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DECISION OF THE BRISBANE CITY COUNCIL

ESTABLISHMENT AND CO-ORDINATION Committee's Recommendation of 24 November 2003

Presented to Council: **2 DECEMBER 2003; and ADOPTED**

J **SETTING OF FLOOD DEVELOPMENT LEVELS AND ADOPTION OF NEW FLOOD MEASUREMENT STANDARDS**
295/10/10

82. The Divisional Manager, Urban Management Division, provides the following background information in relation to this matter.

83. Throughout this document the terminology Q100 is used. Q100 refers to the flow that has a one in one hundred chance of being exceeded in any year. Q100 is equivalent to the 100 year Average Recurrence Interval (100 year ARI) terminology used in some publications. As the flow varies along the river, the flow is related to a reference point. For the present purpose Q100 refers to the flow in the river at the Brisbane Port Office gauge, which is near the corner of Edward and Alice Streets.

84. Administrative Policy No. AP065 – *Erection of Dwellings in Flood Prone Areas* was adopted by the Establishment and Co-ordination Committee on 30 October 1978, and still applies. This policy states that flood levels are a basis for recommending habitable floor levels of dwellings erected in areas prone to Brisbane River flooding, and that the 3.7m Australian Height Datum (AHD) flood level at the Brisbane City Gauge applies. It is recommended that, while this standard remain the same for habitable development, the nomenclature be changed to separate this standard from the standard pertaining to other structures requiring Q100 information as part of the design process, eg. pontoons.

85. In 1984, a Brisbane City Council (BCC) study determined that Q100 = 6,800 cumecs (m^3/sec), which corresponds to 3.7m AHD at the Brisbane Port Office. A committee comprising representatives from BCC and State Government signed off on this flow in November 1984.

86. A graph is used to determine flood levels along the length of the river corresponding to the 3.7m AHD level at the Brisbane Port Office gauge. The graph was prepared in 1988, and has been used ever since to set development levels along the river. It is proposed that the levels interpreted from this graph continue to be used for development purposes.

87. Work undertaken by the State Government in the 1990s, indicated that the Q100 flow in the river might have been higher than the 6,800 cumecs estimated in the 1980s.

88. In November 1996, BCC commissioned Sinclair Knight Merz (SKM) to undertake a study of flood flows in the Brisbane River. One of the outputs of that report was an estimation of the Q100 flow. Following is a chronology of the work undertaken since then:

- 1998 February – Draft SKM Report
- 1998 December - Peer review by Professor Mein
- 1999 June and December - City Design's Draft Reports
- 2000 October – Review of issues and progress by stakeholders. The Department of Natural Resources (DNR) committed to provide information on Areal Reduction Factors (ARF) within a few months

- 2003 June – the Department of Natural Resources and Mines (DNRM) produces draft results with Areal Reduction Factors and estimated a Q100 flow of 6,000-7,000 cumecs at the Brisbane Port Office

- 2003 July and August – SKM and City Design undertake rainfall and flow analysis using the latest DNRM information

- 2003 September – Independent expert panel completes its review into the Q100 flow and level at the Brisbane Port Office gauge

89. The expert panel determined that the plausible range for the Q100 flow in the Brisbane River is 5,000 to 7,000 cumecs, corresponding to levels of 2.8 to 3.8 m AHD respectively. Thus the current Q100 of 6,800 cumecs is within the plausible range.

90. The expert panel's best estimate is that Q100 is 6,000 cumecs. This corresponds to 3.3m AHD at the Brisbane Port Office Gauge. The panel advised that the best estimate of Q100 and the corresponding flood level at the Brisbane Port Office provide sufficient basis for a decision on whether the currently adopted flood levels are broadly acceptable.

91. Currently, flood immunity levels adjacent to the Brisbane River are based on 3.7m AHD at the Brisbane Port Office, which is equivalent to 6,800 cumecs. On the basis that this level is within the plausible range determined by the expert panel, and given the uncertainty in estimation of flows and corresponding flood levels, climate variability and the accuracy of prediction methods, it is appropriate to maintain the existing flood immunity levels for development purposes.

92. The following is a history of habitable floor levels in residential developments adjacent to the river:

Year	**Standard for Habitable Floor**
1992	Q100
1997 approximately	Q100 + 525 mm
2000 City Plan House Code and Subdivision and Development Guidelines	Q100 + 500 mm

93. The Subdivision and Development Guidelines are read in conjunction with City Plan. Section 2.0 of the Guidelines titled "Flood Affected Land" tabulates Minimum Flood Immunity Levels for developments (eg. development level for habitable floors = 100year ARI+0.5m {= Q100 + 500mm}).

94. The National Floodplain Management Manual 2000 introduces the concept of a Defined Flood Level (DFL). The DFL is set by the relevant agency (in this case BCC) and can correspond to the Q100 level, or some other flow level set by the agency. In some jurisdictions development levels are set based on an historic flood event. It is proposed that Q100 be replaced with DFL along the Brisbane River. Further, it is proposed that the DFL be based on the level that has been used for setting development levels on the river for at least the past 15 years, ie. 3.7m AHD at the Brisbane Port Office, which corresponds to a flow of 6,800 cumecs at that location.

95. The following Attachments are submitted:

- "B" - a graph showing the proposed Defined Flood Level along the Brisbane River and how it relates to the new Q100;

- "C" - the draft wording of proposed revised Policy AP065;

- "D" - the proposed change to table 1 of the Brisbane City Plan House Code; and

- "E" - the proposed amendments to the relevant tables B2.2.1 and B2.2.2 from the Subdivision and Development Guidelines.

96. If approved, the proposed changes to Brisbane City Plan 2000 will be sent to the Minister for a first state interest check and for authority to publicly consult on the proposed amendments.

Implications of Proposal

97. Implications include:

- Current development levels adjacent to the Brisbane River remain unchanged – consistent approach in maintaining development levels based on estimated flood levels;
- The terminology in Policy AP065, the Minimum Immunity Levels tables from the Subdivision and Development Guidelines and the City Plan will need to be changed to include Defined Flood Level (DFL). For example, the flood immunity level for a habitable floor constructed adjacent to the Brisbane Port Office:
  - Current House Code: 100 year ARI + 500 mm (= 3.7+0.5m AHD)
  - Proposed amendment to House Code: DFL + 500 mm (= 3.7+0.5m AHD);
- Administrative Policy AP065 "Erection of Dwellings in Flood Prone Areas" will need to be updated to indicate the same basic intent but clarify terminology; and
- The estimated Q100 has decreased from 6,800 cumecs to 6,000 cumecs, so the likelihood of flooding at properties adjacent to the river has decreased as a result of the recent study (ie. those properties will now be slightly less likely to flood than previously estimated).

Customer Impact

98. By adopting the recommendations in this submission, there will not be any changes to design flood levels on the river for development impacted by City Plan. The level that customers receive corresponding to the 100 year ARI prior to this submission will be the same as the DFL that they will receive if this submission is approved. The changes will only be to the terminology. Changes will be made to the City Plan and associated documents using the standard amendment process, which takes up to two years. In the interim, the terminology used in the existing documents will be used.

99. The Divisional Manager therefore submits the following draft resolution, with which the Committee concurs.

100. **RECOMMENDATION:**

THAT IT BE RESOLVED THAT –

(i) As:

(a) Council has now received definitive and reliable advice from an expert panel on the appropriate Q100 flow and level at the Brisbane Port Office Gauge;

(b) on the basis of that advice, it is appropriate that Council reconsider its published position in relation to Brisbane River Flood Levels;

(c) the expert panel's estimate of the Q100 flow at the Brisbane Port Office Gauge is in the range of 5,000 to 7,000 cumecs with a best estimate of 6,000 cumecs;

(d) this range indicates that the current adopted flood immunity level of 3.7m AHD (based on 6,800 cumecs) at the Brisbane Port Office Gauge is still the most appropriate level;

(e) current best practice indicates the adoption of a new measurement standard called the "Defined Flood Level" in the addition to 100 year ARI (Q100) flow methodology;

THEN COUNCIL:

(1) **ADOPTS THE EXPERT PANEL'S BEST ESTIMATE OF THE NEW Q100 FLOW AT THE BRISBANE PORT OFFICE GAUGE TO BE 6,000 CUMECS;**

(2) **DETERMINES THAT THE CURRENT ADOPTED FLOOD IMMUNITY LEVEL OF 3.7m AHD AT THE BRISBANE PORT OFFICE GAUGE IS STILL THE MOST APPROPRIATE LEVEL;**

(3) **DETERMINES** as a consequence of (1) and (2) **THAT THERE IS NO NEED TO CHANGE CURRENT DEVELOPMENT LEVELS FOR PROPERTIES ADJACENT TO THE BRISBANE RIVER;**

(4) **DETERMINES THAT IN FUTURE, THE FLOOD LEVEL USED TO SET DEVELOPMENT LEVELS FOR PROPERTIES ADJACENT TO THE BRISBANE RIVER BE DETERMINED BY THE "DEFINED FLOOD LEVEL" AS SET BY COUNCIL;**

(5) **DETERMINES THAT THE CURRENT DEFINED FLOOD LEVEL BE SET AT 3.7m AHD AT THE BRISBANE PORT OFFICE GAUGE;**

(6) **DETERMINES THAT ADMINISTRATIVE POLICY AP 065, ERECTION OF DWELLINGS IN FLOOD PRONE AREAS, BE RESCINDED AND REPLACED WITH THE DRAFT POLICY AP065** submitted at Attachment "C";

(7) **DETERMINES THAT THE SUBDIVISION AND DEVELOPMENT GUIDELINES BE AMENDED** as set out in Attachment "E" submitted;

(8) **RESOLVES THAT** that pursuant to the requirements of Section 1(1) of Schedule 1 of the *Integrated Planning Act 1997* (IPA), **COUNCIL PROPOSES TO PREPARE AMENDMENTS TO BRISBANE CITY PLAN 2000 TO AMEND HOUSE FLOOD IMMUNITY LEVELS IN THE HOUSE CODE;**

(9) **RESOLVES THAT** pursuant to Section 9(2) of Schedule 1 of IPA, **COUNCIL PROPOSES AMENDMENTS TO THE PLANNING SCHEME TO CHANGE THE HOUSE CODE** as set out in Attachment "D" submitted;

(10) directs that action be taken, pursuant to Section 9(3) of Schedule 1 of IPA, and that the Minister be given a copy of the proposed amendments for consideration of State interests.

24/11 – 4K 3

295/10/10

X.REF

INFORMATION MANAGEMENT

A03/35282

1.0 FILE NUMBER 295/10/10

SUBMISSION TO THE ESTABLISHMENT AND CO-ORDINATION COMMITTEE

2.0 TITLE

Setting of Flood Development levels and adoption of new Flood Measurement Standards.

3.0 ISSUE / PURPOSE

To recommend to Council that:-

(a) existing flood development levels be retained;
(b) it adopt a new 100 year ARI (Q100) flow at the Brisbane Port Office;
(c) to set the Defined Flood Level (DFL) for development adjacent to the Brisbane River;
(d) to authorise appropriate amendments to City Plan and other relevant policies and guidelines.

4.0 PROPONENT

Michael Kerry, Divisional Manager, Urban Management Division
~~Barry Ball, Manager Water Resources Branch, Urban Management Division~~

5.0 SUBMISSION PREPARED BY

(PWPOFM)

Gavin Blakey, Principal Officer Water Resources Branch, Urban Management Division

6.0 DATE

APPROVED

24 NOV 2003

24 November 2003

7.0 FOR E&C APPROVAL OR RECOMMENDATION TO COUNCIL ?

[redacted]

For recommendation to Council

Lord Mayor

8.0 IF FOR RECOMMENDATION TO COUNCIL, IS A COUNCIL RESOLUTION REQUIRED UNDER AN ACT OR ORDINANCE ?

Yes. Schedule 1 of the Integrated Planning Act 1997.

9.0 RECOMMENDATION

RECEIVED

That Council resolve as per draft resolution Attachment "A". 24 NOV 2003

COMMITTEE SECTION

10.0 DIVISIONAL MANAGER

[redacted]

Michael Kerry
Divisional Manager
URBAN MANAGEMENT

I Recommend Accordingly

[redacted]

CHIEF EXECUTIVE OFFICER

11.0 BACKGROUND

Throughout this document the terminology Q100 is used. Q100 refers to the flow that has a 1 in 100 chance of being exceeded in any year. Q100 is equivalent to the 100 year Average Recurrence Interval (100 year ARI) terminology used in some publications. As the flow varies along the river we relate the flow to a reference point. For the present purpose Q100 refers to the flow in the river at the Brisbane Port Office gauge which is near the near corner of Edward and Alice Streets.

Administrative Policy No. AP065 – *Erection of Dwellings in Flood Prone Areas* was adopted by E&C on 30/10/78 and still applies. This policy states that flood levels are a basis for recommending habitable floor levels of dwellings erected in areas prone to Brisbane River flooding, and that the 3.7m AHD flood level at the Brisbane City Gauge applies. It is recommended that, while this standard remain the same for habitable development, the nomenclature be changed to separate this standard from the standard pertaining to other structures requiring Q100 information as part of the design process eg pontoons.

In 1984 a BCC study determined that Q100 = 6,800 cumecs (m^3/sec) which corresponds to 3.7m AHD at the Brisbane Port Office. A committee comprising representatives from BCC and State Government signed off on this flow in November 1984.

A graph is used to determine flood levels along the length of the river corresponding to the 3.7m AHD level at the Brisbane Port Office gauge. The graph was prepared in 1988 and has been used ever since to set development levels along the river. It is proposed that the levels interpreted from this graph continue to be used for development purposes.

Work undertaken by State Government in the 1990's indicated that the Q100 flow in the river might have been higher than the 6,800 cumecs estimated in the 1980's.

In November 1996 BCC commissioned Sinclair Knight Merz to undertake a study of flood flows in the Brisbane River. One of the outputs of that report was an estimation of the Q100 flow. Following is a chronology of the work undertaken since then:

- 1998 February –Draft SKM Report
- 1998 December - Peer review by Professor Mein
- 1999 June and December - City Design's Draft Reports
- 2000 October – Review of issues and progress by stakeholders. DNR committed to provide information on Areal Reduction Factors (ARF) within a few months
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- 2003 July and August –SKM and City Design undertake rainfall and flow analysis using the latest DNRM information
- 2003 September – Independent expert panel completes its review into the Q100 flow and level at the Brisbane Port Office gauge

The expert panel determined that the plausible range for the Q100 flow in the Brisbane River is 5,000 to 7,000 cumecs, corresponding to levels of 2.8 to 3.8 m AHD respectively. Thus the current Q100 of 6,800 cumecs is within the plausible range.

The expert panel's best estimate is that Q100 is 6,000 cumecs. This corresponds to 3.3m AHD at the Brisbane Port Office Gauge. The panel advised that the best estimate of Q100 and the corresponding flood level at the Brisbane Port Office provide sufficient basis for a decision on whether the currently adopted flood levels are broadly acceptable.

Currently flood immunity levels adjacent to the Brisbane River are based on 3.7m AHD at the Brisbane Port Office, which is equivalent to 6,800 cumecs. On the basis that this level is within the plausible range determined by the expert panel, and given the uncertainty in estimation of flows and corresponding flood levels, climate variability and the accuracy of prediction methods it is appropriate to maintain the existing flood immunity levels for development purposes.

The following is a history of habitable floor levels in residential developments adjacent to the river:

Year	Standard for Habitable Floor
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The Subdivision and Development Guidelines are read in conjunction with City Plan. Section 2.0 of the Guidelines titled "Flood Affected Land" tabulates Minimum Flood Immunity Levels for developments (eg development level for habitable floors = 100year ARI+0.5m (= Q100 + 500mm))

The National Floodplain Management Manual 2000 introduces the concept of a Defined Flood Level (DFL). The DFL is set by the relevant agency (in this case BCC) and can correspond to the Q100 level, or some other flow level set by the agency. In some jurisdictions development levels are set based on an historic flood event. It is proposed that Q100 be replaced with DFL along the Brisbane River. Further, it is proposed that the DFL be based on the level that has been used for setting development levels on the river for at least the past 15 years, ie 3.7m AHD at the Brisbane Port Office, which corresponds to a flow of 6,800 cumecs at that location.

Attached are:

"B" a graph showing the proposed Defined Flood Level along the Brisbane River and how it relates to the new Q100.
"C" the draft wording of proposed revised Policy AP065
"D" the proposed change to table 1 of the Brisbane City Plan House Code
"E" the proposed amendments to the relevant tables B2.2.1 and B2.2.2 from the Subdivision and Development Guidelines

If approved the proposed changes to City Plan 2000 will be sent to the Minister for a first state interest check and for authority to publicly consult on the proposed amendments.

12.0 CONSULTATION

The following have been consulted in the preparation of this submission:

- David Askern: Manager Brisbane City Legal Practice
- Juergen Hanisch: Strategic Planning/Project Manager City Planning
- Don Carroll: Group Manager Water and Environment City Design
- Len Purdie: Team Leader Team 6 Development Assessment

13.0 IMPLICATIONS OF PROPOSAL

Implications include:

- Current development levels adjacent to the Brisbane River remain unchanged – consistent approach in maintaining development levels based on estimated flood levels.
- The terminology in Policy AP065, the Minimum Immunity Levels tables from the Subdivision and Development Guidelines and the City Plan will need to be changed to include Defined Flood Level (DFL). For example the flood immunity level for a habitable floor constructed adjacent to the Brisbane Port Office:
    - Current House Code: 100 year ARI + 500 mm (= 3.7+0.5m AHD)
    - Proposed amendment to House Code: DFL + 500 mm (= 3.7+0.5m AHD)
- Administrative Policy AP065 "Erection of Dwellings in Flood Prone Areas" will need to be updated to indicate the same basic intent but clarify terminology
- The estimated Q100 has decreased from 6,800 cumecs to 6,000 cumecs, so the likelihood of flooding at properties adjacent to the river has decreased as a result of the recent study (ie those properties will now be slightly less likely to flood than previously estimated).

14.0 CORPORATE PLAN IMPACT

Nil

15.0 CUSTOMER IMPACT

By adopting the recommendations in this submission there won't be any changes to design flood levels on the river for development impacted by City Plan. The level that customers receive corresponding to the 100 year ARI prior to this E&C Submission will be the same as the DFL that they will receive if this submission is approved. The changes will only be to the terminology. Changes will be made to the City Plan and associated documents using the standard amendment process – which takes up to two years. In the interim, the terminology used in the existing documents will be used.

16.0 ENVIRONMENTAL IMPACT

Nil

17.0 POLICY IMPACT

It will be necessary to amend Policy No. AP065, Table 1 of the House Code of City Plan and Tables B2.2.1 and B2.2.2 of the Subdivision and Development Guidelines to reflect this E&C decision.

18.0 FINANCIAL IMPACT

Nil.

19.0 HUMAN RESOURCE IMPACT

Nil

20.0 URGENCY

Within normal course of business.

21.0 PUBLICITY / MARKETING STRATEGY

There has already been publicity for the river flooding issues and meetings held with key groups. Further presentations will be programmed after acceptance of this policy.

22.0 OPTIONS

1. Adopt a Defined Flood Level for the Brisbane River based on the flood profile corresponding to 3.7m AHD at the Brisbane Port Office gauge (located adjacent to the corner of Alice and Edward Streets) and amend terminology in the Subdivision and Development Guidelines accordingly. Accept the expert panel's best estimate that Q100 = 6,000 cumecs at the Brisbane Port Office gauge.

2. Base the Defined Flood Levels on Q100 = 6,000 cumecs (3.3m AHD at the Brisbane Port Office gauge). This does not make provision for climate variation.

3. Don't adopt Q100 = 6,000 cumecs and maintain the existing flows and levels, ie Q100 = 6,800 cumecs (3.7m AHD at Brisbane Port Office gauge) together with City Plan and Policy 065. This is inconsistent with the expert panel's recommendation.

Option 1 is the recommended option.

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Attachment "A"

DRAFT RESOLUTION TO SET FLOOD DEVELOPMENT LEVELS AND TO ADOPT NEW FLOOD MEASUREMENT STANDARDS.

[Recommendation: that Council resolve that:- **]**
[Resolution: that:- **]**

1. As:-

(a) Council has now received definitive and reliable advice from an expert panel on the appropriate Q100 flow and level at the Brisbane Port Office Gauge;

(b) on the basis of that advice, it is appropriate that Council reconsider its published position in relation to Brisbane River Flood Levels;

(c) the expert panel's estimate of the Q100 flow at the Brisbane Port Office Gauge is in the range of 5,000 to 7,000 cumecs with a best estimate of 6000 cumecs;

(d) this range indicates that the current adopted flood immunity level of 3.7AHD (based on 6,800 cumecs) at the Brisbane Port Office Gauge is still the most appropriate level;

(e) current best practice indicates the adoption of a new measurement standard called the "Defined Flood Level" in the addition to 100 year ARI (Q100) flow methodology;

then:-

(i) adopts the expert panels best estimate of the new Q100 flow at the Brisbane Port Office gauge to be 6,000 cumecs;

(ii) determines that that the current adopted flood immunity level of 3.7AHD at the Brisbane Port Office Gauge is still the most appropriate level;

(iii) determines as a consequence of (i) and (ii) that there is no need to change current development levels for properties adjacent to the Brisbane River;

(iv) determines that in future the flood level used set development levels for properties adjacent to the Brisbane River be determined by the "Defined Flood Level" as set by Council;

(v) that the current Defined Flood Level be set at 3.7AHD at the Brisbane Port Office Gauge;

(vi) that Administrative Policy AP 065 Erection of Dwellings in Flood Prone Areas be rescinded and replaced with the draft Policy AP065 at Attachment "C";

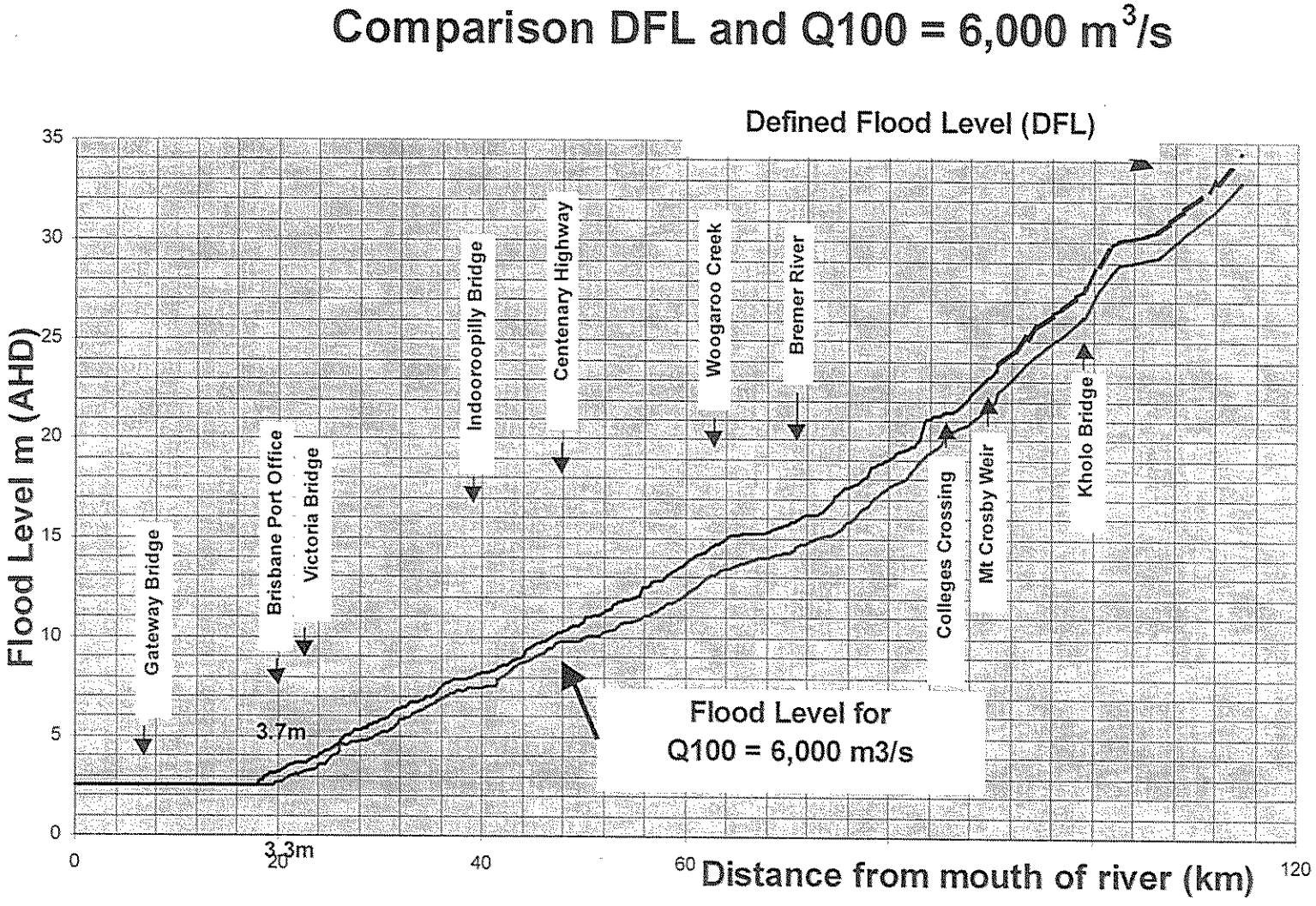
(vii) that the Subdivision and Development Guidelines be amended as set out in Attachment "E";

(viii) that pursuant to the requirements of Section 1(1) of Schedule 1 of the Integrated Planning Act 1997 ("IPA"), Council proposes to prepare amendments to Brisbane City Plan 2000 to amend House Flood Immunity Levels in the House Code;

(ix) that pursuant to Section 9(2) of Schedule 1 of IPA, Council proposes amendments to the Planning Scheme to change the House Code as set out in Attachment "D";

(x) Council directs that action be taken, pursuant to Section 9(3) of Schedule 1 of IPA. And give the Minister a copy of the proposed amendments for consideration of state interests.

Attachment B: Proposed Defined Flood Level along the Brisbane River



Attachment C.

Draft Council Policy AP065 Erection of Dwellings in Flood Prone Areas

AP065 Erection of Dwellings in Areas Prone to Brisbane River Flooding

Overview

Flooding levels relevant to determining habitable floor levels in areas liable to Brisbane River flooding and standards of flood immunity.

Policy

In determining habitable floor levels the 3.7m AHD level at the Brisbane City Gauge is to be used from the river flood profiles derived in 1988.

That level constitute the "Defined Flood Level".

The 100 year Average Recurrence Interval (Q100) flow for the Brisbane Rive at the Brisbane Port Office Gauge is 6,000 cumecs.

Authority

E&C 24/11/2003

Further Assistance

Principal Waterways Program Officer Flood Management Stormwater, Water Resources, Urban Management Division.

Related Information

File 223/1/18
Local Government Act (as amended) Part X1, Section 37(10)

See policies -

AP074 Flood Management for Flood Plain Management

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Attachment D
Amendment to Brisbane City Plan 2000

That Table 1 of Brisbane City Plan 2000 House Code Table 1 be replaced with the following:-

Brisbane City Plan 2000 House Code Table 1: House Immunity Levels

Type of Flooding	Minimum Ground Level for House Pad after filling (where permitted)	Habitable Floor level	Non-habitable Areas (ie. Utility areas, garage, laundry and storage room)
Brisbane River	Defined Flood Level + 300mm	Defined Flood Level + 500mm	50 year ARI + 300mm
Creek or waterway	100 year ARI + 300mm	100 year ARI + 500mm	100 year ARI + 300mm
Localised Overland flowpath or designed open channel	50 year ARI + 300mm	50 year ARI + 500mm	50 year ARI + 300mm
Storm surge	100 year ARI + 300mm	100 year ARI + 500mm	100 year ARI + 300mm

'ARI' means Average Recurrence Interval and is defined in the definitions.
'Defined Flood Level' means The flood level associated with the flood event selected for the management of flood hazard.

Note:
Where subject to more than one type of flooding the highest immunity level as determined for each case applies.

Attachment E

Amendments to the Subdivision and Development Guidelines Chapter 2

Replace tables B2.2.1 and B2.2.2 with the following:

TABLE B2.2.1
MINIMUM FLOOD IMMUNITY LEVELS FOR
RESIDENTIAL DEVELOPMENTS

Flooding Type (Note 1)	Minimum Design Levels (mAHD)			
	Conventional Subdivision	Existing Lot & Redevelopment/ Infill Development		
	Allotment Fill	Habitable Floor	Non-Habitable Areas (Note 2)	Carparking (Note 3)
Brisbane River	Defined Flood Level + 0.3m	Defined Flood Level + 0.5m	Defined Flood Level + 0.3m	20y ARI
Creek or Waterway	100y ARI + 0.3m	100y ARI + 0.5m	100y ARI + 0.3m	100y ARI
Localised Overland Flow Path	50y ARI + 0.3m	50y ARI + 0.5m	50y ARI + 0.3m	50y ARI
Designed Open Channel	50y ARI + 0.3m	50y ARI + 0.5m	50y ARI + 0.3m	50y ARI
Storm Surge (Note 4)	100y ARI + 0.3m	100y ARI + 0.5m	100y ARI + 0.3m	100y ARI

TABLE B2.2.2
MINIMUM FLOOD IMMUNITY LEVELS FOR
INDUSTRIAL/COMMERCIAL DEVELOPMENTS

Flooding Type (Note 1)	Minimum Design Levels (mAHD)			
	Conventional Subdivision	Existing Lot & Redevelopment/ Infill Development		
	Allotment Fill	Habitable Floor (if applicable)	Non-Habitable Areas (Note 2)	Carparking (Note 3)
Brisbane River	Defined Flood Level	Defined Flood Level + 0.5m	Defined Flood Level	20y ARI
Creek or Waterway	100y ARI	100y ARI + 0.5m	100y ARI	100y ARI
Localised Overland Flow Path	50y ARI	50y ARI + 0.5m	50y ARI	50y ARI
Designed Open Channel	50y ARI	50y ARI + 0.5m	50y ARI	50y ARI
Storm Surge (Note 4)	100y ARI	100y ARI + 0.5m	100y ARI	100y ARI