HUMPHREYS
REYNOLDS
PERKINS
planning consultants

BRISBANE
Level 11
40 Creek Street
Brisbane 4000 Australia
T 07 3221 8833
F 07 3221 0278
E mail@hrppc.com.au
W www.hrppc.com.au

DIRECTORS
Jeff Humphreys
BRTP(Hons),BA,FPIA
David Perkins
BRTP,MPIA
Steve Reynolds
BRTP,MSc(EnvMgt),MPIA

ASSOCIATES
John Morwood
BAS(BE),GDURP,MPIA
Leisa Sinclair
BAppSc(Surv),GDURP,MPIA,MUDIA
John Van As
BRTP(Hons),MBA,AssocDipBus(REV),MPIA
Ben Lyons
BBltEnv(Urb&RegPlan),GDURP,MPIA

Associated Humphreys Reynolds Perkins practices:
GOLD COAST
T 07 5594 1322
F 07 5594 1366
NORTH QUEENSLAND
T 07 4953 2877
F 07 4953 2577
SUNSHINE COAST
T 07 5451 0044
F 07 5443 1688

3 November 2011

Our Reference: 11BR120

Ros Vickers
Queensland Floods Commission of Inquiry
Level 30
400 Queen Street
Brisbane 4000

Dear Ros,

Flood Mapping in Queensland Planning Schemes - ADDENDUM

1. This letter is an Addendum to a report I prepared titled "*Flood Mapping in Queensland Planning Schemes – Recommendations to the Queensland Floods Commission of Inquiry*" dated 25 October 2011.

2. Also on 25 October 2011, two Joint Expert Statements were provided to the QFCI from a panel of flood engineering experts[1] titled "*Brisbane River Flood Frequency*" and "*Bremer River Flood Frequency*". Subsequently, that same expert panel gave evidence to the Inquiry on 26 October 2011. I had no previous knowledge of these reports.

3. I have now reviewed both reports as well as the Transcript of Proceedings from 26 October 2011.

4. This Addendum sets out the findings of the expert panel relevant to my report and discusses the consequences upon my conclusions.

Key Findings of the Expert Panel

5. The experts recognised that past attempts at flood mapping the Q100:

   a) were limited by the data and methodologies available at the time;
   b) were limited by the computational power available at the time;

[1] Emeritus Professor Colin Apelt
Mark Babister
Neil Collins
Erwin Weinmann
Dr Sharmil Markar
Dr Michael Leonard
Drew Bewsher
Dr Rory Nathan

Humphreys Reynolds Perkins
Pty Ltd
ABN 93 010 721 294

c) may or may not be accurate (but there is a lack of certainty to determine); and
d) have not communicated well enough the:
    i. limitations of the studies (inputs);
    ii. uncertainty of the findings (outputs); and
    iii. implications (or consequences) of that uncertainty (for future decisions).

6. The experts recommend that future AEP (Annual Exceedence Probability) modelling, resulting in Q100 and other AEP's, should be based on the Monte Carlo framework and take into account:

    a) a full range of rainfall probabilities and variability (eg. random combinations of events in different catchments);
    b) climate change;
    c) the effect of high rainfall events on tides;
    d) joint probabilities between river systems (eg. Brisbane and Bremer);
    e) backwater effects;
    f) much better data (incl. survey) and analysis of that data; and
    g) AEP outputs for a full range of event probabilities (eg. Q2 to PMF).

7. The experts acknowledge a need to centralise all data and mapping information in one agency. However, there exists some tension in that acknowledgement, where Mr Collins clarifies that fine scale (individual allotment) flood mapping will be required for town planning purposes and should be centralised; whereas Mr Bewsher is concerned about such mapping being in a central database because of insurance implications affecting private landowners (see transcript pg4420 lines 1-22 and 45-60).

8. The experts strongly recommend that following the delineation of AEP mapping, a different approach to flood risk analysis and management must be adopted – moving away from *'being fixated'* on the Q100. That is, *'Q100 is just a number, it's what you do with it that counts'*. The experts recommend that sound, risk-based planning and management ought to take into account[2] matters including (but not limited to):

    a) the 'consequences' of the 'uncertainty' of the AEP (acknowledging it is a 'best estimate');
    b) the 'full probability domain' (eg. from Q2 to the PMF);
    c) government processes;
    d) social policy issues;
    a) population density;
    b) ease of evacuation;
    c) potential for loss of life;
    d) environmental issues;
    e) critical infrastructure;

[2] But there is no detail provided on how to do this (the experts only name the items in the list)

f) damage to property;
g) the costs of flooding;
h) the costs of protection;
i) impacts on development costs; and
j) property values.

Implications of the Expert Panel Findings

9. There are five issues which arise from the expert panel's findings, relevant to my previous report:

a) Implications for existing AEP mapping;
b) Implications for existing planning controls based on AEP mapping;
c) Implications for planning schemes with no AEP mapping;
d) Implications for plan-making and decision-making processes; and
e) Implications upon my recommended approach.

(a) Implications for Existing AEP Mapping

10. The expert panel's findings raise a question about existing mapping used in current planning schemes. If that mapping might be incorrect, should it be demoted to 'interim' status until better mapping is completed (eg. using the Monte Carlo framework)?

11. In my opinion, where there exists AEP mapping (based on engineering studies), it should not be termed 'interim' and ought to retain its current status in the planning system until superseded, for the following reasons:

a) The expert panel does not warrant whether all existing AEP mapping is wrong, because without completing better informed mapping they do not know;
b) The expert panel acknowledges that as more information comes to hand, flood mapping will improve and decisions will be less subject to change[3]. This will always be the case. Old mapping will always be improved by new mapping, so it may never be 'final'.
c) Town Planning operates with imperfect knowledge, so maps do not have to be 'correct' before they are useful for planning purposes. Thresholds are set to strike a practical balance between efficiency and control. Existing AEP mapping can serve that purpose.

(b) Implications for Existing Planning Controls Based on AEP Mapping

12. In contrast to my opinion about existing mapping above, the uncertainty underpinning AEP mapping (confirmed by the expert panel) ought to be reflected in the planning controls of a planning scheme. This includes existing planning schemes based on existing AEP mapping.

[3] See paragraphs 41(c) and (d) of Brisbane River Flood Frequency report.

13. Planning controls operate within a set level of resolution, relevant to their context. For a heritage building, the resolution might be set finely to control paint colour. In contrast, for a high-rise building, the resolution might be set more coarsely to restrict buildings above 15 storeys.

14. Because of the potential severe consequences of flooding, the planning system ought to operate at a fine resolution for flood management (to minimise loss of life and property). However, the uncertainty underpinning the mapping poses a challenge to fine resolution planning. That is, it is misleading to overstate the degree of accuracy in flood mapping, but at the same time it may be unreasonable, or is at least inefficient, to seek to control land use at a broader resolution.

15. Because of the lack of certainty, it may be necessary to introduce into existing planning schemes, based on existing AEP mapping, flood controls beyond existing AEP levels (typically 1% or Q100) by mapping an 'Interim Flood Investigation Area' or similar designation. This might seek to estimate the PMF (probable maximum flood) or may merely be a 'planning line' which seeks to invoke code provisions requiring flood compliance for nominated development. The planning scheme could make plain that this area is included because the existing AEP mapping does not account for climate change; backflow; current survey data etc.

(c) Implications for Planning Schemes with no AEP Mapping

16. The time frame to complete improved AEP mapping (using the Monte Carlo framework) as recommended by the expert panel is approximately three years. This is for Brisbane and Ipswich only. The timeframe for similar studies elsewhere in Queensland, based on the same methodology is unknown. This raises the question as to how to plan in the interim, without AEP mapping?

17. The recommendations in my report are unchanged in this respect.

(d) Implications for Plan-Making and Decision-Making Processes

18. Whilst not the subject of my report, the expert panel has strongly highlighted a significant analysis gap in flood management in Queensland. The analysis gap is most apparent between the time AEP flood mapping is generated and the drafting of planning controls applicable to those flood lines. It also exists between the lodgement of a development application and the decision on that application against the planning scheme; however, this assessment process can be better managed if the former gap is addressed initially.

19. There is a clear need for much clearer guidance for local government on how to apply risk analysis and management when drafting planning schemes and making land use planning decisions in flood areas. This may result in some standard provisions for planning schemes, but caution must be applied to any attempt to mandate or standardise codes or

levels of assessment for different land uses, because the context of each local government and each AEP will be very different.

20. This guidance will need to be accompanied by a standardised study methodology and standardised study/mapping outputs, to maximise uniformity of approach and meaningful guidance.

21. Given the significance of flooding to Queensland, it is appropriate to contemplate a formal three step process for flood planning, similar to the process which exists in New South Wales for coastal planning. For some years, NSW has been implementing a three step system whereby:

    a) A Coastal Hazard Study is prepared, which determines the likely erosion/accretion lines based on risk management principles. This equates to an AEP flood study.
    b) A Coastal Management Plan is then prepared, to devise planning measures and non-planning actions to address the implications of the hazard study. Separate studies are required for each local government, because the context varies – similar to flood contexts. This involves community consultation and a balancing exercise to determine the costs and benefits of different approaches. Queensland has introduced a similar requirement in the 2011 Coastal Plan for 'Coastal Adaptation Strategies', to be prepared for each local government (none are yet started). The equivalent step for flood management is, in effect, missing in Queensland. I acknowledge it is, in part, carried out as part of the plan making process in a more modest format. However, I recommend consideration be given to a separate study obligation with formalised baseline requirements.
    c) The planning scheme provisions are then drafted following the recommendations of the Coastal Management Plan. This equates to the planning scheme preparation process in Queensland.

(e) Implications Upon My Recommended Approach

22. The recommendations in my report are changed by the findings of the expert panel in three respects:
    a) the addition of the 'Interim Flood Investigation Area' category (referred to above) to Table 3, as an optional category where existing AEP mapping is used. This category should not alter level of assessment;
    b) the addition of a mandatory requirement for additional AEP probability categories to be included as information only, if they are available, where existing AEP mapping is otherwise used. This mandatory requirement reflects the emphasis the expert panel made upon the need to take into account the 'full probability domain';
    c) the addition of a recommendation for detailed guidance to be provided to local government for plan-making and decision-making in flood affected areas. The guidance must be based upon the risk analysis and management approach

recommended by the expert panel. This is likely to be best achieved via an obligation to prepare a Flood Management Planning Study, between the AEP study which generates the AEP flood events (and hazard levels etc) and the drafting of the planning scheme provisions.

If you have any queries please contact me on (07) 3221 8833.

Yours faithfully,
HUMPHREYS REYNOLDS PERKINS
PLANNING CONSULTANTS

[redacted]

STEVE REYNOLDS