast City Council (various development assessment system projects) (2007-present);
- Hervey Bay Development Assessment Review; HBCC & Urban Development Institute (2005-06);
- Toowoomba Development Assessment Review; Toowoomba City Council (2004-2007);
- Development Assessment Review Brisbane City Council (2002-2003)
- Development Sequencing Study, Ipswich City Council (1997);
- Infrastructure Charges Model DLGP (1996-98);
- Infrastructure Charges Guidelines DHLGP (1994-1995).
- Caboolture Maroochydore Corridor Study, Queensland Transport (1997-2000);
- South East Transit – Land Use/Transport Planning, Queensland Transport (1996-1997);
- Sandgate Road Impact Assessment Study, Qld Department of Main Roads (1996-1997);
- Toowoomba Traffic & Transport Planning Study, Department of Transport (1994-1995);
- Bicycle Brisbane Plan, Brisbane City Council (1994);
- Townsville/Thuringowa Urban Form Options, Department of Transport (1994);
- Bundaberg Southern Access Road, Department of Transport (1993);
- Pine Rivers Area Transport Study, DOT & Pine Rivers Shire Council (1992-1993);
- Beaudesert Corridor Study, SEQ Passenger Transport Study (1990-1991).





## Study Tours

Undertakes privately funded tours both overseas and interstate to visit areas of particular planning interest including:

- in October-November 2004 to Chicago, New York, Boston, Toronto and Vancouver;
- in June-July 2006 to Vancouver, Portland, Seattle, Chicago and Boston;
- in May 2007 to Perth;
- in January-February 2008 to San Francisco, Portland, Denver, Washington DC and New York;
- in April 2008 to Sydney,
- in June July to Vancouver, Washington DC, New York Paris, Copenhagen, Stockholm and Berlin;
- in March 2011 to Hobart.

Now leads Buckley Vann's business, Green Shoe Travel, in running best practice planning tours, including:

- led the February 2010 for the LGAQ, to Sydney Melbourne and Adelaide;
- led the February 2011 Brownfields and Greenfields tour for the LGAQ; to Sydney, Melbourne and Adelaide;
- led a one day SEQ tour for Scenic Rim Regional Council
- currently planning a trip to look at mining development and its planning implications for local communities for LGAQ in August 2011.